

Development of Floriculture Information System in West Bengal: A SWOC Analysis

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at Jadavpur University*

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Dedicated to:-

My beloved parents,

Sri Kalipada Mondal & Smt. Sandhya Mondal

&

My beloved husband,

Mr. Sabyasachi Haldar

CERTIFICATE

Certified that the thesis entitled "**DEVELOPMENT OF FLORICULTRUE INFORMATION SYSTEM IN WEST BENGAL: A SWOC ANALYSIS**" submitted by me for the award of the Degree of Doctor of Philosophy in Arts at Jadavpur University is based upon my work carried out under the supervision of Dr. Krishnapada Majumder, Retired Professor, Department of Library and Information Science, Jadavpur University, West Bengal, India. And that neither this thesis nor any part of it has been submitted before for any degree or diploma anywhere / elsewhere.

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PREFACE

West Bengal is one of the important flower producing state among the different flower producing states in India. There is no denying fact that floriculture generates huge earning opportunity and employment to floriculture community in West Bengal.

For smooth running of every sector timely information is very essential, because without proper information survival and growth of any community is not possible. Information is a very powerful tool to satisfy the needs and requirements of every community, if information is used in timely manner, it can create a huge impact on a state as well as in a country' economy. For this reason, to make floriculture community more knowledgeable and information enriched, a well developed Floriculture Information System has needed.

The study is mainly focused on the identification and analyzation of different components of existing Floriculture Information System, there availability, to understand how they work, different problems associated with the system by SWOC analysis. To improve the performances of the system necessary proposal are suggested in this study.

The research work “Development of Floriculture Information System in West Bengal: A SWOC Analysis” is presented in eight chapters with a list of tables, a list of figures and a list of abbreviations.

Chapter 1- focuses on the background of Floriculture Information System, Objectives of the study, Statement of the problems, Scope of the study, Significance of the study, Limitations of the study and Plan of the study.

Chapter 2 - provides the review of the related literature in West Bengal, India and outside of India related to the present work. Reviews are arranged in the order of Global Prospects of Floriculture, Prospects of Floriculture in India, Prospects of Floriculture in West Bengal, Role of Agricultural Information Centre and System, Components of Agricultural Information System including Agricultural Extension Service and Application of Information Communication Technology (ICT) in Agriculture, Information Needs of Agricultural Community, Agricultural Marketing, Information and Communication Sources of Agriculture.

Chapter 3 - discusses about the research methods adapted to selecting the areas under the study, the sample flower growers, the flower sellers from the selected flower markets, and the organizations related to the study, those are used for analyzing the data to achieve the objectives of the study.

Chapter 4 - highlights the overview of floriculture in West Bengal including different zones of floriculture, types of floriculture, different government initiatives of floriculture and five popular whole seller flower markets in West Bengal have been discussed.

Chapter 5 - presents the detail view of floriculture information system and its components. Collected data on Socio-economic characteristics of respondents sample growers and sellers , Respondents' perception regarding different aspects of Floriculture Information System, collaborative work flow of different components of Floriculture Information system viz., State Agricultural Universities, Krishi Vigyan Kendra, Kisan Call Centre, District Horticulture Department and Block Office and Panchayat Samiti have been discussed.

Chapter 6 - discusses about the findings collected from the different components of Floriculture Information System in West Bengal and inferences have been prepared to justify the objectives of this study.

Chapter 7 - provides the SWOC (Strength, Weakness, Opportunity and Challenge) Analysis of Floriculture Information System in West Bengal.

Chapter 8 - presents conclusion of the entire work and tries to draw some suggestions on the basis of the findings of the study, which will suggest some future scope of research related to this field.

During the survey data are collected through three structured questionnaire. These structured questionnaires are provided in annexure and lastly literatures cited for this entire work are presented in bibliographic references which have been prepared according to the American Psychological Association (APA) Style Manual (7th edition).

LIST OF TABLES

Table No.	Description	Page No.
Table 1.1	Area, Production & Productivity of flowers in different states of India	6
Table 1.2	List of Top 10 countries to whom India exports flowers	7
Table 4.1	Area, Production & Productivity of flowers in different districts of West Bengal	89
Table 4.2	Showing top 10 flower producing districts of West Bengal	90
Table 4.3	Showing productivity of the cultivated flowers in Nadia district in 2018-2019	91
Table 4.4	Showing Productivity of the main cultivated flowers in Purba Medinipur district in 2018-2019	92-93
Table 4.5	Showing Productivity of the cultivated flowers in Paschim Medinipur district in 2018-2019	94
Table 4.6	Showing Productivity of the cultivated flowers in North-24-Parganas district in 2018-2019	95
Table 4.7	Showing Productivity of the cultivated flowers in South-24-Parganas district in 2018-2019	96

Table 4.8	Showing Productivity of the cultivated flowers in Howrah district in 2018-2019	97
Table 4.9	Showing Productivity of the cultivated flowers in Darjeeling district in 2018-2019	99
Table 4.10	Showing Productivity of the cultivated flowers in Kalimpong district in 2018-2019	100
Table 4.11	Showing Productivity of the cultivated flowers in Jalpaiguri district in 2018-2019	101
Table 4.12	Showing Productivity of the cultivated flowers in Cooch Behar district in 2018-2019	102
Table 4.13	Showing list of government schemes for protected cultivation of flowers	105-108
Table 4.14	Showing schemes of floriculture under MIDH, NHM and NMNEH	109
Table 5.1	List of television programmes on floriculture by UBKV experts	144
Table 5.2	List of Talk shows on All India Radio by UBKV experts	145
Table 5.3	List of total Krishi Vigyan Kendras in West Bengal	148-149
Table 5.4	Shows the surveyed data of selected nine KVKs	150-152

Table 5.5	Shows the initiatives taken by the selected KVKs to promote floriculture	152-153
Table 5.6	List of Kisan Call Centres working in the country	157
Table 5.7	Shows the socio-economic characteristics of the respondents flower growers	168
Table 5.8	Types of flowers cultivated by the respondent flower growers	172
Table 5.9	Types of seeds/saplings used by the respondent flower growers	173
Table 5.10	Modes of flower selling by the respondents	174
Table 5.11	Purchased centre of seeds and fertilizers by the respondents	175
Table 5.12	Sources to access of floriculture related information by the respondent flower growers	176
Table 5.13	Awareness of respondents on Government Floriculture Schemes	177
Table 5.14	Usefulness of On-field Information by Government Organizations regarding Floriculture	178
Table 5.15	Showing knowledge of respondents about Kisan Call Centre and its services	180
Table 5.16	Showing knowledge of respondents about Matir Katha-Krishaker Katha App	181

Table 5.17	Showing reason to not achieve desirable position in floriculture among the states in India	181-182
Table 5.18	Shows the socio-economic characteristics of flower sellers	183
Table 5.19	Shows perceptions of flower sellers regarding existing infrastructure of floriculture	187-188
Table 5.20	Shows requirements of flower sellers for the development Floriculture Information System in West Bengal	193

LIST OF FIGURES

Figure No.	Description	Page No.
Figure 3.1	The Map of West Bengal showing the selected flower producing districts as study area.	72
Figure 3.2	Sample collection design of flower growers	73
Figure 3.3	Sample collection design of flower sellers	74
Figure 4.1	The map of West Bengal showing the main flower producing zone	87
Figure 4.2	Mallickghat Flower Market, Kolkata	112
Figure 4.3	Kolaghat Flower Market, Purba Medinipur	115
Figure 4.4	Showing the flower market and ticket of entry fee of the Dhantala Flower Market, Nadia.	118
Figure 4.5	Nokari Flower Market, Nadia	119
Figure 4.6	Thakurnagar Flower Market, North-24-Parganas	120
Figure 5.1	Components and its role of Floriculture Information System	127
Figure 5.2	On-Field Service provided by the expert of Krishi Vigyan Kendra	129
Figure 5.3	Off-Field Service provided by the expert of Kisan Call Centre	130

Figure 5.4	Diagrammatic representation of Information flow in Krishi Vigyan Kendra	147
Figure 5.6	Diagrammatic representation of information flow of Kisan Call Centre	156
Figure 5.7	Showing website of Matir Katha Portal	158
Figure 5.8	Showing website of Matir Katha Portal	159
Figure 5.9	Diagrammatic representation of information flow in Horticulture department	161
Figure 5.10	Diagrammatic representation of the process of getting financial assistance of different govt. schemes from Horticulture Department.	166
Figure 5.11	Graphical representation of percentage of age of the respondent flower growers	169
Figure 5.12	Graphical representation of percentage of educational level of the respondent flower growers	169
Figure 5.13	Graphical representation of percentage of financial status of the respondents flower growers	170
Figure 5.14	Graphical representation of percentage of experience of floriculture by the respondents flower growers	171
Figure 5.15	Graphical representation of percentage of sex of the respondents	171

	flower growers	
Figure 5.16	Graphical representation of percentage of types of flowers cultivated by the respondents flower growers	172
Figure 5.17	Graphical representation of percentage of types of seeds/saplings used by the respondents flower growers	173
Figure 5.18	Graphical representation of percentage of mode of flower selling by the respondents flower growers	174
Figure 5.19	Graphical representation of percentage of purchased centre of seeds and fertilizers by the respondents flower growers	175
Figure 5.20	Graphical representation of sources to access of floriculture related information by the respondents flower growers	176
Figure 5.21	Graphical representation of awareness of respondents about govt. schemes on floriculture	177
Figure 5.22	Graphical representation of usefulness of On-field Information by government organizations on floriculture by the respondent flower grower	179
Figure 5.23	Graphical representation of knowledge of respondents about Kisan Call Centre and its services	180
Figure 5.24	Graphical representation of knowledge of respondents about	181

Matir Katha-Krishoker Katha App

Figure 5.25	Graphical representation of the reason to not achieve desirable position in floriculture among the states in India	182
Figure 5.26	Graphical representation of age of the respondent flower sellers	184
Figure 5.27	Graphical representation of educational qualification of the respondent flower sellers	185
Figure 5.28	Graphical representation of financial status of the respondent flower sellers	186
Figure 5.29	Graphical representation of experience of flower selling of the respondent flower sellers	186
Figure 5.30	Graphical representation of availability of permanent sitting Arrangement	188
Figure 5.31	Graphical representation of types of market land area	189
Figure 5.32	Graphical representation of stability of flower market	189
Figure 5.33	Graphical representation of pay to the market land owner of the flower market	190
Figure 5.34	Graphical representation of availability of toilet facility in flower markets	190

Figure 5.35	Graphical representation of availability of shade in flower markets during rainy season	191
Figure 5.36	Graphical representation of availability of drinking water in flower markets	191
Figure 5.37	Graphical representation of availability of waste disposal area in flower markets	192
Figure 5.38	Graphical representation of availability of cold storage near flower markets	192
Figure 6.1	Unsold flowers near Thakurnagar Flower Market, North-24-Parganas	215
Figure 8.1	Documentary sources related to floriculture in regional language	242
Figure 8.2	Diagrammatic representation of work flow of proposed Floriculture Information Centre under each Panchayat Samiti	244
Figure 8.3	Diagrammatic representation of information flow of proposed Floriculture Information System.	245

LIST OF ABBREVIATIONS

AICC	Agricultural Information Communication Centre
APEDA	Agricultural & Processed Food Product Export Development Authority
ASSOCHAM	Associated Chambers of Commerce and Industry of India
ATARI	Agriculture Technology Application Research Institute
ATIC	Agriculture Technology Information Centre
ATMA	Agriculture Technology Management Agency
BCKV	Bidhan Chandra Krishi Viswavidyalaya
CAGR	Compound Annual Growth Rate
COFAM	Centre of Floriculture and Agri-Business Management
CeRA	Consortium for e-Resources in Agriculture
CAU	Central Agricultural University
DARE	Department of Agriculture Research Education
DEE	Directorate of Extension Education
DAO	District Agriculture Officer
DHO	District Horticulture Officer
FPI	Food Processing Industry
GIS	Geographic Information Centre
HDO	Horticulture Development Officer
IARI	Indian Agriculture Research Institute
ICAR	Indian Council of Agricultural Research
ICT	Information Communication Technology
IFFCO	Indian Farmers Fertilizer Cooperative
KCC	Kisan Call Centre
KPS	Krishi Prajukti Sahayak

KVK	Krishi Vigyan Kendra
MNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MIDH	Mission for Integrated Development of Horticulture
NABARD	National Bank for Agriculture and Rural Development
NAIP	National Agriculture Research Institute
NAM	National Agriculture Market
NARS	National Agriculture Research System
NHB	National Horticulture Board
NHM	National Horticulture Mission
SAC	Scientific Advisory Committee
SAU	State Agricultural University
SMS	Subject Matter Specialist
SWOC	Strength, Weakness, Opportunity and Challenge
UBKV	Uttar Banga Krishi Viswavidyalala

TABLE OF CONTENTS

Certificate.....	iii
Acknowledgement.....	iv-v
Preface.....	vi-viii
List of Tables.....	ix-xii
List of Figures.....	xiii-xvii
List of Abbreviations.....	xviii-xix
CHAPTER- 1	1-19
INTRODUCTION	
1.1 Background.....	2-9
1.2 Significance of the study.....	10
1.3 Objectives of the study.....	11
1.4 Statement of the Problem.....	11-12
1.5 Scope of the study.....	12-15
1.6 Limitations of the study.....	15
1.7 Plan of the study.....	16-17
References.....	18-19

CHAPTER-2	20-66
------------------------	--------------

REVIEW OF RELATED LITERETURE

2.1 Introduction.....	21
2.2 Global Prospects of Floriculture.....	22-24
2.3 Prospects of Floriculture in India.....	24-27
2.4 Prospects of Floriculture in West Bengal.....	27-35
2.5 Role of Agricultural Information Centre and System.....	36-38
2.6 Components of Agricultural Information System.....	39-48
2.6.1 Agricultural Extension Service and Application of Information Communication Technology (ICT) in Agriculture.....	39-43
2.6.2 Information Needs of Agricultural Community.....	43-44
2.6.3 Agricultural Marketing.....	45-46
2.6.4 Information and Communication Sources of Agriculture.....	46-48
References.....	48-66

CHAPTER-3	67-83
------------------------	--------------

METHODOLOGY

3.1 Introduction.....	68
3.2 Research Design.....	68-69
3.3 Sampling	69-74
3.4 Sources of Data.....	75

3.5 Data Collection Methods.....	75-78
3.5.1 Questionnaire Method.....	76-77
3.5.2 Interview Method.....	77-78
3.5.3 Observation Method.....	78
3.6 Data Analysis.....	78-79
3.7 Referencing Style.....	79-83
References.....	83

CHAPTER-4.....84-123

FLORICULTURE IN WEST BENGAL: AN OVERVIEW

4.1 Introduction.....	85-89
4.2 Flower producing zones in West Bengal	89-103
4.3 Government initiatives in the field of Floriculture in West Bengal.....	103-109
4.4 Popular flower markets, marketing system and related issues in.....	110-121
West Bengal	
References.....	121-123

CHAPTER-5.....124-196

FLORICULTURE INFORMATION SYSTEM AND ROLE OF ITS COMPONENTS IN WEST BENGAL

5.1 Introduction.....	125-127
5.2 Role of different components of Floriculture Information System.....	127-194

5.2.1 Component-I: Research & Education related to floriculture	
in West Bengal.....	130-145
5.2.1.1 Role of Bidhan Chandra Krishi Viswavidyalaya (BCKV)	
to promote floriculture in West Bengal.....	138-142
5.2.1.2 Role of Uttar Banga Krishi Viswavidyalaya (UBKV) to	
promote floriculture in West Bengal.....	142-144
5.2.2 Component-II: Extension services related to floriculture	
in West Bengal.....	145-166
5.2.2.1 Role of Krishi Vigyak Kendra (KVK) to promote floriculture in	
West Bengal.....	145-153
5.2.2.2 Role of Kisan Call Centre (KCC) and Matir Katha Portal	
to promote floriculture in West Bengal.....	153-160
5.2.2.3 Collaborative role of Directorate of Horticulture, Block Office	
and Panchayat Samiti to promote floriculture in West Bengal.....	160-166
5.2.3 Component-III: Farmers (Flower Growers and Flower Sellers) in	
West Bengal.....	167-194
5.2.3.1 Socio-economic characteristics of respondent flower growers	
in West Bengal.....	167-171

5.2.3.2 Respondent flower growers' perception regarding Floriculture Information System in West Bengal.....	172-178
5.2.3.3 Usefulness of on-field information by the government organizations regarding floriculture.....	178- 179
5.2.3.4 Usefulness of off-field information by the government organizations regarding floriculture.....	180-182
5.2.3.5 Socio-economic characteristics of respondent flower sellers in West Bengal.....	183-187
5.2.3.6 Perception of flower sellers regarding existing infrastructure of floriculture in West Bengal.....	187-193
5.2.3.7 Requirements of respondents flower sellers for the development of Floriculture Information System in West Bengal.....	193-194
References.....	195-196
CHAPTER-6.....	197-217
FINDINGS & DISCUSSIONS	
6.1 Introduction.....	198
6.2 Findings of Component-I: Research & Education related to floriculture in West Bengal.....	198-200
6.3 Findings of Component-II: Extension services related to floriculture in West Bengal.....	201-202

6.4 Findings of Component-III: Farmers (Flower Growers and Flower Sellers)....	202-217
References.....	217
CHAPTER-7	218-234
SWOC (STRENGTHS, WEAKNESSES, OPPORTUNITIES AND CHALLENGES)	
ANALYSIS OF FLORICULTURE INFORMATION SYSTEM IN WEST BENGAL	
7.1 Introduction	219-221
7.2 Strengths of Floriculture Information System of West Bengal.....	221-223
7.3 Weaknesses of Floriculture Information System of West Bengal.....	223-228
7.4 Opportunities of Floriculture Information System of West Bengal.....	228-230
7.5 Challenges of Floriculture Information System of West Bengal.....	230-233
References.....	233-234
CHAPTER- 8.....	235-246
CONCLUSION & SUGGESTIONS	
8.1 Conclusion.....	236-237
8.2 Suggestions.....	238-245
References.....	246
ANNEXURES.....	247-266
BIBLIOGRAPHICAL REFERENCES.....	267-288

CHAPTER – 1

INTRODUCTION

CHAPTER – 1

INTRODUCTION

1.1 BACKGROUND

Flower is the symbol of beauty, love, purity and a medium of expression of human feelings. It is an integral part of human life for its usability in day to day life such as in social and religious purpose.

Agriculture is a broader term can be defined as cultivation of crops, including its allied sectors such as horticulture, animal husbandry, bee keeping, fish farming and poultry. Horticulture is a branch of agriculture and floriculture is a specialized sub-branch of horticulture. Horticulture is divided into three sub-branch viz. 1) cultivation of fruits are called Pomology, 2) cultivation of vegetables are called Olericulture and 3) cultivation of flowers are called Floriculture. So, floriculture can be defined as a sub-branch of horticulture which deals not only with cultivation of flowers and foliage plants but production of value added products from the flowers and also marketing of flowers and those products.

Floriculture Community: Community as “a group of people who have something common. This can be their age, education, religion, interest, political affiliation, activity, work, profession or a combination of two or more of these” (Giggey,1988)¹. People associated with floriculture are called floriculture community.

The different stake holders under floriculture community are- Government of India sponsored floriculture sector organization and institution, State Government sponsored floriculture sector organization and institution, Floriculture Research Centre, Non-government

organizations (NGOs), Flower growers or farmers, People related to flower marketing, producers of manures, fertilizers, seeds which are used in floriculture.

Global Scenario: In the global scenario, at present floriculture business is around US\$176 billion which is expanding day by day with a growth rate of 10.3 percent per annum and it is expected to reach US\$250 billion by 2025 (**Khan & Fazil, 2015**)⁷. At present, 120 countries are in large scale floriculture. According to International Trade Centre, developed continents like Europe, America and Asia accounted for more than 90% of the total world trade in floriculture products. Asia-Pacific countries are the main suppliers of floricultural products. African, Middle Eastern and other European countries are the main suppliers to the Europe's main markets. Colombia and Equador dominate the market of USA.

National Scenario: Floriculture has emerged as an important agribusiness sector in India providing employment opportunities and entrepreneurship in both rural and urban areas of this country. Due to high demand of floriculture products, its emergence as a profitable agribusiness in India as well as worldwide. Commercial floriculture has developed as high-take activity taking place under the controlled environment inside green house, poly house and shade net. Modernization, western influence, government initiatives and an increased overseas demand in India has resulted in the growth of the flower industry in India. As a result, the Indian floriculture industry is now undergoing a gradual shift from a highly unorganized sector to a professionally managed industry involving both Indian as well as international corporate (**Sarkar, 2019**)⁹.

The main reason for shifting of farmers from traditional cultivation to organized floriculture is due to incremental income from export of flowers and demand for local consumption of flowers which is increasing day by day. Now in India, due to the influence of

western culture the growth in demand for flowers amongst the consumer has been increased- especially the young people-as they buy flowers on occasion like Valentine's day, friendship day etc. and apart from this, there is also a huge demand for flowers during festival, wedding season, political campaign and in corporate sectors.

In India, two types of flowers are cultivated such as loose flowers and cut flowers. Loose flowers are generally cultivated in open field, where the flowers have been exposed to both biotic and abiotic stresses. Loose flowers are offered in religious and social ceremonies and mainly in worship of god in house hold. For example-Jasmine, Marigold, Hibiscus, Sunflower, Cockscomb, Lotus, Beli, Balsam etc. and cut flowers are grown in green houses, shade houses as well as outdoor also. Environmental factors like water, temperature, light and other essential factors like manure, fertilizers are partially or entirely under strict control e.g. Orchid, Chrysanthemum, Rose, Dutch Rose, Tuberose, Gerbera, Gladiolus, Carnation, Anthurium etc.

Considering the economic, aesthetic and social values, Government of India has established floriculture as a sunrise industry and accorded it 100% export oriented status. The domestic market of India is growing at the rate of 25% per year in the country as a whole. The export of cut flowers has been increased at a rate of 4.33%. Floriculture thus, offers a great opportunity to the farmers in terms of income generation and empowerment. The floriculture development of India is depends on different factors like- different agro-climatic condition, availability of man power and large demand of floricultural products in metropolitan cities. The new and modern technology in floriculture sector can improve the production and value added products such as- dry flowers, organic colours, essential oils which have huge demand in national and international market which will increase the potentiality of floriculture community of generating gainful self employment.

According to **NHB (National Horticulture Database)**⁴ the area under floriculture production in India is 339Ha with a production of 1991 MT loose flowers and 867 MT cut flowers in 2018-19. In India, floriculture is commercially practiced in several states in which Tamil Nadu (18.20%), Andhra Pradesh (13.9%) Karnataka (11.9%), West Bengal (10.5%) and also having other flower producing states like- Madhya Pradesh, Mizoram, Gujarat, Andhra Pradesh, Orissa, Jharkhand, Haryana, Assam and Chattisgarh.

Area, Production & Productivity of flowers in India (2018-19)

Sl. No.	States/Union Territories	Flowers			
		Area (in'000 Ha)	Loose (Production in '000 MT)	Cut (Production in '000 MT)	Total Production of Flowers (Production in '000 MT)
1	Tamil Nadu	35.30	520.38	0.00	520.38
2	Andhra Pradesh	22.43	397.38	0.00	397.38
3	Karnataka	32.22	244.00	96.49	340.49
4	West Bengal	27.62	77.25	221.46	298.71
5	Chhattisgarh	12.907	49.288	185.846	235.134
6	Madhya Pradesh	17.72	203.21	10.88	214.09
7	Gujarat	22.43	152.16	0.00	152.16
8	Uttar Pradesh	21.31	46.68	65.51	112.19
9	Haryana	8.610	94.00	11.948	105.948
10	Assam	5.20	34.89	58.34	93.23
11	Maharashtra	5.485	29.08	56.99	86.07
12	Orissa	6.61	24.91	48.79	73.70
13	Kerala	53.26	0.08	44.84	44.92
14	Telangana	3.09	14.20	19.09	33.29
15	Jammu & Kashmir	49.58	29.70	0.39	30.09
16	Himachal Pradesh	0.64	12.95	10.56	23.51

17	Bihar	1.09	17.01	3.67	20.68
18	Sikkim	0.24	16.50	0.09	16.59
19	Uttarakhand	1.53	2.54	11.72	14.26
20	Punjab	2.092	13.073	0.00	13.073
21	Jharkhand	0.73	3.21	8.61	11.82
22	Nagaland	0.07	0.00	8.79	8.79
23	Rajasthan	4.00	7.50	0.00	7.50
24	Mizoram	0.26	0.00	2.37	2.37
25	Manipur	0.13	0.31	0.18	0.49
26	Meghalaya	0.01	0.00	0.02	0.02
27	Arunachal	0.00	0.00	0.00	0.00
28	Tripura	0.00	0.00	0.00	0.00
29	Others	6.83	1.10	0.516	1.616
All India Total		339.386 Ha	1991.381 MT	867.081 MT	2858.462 MT

Table 1.1: Area, Production & Productivity of flowers in different states of India

Source: National Horticulture Board (NHB) Database

According to **Agricultural & Processed Food Product Export Development Authority (ADEDA)**⁸ the country has exported 19726.57 MT of floriculture products to the world for the worth of rupees 571.38 crores /81.94 USD Millions in 2018-19. The major importing countries are United States, Netherlands, United Kingdom, Germany and United Arab Emirates. There are 300 export oriented units are present in India. More than 50% of the floriculture export unit areas are based in Karnataka, Andhra Pradesh and Tamil Nadu.

India Exported Flowers to the Top 10 Countries

(Qty In MT ; Value in Rs. Crore)

2018-19			
Sl.No.	Country	Qty of Flowers	Rs. Crore
1	U S A	4038.07	146.92
2	Netherland	1518.92	77.89
3	U K	1530.01	44.71
4	Germany	1251.71	39.39
5	U Arab Emts	1871.24	34.34
6	Canada	878.99	23.42
7	Australia	250.53	16.07
8	Italy	403.24	15.79
9	Japan	310.37	15.75
10	Malaysia	862.00	15.40

Table 1.2: List of Top 10 countries to whom India exports flowers

Source: Agricultural & Processed Food Product Export Development Authority (ADEDA)

By increasing technical collaboration with foreign companies, Indian floriculture industry is able to increase its share in world wide. Indian floriculture industry has attracted several big Indian corporate such as Reliance, ITC, Tata Group, Thapar Group etc and also overseas retailers like K-mart, Wal-mart, Sears, Sansbury. So, it can be said that India becoming a lucrative opportunity for potential investors.

Besides, the demand of the value added products of flowers such as-essential oil, organic colour and dry flowers are increasing day by day in national and international market. The contribution of India in foreign trade of aromatic compound produced from floriculture products is around Rs. 65 million which accounts for 1.6% of the world trade.

State Scenario: In India, the state West Bengal blessed with unique physiographic condition, distinctive weather and agro-climatic condition. West Bengal emerged as a flower producing state in the atlas of Indian floriculture. The strength of floriculture development in West Bengal is due to suitable agro-climatic condition, availability of man power and lastly large demand of floriculture products in national and international markets **(Bhattacharyya, 2013)⁵**. Due to this reason the state can be called as a paradise of flowers. West Bengal floriculture is comprises of both loose flowers and cut flowers.

According to **NHB (National Horticulture Board)¹⁰** Database, West Bengal ranked 4th in position as a flower producing state (10.5%), after Tamil Nadu (18.20%), Andhra Pradesh (13.9%) and Karnataka (11.9%). But West Bengal is the highest producer of cut flowers in 2018-2019 among the states in India and ranked 7th in terms of production of loose flowers. The total area under floriculture production in West Bengal is 27.62 Ha with a production of 221.64 MT cut flowers and 77.25 MT loose flowers in 2018-19.

According to ASSOCHAM (Associated Chambers of Commerce and Industry of India), it is estimated that near about 2lakh people are involved in only cut flowers production in West Bengal which is blessed with diverse agro-climatic conditions suitable for flower production **(Pratim, 2014)⁶**.

Floriculture Information System: Information is very important for each and every community, rather it can be said that Information is a very powerful tool to address the needs of any community and if it is used in right direction then it can create a huge impact on a country's economy. The term 'Information' is defined as "Information is structured data within a context that gives it meaning" **(Checkland and Holwell, 1998)²**. Information is a basic needs of human

life, therefore, it can be said that without information, survival and development of any community is not possible **(Satpathy, 2006)³**. For this reason, information is very much essential for the development of floriculture community because the overall development of the entire community is crucially depend on floriculture productivity and proper marketing.

Floriculture information can be defined as any useful information related to floriculture such as information related to floriculture resources (soil, water, and climate), inputs (labour, seed/saplings, pesticides/insecticides, and equipments), technologies for production of flowers, post-harvest management and marketing related information.

So, to increase the floriculture productivity a well developed floriculture information system is needed which will disseminate floriculture information in timely manner to the floriculture community for their overall development. “In general an Information System is accepted as a system, automated or manual, that comprises people, machines, and/or methods organized to collect, process, transmit, and disseminate data which represent information” **(Demiryurek, 2010)⁴**. Therefore, a model floriculture information system can be defined as a system in which floriculture related information is generated, consolidated, transformed, received and delivered to the target group i.e., floriculture community in their regional language according to their needs and requirements.

To evaluate and improve the performance of the existing floriculture information system there is need to identification and analyzation of the Strength, Opportunity, Weakness and Challenges (SWOC) of the existing floriculture information system and then suggestion can make for the implication of better functioning floriculture information system.

1.2 SIGNIFICANCE OF THE STUDY:

The present study is highlighting the blooming future of West Bengal as a flower producing state and importance of a well developed Floriculture Information System for the overall development floriculture community as well as the state. A SWOC (Strength, Weakness, Opportunity and Challenges) analysis of the existing Floriculture Information System is drafted to identify the existing situation of the system and how to overcome the present situation for the better future of floriculture community. This study may be useful to the policy makers and planners of the state as well as floriculture community because now-a-days floriculture offers a great opportunity to generate revenue and employment to the state. The study is mainly focused on the identification of different components of Floriculture Information System, their availability, to understand how successfully they work, different problems associated with the system, how to overcome the problem and how to improve the performances of the system. The study will provide useful data to the researcher who will want to research in this field in future. It will also help the researchers to understand the associated problems of floriculture community, existing marketing channels of flowers, existing channels of information and different communication gaps of the information channels at present in this state.

1.3 OBJECTIVES OF THE STUDY:

Keeping in view the importance of Floriculture Information System in West Bengal, the present study has been designed with the broad objectives. The main objectives of this study are as follows:

1. To study the present scenario of floriculture and information need of floriculture community in West Bengal.
2. To perform a SWOC (Strength, Weakness, Opportunities and Challenges) analysis of the existing components of floriculture based information flow.
3. To establish a strong coordination among all the existing components of floriculture based information flow for the betterment of floriculture community in West Bengal.
4. To provide a platform to the floriculture community by developing a model Floriculture Information System through SWOC Analysis for West Bengal that can extend required information support to improve their livelihood.

1.4 STATEMENT OF THE PROBLEM:

Floriculture is a highly specialized and intensive form of agriculture and an important agri-business sector recognized globally. West Bengal is bestowed with all types of agro-climatic condition and enormous genetic diversity which leads the state a big advantage in the field of floriculture. In West Bengal, floriculture is an emerging industry with very high prospects. West Bengal is the highest producer of cut flowers in 2018-2019 among the states in India Floriculture plays an important role in boosting the economy of this state as well as for this country by generating rural employment for many people. Though floriculture is one of the most profitable

sources of income and generate handsome amount of revenue in West Bengal but still this sector is facing lots of difficulties due to lack of proper infrastructure and communication gap in between different components of this system. In many times during the course of study it has been seen that floriculture related information is not properly reached to the grass root level. So, to increase the productivity and to connect all the community members of this sector through proper information and infrastructure, a well developed floriculture information system has needed. To assess and improve the lacuna of this existing Floriculture Information System, the components of this System has been identified and SWOC (Strength, Weakness, Opportunity and Challenge) analysis has been made by the intensive study for the development of this system in West Bengal.

1.5 SCOPE OF THE STUDY:

West Bengal is blessed with diverse agro-climatic condition which places the state in a very advantageous position as a flower producing state in India. A large number of people are depends on floriculture in West Bengal. There is no doubt that floriculture generates huge earning opportunity and employment to the floriculture community in West Bengal. In this context, the development of floriculture community is mostly depends on information generated by technological interventions. For this reason, to make floriculture community more knowledgeable and information enriched, a well developed Floriculture Information System is needed. The present study is focused on the development of well infrastuctured Floriculture Information System which will provides timely information to the floriculture community to solve their day to day problem related to floriculture and can improve the quality of standard of

living. The scope of present study is primarily focused on the identification of different components of Floriculture Information System, their availability, to understand how successfully they work, different problems associated with the system, how to overcome the problem and how to improve the performances of the system. To find out the existing lacuna of Floriculture Information System SWOC (Strength, Weakness, Opportunity and Challenge) analysis of the existing floriculture information system has been framed and to overcome this situation what are the preventive measures are required also discussed in this study.

In order to prepare SWOC (Strength, Weakness, Opportunity and Challenge) Analysis of Floriculture Information System in West Bengal for its development the present study primarily confines to the main components of Floriculture Information System in West Bengal viz. a) Education And Research b) Floricultural Extension Activities (Means solving the need of the farmers with resources made available through a variety of outreach programs) and c) Farmers (Flower Growers & Flower Sellers).

Therefore to investigate the above mentioned components for the SWOC (Strength, Weakness, Opportunity and Challenge) Analysis of Floriculture Information System in West Bengal the following studies have been prepared.

- a) To know the existing condition of Education and Research in the field of Floriculture in West Bengal, two State Agricultural Universities viz. 1) Bidhan Chandra Krishi Viswavidyalaya (BCKV) and 2) Uttar Banga Krishi Viswavidyalaya (UBKV) have been studied.
- b) To focus the existing condition of Research and Extension Activities in the field of Floriculture nine Krishi Vigyan Kendras (KVKs) of main flower producing district of

West Bengal have been studied viz. 1) Nadia Krishi Vigyan Kendra 2) Howrah Krishi Vigyan Kendra 3) Purba Medinipur Krishi Vigyan Kendra 4) Paschim Medinipur Krishi Vigyan Kendra 5) Nimpith Krishi Vigyan Kendra (South-24-Parganas) 6) Ashoknagar Krishi Vigyan Kendra (North-24-Parganas) 7) Coochbehar Krishi Vigyan Kendra 8) Jalpaiguri Krishi Vigyan Kendra and 9) Darjeeling Krishi Vigyan Kendra .

Apart from these to investigate the floriculture information dissemination process from the district level to the ground level, the study was conducted in District Horticulture Department, Block Development Office and Panchayat Samiti of Flower producing districts of West Bengal viz. 1) District Horticulture Department of Cooch Behar 2) Block Development Office, Mathurapur-I Block, South-24-Parganas and 3) Panchayat Samiti, Village-Bhagabatipur, Mathurapur-I Block, South-24-Parganas.

3) To highlight the existing ground reality of Farmers (Flower Producers), one of the main components of Floriculture Information System, nine main flower producing districts of West Bengal have been studied viz. 1) Nadia 2) Purba Medinipur 3) Paschim Medinipur 4) North-24-Parganas 5) South-24-Parganas 6) Howrah 7) Coochbehar 8) Jalpaiguri and 9) Darjeeling.

Apart from these five flower markets of West Bengal have been also studied to focus the existing infrastructural issues of floriculture, marketing system in West Bengal and ground reality of flower traders of West Bengal viz. 1) Mallickghat Flower Market, Howrah 2) Kolaghat Flower Market, Purba Medinipur 3) Dhantala

Flower Market, Nadia 4) Nokari Flower Market, Nadia 5) Thakurnagar Flower Market, North-24-Parganas.

1.6 LIMITATIONS OF THE STUDY:

The study is limited to the state of West Bengal and the data collected for the study is up to the year 2019. The study is purely based on some secondary and primary information which are collected from –

- Flower growers of nine main flower producing zones in West Bengal.
- Flower sellers of five popular whole seller flower markets in West Bengal.
- Nine Krishi Vigyan Kendras of main flower producing zones of this state.
- District Horticulture Offices and Block Offices and Panchayat Samiti of main flower producing zones of this state.
- State Agricultural Universities in West Bengal such as Bidhan Chandra Krishi Viswavidyalaya (BCKV) and Uttar Banga Krishi Viswavidyalaya (UBKV) and
- Department of Food Processing Industries and Horticulture to understand the existing Floriculture Information System.

1.7 PLAN OF THE STUDY

The research work “Development of Floriculture Information System in West Bengal: A SWOC Analysis” is presented in eight chapters.

Chapter 1- focuses on the background of Floriculture Information System, Objectives of the study, Statement of the problems, Scope of the study, Significance of the study and Limitations of the study and Plan of the study.

Chapter 2 - provides the review of the related literature in West Bengal, India and outside of India related to the present work. Reviews are arranged in the order of Global Prospects of Floriculture, Prospects of Floriculture in India, Prospects of Floriculture in West Bengal, Role of Agricultural Information Centre and System, Components of Agricultural Information System including Agricultural Extension Service and Application of Information Communication Technology (ICT) in Agriculture, Information Needs of Agricultural Community, Agricultural Marketing, Information and Communication Sources of Agriculture.

Chapter 3 - discusses about the research methods adapted to selecting the areas under the study, the sample flower growers, the flower sellers from the selected flower markets, and the organizations related to the study, those are used for analyzing the data to achieve the objectives of the study.

Chapter 4 - highlights the overview of floriculture in West Bengal including different zones of floriculture, types of floriculture, different government initiatives of floriculture and five popular whole seller flower markets in West Bengal have been discussed

Chapter 5 - presents the detail view of floriculture information system and its components. Collected data on Socio-economic characteristics of respondents sample growers and sellers , Respondents' Perception regarding different aspects of Floriculture Information System, collaborative work flow of different components of Floriculture Information system viz., State Agricultural Universities, Krishi Vigyan Kendra, Kisan Call Centre, District Horticulture Department and Block Agriculture Office and Panchayat Samiti have been discussed

Chapter 6 - discusses about the findings collected from the different components of Floriculture Information System in West Bengal and inferences have been prepared to justify the objectives of the study.

Chapter 7 - provides the SWOC (Strength, Weakness, Opportunity and Challenge) Analysis of Floriculture Information System of West Bengal.

Chapter 8 - presents conclusion of the entire work and tries to draw some suggestions on the basis of the findings of the study, which will suggest some future scope of research related to this field.

During the survey data are collected through three structured questionnaire. These structured questionnaires are provided in annexure and lastly literatures cited for this entire work are presented in bibliographic references which have been prepared according to the **American Psychological Association (APA) Style Manual (7th edition)**¹¹.

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CHAPTER – 2

REVIEW OF LITERATURE

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REVIEW OF LITERATURE

2.1 INTRODUCTION

A comprehensive and relevant literature review is essential for any scientific investigation. This enables the researcher to go into the deep into the works done in the past to formulate and specify the objectives of the study. This chapter deals with the review of related literature adopted from different national and international published literature on various aspect of Floriculture based Information System. The review of literature is chronologically presents under the following headings. The citations have been used in this study prepared according to APA Referencing Style Manual (7th Edition):

2.7 Global Prospects of Floriculture

2.8 Prospects of Floriculture in India.

2.9 Prospects of Floriculture in West Bengal.

2.10 Role of Agricultural Information Centre and System

2.11 Components of Agricultural Information System

2.11.1 Agricultural Extension Service and Application of Information Communication
Technology (ICT) in Agriculture.

2.11.2 Information Needs of Agricultural Community

2.11.3 Agricultural Marketing

2.11.4 Information and Communication Sources of Agriculture

2.2 GLOBAL PROSPECTS OF FLORICULTURE

Manjoor, Shahid and Baluch (2001)¹ stated that floriculture increasing the economic return in Pakistan. Though the floriculture business is in progress but it is in limited scale and expansion is needed, which required attention of policy makers to introduce some institutional reforms. Moreover, an effective extension service is needed to motivate farmers towards adoption of this enterprise.

Xia et al. (2006)² showed the continuous development of floriculture industry due to development of green house technology, advances in plant biotechnology, transportation and marketing strategies in the field of floriculture reached a historical maximum hub of activity and competitiveness. The Netherland, United States and Japan are the three most important global producers and consumers of floriculture products.

Omwenga (2007)³ revealed the competitiveness of flower industry of Kenya in the world trade market. The flower industry of Kenya dominated the flower export of Africa and Europe. The country has created a positive impact in export of flower in the world trade.

Wainwrite and Labuschangne (2009)⁴ discussed the long term growth of the floriculture industry of Kenya. The different reasons for the success of floriculture in Kenya are – favourable climatic condition with numerous variations to suit every type of flower, hard working and educated work force, economic environment that encourages the internal and external investment, an industry that willing to obtain knowledge and technical issues from external consultants, the ability to innovate rapidly and adopt new technology and the market awareness and information to develop new products.

Taylor (2010)⁵ examined the role of local and international labour in the growth of floriculture industry in Ethiopia. The study also revealed the existing Ethiopian skills in the field of floriculture and how the skills have developed over time with the involvement of universities and international institutions in the implementation of training programs.

Gudeta (2012)⁶ assessed the impact of cut flowers on environment, economic and occupational condition of Ethiopia. By this study social and environmental issues are identified. The social issues are job opportunity creation, workers health and occupational safety, workers right, surrounding community health, compensation of previous land holders and socio cultural change. The environmental issues are water resource utilization, water and soil pollution, air pollution and land cover change. The only one issue has the positive impact on society that is wide job creation of the floriculture industry and rests of the issues are the negative implication of floriculture sector of Ethiopia.

Weiden (2012)⁷ showed that the economic structure of Netherland is widely depending upon the floriculture industry. Different aspects of total business cycle such as production, import and export of Dutch floriculture industry is thoroughly described by this study.

Beyene (2014)⁸ discussed about the Rose flower production and export related issues in Ethiopia. Rose export increases the earning of foreign exchange and employment opportunity in this country. Economic opportunities, social opportunities and challenges of rose production and export are discussed in this study.

Castro, Gonclaves and Tucci (2015)⁹ described the history and development of Brazilian floriculture. Nowadays about 60% area of Brazil are dedicated to the production of flower. The industry is responsible for huge number of job creation directly and indirectly. The sales of

flower in the internal markets as well as export in the outside of the country is increasing day by day and boosting the economy of Brazil.

Gorman et al. (2015)¹⁰ stated about the different factors that influencing the growth of floriculture industry in the Australia. The author pointed out the factors that influence participation and growth in floriculture industry in Australia and suggested that research and development opportunities are needed to improve the growth of this industry.

2.3 PROSPECTS OF FLORICULTURE IN INDIA

Randhwa and Mukhopadhyay (2004)¹¹ investigated the problems faced by flower growers in this country. The study revealed the importance of plant diversification and cultivation of flowers as commercial purpose in India.

Thippaiah (2005)¹² focused on the performance of Karnataka as a flower producing state. Infrastructural problems regarding floriculture, socio-economic conditions of flower producers, problems faced by flower growers in Karnataka are the important issues described by the author in his study.

In an article **Murray and Rao (2006)**¹³ discussed the export opportunities of Indian Floriculture. To encourage the floriculture sector in India attention should be given to the production or productivity factor, quality of production and availability of planting material.

Singh and Upadhyay (2007)¹⁴ stated the scope of floriculture in India. Floriculture is highly increased in India due to commercial purpose. Different constraints such as issues related to flower export, market, infrastructure are also discussed in this study.

Shukla and Srivastava (2009)¹⁵ discussed about different constraints of export oriented rose cultivation in India. In this aspect SWOT (Strength, Weakness, Opportunities and Threat) analysis is prepared by the author for the betterment of this sector.

In an article **Kaur and Saleem (2011)**¹⁶ discussed about the trading of cut flowers from India to International market. The authors stated that from Karnataka, Maharastra and Delhi huge amount of cut flower are exported in the market Japan, United Arab Emirates, Italy, Canada and Australia.

Oyi et.al. (2012)¹⁷ discussed the future of floriculture in Arunachal Pradesh. Arunachal Pradesh promotes floriculture for the development of export oriented cut flower industries. Orchids are commercially grown in Arunachal Pradesh which has very high demand in national and international markets. The states started to promote orchids cultivation for the export purpose.

Balamurugan and Tamizhyothi (2013)¹⁸ showed the potentiality of Tamil Nadu as a producer of commercial flowers in India. SWOT (Strength, Weakness, Opportunities and Threat) analysis of floriculture industry in the state of Tamil Nadu is described by the authors for the better future of this industry.

Sudhagar (2013)¹⁹ pointed out that floriculture emerged as a lucrative business in Hosur Taluk of Tamil Nadu state. Floriculture has the potential for higher return compared to other horticulture crops. Modern technologies are utilized by a new generation of growers to produce improved variety of flowers to get better price.

Mathre (2014)²⁰ described the area, production and productivity of floriculture specially cut flowers in the state of Maharashtra. Floriculture is playing an important role in making Green

and Clean India. The author analyzed that in Maharashtra the area and production of flowers are significantly increased and have big scope for export.

Saha et.al. (2014)²¹ explored the role of All India Coordinated Research Project for the development of floriculture in India. The research projects focused on development of new and improved varieties of flowers, measures for control of insect pests and diseases, post harvesting technologies, extraction of essential oils, make dry flowers to promote floriculture in India.

Khan and Fazili (2015)²² described floriculture is a lucrative line of business in Kashmir. Compared to other field crops floriculture has the higher potential in return. For the improvement of the floriculture industry in Kashmir SWOT (Strength, Weakness, Opportunities and Threat) analysis are made by the author in this study.

Misra and Ghosh (2016)²³ reported the commercial perspective of Indian floriculture. By this study it was observed that during the period of two decades, the production of both loose and cut flowers have been growing at a Compound Annual Growth Rate (CAGR) of 9.92% and 26.66% respectively. The share of India's floriculture to the Global market at present is only about 0.6%.

In an article **Ali et al. (2017)**²⁴ mentioned about the requirement of infrastructural facilities for the development of floriculture in Kashmir. Infrastructural facilities in Kashmir are not adequate for floriculture. Lack of storage facilities, packing, assistance to the growers and post harvest technologies are hampered the sector. No tissue culture laboratory available. The authors mentioned about the existing position of floriculture and necessary measures needed to promote this lucrative industry in Kashmir Valley.

Oliyarasan, Sivakumar and Mahendran (2018)²⁵ analyzed the production and marketing constraints of hi-tech cut flower in Tamil Nadu. The different constraints analyzed in this study are – incidence of pests and disease, water scarcity, high labour cost, scarcity of labour, price fluctuation, lack of market information and high transport cost.

2.4 PROSPECTS OF FLORICULTURE IN WEST BENGAL

Sarkar, Rahima and Misra (1997)²⁶ discussed the position of the marginal and small farmers in the production of cut flowers in West Bengal. Challenges like post-harvest management and marketing of flowers are discussed in this study.

Sarker and Chakravorty (2005)²⁷ showed that the role of market intermediaries in a marketing channel decreases the marketing efficiency in the flower markets of West Bengal. Due to this role marketing of flowers hampered in West Bengal.

Sinha (2005)²⁸ described the profitability of floriculture in respect to the other field crops. Different constraints and marketing channels of flowers are presented by the author. Different policies for the improvement of production and marketing of flowers are suggested by the author in this study.

Paul, Sahu and Chatterjee (2011)²⁹ found that floriculture in Purba Medinipur district has emerged as an important flower growing region in West Bengal and as well as major hindrances in floricultural activities are also discussed in this study.

Das (2012)³⁰ evaluated the commercial prospect of floriculture and its associated problems in Purba Medintipur district in West Bengal. Different problems such as scarcity of healthy

planting materials, transportation, lack of knowledge on modern floriculture production techniques, and lack of infrastructure are discussed in this study.

Majumder and Lahiri (2012)³¹ described that cultivation of flower is more profitable sector than other crops. Most of the farmers in West Bengal mainly two districts Purba Medinipur and Nadia are engaged with floriculture due to incremental income. Due to profit farmers are shifted from traditional farming to flower cultivation.

Bhattacharyya (2013)³² showed the comparison of profitability between floriculture and paddy cultivation. Due to yield higher return in floriculture small and marginal farmers have been shifting to floriculture in West Bengal. The study suggested that the farmers stand gainer if they opt for flower cultivation.

Biswas (2013)³³ explained that Nadia district in West Bengal play an important role as a flower producing district which is responsible for development of agro-based Indian economy. Floriculture is not the main crop of this district but gradually it taking place of other crop and the main flower concentration zones of Nadia district are also discussed in this study.

Sharma (2013)³⁴ stated that to promote floriculture in West Bengal, North Bengal University (NBU) established the state's first tissue culture production centre named Centre of Floriculture and Agri-Business Management (COFAM) for orchids in commercial purpose. In this state, planting materials of orchids mainly bought from tissue production centre of Pune and Bangaluru in India and also from abroad like Holland and Australia, which increases the transportation cost. But now to counter this problem COFAM growing 35000 saplings of orchids at a time under green houses and poly houses. Mainly four varieties of orchid's viz. Cetellia, Dendrobium, Phalenopsis and Oncidium are produced by tissue culture in COFAM. This initiative makes a

bridge to reduce the constraints in supply of planting materials to flower growers and increase the delivery system of orchids in domestic, national and international markets.

Pratim (2014)³⁵ stated that ASSOCHAM (Associated Chambers of Commerce and Industry of India) is one of the apex trade associations of India note down in a study that West Bengal has been the highest producer of cut flowers in domestic market and recorded the highest compounded annual growth rate (CAGR) of over 597 percent during the five year period of 2007-2008 and 2011-12 with total share of 34 percent in the country's total output of flower production. The report of ASSOCHAM also stated that West Bengal ranked eighth in terms of loose flower cultivation. The districts like Purba Medinipur, Nadia, Howrah, North -24-Parganas, South-24-Parganas takes leading position in flower production in West Bengal. From this state, flowers are exported in other state like- Andhra Pradesh, Chhattisgarh, Mumbai, Delhi etc. and exported in other countries like- Singapur, Dubai, Nepal, Bangladesh etc. Directly and indirectly, approximately 2 lakhs people are associated with floriculture in this state which is increasing the economical status day by day.

Roy (2014)³⁶ reported that farmers of Nadia district of West Bengal are shifted in floriculture from traditional cultivation like- paddy and jute due to higher profitability. According to the president of 'Karimpur Kalyan Samiti' Mr Biswanath Biswas –many farmers of Krishnanagar, Chakdah, Ranaghat, Kalyani, Chapra are shifting in floriculture from jute cultivation due to incremental income from floriculture. According to the Officer of District Horticulture Department of Nadia, Mr. Rahul Mallick- five years ago a hybrid variety of Tuberose named 'Prajjal' has been started to cultivated by the farmers in Nadia district. Due to the high disease resistant power and high productive rate the variety of tuberose is being very popular to the farmers in this district. National Horticulture Mission promotes the cultivation of this variety of

Tuberose by distributing the planting materials of this tuberose through the Krishi Vigyan Kendra to the farmers of this district.

Chakraborty (2015)³⁷ stated that due to incremental income, farmers of Paschim Medinipur are shifting their way of cultivation. The farmers of Kharagpur-II, Pingla, Sabang block of Paschim Medinipur district cultivated flowers instead of paddy. Once upon a time huge amount of paddy is cultivated in these blocks but in recent years, farmers are shifted their way of cultivation from paddy to floriculture. The socio-economic statuses of the farmers of those blocks have been changed due to increase of the earning from floriculture. According to the District Agriculture Officer Nimai Chandra Roy recently, in near about 4000 hectares of lands, only Tuberose and Marigold are cultivate. In Debra and Balichak of Pingla block good amount of Tuberose and Marigold are cultivating by the farmers. The farmers of this area are become economically sound day by day to cultivate flowers. From Paschim Medinipur, flowers are also exported in other states like Karnataka, Andhra Pradesh, Delhi, Orissa etc. By the increasing demand of flowers of national and international markets the future of floriculture is very bright in West Bengal.

Maji (2015)³⁸ mentioned the importance of floriculture Bagnan Block of Howrah district in West Bengal Floriculture is fast growing sector in this district but in the present situation floriculture practice in Bagnan is facing some problems, such as – lack of flower market, lack of cold storage, exploitation of middleman, and lack of credit facility are discussed in this study.

Gangyapadhyay (2016)³⁹ explained that due to infrastructural problem in Mallickghat Flower Market, flower traders are facing lots of problem. Mallickghat Flower Market is the property of Calcutta Port Trust. but in the year 2000 the then Sate Government of West Bengal

taken lease that place in just one rupee for 99 years from Calcutta Port Authority. But it was decided at that time that a well decorated flower market will built at that place for reducing day to day problem of flower seller. It was also decided that not only a flower market, a cold storage for flower, a packaging centre, export centre and a canteen will also built in that place. But after 18 years the place remains same due to lack of government support. According to State Horticulture Department, in the year 2004, 37 crore rupees were imposed for this purpose of the flower market building. For this purpose 5 crore rupees were given by the then Central Government to the then State Government. A blueprint of well infrastructured flower market on 3400 square feet area of port trust also prepared at that time. But the work was not started timely, for this reason the package money returned to the then central government.

Ghosal (2016)⁴⁰ stated that to floriculture in West Bengal Mahatma Gandhi National Rural Employment Guarantee (NREGA) scheme is applied for the development of the infrastructure of floriculture. Farmers of Nadia district are benefitting from the scheme to develop floriculture infrastructure. In this scheme the stress is being given on quality production of Gerbera in Shade House and Poly House which has huge demand in global market. According to the state agricultural department, in last financial year Mahatma Gandhi NREGA scheme has helped to constructed Poly Hose in seven villages of Nadia District. These structures are used for off-season cultivation, nursery management to protect flowers from environmental hazards.

Ghosh (2016)⁴¹ reported that infrastructural problem create a big barrier to promote floriculture in West Bengal. Due to lack of proper cold storage facility, farmers have to kept lotus flower into freezer to protect in the festive season. It is very difficult to store flowers in Coochbehar district as well as in North Bengal due to lack of multipurpose cold storage.

Bandyopadhyay (2017)⁴² stated that to promote floriculture in West Bengal, a good initiative have been taken by the Government of West Bengal with collaboration of Jadavpur University. Now organic colours are producing from waste flowers in West Bengal by the collaborative venture of Chemical Engineering Department of Jadavpur University and Government of West Bengal. Organic colour (Locally called Abir) is a value added floricultural product which is highly demanded in nationally and internationally due to its eco-friendly nature. These organic colours are made from the flowers like- Palash, Shimul, Marigold and Aparajita. Especially in southern districts of West Bengal such as- Purulia, Bankura, Birbhum, Paschim Bardhaman districts, during spring season vibrant red colour flower like Shimul and Palash are bloomed. These flowers are used to make red organic colour and other than spring season some flowers like Marigold and Aparajita are available in all season in West Bengal, which are also used for making organic colours. From Marigold, yellow and saffron coloured organic colour and from Aparajita blue coloured organic colours are prepared. These organic colours are prepared very limitedly before but recently West Bengal government emphasized the work for the development of rural economy. Now these colours are selling in Govt. Agri-Marketing stalls like Biswa Bangla Stall and Manjusha Stall throughout the year.

Jana (2017)⁴³ discussed the role of floriculture in socio-economic development of floriculture community of the district Purba Medinipur. Mainly Panskura and Kolaghat blocks is most important flower producing region in Purba Medinipur district. Climatic condition has deep impact on floriculture. Rainy and winter season is very important for floriculture. The study focused on the types of floriculture with the changing climatic condition.

Basu (2018)⁴⁴ reported that due to lack of cold storage facility, farmers of Ranaghat II blocks of Nadia district in West Bengal have been regularly throwing out the unsold flowers on the

street. Dhantala, Nokari, Mathkumra, Purnanagar, Kamalpur and Puratan Chapra are the areas where huge amount of tuberose are cultivated but due to lack of storage facility many farmers are forced to throw flowers regularly. In 2010, former Chief Minister Budhadeb Bhattacharjee inaugurated the cold store in Nokari to provide facility of storage of flowers. But within one year the cold store become out of order and still nothing has been done to restart this cold store.

Chakrabarty (2018)⁴⁵ reported that Horticulture department of Darjeeling district takes different initiatives for marginal farmers in Siliguri Subdivision to promote floriculture. By the collaborative initiative of National Horticulture Mission and Government of West Bengal, different training programs are arranged for marginal farmers to uplift the standard of living of these farmers. The officials of District Horticulture Department encourage the farmers to increase their monthly income by cultivation of flowers. Under the Siliguri subdivision in four blocks such as Matigara, Nakshalbari, Kharibari and Phansidewa, new schemes have been planned for the farmers of these blocks to motivate them about floriculture.

Absar (2019)⁴⁶ explained the problems of flower farmers facing in West Bengal. Many districts of West Bengal are known for floriculture such as Purba Medinipur, Nadia, Howrah, North 24 Parganas and South 24 Parganas. In many times flowers are get damaged due to rain and other natural calamity in the field and the farmers do not get any compensation from the government because flowers are not enlisted in the Rshtriya Fasal Bima Yojana. Flower farmers can get loan through Kisan Credit Card from government bank and after the flowering season they repay the loan but in the mean time if any kind of natural calamity is happened the farmers faces lots of difficulties to repay the loan. According to the officials of District Agriculture Department, flowers are still not under coverage of Fasal Bima Yojana for this reason farmers do not get any compensation from the government.

Bandopadhyay and Ghosh (2019)⁴⁷ stated the different aspects of Mallickghat Flower Market, the largest flower market of Asia such as historical background, marketing system, problems flower traders of this market. Development related issues of this market such as lack of funding, lack of govt. support, problems facing by the sellers are also discussed by the authors in this study.

Gangyopadhyay (2019)⁴⁸ reported that to strengthen the Indian Economy experts of Agricultural Department give importance to the Green House cultivation in floriculture. According to Agricultural experts' different high price flowers like Gerbera, Chrysanthemum, Orchid, Gladiolus can be cultivated by farmers in off-season in Green House which is very profitable business. To promote green house cultivation government provides different types of subsidies for the farmers. Agriculture Department organizes different training programs and workshops for the farmers to provide technological knowledge and information on green house cultivation.

Gangyopadhyay (2019)⁴⁹ explained that farmers of Purba Medinipur and Paschim Medinipur districts facing lots of problem due to poor infrastructure of Kolaghat Flower Market. Kolaghat Flower Market is the second largest flower market in West Bengal where near about 4000 flower sellers and traders are selling flowers at regular basis from 60 years. This market is a railway property. The area of the flower market is approximately 1500 square feet. Each flower sellers have to pay 10 rupees to the railway authority to sell their flowers at regular basis, but the railway authority was never did any infrastructural development for the market. For this reason flower traders and farmers requested many times to the state government to think about this situation. After this the officials of district administration of Purba Medinipur decided to replace the flower market at the area of the middle point of the National Highway 6 and 41 near

Kolaghat Power Station. But flowers sellers and traders are not agreed with the decision because this area is very far from Kolaghat and Mecheda Railway Station. If the market is replaced to this place then the transportation cost will be rise and the distance is consume the time of the sellers and traders. In West Bengal many Kisan Mandi was built by the State Government but due to the ambiguity in selection of proper place like distance from the railway station or bus stand, these mandis are still not utilized by the farmers.

Ghosh and Gupta (2019)⁵⁰ observed that floriculture play a key role in socio-economic development of Kolaghat region of Purba Medinipur district in West Bengal and also stated about the problems of small scale growers of floriculture in this district.

Sarkar (2019)⁵¹ mentioned that to promote floriculture in West Bengal, State Government implemented different schemes on nursery management. Recently many districts are taking this facility to make nursery because nursery management is a very profitable business. In some blocks of South-24-Parganas, like Bishnupur Block, some villages like Bakhrahat, Chak-Enayetpur and Parberia-Jaychandipur make approximately 100 nurseries to sell different species of orchids (eg. Cattelia and Phalenopsis). The owners of the nurseries imported the planting materials of orchids from Chennai. To reduce the shortage of planting materials the Department of Microbiology and Biotechnology of Kalyani University are successfully cultivating the tissue culture of this species of orchids.

2.5 ROLE OF AGRICULTURAL INFORMATION CENTRE AND INFORMATION SYSTEM

Srinivasulu and Nandwana (2001)⁵² provided the details of Agricultural Research Information System which consists of different components such as Agricultural Research Personnel Information System (ARPIS), Agricultural Research Financial Information System (ARFIS), Agricultural Research Library Information System (ARLIS) and Agricultural Research Management Information System (ARMIS). The study also discussed about the strength and development of Agricultural Libraries in India.

Kizilaslan (2006)⁵³ investigated the agricultural information system in Turkey and its effectiveness for farmers. The study highlighted the problems of agricultural information flow, insufficient coordination among the various organizations dealing with this system, and also discussed how farmers are suffering to get agricultural information for lack of connection between the publishing activities of research institutions and other institutions active in this field.

Aina (2007)⁵⁴ stated the importance of agricultural information centre for the development of small- scale farming communities in this digital age. Due to several barriers like illiteracy, poverty, lack of basic infrastructure, small-scale farming communities are not able to access agriculture related information. For effective dissemination of information, there is need for the establishment of agricultural information centre. These centres would be able to satisfy the information needs of the rural farmers.

Adhiguru, Birthal and Kumar (2009)⁵⁵ analyzed the flow of agricultural information to strengthening the agricultural information delivery system in India. The authors included the types of sources of information and sector wise analysis of agricultural information.

Demiryurek (2010)⁵⁶ presented the concepts, theories and different issues relevant to information systems and communication networks for agriculture and rural people. The usefulness of information systems and communication networks are discussed by the authors to identify the system components, their networks, the understanding of how successfully they work and how to improve their performances. The rationale of the system theory and information system approach and analysis method for agricultural information systems are described and discussed by this study.

Prasad (2010)⁵⁷ discussed different aspect of Agricultural Information System. Many isolated attempts such as information on agriculture price, agricultural extension, information on climatic condition, information on marketing techniques were made to provide agriculture information to the farmers. The study stated that the consolidated information system has needed to entire India to serve the farming community to increase the agricultural productivity.

Demiyurek (2014)⁵⁸ presented the concepts, theories and methods of extension science such as agriculture knowledge innovation system and agricultural communication networks and also discussed about the usefulness of information system and communication networks in order to identify the components of Agricultural Information System.

Sani et.al. (2014)⁵⁹ reviewed the economic problems of Nigerian farmers. Different issues related to agricultural information such as concept of agricultural information, information generation, types of agricultural information, users of agricultural information, sources of agricultural information, flow of information and the barriers of information dissemination are discussed by the authors in this study.

Sathees et. al. (2015)⁶⁰ proposed an agricultural marketing system by using information communication technology (ICT) which will provide an environment to the farmers to deliver the agricultural products to the marketing place in time and enriched the farmers with up to date farming technology by co-coordinating all transactions in a cloud based e-commerce environment in India.

El-Kalash, Uzoigwe and Mohammed (2016)⁶¹ analyzed the role of rural information centre as a gateway for agricultural development and national transformation in Nigeria. The study described about the different components of rural information centre and prospects of establishing adequate rural agricultural information centre to serve rural agrarian community in better way.

Maragur et al. (2018)²¹ suggested a design for the development of simple module to make smart agriculture system. The two stages are highlighted in this study; one is the field monitor by the use of GSM technology to maximize the plant growth and the second is reduction human resource by making agriculture vehicle for ploughing, crop cutting and pesticides spraying.

Najdovski and Manevska (2019)⁶³ constructed a model of an Agricultural Information System to disseminate timely and rapid information to the agricultural society. The study presents different steps to create a user friendly model of Agricultural Information System. By the analyzation of current situation of the system, the model has been proposed to improve the communication between farmers, coordinators and agricultural experts.

2.6 COMPONENTS OF AGRICULTURAL INFORMATION SYSTEM

2.6.1 AGRICULTURAL EXTENSION SERVICE AND APPLICATION OF INFORMATION COMMUNICATION TECHNOLOGY (ICT) IN AGRICULTURE

Van Den Ban (1993)⁶⁴ focused on different aspects of Agricultural Knowledge and Information System for the improvement of agricultural extension of a country. The author discussed about the identification of information needs of farmers. Researchers have to choose research topics very carefully to satisfy the farmers' needs by the extension workers. By the cooperation of researchers, extension agents and farmers development of agriculture is possible. Extension workers have to create a bridge to provide scientific knowledge and information to the farmers. Many possibilities have been raised in this study to help farm families and to contribute more to the agricultural development in a country.

Dash and Mishra (2004)⁶⁵ highlighted the vital role of Krishi Vigyan Kendra as a light house to provide constructive advisory services to the rural people of Orissa. Different fruitful extension activities such as front line demonstration, advisory services, field day etc. regarding transferring of knowledge and information to the rural people is very broadly described in this study.

Roy (2009)⁶⁶ explored the status of Information and Communication Technology (ICT) in Bangladesh and the application of Information Communication Technology in Agriculture of

Bangladesh in an initial stage. Number of ICT projects in the field of agriculture at present is positively running.

Chhachhar et al. (2013)⁶⁷ investigated the main purpose of using mobile phones among the farmers in the field of agriculture to access information. There is the need of awareness among the farmers about the proper use of mobile phones to increase the productivity of agricultural crops and increase the income of the farmers.

Jayade and Khot (2013)⁶⁸ stated the use of Information Communication Technology (ICT) as a highly powerful tool in agricultural research as well as information dissemination tools to the farmers.

Singh, Meena and Swanson (2013)⁶⁹ analyzed the role of Agricultural Extension System in India. This system is comprises of Ministry of Agriculture, State agricultural department, Agricultural institutes for technology dissemination and non-government organization. The study showed that there are large gaps identified in between research and extension approaches in India. There are need to evaluate the performance and socio-economic impacts of research and extension.

Thiam (2013)⁷⁰ described the positive impact of information technology in the field of agriculture to improve the agricultural productivity in the United States. Application of mobile phone, use of GIS (Geographical Information System) and remote sensing increased the efficiency and effectiveness of farming in United States.

Behara, Maharana and Acharya (2014)⁷¹ suggested the important role of Krishi Vigyan Kendra to accelerate the agricultural production and for the improvement of the socio-

economic conditions of farming community in Koraput district of the State Orissa. Different methods of dissemination of information from Krishi Vigyan Kendra are discussed in this study.

Bhalekar, Ingle and Pathak (2015)⁷² discussed the increasing application of Information Communication Technology (ICT) in the agriculture sector. Different ICT project are initiated by NGOs (Non-Government Organizations), Private Organization, cooperative bodies and government organization in India for the development of rural people.

Nallusamy, Balasubramaniam and Chellapan (2015)⁷³ discussed the use the digitization of agriculture sector by the help of Information Communication Technology for the delivery of timely information to the target user for their sustainable development.

Das (2016)⁷⁴ stated the role of Kisan Call Centre for dissemination of agriculture information in Cooch Behar district of West Bengal. Application of mobile technology in the field of Agriculture sector is discussed in this study.

Sajesh and Suresh (2016)⁷⁵ showed the importance of agricultural extension services in transferring relevant information to farmers. A clear idea about the different components of agricultural extension services are described by this study. The authors highlighted the collaborative function of different components of Agricultural Extension system of India.

Shukla and Mohapatra (2016)⁷⁶ revealed the contribution of television as a popular medium or source of dissemination of agriculture information to the agricultural community. Krishi Darshan program in Doordarshan channel telecast lots of agricultural program which provides updated information in regional language for the upliftment of agricultural society.

Chowdhury (2017)⁷⁷ reported that Government of West Bengal created ‘Matir Katha App’, an Information Communication Technology (ICT) based service providing expert advice to help the farmers in agriculture. This App is the result of collaborations between the Department of Agriculture, Agri-Marketing, Animal Husbandry, Fisheries, Horticulture and the state information technology agency WEBEL. This service is provided through the technical expert (Krishi Prajukti Sahayak). This Krishi Prajukti Sahayak is provided with a tablets containing ready answer of frequently asked questions related to agriculture and the allied sectors. There is also a panel of experts who analyze and provide solution to the problems of the farmers. ‘Matir Katha App’ provides solutions to the farmers’ on different agricultural related issues such as crop types, prices, availability of seeds and planting materials, crop insurance, crop disease and weather forecast as SMS in mobiles of farmers in the regional language.

Panda (2017)⁷⁸ mentioned the pivotal role of Information Communication Technology (ICT) tools based information extension services to make agricultural society knowledgeable and information enriched in West Bengal. Many issues such as awareness of ICT tools, access on ICT tools, effectiveness of ICT tools and attitude towards ICT tools in Cooch Behar district is mentioned by the author.

Prajapati and Rathore (2017)⁷⁹ investigated the different constraints faced by program coordinator for the effective functioning of Krishi Vigyan Kendra in India. Different kind of constraints such as organizational constraints, infrastructural constraints, financial constraints, administrative constraints, political constraints, personnel constraints and training related constraints are investigated by this study.

Singh, Ahlawat and Sanwal (2017)⁸⁰ observed the role of Information Communication Technology for transfer of information and technology, procurement of inputs and selling of outputs in a way so that farmers can be benefitted. Timely information by the help of ICT helps the farmers to adopt good agricultural practice in India.

Pandey and Kumari (2018)⁸¹ showed the application of Information Communication Technology (ICT), to access relevant information regarding agro-inputs, crop production technologies, agro-processing, market support, agro-finance and market support by the farmers. But the study showed the awareness of farmers towards information communication technology as a source of information is very low.

Kavitha and Anandaraja (2019)⁸² mentioned the aim of Kisan Call Centre for the development of farmers in Telengana state. The centre providing information regarding district wise, sector wise, crop wise etc. The call data of Kisan call centre are analysed by the author to show the increasing usage of mobile based technology in the field of agriculture.

2.6.2 INFORMATION NEEDS OF AGRICULTURAL COMMUNITY

Ozowa, (1995)⁸³ emphasised the information needs of small-scale farmers in Africa. In this study it has been seen that not enough attention has been paid to the information dissemination process by the extension workers which is the most important ingredients for the development of agriculture. A new approach should be taken by the government to understand the exact information needs of the farmers. By the assessment of the process of information flow in agriculture, opinions are suggested by the author for the improvement of the present situation.

Naveed, Anwar and Bano (2012)⁸⁴ described the information seeking pattern of Pakistani farmers. Authors showed that Pakistani farmers mainly rely on interpersonal relationship with neighbours, friends, relatives to access information. The use of mass-media, both print and electronic as well as human resource is utilized poorly by the farmers of this country.

Mittal and Mehar (2013)⁸⁵ stated that Information has an extensive and multifaceted role in agriculture. It empowers farmers to respond to different types of risk, market incentives and competition more efficiently. The reliable, timely and relevant information has needed, which would reduce the farmers' risk and uncertainty and empowering them to take right decision in the field of agriculture in Indo-Gangatic plains.

Naveed and Anwar (2013)⁸⁶ identified the agricultural needs of Pakistani farmers. Types of information needs such as soil related, seed related, harvesting activities are described by the author. Number of barriers to seek information such as education, language is faced by the farmers in Pakistan. Need-based infrastructure to get information is suggested by the authors in this country.

Haldar et al. (2015)⁸⁷ discussed the Agricultural Information Network in West Bengal. The information needs of farmers are satisfied by progressive farmers, extension personnel and agricultural organization those are deals with extension program. These all are interconnected by direct or indirect path of communication to provide information and knowledge to the farmers.

2.6.3 AGRICULTURAL MARKETING

Rahman, Selvaraj and Ibrahim (2012)⁸⁸ showed the past and present scenario of agricultural marketing in India. Indian agriculture can be balanced and made efficient through proper and better management practices. Moreover the opportunities provide by agricultural marketing should be tapped effectively by the marketers. Different challenges and future recommendations are also discussed by this study.

Bhargav (2017)⁸⁹ showed the problems related to marketing of agricultural products. Due to lack of awareness and education farmers faced lots of problems in the marketing of organizational products and middlemen enjoy the benefits at the cost of poor Indian farmers. To boost the standard of living of rural farmers of India there is need of an agricultural marketing system.

Bhosage (2018)⁹⁰ analyzed the nature and importance of Agricultural products in India. At present farmers can use internet on many possible way of selling agricultural products. Farmers will be able to sell their product through e-market platform ie. National Agriculture Market (NAM) which was launched by Govt. of India. It is an electronic trading portal for direct selling of agricultural products through which many of the problems of farmers will be solved.

Bista, Patidar and Manjunath (2018)⁹¹ highlighted the use of mobile phone to build a network among the farmers to deal the auction in agricultural mandi. The mobile based e-auction system is very helpful to the farmers to access the wide market information. By this system the famers can sell their product directly by removing the interference of middleman.

Raj (2018)⁹² pointed out the different problems involved in marketing of agricultural product in India. There is limited access to the market information literacy level among the

farmers is low, multiple channels of distribution eats away the pocket of both farmers and consumers. Technology has improved in this field but it has not reached to the rural level. There is a well organized and regulated agricultural marketing system is needed to sell agricultural product directly.

2.6.4 INFORMATION AND COMMUNICATION SOURCES OF AGRICULTURE

Rees et al. (2000)⁹³ reported the role of agricultural knowledge and information system in Kenya. The major sources of agriculture has been identified, those are-local neighbours, family, markets and community based organizations. The author also reported that extension personnel treated as an important source of information but farmers have dissatisfied to the extension personnel due to lack of frequent interactions. The information requirements of the most of the farmers are not addressed by the extension personnel. Inadequate human resources from the government organizations and poor local leadership create a serious barrier in effective information flow to the farmers where as extension workers faces lack of resources to disseminate farm communities and poor communications with researchers leading to information distortion.

Opara (2008)⁹⁴ investigated the sources of agricultural information available to the farmers as well as preferred sources of farmers in Imo state, Nigeria. A different type of preferred sources has been identified by the author such as- agricultural workers as source of information, fellow farmers, radio, television etc. By this study it has been found that there is need for the extension agency for the identification of different sources of information at regular basis that farmers prefer.

Jain (2011)⁹⁵ focused on the impact of empowerment of rural people in agriculture through e-choupal in India. E-choupal is a internet kiosk conceived by ITC which gives information regarding weather forecast, market rates of crops, soil testing. The study indicated that users had good knowledge than non-users about all aspects of agriculture service which includes weather forecast, market rates of crops, soil testing, agronomical practices of wheat, Choupal Pradarshan Khet and e-Choupal hub.

Kamruzzaman et al. (2013)⁹⁶ discussed the involvement of rural women in agricultural activities and the use of communication sources by them in Bangladesh. Education, family size, annual family income, farm size, organizational participation, agricultural knowledge of the rural women had positive and significant relationship with their use of communication sources. This means that higher the education, small family, more the family income, large farm size, more organizational participation, more agricultural knowledge of the rural women had higher use of communication sources. For increasing agricultural production, it is essential to use more communication sources for technology upgrade. The rural women had inadequate use of communication sources which results poor yield from agricultural work. There is need to develop extension approach for agricultural production.

Alarape et al. (2014)⁹⁷ assessed the role of agricultural information dissemination and utilization in sustainable and improved agricultural productivity development in Nigeria. The study revealed that major sources of agricultural information to rural farmers were media (radio, television and newspaper and had very rare contact with extension workers who were generally in the best position to exchange agricultural information with rural farmers. The study recommended that there is need for government effort in agricultural information dissemination to transform the economy through investment in agricultural productivity and development.

Prabha et al. (2016 pp.92-102)⁹⁸ highlighted the role of government schemes in Indian agriculture and rural development in India. The study revealed that government has initiated many programmes for agriculture and rural development which has not to reaching to the target groups to a satisfactory level. So, the necessary methods are needed to taken by the government to reach the deprived needy areas.

Yaseen et al. (2016)⁹⁹ described the problems of farmers to access agricultural information sources in Rural Pakistan. The study highlighted that extension staff are treated as an important source of information but the performance of extension staff is not encouraging. So, the government has to take some initiatives to launch a policy to faster performance of public agricultural extension system to fulfill the advanced technological needs of farmers to flourish sustainable agriculture and rural development.

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CHAPTER – 3
METHODOLOGY

CHAPTER – 3

METHODOLOGY

3.1 INTRODUCTION

“Research is a search or investigation directed to the discovery of some fact by careful consideration or study of a subject” **(Ohdedar, 1993, p.1)²**. Research methods defined as all those methods or techniques that are used for conduction of research. Research Method, thus refers to the methods the researchers use in performing research operations. So, methodology of research implies the body of methods, that is, procedures and techniques of collection, organization, analysis and evaluation of data or facts, which should be mastered and followed in order to execute research. In other words, “all those methods which are used by the researcher during the course of studying his research problem are termed as research methodology” **(Kothari & Garg, 2019, p.6)⁵**.

3.2 RESEARCH DESIGN

“Research design is a blue print, or preliminary plan or sketch of the work to be done in respect of a specific kind of research undertaken” **(Ohdedar, 1993, p.35)²**. Research Design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. In fact, the research design is the conceptual structure within which research is conducted; it constitutes the blue print for the collection, measurement and analysis of data. As such the design includes an outline of what the researcher will do from writing the hypotheses and its optional implications to the final analysis of data. In brief, research design must, at least, contain a clear statement of the research

problem; procedures and techniques to be used for gathering information; the population to be studied and methods to be used in processing and analyzing data **(Kothari & Garg, 2019)⁵**.

This study used descriptive research design to prepare the SWOC Analysis of Floriculture Information System in West Bengal. The other name of descriptive method is survey method. In this method researcher has to present the things which are happening and exist at present. It deals with conditions or relationships that exist, opinions that prevail, processes that are going on, effects that are manifest, or trends that are developing. It is mainly concerned with the present though it often considers past events and influences as relating to current status **(Ohdedar, 1993)²**. Descriptive method is concerned with describing the characteristics of a particular individual or a group. Descriptive method is a systematic method of discovering new facts or of verifying old through sequence, inter-relation, casual explanation and natural laws that cover them. Descriptive research has two aspects, viz., qualitative and quantitative research. Descriptive design is a combination of various survey methods to collect qualitative and quantitative data. Both qualitative and quantitative method of data collection has been employed in this study to collect relevant facts, figures and data from the population.

3.3 SAMPLING

Sampling is an essential element of the survey or descriptive method. It is the process or method of drawing or selecting a sample from a particular population. Population in the context of sampling means all the people or objects that are under investigation or observation. “A sample is a smaller representation of a larger whole” **(Ohdedar, 1993, p.63)²**.

Stratified sampling technique has been used in this study. This sampling technique is practiced when the population is not homogeneous but can be divided into various homogeneous groups (called strata) **(Kothari & Garg, 2019)⁵**.

. This process is adopted in the case of a population which is not homogeneous, and consists of a number of strata (level or groups), the characteristics of one stratum differing from those of another. Under stratified sampling the population is divided into sub-populations that are individually more homogeneous than the total population.

In this study samples has been taken from different separate homogeneous groups such as Flower Growers, Flower Sellers and Extension Workers of Krishi Vigyan Kendras, Experts of floriculture department Krishi Viswavidyalaya, Experts of Horticulture department.

- a. To collect data on the existing condition of education and research in the Field of Floriculture in West Bengal as a component of this system, 2 State Agricultural University viz., 1) Bidhan Chandra Krishi Viswavidyalaya (BCKV) and 2) Uttar Banga Krishi Viswavidyalaya (UBKV) have been selected.
- b. To collect extension activity related data in the field of floriculture, 9 Krishi Vigyan Kendras of main flower producing districts of West Bengal have been selected. Apart from this in order to assess the channel of floriculture information dissemination process at the state level, Food Processing Industries & Horticulture and at the district level, 1 District Horticulture Department (Cooch Behar), 1 Block Development Office (Mathurapur-I Block, South-24-PGS) and 1 Panchayat Office (Bhagabatipur Gram Panchayat, Mathurapur-I Block, South-24-PGS) have been selected.

Selected 9 Krishi Vigyan Kendras in West Bengal are-

1) Nadia Krishi Vigyan Kendra, 2) Howrah Krishi Vigyan Kendra, 3) Purba Medinipur Krishi Vigyan Kendra, 4) Seva Bharati Krishi Vigyan Kendra (Paschim Medinipur), 5) Nimpith Krishi Vigyan Kendra (South-24-Parganas), 6) Ashoknagar Krishi Vigyan Kendra (North-24-Parganas) 7) Coochbehar Krishi Vigyan Kendra , 8) Jalpaiguri Krishi Vigyan Kendra and 9) Darjeeling Krishi Vigyan Kendra.

- c. To collect ground level data about the information and extension services provided by the government organizations to the flower farmers and to measure their knowledge and awareness about the government facilities in the field of floriculture, 331 flower farmers from 9 leading flower producing districts have been selected and to collect data on the issues of flower marketing system and infrastructural constraints related to floriculture, 218 flower sellers of 5 popular flower markets of West Bengal have been selected for this purpose.

331 flower growers from 9 leading flower producing districts in West Bengal:

- 1) Village Kakharda in Sahid Matangini Block of Purba Medinipur District-45 farmers.
- 2) Villages-Phalashpur and Bar-Phalashpur in Pingla Block of Paschim Medinipur-74 farmers.
- 3) Village Nokari in Ranaghat -II Block of Nadia District- 42 farmers.
- 4) Village Shimulpur in Gaighata Block of North 24-Parganas- 39 farmers.
- 5) Villages- Bhagabatipur, Ramjibanpur and Boro Sudhi in Mathurapur-I block of South 24 Parganas-36 farmers.

- 6) Village Khalor in Bagnan-I Block of Howrah District-28 farmers.
- 7) Village Bijanbari in Darjeeling Pul Bazar Block of Darjeeling District-22 farmers.
- 8) Village Purba Magurmari in Dhupguri Block of Jalpaiguri District -21 farmers.
- 9) Village Pundibari in Cooch Behar II Block of Cooch Behar District-24 farmers.

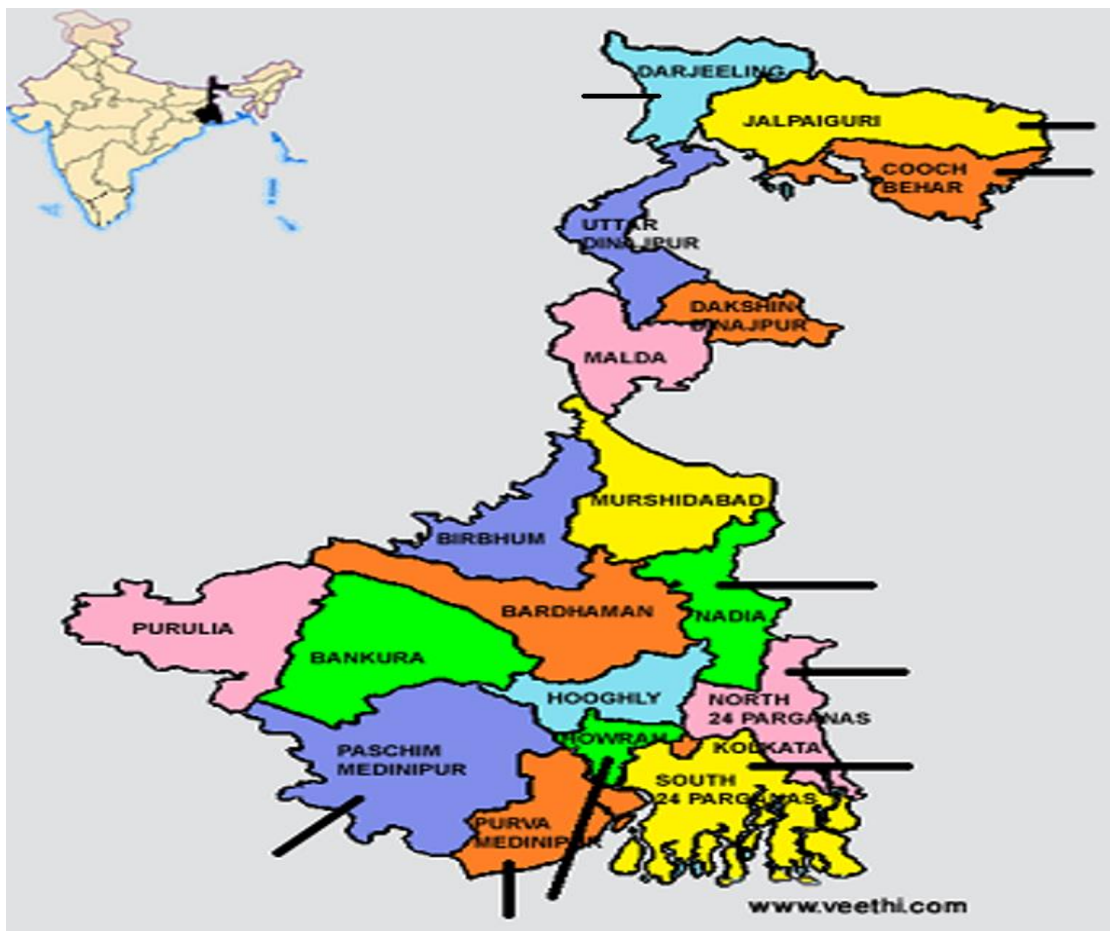


Fig. 3.1: The Map of West Bengal showing the selected flower producing districts as study area.

Source: www.Pinterest.com

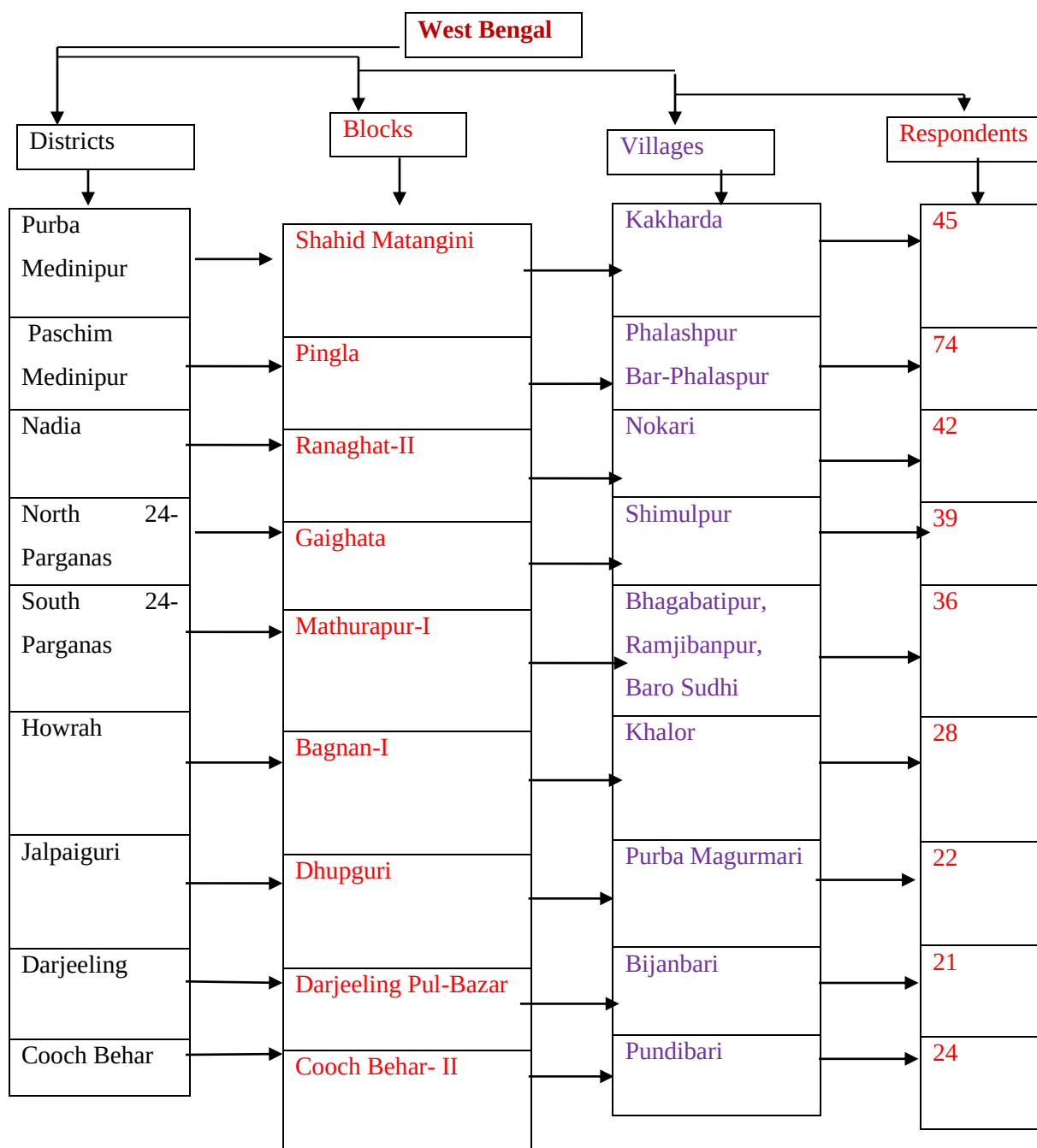


Fig 3.2: Sample Collection Design of flower growers

218 flower sellers from 5 popular flower markets in West Bengal:

- 1) Mallickghat Flower Market (Kolkata) - 57 flower sellers.
- 2) Kolaghat Flower Market (PurbMedinipur) - 48 flower sellers.
- 3) Dhantala Flower Market (Nadia) - 41 flower sellers.
- 4) Nokari Flower Market (Nadia) - 28 flower sellers.
- 5) Thakurnagar Flower Market (North-24-Parganas) - 44 flower sellers.

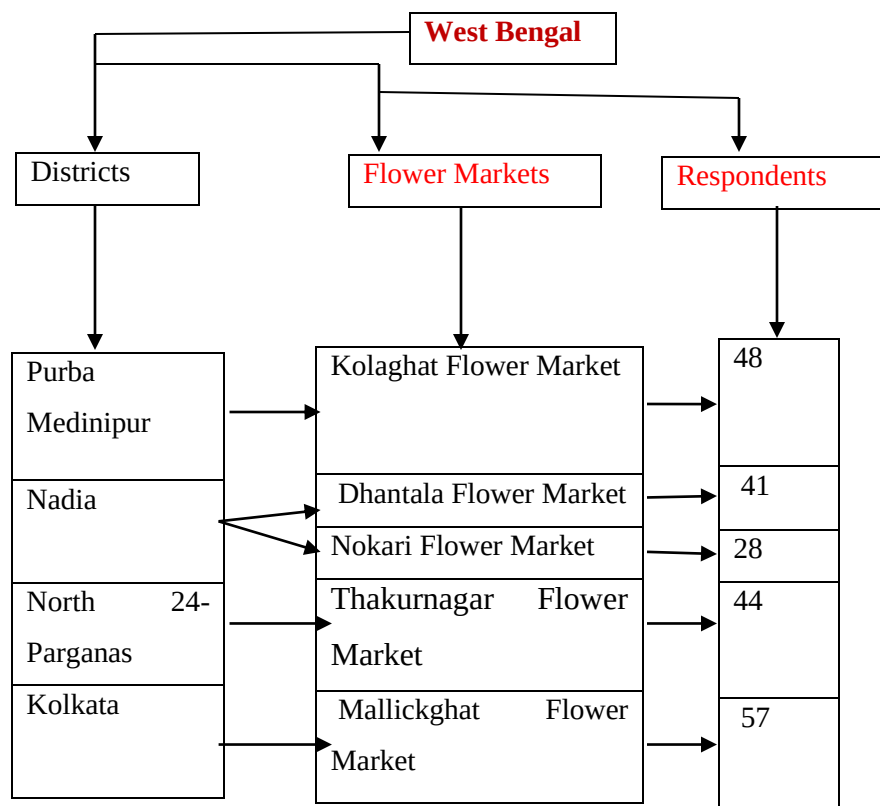


Fig 3.3: Sample collection design of flower sellers

3.4 SOURCES OF DATA

In this study, both primary and secondary data has been collected. The primary data has been collected from the government reports and publications of Food Processing Industries & Horticulture Department, Government of West Bengal, Annual Reports and publications of Krishi Vigyan Kendras of West Bengal, Government Reports of District Horticulture Departments of West Bengal, conference proceedings, research based journal articles and current newspaper articles.

For Secondary data books, encyclopedias, dictionaries, journal articles, e-resources like Websites of Indian Council of Agricultural Research (ICAR), State Agricultural Universities (SAUs), National Horticulture Board (NHB), Agricultural & Processed Food Product Export Development Authority (APEDA), Matir Katha Portal have been studied. A detailed description of reviewed literature has been presented in chapter-2 entitled, 'Review of Literature'.

3.5 DATA COLLECTION METHODS

Data collection methods or techniques allow us to systematically collect information about our objects of study (people, objects, phenomena) and about the settings in which they occur (**Chakrabarti, 2010**)⁴. The present study has been carried out by the following data collection methods:

3.5.1 QUESTIONNAIRE METHOD

According to **Kerlinger (1986)**¹, “questionnaire is a written document listing a series of questions pertaining to the problem under the study”. A questionnaire is a formulated series or list of questions systematically prepared, and is meant for collecting data on a problem under investigation. In this study, three types of questionnaire have been designed for purpose of survey to collect necessary data. Both types of questions i.e., open-ended (respondents have to write their answers at some length) and close-ended (respondents have to opt their answers from mostly readymade alternative answers prepared by the researcher) has been included in these questionnaires.

- a) To collect extension activity related data in the field of floriculture, a structured questionnaire has been designed circulated to the selected nine Krishi Vigyan Kendras of main flower producing districts of West Bengal by personal contact. Filled in questionnaires were collected from the nine Krishi Vigyan Kendras. (Annexure-I)
- b) To collect ground level data about the information and extension services provided by the government organizations to the flower farmers and to measure their knowledge and awareness and the government facilities in the field of floriculture, a structured questionnaire has been designed and circulated to the flower farmers of selected nine main flower producing districts of West Bengal by personal contact (mentioned in Sampling Design). Total 331 filled in questionnaires have been collected from the selected areas of West Bengal. (Annexure-II)

- c) To present the SWOC Analysis of the Floriculture Information System in West Bengal more authentically by this study, another structured questionnaire has been designed. To collect data on the issues of flower marketing system and infrastructural constraints related to floriculture, this questionnaire circulated to the flower sellers of five popular flower markets of West Bengal (mentioned in 3.3-Sampling). Total 218 filled in questionnaire have been collected due to their busy time schedule in pick hours of flower selling in the flower market. (Annexure-III)

3.5.2 INTERVIEW METHOD

Interview means conversation with a purpose. As a data collection method the interview is a conversation carried out with the definite purpose of collecting data on the problem under investigation by means of the spoken word through a person to person contact between an interviewer (researcher) and an interviewee (respondents) **(Ohdedar, 1993)²**.

- a) To collect data on the existing condition of Education and Research in the Field of Floriculture in West Bengal semi-structured interview method has been conducted. Head of the Floriculture Department and Librarian of Bidhan Chandra Krishi Viswavidyalaya (BCKV) and Uttar Banga Krishi Viswavidyalaya (UBKV) were interviewed to collect necessary data on the mentioned topic of Floriculture Information System in West Bengal.

- b) In order to assess the channel of floriculture information dissemination process in the district level, semi-structured interview has been conducted. In this context, to collect necessary data Assistant Director of Horticulture Department of Coochbehar District, Agriculture Development Officer of Block Development Office of Mathurapur-I Block,

South-24-Parganas and Member of Panchayat of Bhagabatipur Village, Mathurapur Block-I, South-24-Parganas has been interviewed.

c) To collect district wise Area Production & Productivity of flowers in West Bengal a semi-structured interview was conducted. To collect required data on the topic Assistant Director of Horticulture, Department of Food Processing Industries & Horticulture, Government of West Bengal has been interviewed.

3.5.3 OBSERVATION METHOD

Observation method plays an important role as a data collection method. Observation is defined as a planned methodical watching that involves constraints to improve accuracy (Ahuja, 2001)³. To assess the present situation of Floriculture Information System in West Bengal observation method was carried out. Observation method is useful to collect complete and detailed data by the means of photographs, pictures, recording of conversations, and video recording of different activities. During the present course of study a number of photographs, pictures has been captured as well as conversations have been recorded as an important data.

3.6 DATA ANALYSIS

The collected data are but bits and pieces of information. Individually they do not mean anything, but through the process of organization, analysis and interpretation, the data are transformed into evidences. Collected data has been analyzed on the basis of responses received from the different components of Floriculture Information System. Collected data are analyzed

in tabulation form with percentage method which is the process of classified data from data-collecting tools into tabular manner so that systematic examination of the data becomes convenient and effective and the tabulated data presented by graphical method through number of charts, graphs by the help of MS-Excel. The graphic method of the presentation of collected data is very effective in attracting the attention of reader. Based on the findings, inferences have been prepared to justify the objectives of this study.

3.7 REFERENCING STYLE

Referencing is the process of acknowledging the source/s of the information, ideas, words, and images that has been used in any study. In this study, American Psychological Association (APA) Referencing Style, 7th Edition has been used to present bibliographic references and citations. The American Psychological Association (APA) style is a widely used author-date system of referencing or bibliographic citation (**American Psychological Association, 2020**)⁶. Some of the examples of APA Referencing Style, 7th Edition are as follows:

- **Book with one author**

General Style

**Author, A. (Copyright year). Title of the book in italics (Edition if available).
Publisher.**

1. Giggey, S. (1988). *Rural community resources: A guide for developing countries*. MacMillan.

2. Chakrabarti, B. (2010). *Library and information science research: Methods, techniques, tenets* (1st ed.). World Press.

- **Book with more than one author**

General Style

Author, A., & Author, B. (Copyright year). Title of the book in italics (Edition if available). Publisher.

1. Kothari, C.R., & Garg, G. (2019). *Research methodology: Methods and techniques* (4th ed.). New Age International.

- **Chapter in an Edited Book**

General Style

Author, A., & Author, B. Copyright year). Title of the book chapter. In A. Editor, & B. Editor (Eds.), Title of the book (Edition, Pages). Publisher.

1. Xia, Y., Xianbao, D., Zhou, P., & Shima, K. (2006). The world of floriculture industry: Dynamics of production and markets. In A. Jaime, & T. Silva (Eds.), *Floriculture, ornamental and plant biotechnology: advances and topical issues* (pp. 336-347). Global Science Books.

- **Journal article: One author**

General Style

Author, A. (Year of publication). Title of the article. Title of the journal (in italics), Volume in italics(issue), Pages. DOI or URL (if available)

1. Demiryurek, K. (2010). Analysis of information systems and communication networks for agriculture and rural people. *Agricultural Economics*, 56(5), 444 – 452. <https://www.agriculturejournals.cz/publicFiles/21266.pdf>

- **Journal article: More than one author**

General Style

Author, A., & Author, B. (Year of publication). Title of the article. Title of the journal (in italics), Volume in italics(issue), Pages. DOI or URL (if available)

12. Khan, D., & Fazil, A. I. (2015). A SWOT analysis of floriculture industry in Kashmir. *Abhinav International Monthly Refereed Journal of Research in Management and Technology*, 4(12), 1-4. https://www.academia.edu/44008119/A_SWOT_ANALYSIS_OF_FLORICULTURE_INDUSTRY_IN_KASHMIR
13. Pavan, M.K., Devegowda, S.R., Kumari, K., & Kushwaha, S. (2019). Kisan call centre for effective extension service. *Agrobios Newsletter*, 17(1), 115-117. https://www.researchgate.net/publication/335796326_Kissan_Call_Center_for_Effective_Extension_Service

- **Dissertation/Thesis (Published)**

General Style

Research Scholar, A. (Submission Year). Title of the thesis [Doctoral dissertation, Name of the university]. Database name. URL or DOI

1. Sinha, M. (2005). An economic analysis on production and marketing of principal flowers in Nadia district of West Bengal: A case study [Doctoral dissertation, Bidhan Chandra Krishi Viswavidyalaya]. Krishikosh. <http://krishikosh.egranth.ac.in/handle/1/81027>

- **Webpage on a Website (Content likely to change)**

General Style

Name of the Website.(n.d.). Name of the Webpage. Retrieved date, from URL

1. National Horticulture Board.(n.d.). Statistics. Retrieved 29 August, 2019, from <http://nhb.gov.in/StatisticsViewer.aspx?enc=CaSOU6CTRn/Ty9tOdH8Lkgol2QGwss6940QLGSpY2T0m6tZbw4/y0R84pftyqIGN>

- **Newspaper Article (From the internet)**

General Style

Reporter, A. (Year, Month and Date). Title of the article. Name of the newspaper(in italics). DOI or URL

1. Sharma, M. (2013, March 13). Orchids bloom for business in NBU. *The Telegraph*. <https://kurseonginfo.wordpress.com/2013/03/13/orchids-bloom-for-business-in-nbu/>

- **Multilingual Newspaper (From the internet)**

General Style

Reporter, A. (Year, Month and Date). Transliterated title of the article [Translation of the title]. Name of the newspaper (in italics). DOI or URL

1. Chowdhury, P. (2017, August 17). Chash-bashe poramarsha dite bishes 'App'
[New app to provide information service to the farmers]. *Anandabazar Patrika*.
<https://www.anandabazar.com/district/bardhaman/west-bengal-government-launches-new-app-for-the-benefit-of>

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4. Chakrabarti, B. (2010). *Library and information science research: Methods, techniques, tenets*. World Press.
5. Kothari, C.R., & Garg, G. (2019). *Research methodology: methods and techniques* (4th ed.). New Age International.
6. American Psychological Association. (2020). *Publication manual of the American Psychological Association: The official guide to APA style* (7th ed.).
<https://doi.org/10.1037/0000165-000>

CHAPTER – 4

FLORICULTURE IN WEST BENGAL: AN OVERVIEW

CHAPTER – 4

FLORICULTURE IN WEST BENGAL: AN OVERVIEW

4.1 INTRODUCTION

West Bengal is a state situated in the eastern part of India. The state surrounded by Assam and Sikkim to the north east, Orissa in the south west and Jharkhand and Bihar to the west. It shares its international border with Bangladesh and Bhutan. It stretches from Himalayas in the north to the Bay of Bengal in south. West Bengal located in between 27°13'115" to 21°25'24" north latitudes and 85°48'20" to 89°53'04" east longitudes. West Bengal is predominantly an agrarian State. Comprising of only 2.7% of India's geographical area, it supports nearly 8% of its population. The total area of West Bengal is about 88,752 square kilometer. The average temperature of this state varies in summer 45 °c (maximum) to 20°c (minimum) and in winter 15°c (maximum) to 8°c (minimum) and average rainfall of this state is 175cm. There are 71.23 lakh farm families of whom 96% are small and marginal farmers. The average size of land holding is only 0.77 ha. However, the State is bestowed with diverse natural resources and varied agro-climatic conditions which support cultivation of a wide range of crops. The net cropped area is 52.05 lakh ha which comprises 68% of the geographical area and 92% of arable land (**Bengal Surges Ahead, n.d.**)¹².

The plains of West Bengal are the paradise of flowers. Favorable climatic condition, tolerable temperature, graceful monsoon and availability of manpower places West Bengal in an advantageous position in this field. Thus floriculture offers a great opportunity to the floriculture community in term of income generation and empowerment. At present in rural areas of West

Bengal many people are largely depend on floriculture, though it is not the main crop of West Bengal but now-a-days floriculture is taking place of other crops gradually due to incremental income and its importance is increasing day by day in many district of West Bengal **(Bhattacharyaa, 2013)¹** .

West Bengal emerged as a leading flower producing state in the atlas of Indian floriculture. The strength of floriculture in West Bengal is due to suitable agro-climatic condition, availability of man power and lastly large demand of floriculture products in national and international markets. According to NHB (National Horticulture Board) Database, West Bengal ranked 4th in position as a flower producing state (10.5%), after Tamil Nadu (18.20%), Andhra Pradesh (13.9%) and Karnataka (11.9%). But West Bengal is the highest producer of cut flowers in 2018-2019 among the states in India and ranked 7th in terms of production of loose flowers. The total area under floriculture production in West Bengal is 27.62 Ha with a production of 221.64 MT cut flowers and 77.25 MT loose flowers in 2018-19 **(National Horticulture Board, n.d.)¹⁴**.

According to ASSOCHAM (Associated Chambers of Commerce and Industry of India), it is estimated that near about 2lakh people are involved in only cut flowers production in West Bengal which is blessed with diverse agro-climatic conditions suitable for flower production **(Pratim, 2014)⁴**.

In West Bengal floriculture is comprises of both loose flowers and cut flowers.

- a. **Loose Flowers:** Loose flowers are generally cultivated in open field, where the flowers have been exposed to both biotic and abiotic stresses. Loose flowers are offered in religious and social ceremonies and mainly in worship of god in house hold eg. Jasmine, Marigold, , Hibiscus, Beli, Balsam etc.

- b. **Cut Flowers:** Cut flowers are grown in green houses, shade houses as well as outdoor also. Environmental factors like water, temperature, light and other essential factors like manure, fertilizers are partially or entirely under strict control eg. Orchid, Chrysanthemum, Dutch Rose, Gerbera, Tuberose, Gladiolus, Carnation etc.

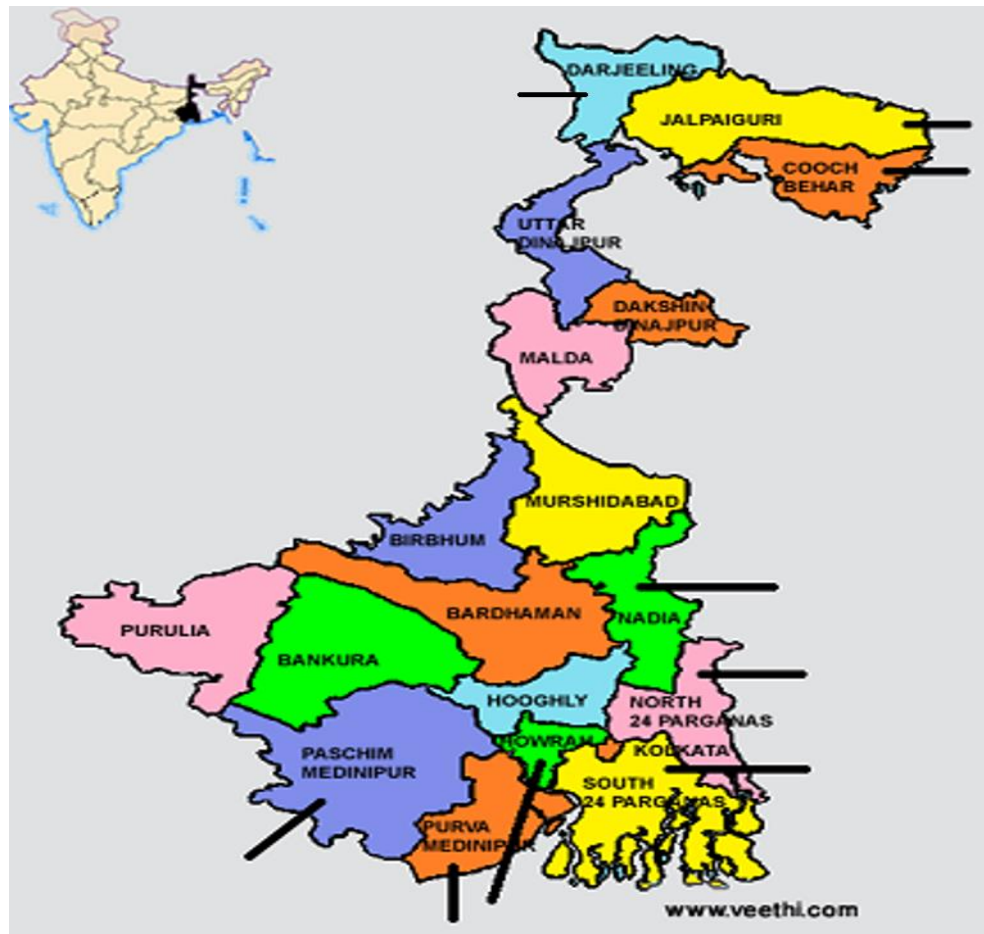


Figure 4.1: The map of West Bengal showing the main flower producing zone

Source: [www. Pinterest.com](http://www.Pinterest.com)

Area, Production & Productivity of Flowers in West Bengal.

2018-19 (Final Estimate)

SL. No.	Name of the District	Area in '000 ha	Loose Flower (Production in '000 MT)	Cut flower (Production in Crore Sticks)	Total Production of Flowers (Production in '000 MT)
1	Darjeeling	0.987	0.472	14.528	15.00
2	Kalimpong	0.815	0.363	11.772	12.135
3	Jalpaiguri	0.213	0.368	1.504	1.872
4	Alipurduar	0.154	0.288	0.680	0.968
5	Coochbehar	0.282	0.725	1.560	2.285
6	Uttar Dinajpore	0.317	0.948	1.469	2.417
7	Dakshin Dinajpore	0.089	0.278	0.522	0.8
8	Malda	0.179	0.761	0.547	1.308
9	Murshidabad	0.393	1.809	2.345	4.154
10	Nadia	7.686	20.646	84.701	105.347
11	24-Pgs(N)	2.557	8.931	19.358	28.289
12	24-Pgs (S)	2.483	8.818	18.946	27.764
13	Howrah	1.611	5.767	6.522	12.289
14	Hooghly	0.211	0.327	1.204	1.531
15	Purba Bardhaman	0.195	0.638	0.349	0.987
16	Paschim Bardhaman	0.038	0.093	0.139	0.232
17	Birbhum	0.211	0.586	0.362	0.948

18	Bankura	0.151	0.308	0.514	0.822
19	Purulia	0.070	0.105	0.246	0.351
20	Paschim Medinipur	3.943	8.825	60.367	69.192
21	Jhargram	0.131	0.158	0.601	0.759
22	Purba Medinipur	5.747	16.058	70.229	86.287
Total West Bengal		28.462	77.272	298.465	375.737

Table 4.1: Area, Production & Productivity of flowers in different districts of West Bengal

Source: Food Processing Industries (FPI) & Horticulture Dept., Govt. of West Bengal

4.2 FLOWER PRODUCING ZONES IN WEST BENGAL

The main flower producing zones in West Bengal are categorized in two sub-zones such as South Bengal and North Bengal. The climatic condition of West Bengal is very unique. The climatic condition of South Bengal and North Bengal is totally different from each other. The climatic condition of South Bengal is mainly hot and humid in nature with adequate rainfall and moderate winter where as North Bengal have tropical and pre-humid climatic condition, adequate rainfall, moderate temperature and prolonged winter. Some important river of South Bengal are- Hooghly, Ajay, Damodar, Rupnarayan, Haldi, Matla and in North Bengal-Teesta, Torsa, Jaldhaka, Raidak and Sankosh. In South Bengal loose flower cultivation is predominant while in the hilly areas of North Bengal cut flower cultivation is predominant. These unique climatic conditions of West Bengal are most congenial for the production of various types of flowers.

Top 10 Flower Producing Districts in West Bengal

SL No.	Name of the District	Area in '000 ha	Loose Flower (Production in '000 MT)	Cut Flower (Production in Crore sticks)	Total Flowers (Production in '000 MT)
1	Nadia	7.686	20.646	84.701	105.347
2	Purba Medinipur	5.747	16.058	70.229	86.287
3	Paschim Medinipur	3.943	8.825	60.367	69.192
4	24-Pgs (N)	2.557	8.931	19.358	28.289
5	24- Pgs(S)	2.483	8.818	18.946	27.764
6	Darjeeling	0.987	0.472	14.528	15.00
7	Howrah	1.611	5.767	6.522	12.289
8	Kalimpong	0.815	0.363	11.772	12.135
9	Cooch Behar	0.282	0.725	1.560	2.285
10	Jalpaiguri	0.213	0.368	1.504	1.872

Table 4.2: Showing top 10 flower producing districts of West Bengal

Source: Food Processing Industries (FPI) & Horticulture Dept., Govt. of West Bengal

a. Flower producing zones of South Bengal

In South Bengal the main flower producing districts are Nadia, Purba Medinipur, Paschim Medinipur, Howrah, North 24- Parganas and South 24- Parganas.

- **Nadia District**

The Geographical location of Nadia district is from 23⁰28'15.48'' N latitude and 88⁰33'23.51'' East longitude. The total geographical area of this district is 391.0 hectares. The

climatic condition of this district is hot sub-humid to humid in nature. Generally the entire Nadia district is the part of Lower Gangetic Plain. Average annual rainfall is 1385.3 mm. Distributaries of Ganga are prevailing in this district with some khals and bills. Soil is loamy to clay loam. Physical set up, irrigation facilities; favourable agro climatic condition gives advantage in the field of floriculture. Total net cropped area of flower cultivation is 7.686 hectares (28.462 hectares of total net flower cultivated area) in 2018-2019. Both types of flowers (loose and cut flowers) are cultivated in this district.

If the state scenario of flower cultivation is considered it is seen that Nadia district ranked 1st in terms of area devoted to flower cultivation and amount of production of different flowers. The main flower producing areas in Nadia district are-Ranaghat, Hanskhali, Chakdaha, Nakashipara, Haringhata, Hanskhali, Santipur, Karimpur, Chapra, Debagram, Jugalkishor, Raghunathpur, Dhantala, Punyanagar, Dhubulia, Kalinarayanpur, Birnagar and Badkulla (Biswas, 2013).

Flowers Name	Area in ‘ 000ha	Production in Crore Cut Flowers	Productivity in Lakh sticks/Ha
Rose	0.318	10.842	3.409
Chrysanthemum	0.043	1.185	2.756
Gladiolus	0.366	4.845	1.324
Tuberose	2.836	66.856	2.357
Gerbera	0.0045600	0.9702500	21.2774123
Orchid	0.0001	0.0025	2.5000
Flowers Name	Area in ‘ 000ha	Production in ‘000MT Loose Flowers	Productivity in MT/Ha
Marigold	1.926	17.356	9.011

Table 4.3: Showing productivity of the cultivated flowers in Nadia district in 2018-2019

Source: Food Processing Industries (FPI) & Horticulture Dept., Govt. of West Bengal

- **Purba Medinipur District**

Purba Medinipur district is geographically located between 21°56'14.24" N and 87°46'34.80" E. The total geographical area of this district is 396.59 hectares. The climatic condition of this district is hot sub-humid to humid in nature. Purba Medinipur district is the part of Lower Gangetic Plain. Average annual rainfall is 1746.6 mm. Soil is loamy to clayey. Strong irrigation facilities and favourable agro climatic condition gives advantage in the field of floriculture. Total net cropped area of flower cultivation is 5.747 hectares (28.462 hectares of total net flower cultivated area) in 2018-2019. Both types of flowers (loose and cut flowers) are cultivated in this district.

Purba Medinipur district ranked 2nd in position in terms of area and production of flowers. The main flower producing areas of this district are-in Panskura block- Haur, Satyeswar, Manur, Ghoshpur, Maishora, Keshapat, Chaitanpur, Haur and Mahatpur. In Kolaghat block- Deulia, Barisha, Khanadihi, Pulsita and Mihitukri. In Khirai block-Sherhati, Dokanda, Jodra, Usudpur, Naskardighi, Dhairanda and Kalidan. In Shahid Matangini block-Kharui, Jayramchack, Kakharda and Jagannathpur.

Flowers Name	Area in ‘000ha	Production in Crore Cut Flowers	Productivity in Lakh sticks/Ha
Rose	0.627	36.101	5.758
Chrysanthemum	0.225	7.432	3.303
Gladiolus	0.425	6.732	1.584
Tuberose	0.762	19.964	2.620
Flowers Name	Area in ‘000ha	Production in ‘000MT Loose Flowers	Productivity in MT/Ha
Marigold	1.421	12.875	9.061

Jasmine	0.324	0.421	1.299
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Table 4.4: Showing Productivity of the main cultivated flowers in Purba Medinipur district in 2018-2019

Source: Food Processing Industries (FPI) & Horticulture Dept., Govt. of West Bengal

- **Paschim Medinipur District**

Paschim Medinipur district is geographically located between 22° 25'15.13" N and 87°19'33.92" E. The total geographical area of this district is 928.53 hectares. The climatic condition of this district is hot sub-humid to humid in nature. Paschim Medinipur district is the part of Lower Gangetic Plain. Average annual rainfall is 1569.5 mm. Soil is clayey loamy to Loamy sandy. Sources of irrigation are mainly from Tanks, Open wells, Bore wells. Strong irrigation facilities and favourable agro climatic condition of this district gives advantage in the field of floriculture. Total net cropped area of flower cultivation is 3.943 hectares (28.462 hectares of total net flower cultivated area) in 2018-2019. Both types of flowers (Loose and Cut flowers) are cultivated in this district.

Paschim Medinipur district ranked 3rd in position in terms of area and production of flowers. The main flower producing areas of this district are in Debra block- Balichak, and Baragarh, in Pingla block-Phalaspur and Bar-Phalashpur, in Daspur block- Loada, Gopalnagar, Brindabanpur and Sagarpur, Sabang block and Kharagpur-II block.

Flowers Name	Area in ‘ 000ha	Production in Crore Cut Flowers	Productivity in Lakh sticks/Ha
Rose	0.408	25.902	6.348
Chrysanthemum	0.122	2.488	2.039
Gladiolus	0.154	2.265	1.471
Tuberose	1.036	29.625	2.860
Gerbera	0.0005800	0.0876000	15.1034483
Flowers Name	Area in ‘ 000ha	Production in ‘000MT Loose Flowers	Productivity in MT/Ha
Marigold	0.812	7.132	8.781
Jasmine	0.070	0.101	1.443

Table 4.5: Showing Productivity of the cultivated flowers in Paschim Medinipur district in 2018-2019

Source: Food Processing Industries (FPI) & Horticulture Dept., Govt. of West Bengal

- **North-24-Parganas**

The Geographical location of North-24-Parganas district is from 22⁰42’36.17’’ N latitude and 88⁰42’39.23’’ East longitude. The total geographical area of this district is 388.52 hectares. The climatic condition of this district is hot sub-humid to humid in nature. Generally the North-24-Parganas district is the part of Lower Gangetic Plain. Average annual rainfall is 388.52 mm. Soil is clayey to loamy. Irrigation facilities are mainly performed by Tanks, Bore well, and Canals; favourable agro climatic condition and strong irrigational facilities gives advantage in the field of floriculture. Total net cropped area of flower cultivation is 2.557 hectares (28.462 hectares of total net flower cultivated area) in 2018-2019. Both types of flowers (Loose and Cut flowers) are cultivated in this district.

North-24-Parganas district ranked 4th in position in terms of area and production of flowers. The main flower producing areas of North-24-Pargana district are, Bangaon, in Gaighata block- Thakurnagar, Jaleswar, Dharmpur, Shimulpur, Chandpara, Madhusudankati, Phulsara, Shutia, Ramnagar, Jhaudanga, and Duma.

Flowers Name	Area in ‘000ha	Production in Crore Cut Flowers	Productivity in Lakh sticks/Ha
Rose			
Chrysanthemum	0.035	1.172	3.349
Gladiolus	0.076	1.150	1.513
Tuberose	0.928	12.864	1.386
Gerbera	0.0005700	0.1066500	18.7105263
Flowers Name	Area in ‘000ha	Production in ‘000MT Loose Flowers	Productivity in MT/Ha
Marigold	0.894	7.944	8.886
Jasmine	0.003	0.003	1.000

Table 4.6: Showing Productivity of the cultivated flowers in North-24-Parganas district in 2018-2019

Source: Food Processing Industries (FPI) & Horticulture Dept., Govt. of West Bengal

- **South-24-Parganas**

South-24-Parganas is the largest district of West Bengal by area. The total area of this district is 953.37 hectares. The Geographical location of South-24-Parganas district is from 21°40’38.95’’ N latitude and 88°18’33.27’’ East longitude. The climatic condition of this district is hot sub-humid to semi-arid in nature. The South-24-Parganas district is the part of Lower Gangetic Plain. Average annual rainfall of this district is 1796.2 mm. Soil is clayey to loamy. Irrigation facilities are mainly performed by Tanks, Bore well, and Canals; favourable agro

climatic condition and strong irrigational facilities gives advantage in the field of floriculture. Total net cropped area of flower cultivation is 2.483 hectares (28.462 hectares of total net flower cultivated area) in 2018-2019. Both types of flowers (Loose and Cut flowers) are cultivated in this district.

South-24-Parganas district ranked 5th in position in terms of area and production of flowers. The main flower producing areas of South-24-Pargana district are in Bhangar I block- Shaksahar, Chandaneswar and Bodra, in Bhangar-II block- Panapukur, Baniara, Chilatala, Sanpukuria, Polerhat, and Ghatakpur, in Bishnupur-II block- Bakhrat, Chak-Enayetpur, Parberia-Jaychandipur, in Mathurapur –I block- Bhagabatipur, Ramjibanpur and Boro Sudhi.

Flowers Name	Area in ‘ 000ha	Production in Crore Cut Flowers	Productivity in Lakh sticks/Ha
Rose	0.101	1.065	1.054
Chrysanthemum	0.077	1.356	1.761
Gladiolus	0.046	0.512	1.113
Tuberose	1.152	15.945	1.384
Gerbera	0.0003500	0.0678700	19.3914286
Flowers Name	Area in ‘ 000ha	Production in ‘000MT Loose Flowers	Productivity in MT/Ha
Marigold	0.890	8.368	9.402

Table 4.7: Showing Productivity of the cultivated flowers in South-24-Parganas district in 2018-2019

Source: Food Processing Industries (FPI) & Horticulture Dept., Govt. of West Bengal

- **Howrah**

Geographically Howrah district is located at 22°35’44.77’’ N latitude and 88°15’49.10’’ East longitude. The total geographical area of this district is 138.67 hectares. The

climatic condition of this district is hot sub-humid to humid in nature. The Howrah district is the part of Lower Gangetic Plain. Average annual rainfall of this district is 1531.4 mm. Soil is clayey to loamy. Irrigation facilities are mainly performed by Canals, Tanks, Bore well; this favourable agro climatic condition and strong irrigational facilities gives advantage in the field of floriculture. Total net cropped area of flower cultivation is 1.611 hectares (28.462 hectares of total net flower cultivated area) in 2018-2019. Both types of flowers (loose and cut flowers) are cultivated in this district.

In Howrah district the main flower producing areas are in Bagnan II block-Bankurdaha, Deulti, Orphuli and Dharmonna, Kantapukur, Saratchandra Udaynarayanpur block, in Bagnan-I block- Khajutti, Ulliberia, Shyampur block and Shankrail.

Flowers Name	Area in ‘ 000ha	Production in Crore Cut Flowers	Productivity in Lakh sticks/Ha
Rose	0.098	3.283	3.350
Chrysanthemum	0.048	0.830	1.729
Gladiolus	0.090	1.240	1.378
Tuberose	0.085	1.142	1.344
Gerbera	0.0002000	0.0273500	13.6750000
Flowers Name	Area in ‘ 000ha	Production in ‘000MT Loose Flowers	Productivity in MT/Ha
Marigold	0.375	4.112	10.956
Jasmine	0.048	0.098	2.042

Table 4.8: Showing Productivity of the cultivated flowers in Howrah district in

2018-2019

Source: Food Processing Industries (FPI) & Horticulture Dept., Govt. of West Bengal

b. Flower producing zones of North Bengal

North Bengal is exceptional because of outstanding variations in climatic conditions that appropriate for growing a wide variety of high value cut flowers like Gladiolus, Hybrid Gerbera, Carnation, Anthurium, Orchids and different varieties of Lily (**Chakraborty, 2018**)⁸. In North Bengal, the main flower producing areas are Darjeeling, Kalimpong, Jalpaiguri and Coochbehar district.

- **Darjeeling District:**

Darjeeling district is the north most district of West Bengal. Geographically Darjeeling district is located at 27°02'09.63'' N latitude and 88°15'45.63'' East longitude. The total geographical area of this district is 325.46 hectares. The climatic condition of this district is hot sub-humid to humid in nature. The Darjeeling district is situated in Eastern Himalayan Region. Average annual rainfall of this district is 1675 mm. Soil is red sandy loam. Irrigation facilities are mainly performed by micro-irrigation process; this unique agro climatic condition gives advantage in the field of floriculture. Total net cropped area of flower cultivation is 0.987 hectares (28.462 hectares of total net flower cultivated area) in 2018-2019. Mainly cut flowers are predominantly cultivated in this district.

The main flower producing areas of Darjeeling district are Mirik, Kurseong, in Darjeeling-Pulbazar block-Bijanbari, Jorbunglow-in Sukhia Pokhari block, in Rangi-Rangliot block-Takdah, Ratomati, Pehla Gaon, in Siliguri-Matigara, Nakshalbari, Kharibari and Phansidewa.

Flowers Name	Area in ‘ 000ha	Production in Crore Cut Flowers	Productivity in Lakh sticks/Ha
Chrysanthemum	0.040	1.152	2.880
Gladiolus	0.783	12.530	1.600
Anthurium	0.001	0.062	6.200
Tuberose	0.002	0.030	1.5
Gerbera	0.0003500	0.0725500	20.5607143
Orchid	0.0006	0.0226	3.7667
Rose	0.021	0.668	3.181
Flowers Name	Area in ‘ 000ha	Production in ‘000MT Loose Flowers	Productivity in MT/Ha
Marigold	0.050	0.315	6.300
Jasmine	0.012	0.016	1.333

Table 4.9: Showing Productivity of the cultivated flowers in Darjeeling district in 2018-2019

Source: Food Processing Industries (FPI) & Horticulture Dept., Govt. of West Bengal

- **Kalimpong District:**

Geographically Kalimpong district is located at 27°4’0.0048’’ N latitude and 88°28’0.0012’’East longitude. The total geographical area of this district is 1,053.60 km². The climatic condition of this district is hot pre-humid in nature. The Kalimpong district is situated in Eastern Himalayan Region. Average annual rainfall of this district is 3053 mm. Soil is red sandy loamy. Irrigation facilities are mainly performed by bore well, canal, lift-irrigation process; this unique agro climatic condition gives advantage in the field of floriculture. Total net cropped area of flower cultivation is 0.815 hectares (28.462 hectares of total net flower cultivated area) in 2018-2019. Mainly cut flowers are predominantly cultivated in this district

The main flower producing areas of Kalimpong district are in Kalimpong- I block, Kalimpong-II block, Gourbathan block, Bara Mangwa and Poshyar Busty.

Flowers Name	Area in ‘000ha	Production in Crore Cut Flowers	Productivity in Lakh sticks/Ha
Chrysanthemum	0.032	0.665	2.078
Gladiolus	0.632	10.260	1.623
Anthurium	0.001	0.073	7.300
Tuberose	0.002	0.032	1.6
Gerbera	0.0002800	0.0575700	20.5607143
Orchid	0.0004	0.0162	4.0500
Rose	0.021	0.668	3.181
Flowers Name	Area in ‘000ha	Production in ‘000MT Loose Flowers	Productivity in MT/Ha
Marigold	0.040	0.242	6.050
Jasmine	0.003	0.004	1.333

Table 4.10: Showing Productivity of the cultivated flowers in Kalimpong district in 2018-2019

Source: Food Processing Industries (FPI) & Horticulture Dept., Govt. of West Bengal

- **Jalpaiguri District:**

Geographically Jalpaiguri district is located at 26°31’19.27’’ N latitude and 88°43’02.88’’ East longitude. The total geographical area of this district is 622.7 hectares. The climatic condition of this district is hot sub-humid to humid in nature. The Jalpaiguri district is situated in Eastern Himalayan Region. Average annual rainfall of this district is 1132.4 mm. Soil is red sandy loam. Irrigation facilities are mainly performed by open wells bore wells and lift-irrigation process; this unique agro climatic condition gives advantage in the field of

floriculture. Total net cropped area of flower cultivation is 0.213 hectares (28.462 hectares of total net flower cultivated area) in 2018-2019. Mainly cut flowers are predominantly cultivated in this district.

In Jalpaiguri district the main flower producing areas are in Dhupguri- Purba Mallickpara, Bandhunagar, Natunpara, Maynaguri, Kranti, Gossairhat, Shibnathpur, Jamaladaha, Koardanga and Purba Magurmari.

Flowers Name	Area in ‘ 000ha	Production in Crore Cut Flowers	Productivity in Lakh sticks/Ha
Chrysanthemum	0.003	0.048	1.600
Gladiolus	0.094	1.384	1.472
Tuberose	0.005	0.036	0.72
Gerbera	0.0001600	0.0279500	17.4687500
Orchid	0.0002	0.0076	3.8000
Flowers Name	Area in ‘ 000ha	Production in ‘000MT Loose Flowers	Productivity in MT/Ha
Marigold	0.037	0.275	7.432
Jasmine	0.023	0.023	1.000

Table 4.11: Showing Productivity of the cultivated flowers in Jalpaiguri district in 2018-2019

Source: Food Processing Industries (FPI) & Horticulture Dept., Govt. of West Bengal

- **Cooch Behar District**

Geographically Cooch Behar district is located at 26⁰19’03.39’’ North latitude and 89⁰27’18.97’’ East longitude. The total geographical area of this district is 338.7 hectares. The climatic condition of this district is pre-humid to sub-humid in nature. The Cooch Behar district

is the situated in Lower Gangetic Plain Region. Average annual rainfall of this district 2914 mm. Soil is red sandy deep loamy. Irrigation facilities are mainly performed by bore wells and lift-irrigation process; this unique agro climatic condition gives advantage in the field of floriculture. Total net cropped area of flower cultivation is 0.282 hectares (28.462 hectares of total net flower cultivated area) in 2018-2019. Mainly cut flowers are predominantly cultivated in this district.

In Cooch Behar district the main flower producing areas are in Cooch Behar II block- Kholta, Pundibari, in Tuphanganj block- Maruganj, in Dinhata block- Shitalkuchi, Gosanimari and Sitai, Mathabhanga I and II block, Haldibari block.

Flowers Name	Area in ‘ 000ha	Production in Crore Cut Flowers	Productivity in Lakh sticks/Ha
Rose	0.001	0.032	3.200
Chrysanthemum	0.005	0.062	1.240
Gladiolus	0.042	0.545	1.298
Tuberose	0.055	0.868	1.578
Gerbera	0.0003700	0.0478700	12.9378378
Orchid	0.0002	0.0056	2.8000
Flowers Name	Area in ‘ 000ha	Production in ‘000MT Loose Flowers	Productivity in MT/Ha
Marigold	0.090	0.615	6.833

Table 4.12: Showing Productivity of the cultivated flowers in Cooch Behar district in 2018-2019

Source: Food Processing Industries (FPI) & Horticulture Dept., Govt. of West Bengal

Apart from above mentioned districts at present, other districts in this state are more or less started to cultivating flowers due to incremental income than other crops. Such as-

- Birbhum District: In Mayreshwar-I block-Rambhadrapur, Siuri-I block-Changuria, Suri II block- Kendua, Hatjan Bazar, Jajigram and Faehpur.
- Bankura District: Borjora, Patrasayar, Bishnupur, Hirbandh, Simlapal, Sarenga, Chatna, and Jaypur
- Purba Burdwan: In Prubashali I block- Betpukur Village and Purbasthali II block.
- Paschim Burdwan: Panagarh, Rajbandh.
- Murshidabad: Jangipur, in Raghunathganj block-Jamuar, Jorur, Senda, Mandalpur, Siddhi Kali, Burala, in Sagardighi block-Baneshwar, Moregram, Khargramand and Kandi.

4.3 GOVERNMENT INITIATIVES IN THE FIELD OF FLORICULTURE IN WEST BENGAL

Many Government initiatives have been taken for the development of floriculture in West Bengal. These are as follows:

- a. To promote floriculture in West Bengal, North Bengal University (NBU) established the state's first tissue culture production centre named Centre of Floriculture and Agri-Business Management (COFAM) for orchids in commercial purpose. In this state, planting materials of orchids mainly bought from tissue production centre of Pune and Bangaluru and also from Holand and Australia, which increases the transportation cost. But now to counter this problem COFAM growing 35000 saplings of orchids at a time

under green houses and poly houses. Mainly four varieties of orchid's viz. Catellia, Dendrobium, Phalenopsis and Oncidium are produced by tissue culture in COAFM. This initiative makes a bridge to reduce the constraints in supply of planting materials to flower growers and increase the delivery system of orchids in domestic, national and international markets **(Sharma, 2013)³**.

- b. By the collaboration of Chemical Engineering department of Jadavpur University and Government of West Bengal, organic colour (Locally called Abir) has been produced from Marigold, Aparajita, Shimul and Palash flowers, which have very high demand in national and international markets. The colours are selling in Govt. Agri-Marketing stalls like Biswa Bangla stall and Manjusha stall throughout the year. This initiative creates job employment for many people, especially in the districts of southern part of West Bengal such as Paschim Bardhaman, Bankura, Birbhum and Purulia as well as other flower producing district of West Bengal **(Bandyopadhyay, 2017)⁶**.

- c. Government of West Bengal created 'Matir Katha App', an Information Communication Technology (ICT) based service providing expert advice to help the farmers in agriculture as well as floriculture. This App is the result of collaborations between the Department of Agriculture, Agri-Marketing, Animal Husbandry, Fisheries, Horticulture and the state information technology agency WEBEL. 'Matir Katha App' provides solutions to the farmers' on different agricultural related issues such as crop types, prices, availability of seeds and planting materials, crop insurance, crop disease and weather forecast as SMS in mobiles of farmers in the regional language **(Chowdhury, 2017)⁷**.

- d. To develop floriculture in West Bengal as well as in India one initiative has been taken by the Central government in 2020' budget ie., 'Kisan Rail'. This train will carry perishable goods in air-conditioned coaches. Flower is one of the items from the list of perishable goods. By this initiative the flower traders of West Bengal will be benefitted because this initiative will help the flower traders to export their flowers in different states of the country easily (Manna, 2020)¹⁶.
- e. To strengthen the Indian Economy government gives importance to the Green House cultivation in floriculture. According to Agricultural experts' different high price flowers like Gerbera, Chrysanthemum, Orchid, Gladiolus can be cultivated by farmers in off-season in Green House which is very profitable business. To promote green house cultivation government provides different types of subsidies for the farmers. Agriculture Department organizes different training programs and workshops for the farmers to provide technological knowledge and information on green house cultivation. To promote protected cultivation for flower government takes many initiatives.

Lists of schemes under Government of India for protected cultivation

Items		Cost Norms	Patter of Assistance
1)Green House Structure	a. Fan and Pad System	Rs. 1650/Sq.m (up to area 500 Sq. m). Rs. 1465/Sq. m (>500 Sq.m up to 1008 Sqm) Rs. 1420/Sq. m (>1008 Sq.	50% of cost for a maximum area of 4000 sq. m per beneficiary.

		m up to 2080 Sq.m) Rs. 1400/Sq. m (>2080 Sq. m upto 4000 Sq.m) Above rates will be 15% higher for hilly areas.	
	b. Naturally ventilated system		
	i) Tubular structure	Rs.1060/Sq.m (up to area 500 Sq. m) Rs. 935/Sq.m (>500 Sq. m up to 1008Sq. m) Rs. 890/Sq. m (>1008 Sqm up to 2080 Sq. m) Rs. 844/Sq. m (>2080 Sq. m up to 4000 Sq. m) Above rate will be 15% higher for hilly areas.	50% of cost limited 4000 sq. m. per beneficiary.
	ii) Wooden structure	Rs. 540/Sq. m and Rs. 621/Sq. m for hilly areas.	50% of the cost limited to 20 units per beneficiary (each unit not to exceed 200 sq.m).
	iii) Bamboo	Rs. 450/Sq. m and	50% of the cost limited to 20

	structure	Rs. 518/Sq. m for hilly areas	units per beneficiary (each unit should not exceed 200 sq.m).
2. Shade Net House	(a) Tubular structure	Rs. 710/Sqm and Rs. 816/Sqm for hilly areas	50% of cost limited to 4000 sq.m. per beneficiary.
	(b) Wooden structure	Rs. 492/Sqm and Rs. 566/Sqm for hilly areas.	50% of cost limited to 20 units per beneficiary (each unit not to exceed 200 sq.m) .
	(c) Bamboo structure	Rs.360/Sqm and Rs.414/Sqm for hilly areas.	50% of cost limited to 20 units per beneficiary (each unit not exceed 200 sq.m).
3. Plastic Tunnels		Rs. 60/Sqm and Rs.75/Sqm for hilly areas.	50% of cost limited 1000 sq.m. per beneficiary.
4. Walk in tunnels		Rs. 600/ sqm	50% of the cost limited to 5 units per beneficiary (each unit not to exceed 800 Sq.m).
5. Cost of planting material and cultivation of Orchid and		Rs. 700/Sqm	50% of cost limited to 4000 sq.m. per beneficiary.

Anthurium under poly house/shade net house		
6. Cost of planting material and cultivation of Carnation and Gerbera under poly house/shade net house	Rs. 610/Sqm	50% of cost limited to 4000 sq.m. per beneficiary.
7. Cost of planting material and cultivation of Rose and Lilium under poly house/shade net house	Rs. 426/Sqm	50% of cost limited to 4000 sq.m. per beneficiary.

Table 4.13: Showing list of government schemes for protected cultivation of flowers

Source: National Horticulture Board (NHB)

- f. Mission for Integrated Development of Horticulture (MIDH), National Horticulture Mission (NHM) and Horticulture Mission for North East and Himalayan States (NHMNEH) of Government of India during XII Plan have taken some initiatives to promote floriculture in West Bengal as well as all over India. These initiatives are as follows:

List of Floricultural Schemes of Government of India

Item	Cost Norms	Pattern of Assistance
i) Cut Flowers	Rs. 1.00 lakh/hector	40% of the cost for Small and Marginal farmers and 25% of cost to other category farmers in general areas, 50% of cost in North East, Himalayan States and Tribal Sub-Plan Areas, Andaman & Nicobar and Lakshadweep Island.
ii) Bulbous Flowers (Gladiolus, Tulip and Tuberose)	Rs 1.50 lakh/hector	40% of the cost for Small and Marginal farmers and 25% of cost to other category farmers in general areas, 50% of cost in North East, Himalayan States and Tribal Sub-Plan Areas, Andaman & Nicobar and Lakshadweep Island.
iii) Loose Flowers	40.000/hector	40% of the cost for Small and Marginal farmers and 25% of cost to other category farmers in general areas, 50% of cost in North East, Himalayan States and Tribal Sub-Plan Areas, Andaman & Nicobar and Lakshadweep Island.

Table 4.14: Showing schemes of floriculture under MIDH, NHM and NMNEH

Source: National Horticulture Board (NHB)

4.4 POPULAR FLOWER MARKETS, MARKETING SYSTEM AND RELATED ISSUES IN WEST BENGAL

A. Mallick Ghat Flower Market and Marketing System:

Mallick Ghat Flower Market is situated on the bank of Hooghly River in Kolkata, West Bengal. The Flower Market was built in the year 1855 by Ram Mohun Mallick on the memory of his father Nemai Chand Mallick (1736-1807), who had major interest in the salt trade and real estate business of those days. It is located under the south-east end of the famous Howrah Bridge (Renamed Rabindra Setu in 1965) and has the Ganga River's ghat at the back.

Mallick Ghat Flower Market is under north Kolkata that gathers all the essence of flowers in a single area. It is not only Kolkata or West Bengal; the market is East- India's largest wholesaler market and well connected by all means of transportation. It starts where the bridge ends and spreads by the river bank for a kilometer across the line **(Bandopadhyay & Ghosh, 2019)¹³**.

Starting as early as 3 O'clock in the morning the market is crowded with sellers, vendors, traders, retailers. Some sellers stay overnight as well so flowers are available 24x7 at the market throughout the week. Different types of flowers like traditional flowers- Marigold, Lotus, Hibiscus, Jasmine, Beli, Balsam, Sunflower, Tuberose etc., Cut flowers like Rose in different colours, Tuberose Gerbera, Carnation, Chrysanthemum, Gladiolus, Cockscomb, Orchids etc. and different types of garlands, bouquets are available in the market . All sorts of flowers along with their distinctive fragrances greet everyone to enter into the market. Except flowers other material used in worship of god

like Tulsi leaves, Bel Leaves, Mango leaves, Beetle leaves, ornamental grasses, ornamental ferns, Casuarinas and Thuja leaves (locally called Jhau leaves) and also artificial flowers are available in the market.

At present approximately 2000 flower sellers and 244 permanent stalls are present, except permanent stalls, some of the sellers are on ramshackle, some on the muddy ground selling flowers every day. Most of the sellers are live in small makeshift homes within the market and are engaged in making floral arrangements and bouquets which are of great demand especially during festivals and other religious occasion.

The main flower purchasing area of this market is Kolaghat, Mecheda, Panskura, Bagnan, Chandannagar, Nadia, North 24-PGS, South 24-PGS. The market supplies around 60% of the flowers sold in the world's biggest flower auctions in Amsterdam, Auckland, Dubai, Europe and different parts of the country especially in winter season. Since the market supplies flowers to the neighboring state as well as abroad, packaging of flowers in bales, thermokol boxes and bamboo baskets using ice base inside are another significant activity. Flowers are also imported in the market from the other state like Tamil Nadu, Karnataka, and Maharashtra.

All the flower sellers as well as stall owners who used to sell their flowers in the market have to pay a fixed amount of money to the Calcutta Port Authority for their day to day business because the land of the market is the property of Calcutta Port Trust Authority. For their regular business each and every flower seller have to pay 10 rupees every day and 244 stall owner have to pay 104 rupees monthly for per square feet land to

the port authority as rent. The Port Authority also charges 535 rupees for per flower loaded four wheelers (Matador).



Fig. 4.2: Mallickghat Flower Market, Kolkata

According to the Mallickghat Flower Market Committee, the market is the property of Calcutta Port Trust but in the year 2000 the then State Government of West Bengal taken lease that place in just one rupee for 99 years from Calcutta Port Authority. It was decided at that time that a well decorated flower market will built at that place for reducing day to day problem of flower seller. It was also decided that not only a flower market, a cold storage for flower, a packaging centre, export centre and a canteen will also built in that place. But after 18 years the place remains same due to lack of government support.

According to State Horticulture Department, in the year 2004, 37 crore rupees were imposed for this purpose of the flower market building. For this purpose 5 crore rupees were given by the then Central Government to the then State Government. A blueprint of well infrastructured flower market on 3400 square feet area of port trust also

prepared at that time. But the work was not started timely, for this reason the package money returned to the then central government.

According to the Chairman of Mallick Ghat Flower Market Committee, Mr. Swarnakamal Saha, In the year 2008, the market area was met with a fire accident, at that time many stalls were reduced to ashes but however it rose again from its ashes but at present the expenses of the project of the flower market will rise upto 45 crore rupees. The recent amount of rupees for the development of the market is not possible to bear by the present State Government. For this reason the development of Mallick Ghat Flower Market is still not completed (**Gangyapadhyay, 2016**)⁵.

According to the production of flowers West Bengal captured 3rd position in the country after Tamil Nadu and Karnataka. In spite of that flower sellers are facing lots of problems due to lack of proper infrastructure for their business. Mr. Narayan Chandra Nayek, the President of “All Bengal Flower Grower and Flower Trader Association” states that, It is their long time demand to the State Government to develop a well decorated flower market, a cold storage for flower preservation and application of modern technique of flower production to achieve good export quality of flowers. He also added, due to lack of cold storage, flower sellers have to sell their flowers day to day basis anyway. But in some day when they don't able to sell their flowers, the remaining flowers have thrown here and there. Due to lack of a well infrastructured flower market their business meet crisis and they don't able to compete with Tamil Nadu and Karnataka.

In 2016, flower growers of West Bengal submitted a 100 round demand petition to the then Horticulture Minister Mr. Abdur Rejjak Mollah. The Minister said that at present due to lack of funding, the State Government doesn't able to bear the expenses of the Mallick Ghat Flower Market Project.

B. Kolaghat Flower Market and Marketing System:

Kolaghat Flower Market is situated on the bank of the Rupnarayan river in Purba Medinipur of West Bengal under the Kolaghat Block of the Tamluk Subdivision. The famous flower market is located near down platform of Kolaghat Railway Station (platform No 1) on the bank of Rupnarayan River. According to Market Committee Member, the market was built in 1985 on the land of South–Eastern Railway. At present approximately 1500 to 2000 flower traders, approximately 125 Aratdars or Middleman come to the market every day. There is near about 35 stalls of artificial flowers are present.

Starting as early as 3 o'clock in the morning the market is crowded with sellers, venders, buyers as well as middleman or aratdars till 12 o'clock. Different types of flowers i.e. traditional flowers like Marigold, Lotus, Hibiscus, Jasmine, Beli, Sunflower, Tube rose etc. and cut flowers like Tube rose, Rose, Gerbera, Carnation, Chrysanthemum, Gladiolus, Cockscomb etc., different types of flower garlands, bouquets, other material used in worship of god like Tulsi leaves, Bel Leaves, Ornamental grasses, Ferns, Ornamental plants, Casuarinas and Thuja leaves (locally

called Jhau leaves.) and artificial flowers are available in the market. The market area has an everlasting pleasant fragrance of flowers that fill the air and remains colourful throughout the day and is a sight to watch.

All the flower sellers who come to sell their flowers to this market have to pay a fixed amount of money to the railway authority because the land of the market is a railway property. During the survey a local flower trader states that a man behalf of railway authority use to stand at the each entrance position of the market with coupon and collect 10 rupees from each and every flower traders who come to sell their flowers at the market.



Fig. 4.3: Kolaghat Flower Market, Purba Medinipur

Approximately 125 Middleman or Aratdar regularly come to the flower market. Their business strategy is different from the general traders. First of all they have to buy a fixed place for their business from the railway authority in the market place. After buying the fixed place from the railway authority, they are granted to continue their business at that particular place. But everyday they have to pay a fixed amount to the railway

authority for their day to day business. During the survey a middleman or aratdar states that he bought a place measuring 4'x 6'ft in the flower market by a lump sum amount of money. After that for everyday business he has to pay rupees 25 to the railway authority **(Mondal & Majumder, 2019)¹¹**.

The Aratdar or Middleman buys all flowers from general traders at average market price, and then they sell the flowers to the retailers of flowers as per their requirement. The Aratdars or middleman also sells the flowers at small wholesale market by auction sell in the evening.

Since market supplies flowers to the neighbouring states, packaging of flowers and transporting is another activity of the market. We know that Kolaghat is well connected by railways, waterways as well as roadways. From this market flowers are sent to the entire city and also exporting to different part of the country and also out of the country. For the packaging purpose they use ice base inside the big basket made by bamboo stick then flowers are kept into the basket. From Kolaghat the flowers at first sent to the Mecheda and Panskura then from that place flowers are transported by truck to the outside of the state. The flowers are exported to the different parts of the country like – Delhi, Bhubaneswar, Tata-Jamshedpur, Chennai etc as well as outside of the country.

This market is a railway property. The area of the flower market is approximately 1500 square feet. Each flower sellers have to pay 10 rupees to the railway authority to sell their flowers at regular basis, but the railway authority was never did any infrastructural development for the market. For this reason flower traders and farmers requested many times to the state government to think about this situation. After this the

officials of district administration of Purba Medinipur decided to replace the flower market at the area of the middle point of the National Highway 6 and 41 near Kolaghat Power Station. But flowers sellers and traders are not agreed with the decision because this area is very far from Kolaghat and Mecheda Railway Station. If the market is replaced to this place then the transportation cost will be rise and the distance is consume the time of the sellers and traders. In West Bengal many Kisan Mandi was built by the State Government but due to the ambiguity in selection of proper place like distance from the railway station or bus stand, these mandis are still not utilized by the farmers (Gangyopadhyay, 2019)¹⁵.

C. Dhantala Flower Market and Marketing System:

Dhantala is a village in Ranaghat II CD Block in Ranaghat Subdivision of Nadia district in the state of West Bengal. Ranaghat is the nearest railway station which approximately 6km away. Dhantala is on the Ranaghat-Duttapulia Road. Dhantala connects with Krishnanagar, Bangaon, Bangladesh through this road.

Ranaghat-Dhantala-Krishnanagar, Ranaghat-Dhantala-Aishmali-Bangaon, Ranaghat- Dhanta- Majhdia bus services are available for local transport. In Ranaghat-Dhantal area 90% of farmers depend on floriculture. All kinds of flowers are cultivated in this area. Dhantala Flower Market is situated on the Ranaghat-Duttapulia main road. The market is run on the two sides of main road. The area beside the main road where the flower market is running, that is the land of PWD (Public Works Department).



Fig. 4.4: Showing the flower market and ticket of entry fee of the Dhantala Flower Market, Nadia.

Middlemen are coming to this market. The middle man is purchase flowers from the flower growers and then transports the flowers in different market of the state as well as outside of the state.

Packaging of flowers and transporting is another activity of this market. For packing purpose they use ice base inside the bamboo basket and Thermokol boxes. From this market flowers are export in Varanasi, Siliguri, Patna, Delhi, Mumbai, as well as other country like Dhaka, Dubai, Nepal etc. In festive season flowers are also imported from different states to this market like- Bangaluru, Chennai specially Gerbera, Orchid when demand is high.

D. Nokari Flower Market and Marketing System:

Nokari is a village in Ranaghat II block in Ranaghat Subdivision of Nadia district. A short stretch of Ranaghat-Duttapulia Road connects Nokari to Aishtala where National Highway 12 meets State Highway 11.



Fig. 4.5: Nokari Flower Market, Nadia

In Nokari Village a flower market is situated. The market is small in respect of Dhantala flower market in Nadia district. This market is also starting from 3'O clock in the morning to till 9am. The speciality of this market is there is a permanent shade for the flower sellers made by West Bengal Government. But the space within the shade is not enough to accommodate large number of traders, for this reason maximum flower sellers are selling their flowers in Dhantala Flower Market. Local flower growers are generally come to this market for selling their flowers like- Nokari, Mathkumra, Purnanagar, Puratan Chapra, Dhantala, Kamalpur.

In this market mainly traditional flowers are available like- Tuberose, Marigold, Hibiscus, Balsam etc.

E. Thakurnagar Flower Market and Marketing System:

Thakurnagar is a town situated at Gaighata Block in North 24 PGS in West Bengal. Thakurnagar is located 63.4 km north east of Kolkata and it is the nearest border of Bangladesh. Thakurnagar is named after Pramath Ranjan Thakur, the great grandson of the founder of the Hindu Matuan Movement, Harichand Thakur.

Thakurnagar flower market is located near Thakurnagar Railway Station (Platform-1). The station is located on Sealdah-Bongaon-Ranaghat line of Kolkata Sun-urban Railway. The Station is 63 km from Sealdah Railway Station. According to the Market Committee member the market was built in 1975. The total flower market is consists of 5 separate building having separate owner. Each market has a separate building where flower sellers are sell their flowers at regular basis. At present more than 2000 flower sellers come to the market every day. The market is started from 9am to till 2pm., mainly traditional flowers are dominated in this market, such as- Marigold, Rose, Tuberose, Hibiscus, Balsam etc. Except the flowers different kind of leaves like- Tulsi, Mango, Bel, different types of ornamental grasses and some artificial flowers are also available in this market.

All the flower sellers who are use to come this market have to pay a fixed amount of money to the owner of the market. The price will be 10, 20 or 30 depending on to the amount of flower and area occupied by the sellers. The flower sellers are coming from the places such as Baduria, Gaighata, Bangaon, Gopal Nagar, Nagbari of this district and also from the different places of Nadia district.



Fig.4.6: Thakurnagar Flower Market, North-24-Parganas

From this market flowers are exported in Delhi, Assam, Bangladesh and some flowers like-Garbera, Orchids, Crysanthemum are also imported from Bangalore and Lotus from Birbhum District at festive season.

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CHAPTER – 5

FLORICULTURE INFORMATION SYSTEM AND ROLE OF ITS COMPONENTS IN WEST BENGAL

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FLORICULTURE INFORMATION SYSTEM AND ROLE OF ITS COMPONENTS IN WEST BENGAL

5.1 INTRODUCTION

Floriculture has emerged as an important agribusiness sector in West Bengal as well as in India, providing employment opportunities and entrepreneurship in both rural and urban areas of this state as well as this country. Due to high demand of floricultural products, it is emerged as a profitable agribusiness sector in this state and also in this country. Information has a very important role for the development of any sector and floriculture sector is not out of this system. Information is very essential for the overall development of this sector as well as floriculture community. To make information enriched and knowledgeable to the stake holders of this community a well infrastructured Floriculture Information System has needed. Some important definitions related to floriculture information system are as follows:

- **Information:** “Structured data within a context that gives it meaning” (**Checkland & Holwell, 1998**)².
- **Floriculture Information:** Any useful information related to floriculture such as- information related floriculture resources (soil, water, and climate), inputs (seed/saplings, pesticides/insecticides, and equipments), technologies for production of flowers, flower marketing and Post-harvest management.

- **System:** A system is “a group of interacting components, operating together for a common purpose” (Spedding, 1988)¹.
- **Information System:** According to Demiryurek et. al., (2008)⁴, “an information system is automated or manual, that comprises of people, machine and methods to collect, process, transmit, and disseminate data which represent information”.
- **Floriculture Information System:** Can be defined as a system in which floriculture related information is generated, consolidated, transformed, received and delivered to the target group i.e., floriculture community in their regional language according to their needs and requirements.

This system is a national platform for information and knowledge sharing and exchange for floricultural research and development for target groups and stakeholders at a country level. It serves as a knowledge repository aiming for strengthening, coordinating and adding value to the floriculture sector in order to increase the production and improve the standard of living of farmers.

- **Functions of Floricultural Information System**

- To develop tools and methodologies for the collection, storage, management and dissemination of floricultural information based on Information Communication Technology (ICT).
- To establish links and partnerships among countries and organizations with the appropriate resources, experiences and capabilities in pursuit of the capacity building goal.
- To facilitate the exchange of information at national, regional and international levels by promoting collaboration, information sharing and joint projects.

- To provide a platform that can provide support services to the floricultural community and helped in uplifting the floricultural community and improving their quality of standard of living.

5.2 ROLE OF DIFFERENT COMPONENTS OF FLORICULTURE INFORMATION SYSTEM

By the review of related literature, it has been established that an Agricultural Information System consists of three major components viz. Research & Education, Extension and Farmers (**Demiryurek et al., 2008**)⁴. Though, Floriculture is a micro-subject of agriculture then the components of Floriculture Information System are the same in this respect.

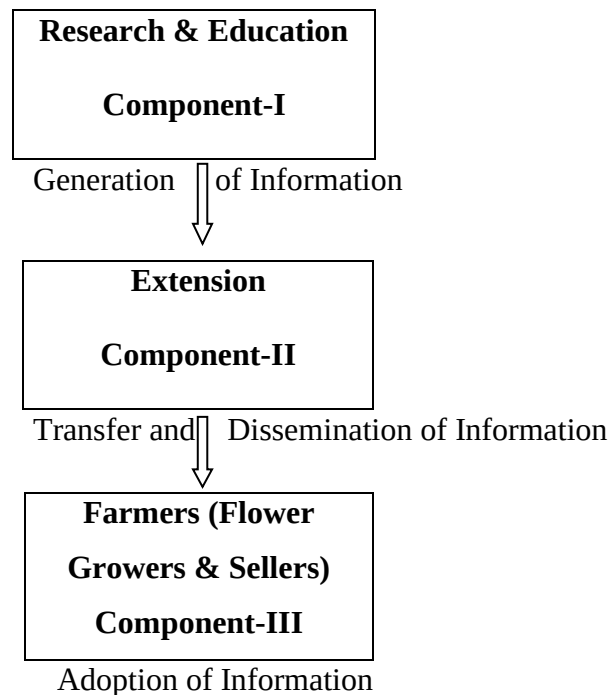


Fig. 5.1: Components and its role of Floriculture Information System

Three core components of Floriculture Information System are:-

a) Component-I: Research & Education in the field of Floriculture:

The primary role of Component-I: Research & Education in the field of Floriculture is generation of information. Generation of information is very important for the development of floriculture community. Floriculture information is generated in different ways, like- from Horticulture research and development institutes, Agricultural universities, Agricultural experts, Government and Non-government organization related to floriculture, Agriculture Marketing Department, Climatic Information Department. Floriculture information such as climatic information, crop related information i.e. fertilizers, pesticides seeds etc. , floriculture technology related information, marketing related information, crop disease related has been generated by the scientists and researchers of Horticulture research and development institutes, Agricultural Universities, Agricultural experts, Government and Non-government organization related to floriculture, Agriculture Marketing Department, Climatic Information Department.

b) Component-II: Extension Activity in the field of Floriculture.

The primary role of extension is transfer and dissemination of information. Extension service means reaching out to solving public needs with resources available through a variety of outreach programs (**Kizilaslan, 2006**)³.

Generated information has no value unless it is communicated and transferred to the floriculture community according to their needs. Government and Non-government agencies communicate floriculture community through their own way like demonstration programmes, different training programmes. Through information communication technology now-a-days information consolidated, transformed, digitized, store in electronic format as image or text

according to the needs of the floriculture community. The database contain different kind of information like- climatic information, crop related information i.e. fertilizers, pesticides seeds etc., floriculture technology related information, marketing related information etc. The extension services mainly provided by Krishi Vigyan Kendra, Kissan Call Centre and collaboratively by District Horticulture Offices, Block Offices and Panchayat Samiti at grass root level.

Two types of services are provided by the organizations **a) On-field Services (face-to face interactions):** The experts of these organizations through different training, demonstration, field visit provide information related to floriculture and **b) Off- field Services (without face to face interactions):** Sometimes farmers have contact to the experts of these organizations by toll free number. The experts of these organizations then collect data according to the cultivation related problems facing by the farmers. Then the relevant measures has been transferred to the farmers in their local language according to their needs in timely manner by the application of information communication technology (ICT).



Fig. 5.2: On-Field Service provided by the expert of Krishi Vigyan Kendra

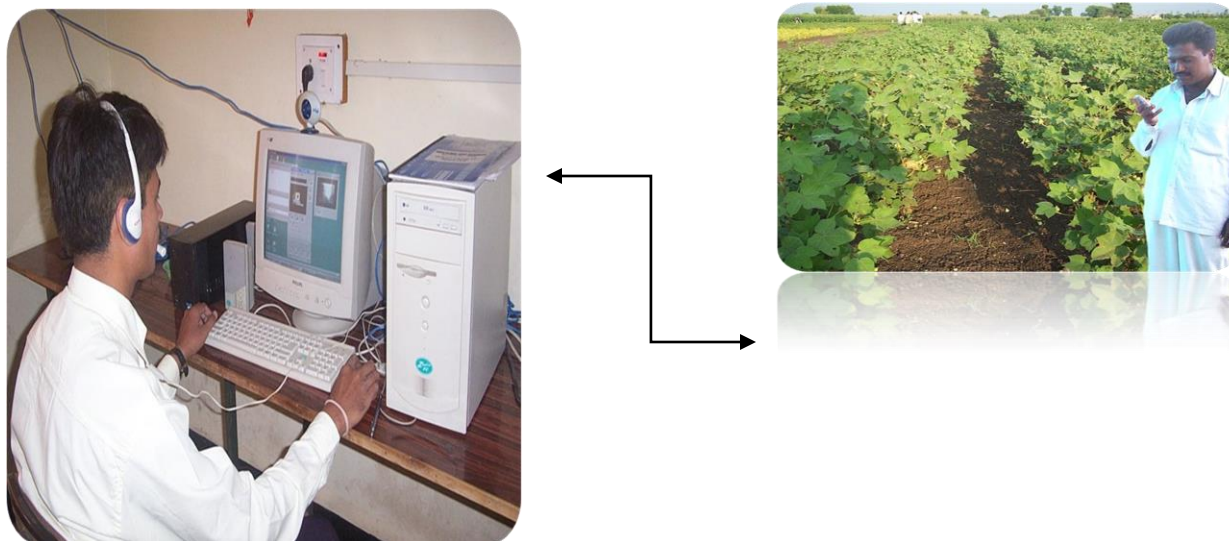


Fig. 5.3: Off-Field Service provided by the expert of Kisan Call Centre

c) Component-III: Farmers (Flower growers & Sellers):

Farmers (Flower growers and Sellers) are the third component of this system. They are the main target groups. Because generated information are meaningless if it is not adopted and applied by the farmers. Farmers are the adopter of generated, consolidated and transferred knowledge and information.

5.2.1 COMPONENT-I: RESEARCH & EDUCATION RELATED TO FLORICULTURE IN WEST BENGAL

In India, Research and Education in the field of floriculture is coordinated and managed by Indian Council of Agricultural Research (ICAR). Indian Council of Agricultural Research (ICAR) is an autonomous organization under the Department of Agriculture Research Education (DARE), Ministry of Agriculture & Farmers Welfare, Government of India, formerly known as Imperial Council of Agricultural Research. It was established on 16th July, 1929. The ICAR has

its headquarters at New Delhi. The Council is the apex body for, coordinating, guiding and managing research and education in agriculture including horticulture (floriculture), fisheries and animal sciences in the entire country. With 64- State Agricultural Universities (SAUs), 4- Deemed Universities, 65-ICAR Institutes, 14- National Research Centres, 3- Central Research Institutes, 6- National Bureaux and 13-Project Directors spread across the country. This is one of the largest national agricultural systems in the world. The ICAR play a pioneering role to develop agriculture as well as floriculture in India through its research and technology development (**Indian Council of Agricultural Research, n.d.**)⁸.

➤ **Mandates of ICAR:**

- a. Planning, Coordinating and funding to promote research and technology development for sustainable agriculture as well as floriculture.
- b. Promote frontline extension service for the application, adaptation, capacity building and technology dissemination for argi-based rural development.
- c. Knowledge management to provide right information to the right person at right time and
- d. Policy making, cooperation among member institution of ICAR and provide consultancy service in Agricultural Research, Education and Extension.

➤ **Knowledge Management Division of ICAR**

The knowledge Management Division of ICAR is committed to promote ICT driven technology and information dissemination system for quick, effectual and cost-effective delivery of information to all the stake holders of agricultural community. This division plays an important role in dissemination of current information such as latest ICAR technologies, policies, research data and other activities through print, electronic and web mode. The directorate of this

division is the nodal centre for design, maintenance and updating of ICAR website along with network connectivity across ICAR institutes and KVKs in all over the country. Besides this, the directorate of this division provides public relation and publicity support to the council and its constituents across the country.

The thrust areas of Knowledge Management Division are:

- Dissemination and sharing of agricultural information and knowledge through value-added information products in print, electronic and web mode.
- Development of e-resources on agricultural information and knowledge for global exposure.
- Strengthen e-connectivity among the ICAR Institutions, Agricultural Universities and KVKs.

ICAR Launched/co-operated NAIP(National Agricultural Innovation Project) sponsored projects for e-publishing of research of publications, standardization of websites of ICAR institutes, development of a digital Information dissemination system for ICAR and mobilization of mass media support for sharing agricultural knowledge **(Kumar et al., 2018)¹⁰**.

ICAR developed three more initiatives to strengthen the information dissemination process. These initiatives are CeRA, Krishikosh and Krishiprabha.

❖ **CeRA (Consortium for e-Resources in Agriculture)**

Consortium for e-Resources in Agriculture (CeRA) is an e-Consortium of Agricultural Libraries under ICAR for National Agricultural Research and Education System) Libraries. The consortium is established on November, 2007. This consortium provides 24x7 online accesses of selected journals agriculture and its allied subjects to all the researchers, teachers, students, policy makers, administrators and extension specialists through IP authentication. The consortium consists of 152 members of ICAR

Functions of Consortium for e-Resources in Agriculture (CeRA):

- a. For the development of Agriculture (Floriculture), dissemination of generated and updated information is very essential. This consortium provides online accessibility of articles from more than 2900 journals related to Agricultural Science and its allied subjects.
- b. CeRA acts as a catalyst to enhance agricultural research, education and extension activities of the institutions and universities of ICAR in achieving excellence and setting high standards in output and service to the grass root level and
- c. This consortium also provides Document Delivery Request System and Remote Access Facility.

List of Publications provided by CeRA:

- List of Springers free publication
- Journals covered under CeRA
- E-books covered under CeRA

- J-Gate database and
- KRISHI publications

❖ **Krishikosh**

Krishikosh is a digital repository of Agriculture and allied sectors such as Horticulture (Floriculture), Animal Sciences, Fisheries and Dairy Farming. It is an initiative of National Agricultural Innovation Project (NAIP) under ICAR. To strengthen the digital libraries and information system 'Krishikosh' is created. It provides services to all scientist, researchers, students and teachers of all State Agricultural Universities (SAUs), Deemed Universities (DUs), Central Universities (CUs) and Institutes under ICAR.

Krishikosh has the collection of old and valuable books, journals, thesis, research articles, monographs, catalogues, conference proceedings, success stories, case studies, annual reports, newsletters, pamphlets, brochures, bulletins and other grey literatures, spreads in different ICAR institutions and Agricultural Universities under ICAR in all over the country.

Krishikosh is an open access digital repository under the ICAR open access policy. Under this ICAR's open access policy it is mandatory, to upload all institutional publications viz., research articles, thesis, dissertation, monographs, catalogues, conference proceedings, success stories, case studies, annual reports, newsletters, pamphlets, brochures, bulletins and other grey literatures, summary of the complete project, speeches of Agricultural Research Institution and Agricultural Universities under ICAR.

Total 103 SAUs and ICAR Institutes are registered in Krishikosh. At present, Krishikosh has more than 35 millions digitalized pages in 1,60,000 digital volumes like books, journal

articles, reports, proceedings, manuals, historical records and more than 1,00,000 Ph.D Thesis and M.Sc. Dissertations are submitted by various ICAR institutions and universities under ICAR.

❖ **Krishiprabha**

‘Krishiprabha’ is a full text digital repository of Indian Agricultural Doctoral Dissertations. It was created by National Agricultural Innovation Project (NAIP) under the financial support of Indian Council of Agricultural Research on November, 2007. The dissertations are submitted by research scholars of 45 State and Deemed Universities. At present Krishiprabha have more than 10500 dissertations.

To promote floriculture in West Bengal as well as in all over India, many research projects and schemes has been implemented time to time by ICAR on floriculture (**Saha, et al., 2014**)⁷. These are as follows:

- In 1957, Indian Council of Agricultural Research (ICAR) recommended a research project on ‘Indigenous Ornamental Plants’.
- During 1960-62, a scheme was implemented by ICAR institute, IARI (Indian Agricultural Research Institute), New Delhi on ‘Cytogenetical and Physiological studies in relation to floriculture’.
- During 1960-65, a coordinated scheme on floriculture was sanctioned by ICAR at the nine centres viz., Hyderabad, Andhra Pradesh; Shillong, Assam; IARI, New Delhi; Bangalore, Karnataka; Pune, Maharashtra; Coimbatore, Tamil Nadu;

Saharanpur, Uttar Pradesh, Darjeeling; West Bengal on different flowers and ornamental plants.

- ICAR sanctioned 'Coordinated Scheme for maintenance and propagation of seeds and bulbs of flowers at Shimla, Himachal Pradesh (1960-1964); Mussoorie, Uttarakhand (1960-1965) and Ootacamund; Tamil Nadu (1960-1965).
- During 1963-1966, ICAR sanctioned one schemes on 'Investigation into ideal storage conditions of seeds of ornamental plants' at Coimbatore and Ootacamund centre.
- ICAR further sanctioned one research projects in 'Research on the following commercial flower crops: Jasmine, Crossandra and Chrysanthemum at Coimbatore during 1962-1967.
- ICAR established 'Division of Floriculture and Landscape Gardening' in 1969 at Indian Institute of Horticultural Research, Bangalore.
- During 1970-71, ICAR started 'Coordinated Floriculture Improvement Project' in Indian Agricultural Research Institute (IARI), New Delhi and
- In 1983, 'Division of Floriculture and Landscaping' at IARI, New Delhi.

To promote floriculture in all over India, the following ICAR research institutes are engaged in research of various aspects of floriculture. These institutes are-

- Indian Agricultural Research Institute, New Delhi.
- Indian Institute of Horticultural Research, Bangalore (Karnataka).
- ICAR research complex for NEH region, Shillong (Assam).
- National Research Centre for Orchids, Pakyong (Sikkim).
- CSIR Institutes (National Botanical Research Institute, Lucknow, (Uttar Pradesh).
- Institute of Himalayan Bio-resources Technology, Palampur
- Horticulture Experiments and Training Centre, Chaubattia, (Uttar Pradesh)
- Bhaba Atomic Research Centre, Mumbai (Maharashtra)
- Regional Plant Resource Centre, Bhubaneswar (Odisha)
- Botanical Survey of India, Calcutta (Kolkata)
- Agri-Horticultural Society of India, Calcutta (Kolkata) and
- Lalbagh Botanic Garden, Bangalore (Karnataka)

In state level, basically State Agricultural Universities (SAUs) performed the responsibility of research and education in agriculture as well as floriculture. State Agricultural Universities (SAUs) are an autonomous organization with state wide responsibility for agricultural research, education and extension education. The SAUs are headed by a Vice-Chancellor, governed by a board and advised by an advisory committee. The governing boards of the SAUs have representatives from government, farmers and agri-business. Being autonomous organizations, they are able to effectively integrate research and education and carry

out their mandate. These Universities get direct funding from the State Government for research, education and extension education and substantial grants from the National Agricultural Research Council (Singh, Meena & Swanson, 2013)⁵.

In West Bengal, two State Agricultural Universities -a) Bidhan Chandra Krishi Viswavidyalaya (BCKV) and b) Uttar Banga Krishi Viswavidyalaya (UBKV) have been studied to know the present situation of research and education in the field of floriculture.

5.2.1.1 ROLE OF BIDHAN CHANDRA KRISHI VISWAVIDYALAYA (BCKV) TO PROMOTE FLORICULTURE IN WEST BENGAL:

Bidhan Chandra Krishi Viswavidyalaya (BCKV) was established in 1974 with the responsibility of handle Agricultural Education, Research and Extension Education in West Bengal. Bidhan Chandra Krishi Viswa Vidyalaya (BCKV) functioning as a same way likes other SAUs as the branches of Agricultural research under ICAR. The internal working system of a State Agricultural University is mentioned above.

- ❖ The role of central library of State Agricultural University is very important to support in Agricultural Education, Research and Extension Education. The Central Library of Bidhan Chandra Krishi Viswavidyalaya was inaugurated in 1980 encompassing total 81000 square feet areas. BCKV have huge collection of resources to disseminate information to its users such as Administrators, Teachers, Research Scholars, Extension Workers, Staffs and Students. In BCKV, research work primarily conducts on Germplasm Collection & Conservation, Mutation Breeding, In vitro tissue culture, Dehydration of flowers.

❖ **Total Collections of BCKV:** According to Dr. Subir Das, The Deputy Librarian, Bidhan

Chandra Krishi Viswavidyalaya, the total collections of the central library are as follows:

Books- 76,057

Pamphlets- 8,252

Bound Journals- 25,023

International Standards- 95

Thesis and Dissertations- 4315

Annual Reports-190

Current Indian Journals (Hard Copy) – 10

Research Bulletin – 9893

CD ROM Database

Non-Book Materials like- Video Cassettes (37), Audio Cassettes (06), Book
Accompanying CDs (55), Thesis Soft Copies (309), and Proceedings Soft Copies (36)

Digital Repositories:

Indian & Foreign Journals through ‘CeRA’- 2200+

Krishikosh- More than 1,60,000 digital volumes

Krishiprabha- 10500+ Doctoral Dissertations

According to Dr. Subir Das, The Deputy Librarian, Bidhan Chandra Krishi Viswavidyalaya (BCKV), except the members of BCKV Central Library (users such as Administrators, Teachers, Research Scholars, Extension Workers, Staffs and Students), the library services are also given to the local participated farmers during the period of different training programs, seminar and workshops organized by different departments of BCKV. Books and Pamphlets in regional language are also provided to those farmers for seeking knowledge

and information about different aspects of farming such as, information related to various types of crops, innovative techniques of farming, information regarding various crops diseases and different remedies or solution to cope with the diseases.

Apart from library services agricultural technology related information also provided to the farmers and other stake holders of agricultural community through the Agricultural Technology Information Centre (ATIC). This information centre scheme has been launched by ICAR with an intention of establishing a single window system. ATIC is established under the monitoring of BCKV to solve location specific problems of farmers. Various services extended through ATIC, such as offering diagnostic service of crops, sale of technological inputs among farmers, supply of farm publications to the farmers, and organized farmers' visit to various units as per interests of the farmers.

According to Dr. Subhendu Sekhar Gantait, Associate Professor & Head of the Department (HOD), Floriculture & Landscape Architecture, to promote Floriculture Research and Education different initiatives has been taken-

- Short Term Course, sponsored by ICAR on 'Technology Update on Floriculture and Aromatic Crops for Farmers' Empowerment and Rural Entrepreneurship' in 9-18 December, 2019.
- ICAR sponsored, National Symposium on 'Recent Advances on Floriculture and Urban Horticulture in Global perspectives' in 4th-5th January, 2018.
- National Symposium on 'Commercial Floriculture in India' in 22nd -24th January, 2000.

- ICAR sponsored, Symposium on ‘Sustainable Production and Export of Horticultural Crops’ in 2nd -4th December, 2005.
- National Symposium on ‘Landscape and Urban Horticulture’ in 12-14 September, 2013.
- Experts of BCKV provide lectures, advisory services and technology demonstration services through Workshop, Seminar and Frontline Demonstrations on Floriculture, organized by ‘Gaighata Block Puspa, Krishi O Shilpa Mela’ in every December to January, since, 2003.

Apart from this a topic of floriculture ‘Landscaping and Gardening’ is recently introduced as a stream to promote floriculture on the basis of its aesthetic value by Bidhan Chandra Krishi Viswavidyalaya (BCKV), Kalyani. The main objective of this stream is selection of flowering; ornamental plants and foliages for landscaping, garden display, interior plants decoration for purify air from pollution and spread positive energy to the environment.

According to Dr. Subhendu Sekhar Gantait, Associate Professor & Head of the Department (HOD), Floriculture & Landscape Architecture, the main barrier to conduct research is –

- Lack of funding because floriculture sector is a minor sector of Horticulture (a discipline of Agriculture). Flower is a non-edible crop. It has only ornamental and aesthetic value. For these reason floriculture is secondary requirement not the prime priority for research funding.

5.2.1.2 ROLE OF UTTAR BANGA KRISHI VISWAVIDYALATA (UBKV) TO PROMOTE FLORICULTURE IN WEST BENGAL:

Uttar Banga Krishi Viswavidyala (UBKV) was established in 2001. The University is contributes for the overall development of the state, such as- development of quality professionals in the field of Agriculture and allied sciences, conducts demand driven research, capacity building of farmers providing consultancy and advisory services which will improve the livelihoods of farmers.

To strengthening the Agricultural Education, Research and Extension Education of UBKV, the central library of this university plays a vital role. UBKV have huge collection of resources to disseminate information to its users such as Administrators, Teachers, Research Scholars, Extension Workers, Staffs and Students.

The Department of Floriculture, Medicinal and Aromatic Plants of this university, cater the responsibility of research and education in the field of floriculture. Faculty of Horticulture of Uttar Banga Krishi Viswavidyalaya since its inception on the 1st February, 2001, different courses has been conducted in this university Such as-Under Graduate, Post Graduate and PhD for the students and research scholar. The research mandate of the department of Floriculture, Medicinal and Aromatic Plants includes: Micro-propagation of high-valued ornamental plants, Germplasm Collection & Conservation, post-harvest management and packing of flowers, protected cultivation of high valued ornamental crops.

❖ **Total Collections of UBKV:** According to Mr. Prafulla Kr. Paul, Assistant Librarian of UBKV, the total collections of the central library are as follows

Books - 31,917

Bound Journals - 4034

Periodicals - 95

Thesis and Dissertations (Digitized) - 310

CD ROM -131

CD ROM Database-08

Digital Repositories:

Indian & Foreign Journals through 'CeRA'- 2200+

Krishikosh- More than 1, 60,000 digital volumes

Krishiprabha- 10500+ Doctoral Dissertations

UBKV also provides diagnostic service of crops, supply of planting materials at low cost, sale of technological inputs among farmers, supply of farm publications to the farmers, and organized farmers' visit to various units as per interests of the farmers through Agricultural Technology Information Centre (ATIC) as BCKV.

According to Dr. Soumen Maitra, HOD, Floriculture, Medicinal and Aromatic Plants to promote floriculture in West Bengal different programs have been organized by UBKV. These are as follows:

- Training program on 'Utilization of Vermi-compost in Floriculture' from 08/02/2018-02/03/2018

- Experts of UBKV provide knowledge and information through Television Shows telecasted by Government and Non-government channel, such as-

Date	Telecasted by	Name of the Programs	Topic
16.09.2004	ETV Channel	Annadata	‘Decorative Varieties of Orchids’
17.09.2004	ETV Channel	Annadata	‘Propagation of Orchids’
18.09.2004	ETV Channel	Annadata	‘Different Diseases of Orchids’
28.05.2005	Doordarshan	Krishi Darshan	‘Orchid Production’
26.02.2009	Doordarshan	Krishi Darshan	‘Uttarabange Phool-O-Fal-Chaser Sambhabona Kotota’
05.01.2010	Doordarshan	Krishi Darshan	‘Paharey Anthurium Phool Chas’

Table 5.1: List of television programmes on floriculture by UBKV experts

- Experts of UBKV provide knowledge and information through Audio Shows broadcasted by All India Radio.

Date	Telecasted by	Name of the Programs	Topic
12.06.2015	All India Radio	Ahashbani	‘Uttarabange Phool Chaser Sambhabana’
10.11.2016	All India Radio	Akashbani	‘Uttarabange Bnjjik Vittite Phool Chaser Sambhabana Ebong Chaas Padhati’

Table 5.2: List of Talk shows on All India Radio by UBKV experts

5.2.2 COMPONENT-II: EXTENSION SERVICES RELATED TO FLORICULTURE IN WEST BENGAL

Extension service means reaching out to solving public needs with resources available through a variety of outreach programs (**Kizilaslan, 2006**)³. Floricultural Extension Service means reaching out to solving the needs of flower farmers with resources available generated from education and research through a variety of outreach programs such as training, front-line demonstration and advisory services.

Extension services in the field of floriculture basically provided by Krishi Vigyan Kendas, Kisan Call Centres and collaboratively by the extension workers of District Horticulture Department, Block Office and Panchayat Samiti.

Two types of services have been provided by the centres a) On-field services -provided by the extension workers of Krishi Vigyan Kendras and collaboratively by the extension workers of District Horticulture Department-Block Development Office-Panchayat Samiti and b) Off-field services provided by Kisan Call Centre.

5.2.2.1 ROLE OF KRISHI VIGYAN KENDRA TO PROMOTE FLORICULTURE IN WEST BENGAL

Krishi Vigyan Kendra (KVK) is an information and knowledge providing centre from where floriculture community as well as agricultural community (because floriculture is a branch of agriculture) can get information and advisory services to solve their day to day farming related problem. To accelerate the production of flower and improving the socio-economic condition of farmers, the role of Krishi Vigyan Kendra is very important in West Bengal as well as in India.

KVKs play the role of a medium to transfer the latest information and technology in between the Indian Council of Agricultural Research (ICAR) at one end and farmers on the other end. By the constant research of Agricultural Scientists lots of information and technologies are generated but these have no values unless it is transferred to the farmers according to their needs. By the help of KVKs laboratory based research is reaching to the end users i.e. farmers for their benefit. Krishi Vigyan Kendras provide the information and knowledge about modern technologies related to agriculture and allied sectors (such as Floriculture, Olericulture, Pomology, Animal Husbandry, Sericulture, Fisheries and Dairy farming) at the doorstep of farmers **(Behara, Maharana & Acharya, 2014)⁶**.

According to the mandate of Indian Council of Agricultural Research (ICAR), it acts as a repository of information and knowledge of agriculture and its allied sectors to enhance the quality of living of the farmers. To meet the agricultural research and education need of this country, ICAR established many Agricultural Universities, Agricultural Institutes in all over India. In extend to working at grass root level; ICAR has established Krishi Vigyan Kendra (KVK) at district level. KVK is an integral part of the National Agricultural Research System (NARS) in India.

In India, first KVK was established in Pondicherry (now called Puducherry) in the year 1974. At present there are 716 KVKs in all over India. These KVKs are administrated by State Agricultural University (SAU) and Central Agricultural University (CAU), ICAR Institutes, Non-governmental Organizations (NGOs), State Government, by various Public Sector Undertakings (PSUs) and other Educational Institutions.

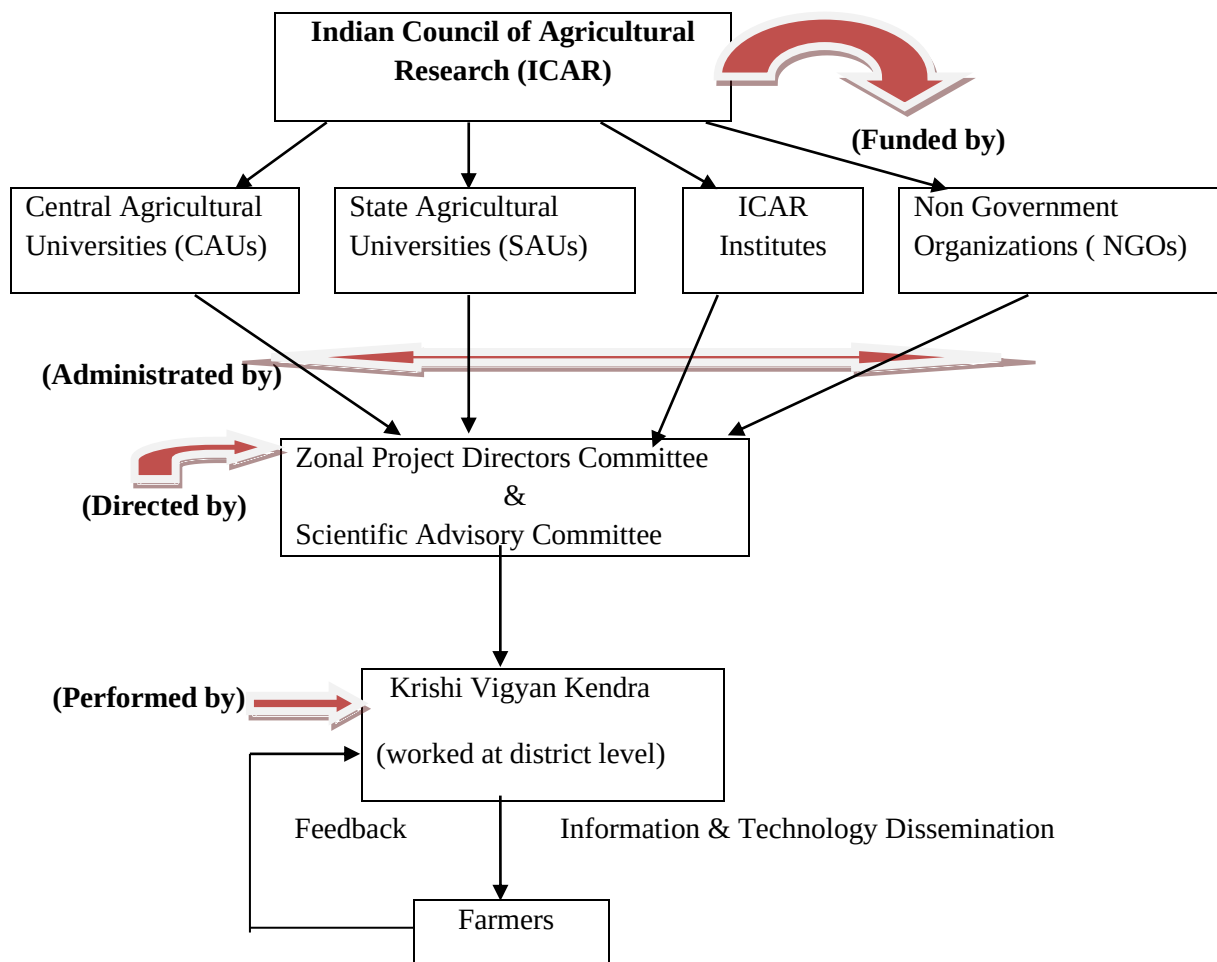


Fig.5.4: Diagrammatic representation of Information flow in Krishi Vigyan Kendra

In West Bengal, there are 24 Krishi vigyan Kendras (KVKs) are present, out of which 12 KVKs are under State Agricultural University (SAU), 1 KVK is under Central University (CU), 5 KVKs are under ICAR institutes, 1 KVK under Deemed-to-be University (DU), 1 KVK under Public Sector Undertaking (PSU) and 3 KVKs under Non-Government Organization (NGO).

Krishi Vigyan Kendras in West Bengal (24)		
SL. No.	Address of Krishi Vigyan Kendras	Host Organization
1.	Krishi Vigyan Kendra, Village Milebasa, P.O.-Kalukhali, P.S.- Bhagwangola, Murshidabad	Director, of Research, Extension & Farms West Bengal University of Animal & Fishery Sciences.
2.	Krishi Vigyan Kendra, Block Seed Farm Chopra, Uttar Dinajpur	Uttar Banga Krishi Viswavidyalaya (UBKV)
3.	Krishi Vigyan Kendra, P.O.- Jagatballavpur, Howrah	Bidhan Chandra Krishi Viswavidyalaya (BCKV)
4.	Krishi Vigyan Kendra, P.O.- Chinsurah, Hooghly	Vice-Chancellor, Bidhan Chandra Krishi Viswavidyalaya (BCKV)
5.	Krishi Vigyan Kendra, 812/1-Ashoknagar, North 24 Parganas	West Bengal University of Animal & Fishery Sciences
6.	Krishi Vigyan Kendra, Central Research Inst. For Jute & Allied Fibre Bud Bud, Bardhaman	Central Research Institute of Jute & Allied Fibres (CRIJAF)
7.	Krishi Vigyan Kendra, Pundibari, Coochbehar	Uttar Banga Krishi Viswavidyalaya, Pundibari
8.	Krishi Vigyan Kendra, Block Seed Farm PO.Ratua (Manik Chowk), Malda	Uttar Banga Krishi Viswavidyalaya
9.	Krishi Vigyan Kendra, Regional Research Station Majhihan, Patiram, Dakshin Dinajpur	Uttar Banga Krishi Viswavidyalaya
10.	Krishi Vigyan Kendra, P.O.- Gayeshpur, Nadia	Bidhan Chandra Krishi Viswavidyalaya
11.	Rathindra Krishi Vigyan Kendra, Palli Siksha Bhavan, (Institute of Agriculture) PO.Sri Niketan, Birbhum	Visva-Bharti Shanti Niketan
12.	Krishi Vigyan Kendra, Kalimpong, Darjeeling	Uttar Banga Krishi Viswavidyalaya
13.	Krishi Vigyan Kendra, Kalayan, Vill-Bongabari, Vivekananda Nagar, Purulia	Kalyan. Vill-Bongobari.
14.	Krishi Vigyan Kendra, PO.Ramsha via Lataguri, Jalpaiguri	West Bengal University of Animal & Fishery Sciences.
15.	Krishi Vigyan Kendra, WBCADC, Sonamukhi, Bankura	WB Comprehensive Area Development Corporation.

16.	Krishi Vigyan Kendra, C/O.Sri Ramkrishna Ashram, PO. Nimpith Ashram, South 24-Parganas	Sri RamkrishnaAshram, PO. Nimpith Ashram South 24 Parganas-743338
17.	Krishi Vigyan Kendra, Seva Bharati, Kapgari, West Medinipur	Seva Bharati, Kapgari, West Midnapur
18.	Krishi Vigyan Kendra, Vill.-Arapanch, Mouza-Natagachi and Vill.-Narendrapur, Mouza-Ukhilapaikpara, South 24 Parganas.	Ramakrishna Mission Vivekananda University, Belur Math,
19.	Krishi Vigyan Kendra, Malda	ICAR-CISH, Lucknow Regional Station, Malda
20.	Krishi Vigyan Kendra, North 24 Pargana	ICAR-CRIJAF, Barrackpore
21.	Krishi Vigyan Kendra, North Farm of the ICAR-CRIJAF, North 24 Paraganas	ICAR-CRIJAF, Barrackpore
22.	Krishi Vigyan Kendra, Eastern Regionsl Station (NDRI) Kalyani, Nadia	ICAR-NDRI,Karnal-132001 (Haryana)
23.	Purba Medinipur Krishi Vigyan Kendra, Purba Medinipur	Bidhan Chandra Krishi Viswavidyalaya (BCKV)
24.	Krishi Vigyan Kendra, Melibasa, Murshidabad	Ramkrishna Mission Vivekananda University

Table 5.3: List of total Krishi Vigyan Kendras in West Bengal

Source: Website of Indian Council of Agricultural Research

As a component of Floriculture Information System, 9 KVKs of flower producing zone of West Bengal has been selected for survey with structured questionnaire to know the work flow of Floriculture Information System at district level in West Bengal such as- 1) Nadia Krishi Vigyan Kendra 2) Howrah Krishi Vigyan Kendra 3) Purba Medinipur Krishi Vigyan Kendra 4) Seva Bharati Krishi Vigyan Kendra (Paschim Medinipur) 5) Nimpith Krishi Vigyan Kendra

(South-24-Parganas) 6) Ashoknagar Krishi Vigyan Kendra (North-24-Parganas) 7) Coochbehar Krishi Vigyan Kendra 8) Jalpaiguri Krishi Vigyan Kendra and 9) Darjeeling Krishi Vigyan Kendra.

KVK	Year of Establishment	Administrated by	Jurisdiction covered	Challenges
1.Nadia	2004	BCKV (SAU)	17 Blocks	Infrastructure, funding, low literacy rate of farmers, lack of marketing related information.
2.Purba Medinipur	2017	BCKV (SAU)	25 Blocks	Infrastructure, funding, low literacy rate of farmers, less number of efficient workers.
3.Paschim Medinipur	1976	NGO-Seva Bharati	24 Blocks	Infrastructure, low literacy rate of farmers.
4. Nimpith (South-24-Parganas)	1979	NGO-Ramkrishna Ashram	15 Blocks	Low literacy rate of farmers, less number of efficient workers, limitations of land for poor and marginal farmers to adopt new technology.
5.Ashokenagar (North-24-PGS)	2005	WBUAF(SAU)	11 Blocks	Infrastructure, funding, low literacy rate of farmers, Less number of efficient workers.
6. Howrah	2005	BCKV(SAU)	14 Blocks	Low literacy rate of farmers to deal with.

7. Cooch Behar	2004	UBKV (SAU)	12 Blocks	Low literacy rate of farmers, behaviour of farmers towards information application is not positive, lack of availability of quality planting materials to distribute farmers.
8. Jalpaiguri	2000	WBUAF(SAU)	7 Blocks	Low literacy rate of farmers to deal with, lack of market related information
9. Darjeeling	1993	UBKV (SAU)	10 Blocks	Infrastructure, funding and low literacy rate of farmers.

Table 5.4: Shows the surveyed data of selected nine KVKs

Name of the KVKs	Initiatives taken in the field of floriculture
Nadia	a) Nadia KVK has a model nursery for seedling development b) Frontline demonstration for “Prajjal” variety of tuberose flower which is disease resistant. c) Nursery Management for ornamental flower. d) Shade management for high-tech flower cultivation e) Poly house development training for Orchid and Gerbera cultivation f) Cultivation of loose flower g) Technical intervention was made like quality seedling production, quality bunch production for Gerbera, Orchid, Chrysanthemum, Marigold and Tuberose and h) Value added in flower by preparation of dry flower, scent, gulal

	from flower.
Purba Medinipur	a) Growing awareness for cultivation of some high value flower such as Gerbera, Gladiolus and Orchid in increasing the demand of the national and international market b) Diversification of flower production c) Increase the use of protected cultivation such as Green House, Poly House and Shade Net d) Post-harvest management technology for export oriented flowers.
Paschim Medinipur	a) Promote Commercial Floriculture, b) Protected Cultivation c) Nursery Management d) Supplying low cost planting materials.
Nimpith (South-24-PGS)	a) Poly House Promotion, b)Green House Cultivation, b) c) Nursery Management c) d) Give information related to domestic floriculture.
Ashoknagar (North-24-PGS)	- a)Promote Nursery Management - b)Protected Cultivation
Howrah	a) Promote Protected Cultivation such as Shade Net, Green House .
Cooch Behar	a) On-Field Demonstration on Floriculture b) Awareness camp to promote scientific floriculture c) Post-harvest management d) Supply of quality planting material.
Jalpaiguri	a) Growing awareness for cultivation of Marigold flower in increasing the demand of the local market for livelihood generation. b) Increase the use of protected cultivation such as Green House, Poly House, and Shade Net.

	c) Cultivation of export oriented high value flowers like- Gladiolus, Anthurium, Chrysanthemum, Orchid etc. d) Post-harvest management technology for export oriented flowers.
Darjeeling	a) Cultivation of export oriented high value flowers like- Carnation, Orchid, Anthurium, Chrysanthemum. b) Promote protected cultivation c) Promote nursery management

Table 5.5: Shows the initiatives taken by the selected KVKs to promote floriculture in

West Bengal

5.2.2.2 ROLE OF KISAN CALL CENTRE (KCC) AND MATIR KATHA PORTAL TO PROMOTE FLORICULTURE IN WEST BENGAL

To disseminate floriculture information the role of Kisan Call Centre is very vital in West Bengal as well as in India. There are two types of agricultural extension services has been provided-1) On-field extension service and 2) Off-field extension service. The service of Kisan Call Centre lies under Off-field extension service because farmers contact agricultural extension workers without face to face interactions.

The Kisan Call Centres are useful application of Information Communication Technology (ICT). By the use of ICT, these centres deliver knowledge and information exactly as per requirement of the agricultural community as well as floriculture community to solve their day to day farming related problems. These centres disseminate information instantly in the regional language to the farmers (Pavan et al., 2019)¹².

The Kisan Call Centre scheme was launched by the Department of Agriculture & Cooperation (DAC), Ministry of Agriculture, Government of India on January 21st, 2004 with the objective to answer queries of farmers instantly in their own language. These centres are

placed in 14 location covering all the States and Union Territories in India. These centres can be accessed by the farmers all over the country on common Toll Free Number 1800-180-1551. Farmers can access the service through mobile phones and landlines of all telecom networks including private service providers. The service is available for 16 hours a day from 6am to 10 pm except Sundays and Gazetted holidays, beyond these hours the calls are attended in IVRS mode in 22 regional languages all over the country. Around 600 Call Centre Operators have been engaged at 32 Kisan Call Centres located in 14 places with 25 Nodal Agencies in all over India to answer the farmers' queries.

- **Operating System of Kisan Call Centres**

The operating system of Kisan Call Centres are consists of three levels, such as-1) Level I 2) Level II and 3) Level III

Level I: In the first stage ie. Level I, operators of Kisan Call Centres pick up the call with short welcome message then takes down the basic information and queries of the callers and these details fed into the computers. These database maintained by the server for further use because these database are very important for policy makers in state level as well as national level. The operator should know the local language, preferably from agricultural background and able to answer most of the queries of farmers.

Level II: In case the first level operator is not able to answer the queries of the farmers then the operators forward the calls to the concerned Subject Matter Specialists (SMSs) located at the respective places like Agricultural Research Institutes, Krishi Vigyan Kendras(KVKs), State Agricultural Institutes and Allied sectors such as Horticulture, Forestry, Animal Husbandry,

Fisheries. The data relating to the farmers including the queries are also transferred to the Level II functionaries on his computer along with the call.

Level III: It is the last stage of this operating system. If the first and second level functionaries do not able to answer the queries of the farmers then the questions are sent to the Nodal Agency of the state. Then appropriate replies would be framed by the consultation with the concerned experts available within the state or outside the state by the Nodal Cell. Then the replies would be sent to the farmers by phone through the Level I operator within 72 hours of receipt of the queries from the farmers.

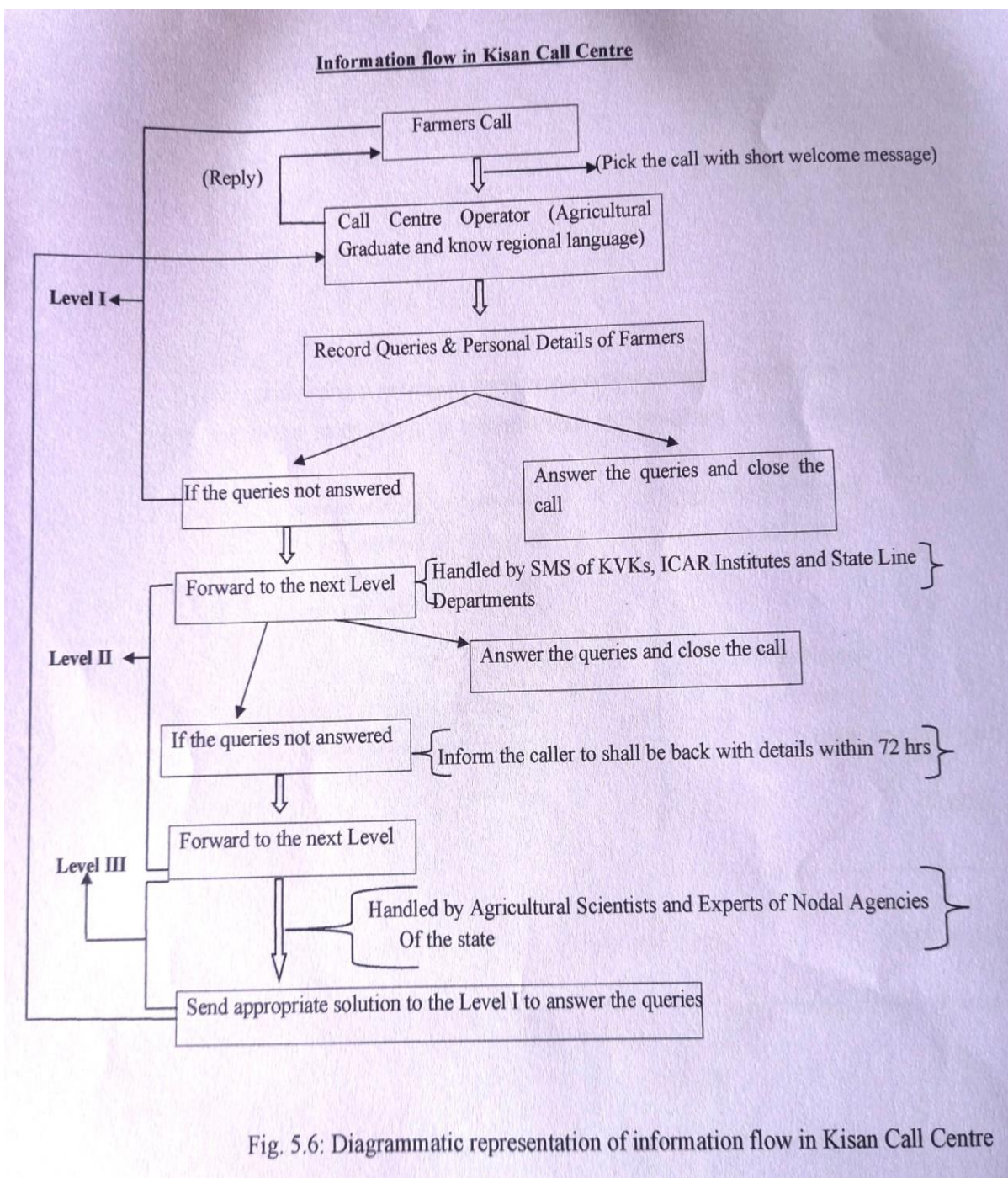


Fig. 5.6: Diagrammatic representation of information flow in Kisan Call Centre

List of Kisan Call Centres working in the country

SL No.	Call Centre Location	States and Union Territories Covered
1	Hyderabad	Andhra Pradesh
2	Patna	Bihar, Jharkhand
3	Jaipur	Delhi, Rajasthan
4	Ahmedabad	Gujarat, Dadra, Nagar Haveli, Daman & Diu
5	Chandigarh	Haryana, Punjab, Chandigarh, Himachal Pradesh
6	Jammu	Jammu & Kashmir
7	Bengaluru	Karnataka, Kerala, Lakshadweep, Andaman & Nicobar
8	Jabalpur	Madhya Pradesh, Chattisgarh
9	Pune	Maharashtra, Goa
10	Coimbatore	Tamil Nadu, Puducherry, Andaman & Nicobar
11	Kanpur	Uttar Pradesh, Uttarakhand
12	Kolkata	West Bengal, Sikkim
13	Guwahati	Arunachal Pradesh, Assam, Mizoram, Meghalaya, Tripura, Nagaland, Manipur
14	Bhubaneswar	Odisha

Table 5.6: List of Kisan Call Centres working in the country

Sources: Website of Indian Council of Agricultural Research

- **Matir Katha Portal:**

Other than Kisan Call Centre, Matir Katha is an ICT-based farmer-centric agricultural-extension project has been developed for the benefit of farmers by the Agriculture Department, Govt. of West Bengal. It has implemented through a web portal (of the same name) that disseminates information and advisory services to farmers. It was launched by the Agriculture

Department during financial year (FY) 2014-15 and is being extensively implemented throughout the state from FY 2015-16.

Under this project, all field-level functionaries of all blocks have been provided with hand-held devices having built-in content. The content is of two broad categories – scientific packages of practice (POP), both in Bengali and in English, for 93 crops and interactive modules on crop-related questions and answers, farmers’ training, integrated nutrient management (INM), integrated pest management (IPT), fertilizer and pesticide calculators, and agricultural advisories and activities.

Farmers’ queries are getting answered in the shortest possible time. Answers and advisories are also being sent through SMS. Other services being offered through the website are soil sample collection for issuing soil health cards to farmers, applications for financial assistance for farm mechanization, automation of crop-cutting experiments, tracking of crop insurance applications and reporting of schemes.

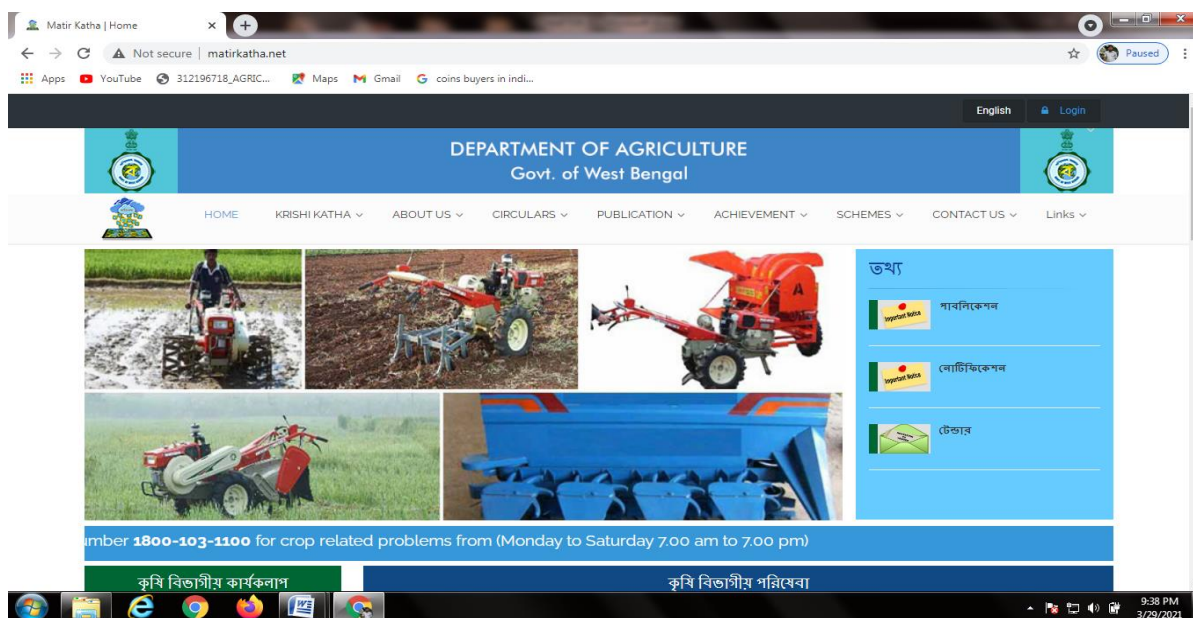


Fig. 5.7 Showing the website of Matir Katha Portal

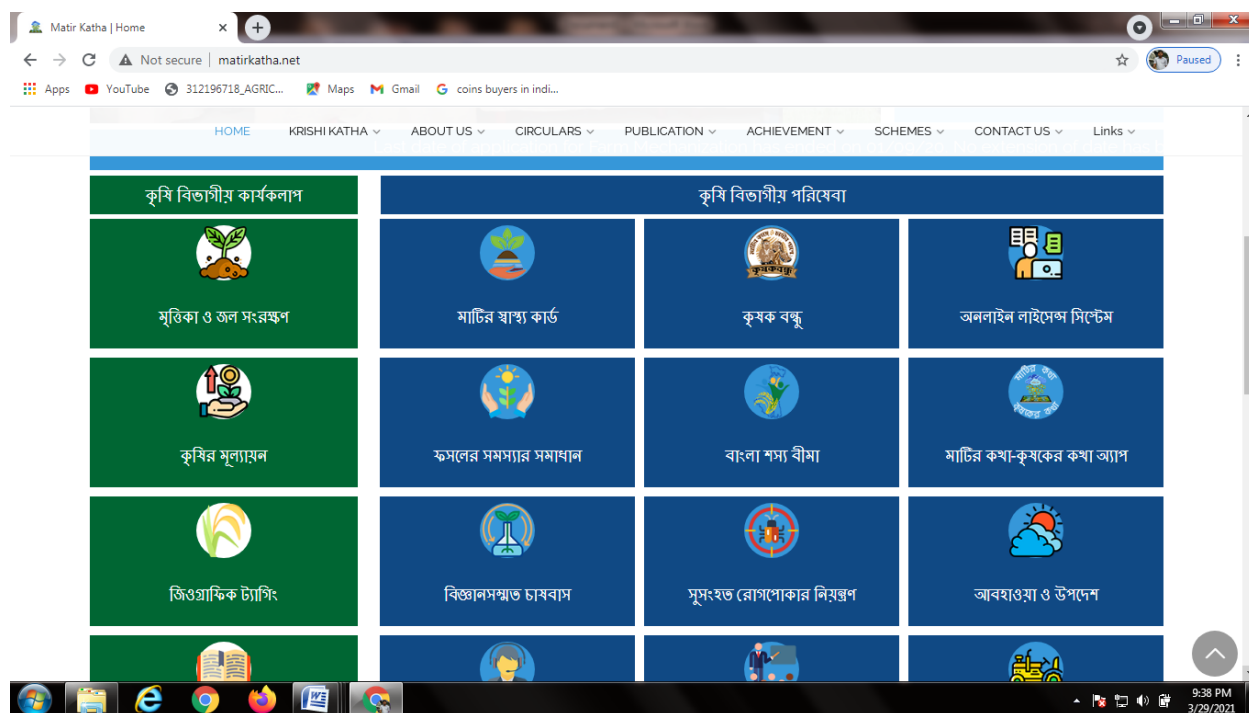


Fig. 5.8 Showing the website of Matir Katha Portal

- **Matir Katha-Krishoker Katha app**

Matir Katha-Krishoker Katha app is an ICT based agricultural-extension portal which provides a dynamic platform to disseminate crop solution to farmers at the farm-gate level developed by Agriculture Department, Government of West Bengal for the benefit of farmers. This project is the result of collaboration between Department of Agriculture and its allied sectors, such as - Agriculture Marketing, Animal Husbandry, Fishers, and Horticulture (Floriculture) and the State Information Technology Agency WEBEL, the system allows farmers to avail the services of technical experts through Krishi Prajukti Sahayak (KPS) or Agri-Tech Assistants. Under the scheme, KPS is provided with tablets containing ready answers of frequently asked questions concerning agriculture and its allied sectors. There is also a panel of

experts who analyze and provide solutions to the problems of the farmers that are relayed to them by the KPS. Posted in Gram Panchayat levels, KPS are provided with android tablets with GPRS connection to facilitate real time audio and video messaging, thereby relaying the farmers' problems to the agricultural-experts instantly. Matir Katha-Krishoker Katha provides solutions to the farmers on a host issues concerning crop types, prices and availability of seeds, insurance, crop disease and weather forecast (**Chowdhury, P., 2017**)⁹. Through the Matir Katha-Krishoker Katha app farmers can ask their queries directly to officials of the department. There is a toll-free phone number for the same purpose – 18001031100. The Matir Katha Call Centre operates from Monday to Saturday from 7 am to 7 pm. All the services are free of cost (**Matir Katha, n.d.**)¹¹.

5.2.2.3 COLLABORATIVE ROLE OF DISTRICT HORTICULTURE DEPARTMENT, BLOCK OFFICE AND PANCHAYAT SAMITI TO PROMOTE FLORICULTURE IN WEST BENGAL

The Department of Horticulture, Headed by the Director of Horticulture, is responsible for implementation of Government policies related to Horticulture in the State. Additional Director of Horticulture and Joint Director of Horticulture are heading the extension work at state level and range level (The state has been divided into seven ranges).

The Assistant Director of Horticulture is the nodal authority at district level extension works. Each Sub-Division has a Sub-Divisional Horticulture Officer assisted by Subject Matter Specialists to channelize the horticulture extension services in the subdivision level of a district.

The block level extension works are carried out by Horticulture Development Officer (HDO) and at Panchayat Level; the Krishi Prajukti Sahayak (KPS) are attached to help the HDO to close contact with the farmers at their respective operational areas.

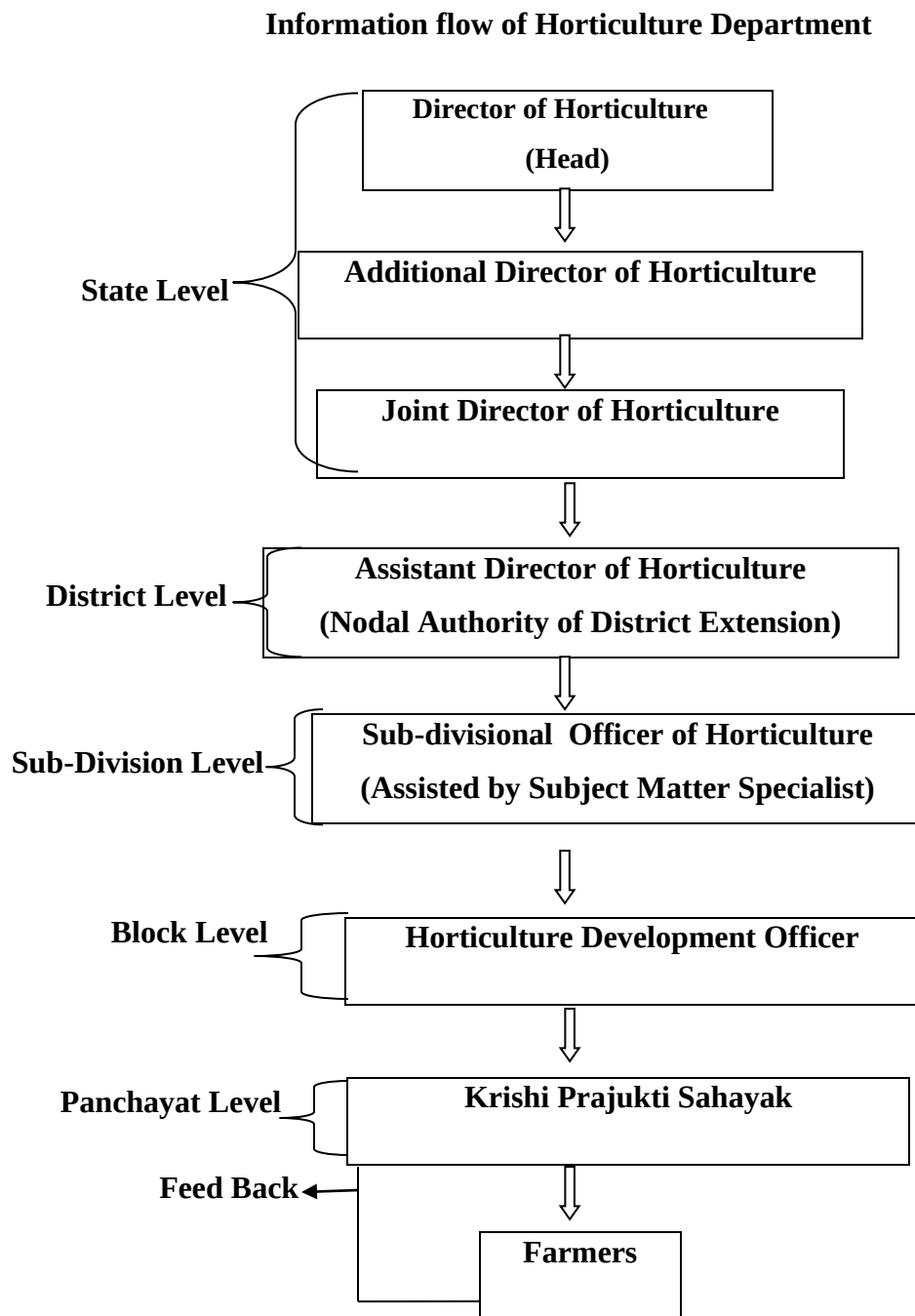


Fig. 5.9: Diagrammatic representation of information flow in Horticulture department

Functions of Horticulture Department at different Levels:

- **State Level: :** (According to Dr. Ranajay Dutta, Assistant Director of Food Processing Industries & Horticulture, Govt. of West Bengal)
 - a. Planning and Policy making by Director of Horticulture, Additional Director of Horticulture and Joint Director of Horticulture with the administrators of the state.
 - b. Implementation of government policies and schemes related to horticulture in the state.

- **District Level:** (According to Dr. Biplab Sharma, Assistant Director of Horticulture Department, Cooch Behar)
 - a. Supervision of overall district level horticultural activities.
 - b. Monitoring of government allotment and work progress in the field of horticulture at district level.
 - c. Issue of license to businessmen for storage, selling of seeds, pesticides and fertilizers.
 - d. Responsible for report returns to the state level higher authority.

- **Sub-Division Level:**
 - a. Provide financial assistance to promote protected in green house, shade net house and poly house cultivation of horticultural crops such as flower, vegetables and fruits.
 - b. Organize workshop, training programs for the farmers
 - c. Circulation, publishing of technical information
 - d. Disbursement and monitoring of training allotment

- e. Supervision of plant protection and crop production work by the assistance of Subject Matter Specialists (SMSs)
- **Block Level:** (According to Bilas Mandal, Field Officer, Mathurapur-I Block)
 - a. Provide information about different schemes and advisory services in the field of horticulture to increase the area of horticultural crops (flower, vegetable and fruit)
 - b. Provide leaflets, pamphlets to the farmers on horticultural crops.
 - c. Monitor for the implementation of all the horticulture related schemes in the block.
 - d. Provide trainings and workshops related information to the farmers.
 - e. Distribute the seeds and planting materials sometime free of cost or with subsidy to farmers under various schemes.
 - f. Distribute fertilizers sometime free of cost or with subsidy to farmers under various schemes.
 - **Panchayat Level:** (According to Kakali Kayal, Panchayat Samiti Member of Bhagabatipur Village, Mathurapur-I Block)
 - a. Organize crops demonstration and technical demonstration programs for the farmers.
 - b. Distribution of seeds and planting material to the farmers.
 - c. Distribution of fertilizers and pesticides to the farmers.
 - d. Convey the messages of associated problems related to horticultural crops via Krishi Prajukti Sahayak (KPS) at Panchayat level from the grass root level to the higher authority.

❖ Process of getting financial assistance of different schemes from District Horticulture Department

According to Dr. Biplab Sharma, Assistant Director of Horticulture, Government of West Bengal, the processes of getting financial assistance of different schemes of horticulture from the District Horticulture Department are described by different steps. These steps are as follows:

➤ Step I:

Farmers can get application form of different schemes either from Horticulture Development Officer of block office or from Sub-divisional Officer of Horticulture department.

➤ Step II:

After getting the application form, the farmer have to fill up the form with details such as- personal information with identity proof like Xerox of Adhaar Card or Voter ID, Bank account details like- account number, IFSC Code, land details, like-Area of land holding, Daag number, Khatian number, purpose of application and passport size photograph. Then have to submit the form into the respective office from where the form was collected.

➤ Step III:

Then the form submitted to the District Horticulture Office by the respective authority. After that the Assistant Director of Horticulture will register the beneficiary farmer in Hort.net portal of Government of India. After registration a beneficiary code will be generated.

➤ **Step IV**

Then a list of total beneficiary farmers of the district will be prepare by the Assistant Director of Horticulture for verification with details of beneficiary farmers.

➤ **Step V:**

After that the list of beneficiary farmers will send to the District Magistrate Officer (DMO) for approval.

➤ **Step VI:**

Then the approved list will sent to the District Horticulture Office from District Magistrate Office.

➤ **Step VII**

After that the Assistant Director of Horticulture, of District Horticulture Office, will sent the approved list with permission letter to the respective bank of Government of India.

➤ **Step VIII:**

Then the respective bank will transfer the sanctioned subsidy amount to the beneficiary farmers' account through Direct Benefit Transfer (DBT).

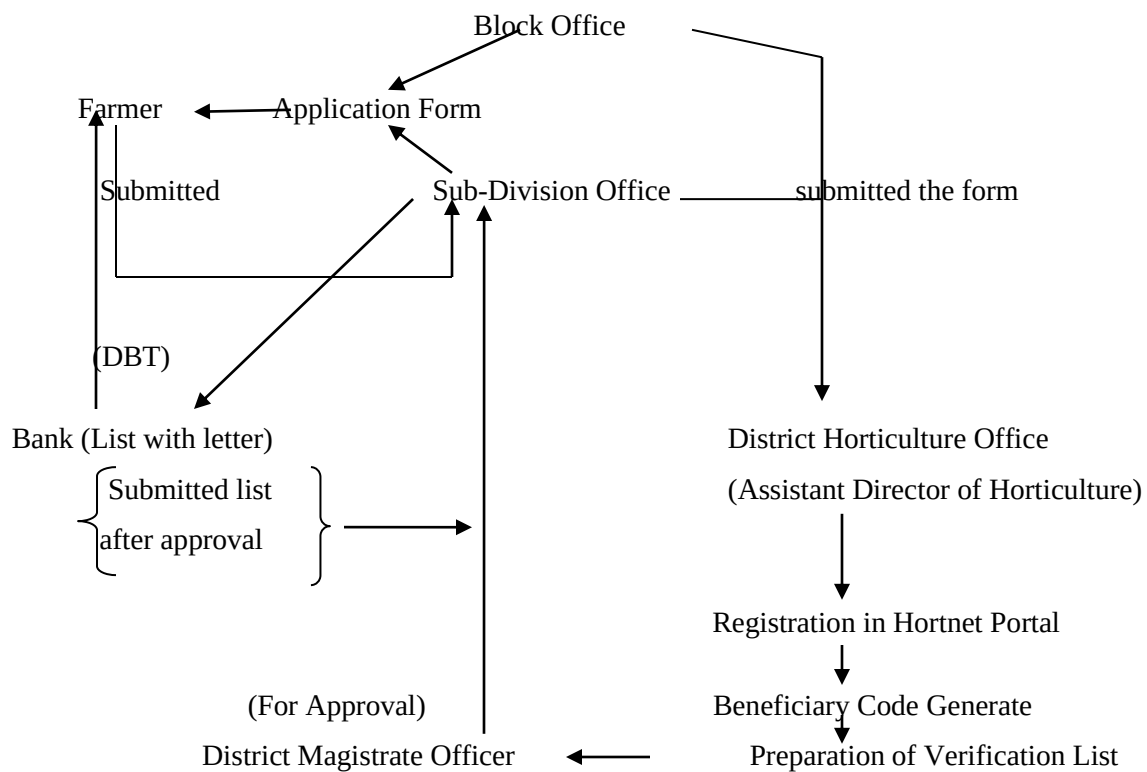


Fig. 5.10: Diagrammatic representation of the process of getting financial assistance of different govt. schemes from Horticulture Department.

5.2.3 COMPONENT-III: FARMERS (FLOWER GROWERS & SELLERS) IN WEST BENGAL

A. FLOWER GROWERS

Farmers (growers and sellers) are the third component of this system. They are the main target groups. Because generated information are meaningless if it is not adopted and applied by the farmers. Farmers are the adopter of generated, consolidated and transferred knowledge and information.

To collect ground level data about the information and extension services provided by the government organizations to the flower farmers (growers and sellers) , and to measure their knowledge and awareness about the government facilities in the field of floriculture, 331 flower growers from 9 leading flower producing districts (Nadia, Purba Medinipur, Paschim Medinipur, North-24-Parganas, South-24-Parganas, Howrah, Darjeeling, Jalpaiguri, and Cooch Behar) have been selected and to collect data on the issues of flower marketing system and infrastructural constraints related to floriculture, 218 flower sellers of 5 popular flower markets(Mallick Ghat Flower Market, Kolaghat Flower Market, Dhantala Flower Market, Nokari Flower Market, Thakurnagar Flower Market) of West Bengal have been selected for this purpose because floriculture is not only deal with production of flowers but also deals marketing of those flowers.

5.2.3.1 SOCIO-ECONOMIC CHARACTERISTICS OF RESPONDENT FLOWER GROWERS IN WEST BENGAL

There are three hundred thirty one (331) flower growers have been selected from the different flower producing zones of West Bengal mentioned in details in Chapter-3. The socio-economic characteristics such as age, educational level and financial status, experience and sex of flower growers are described below in tabular form.

- **Socio- economic characteristics of the respondents**

Characteristics	Categories	Frequencies	Percentage
Age	18-25 years	38	11.48 %
	26-35 years	93	28.09 %
	36-45 years	104	31.41 %
	46-55 years	62	18.73 %
	56-65 years	34	10.27 %
Educational Level	Primary Level	79	23.86%
	Secondary Level	172	51.96%
	Higher Secondary Level	53	16.01%
	Graduation and above	27	8.15%
Financial Status	Below Poverty level	156	47.12%
	Lower Middle Class	123	37.16%
	Upper Middle Class	52	15.70%
Experience in Floriculture	1-5 years	45	13.59%
	5-10 years	188	56.79%
	10-15 years	85	25.67%
	15-20 years	13	3.92%
Sex	Male	214	64.65%
	Female	117	35.34%

Table 5.7: Shows the socio-economic characteristics of the respondents flower growers

- **Age :** The results from the above table shows that out of 331 respondents 38(11.48%) respondents were the age between 18-25, 93(28.09%) respondents were the age between 26-35, 104(31.41%), respondents were the age between 36-45, 62 (18.73%) respondents were the age between 46-55 and 34(10.27%) respondents were the age between 56-65.

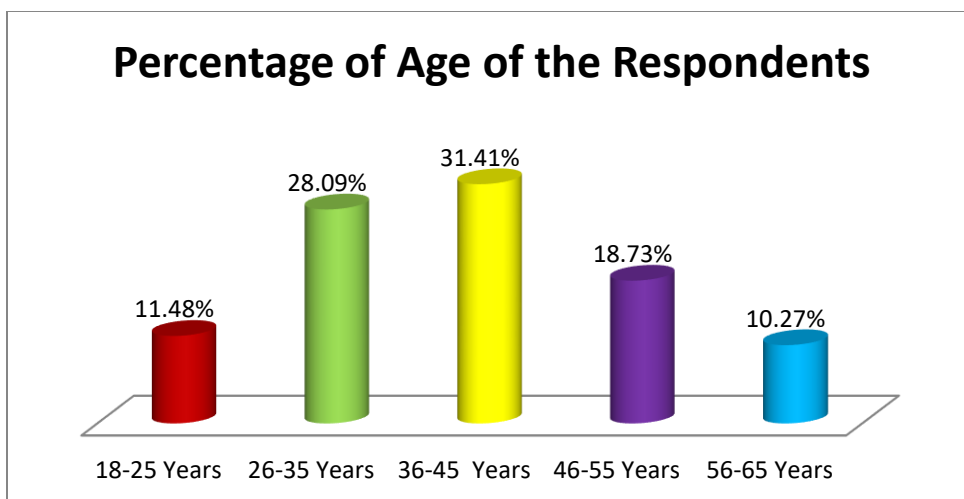


Fig. 5.11: Graphical representation of percentage of age of the respondent flower growers

- Educational Qualification:** From the above table, out of 331 respondents 79 (23.86%) respondents have completed Primary Education, 172 (51.96%) respondents have completed Secondary Education, 53 (16.01%) respondents have completed Higher Secondary Education and 27 (8.15%) have completed Graduation.

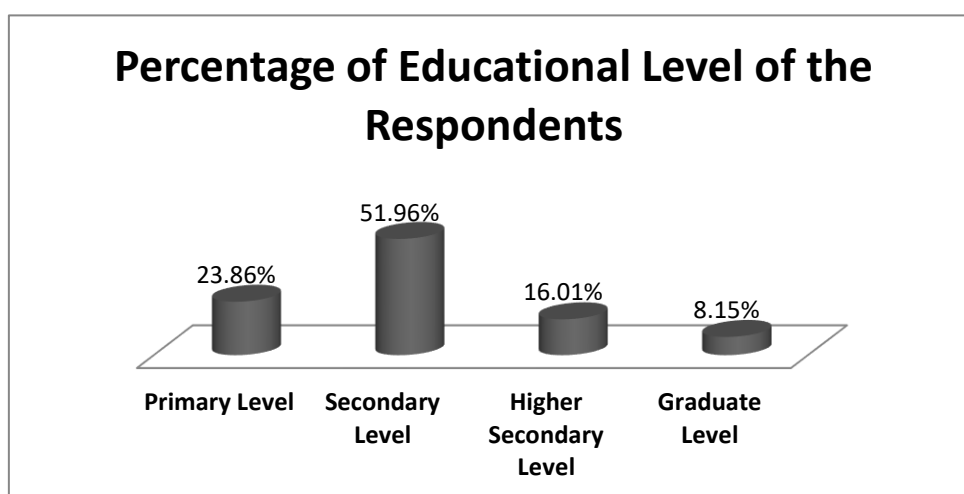


Fig. 5.12: Graphical representation of percentage of educational level of the respondent flower growers

- ❖ **Financial Status:** The results of above table show that out of 331 respondents 156 (47.12%) respondents were under Below Poverty Level, 123 (37.16%) were Lower Middle Class and 52 (15.70%) were Upper Middle Class.

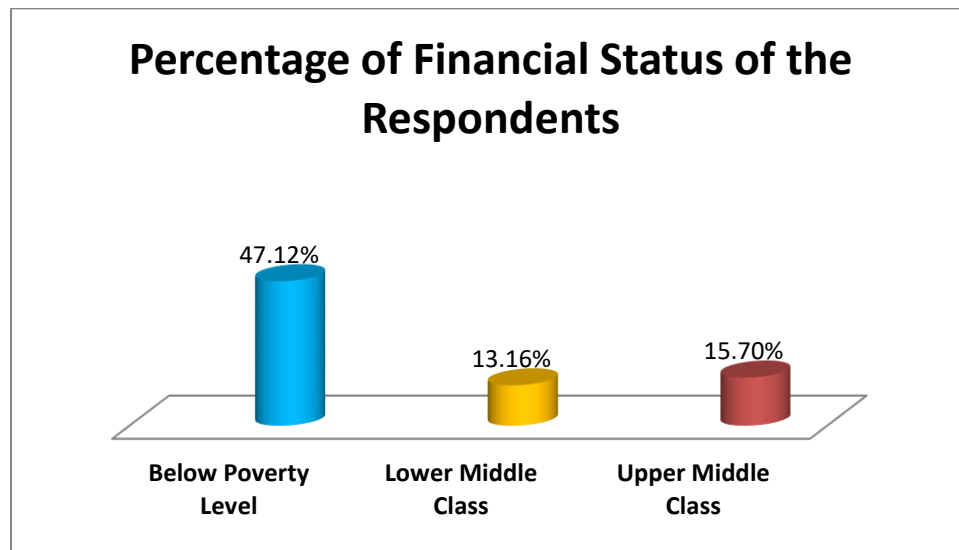


Fig. 5.13 Graphical representation of percentage of financial status of the respondent flower growers.

- **Experience in floriculture:** The above table shows that out of 331 respondents 45 (13.59%) respondents have 1-5 years of experience in floriculture, 188 (56.79%) respondents have 6-10 years of experience in floriculture, 85 (25.67%) respondents have 11-15 years of experience in floriculture and only 13 (3.92%) respondents have 16-20 years of experience in floriculture.

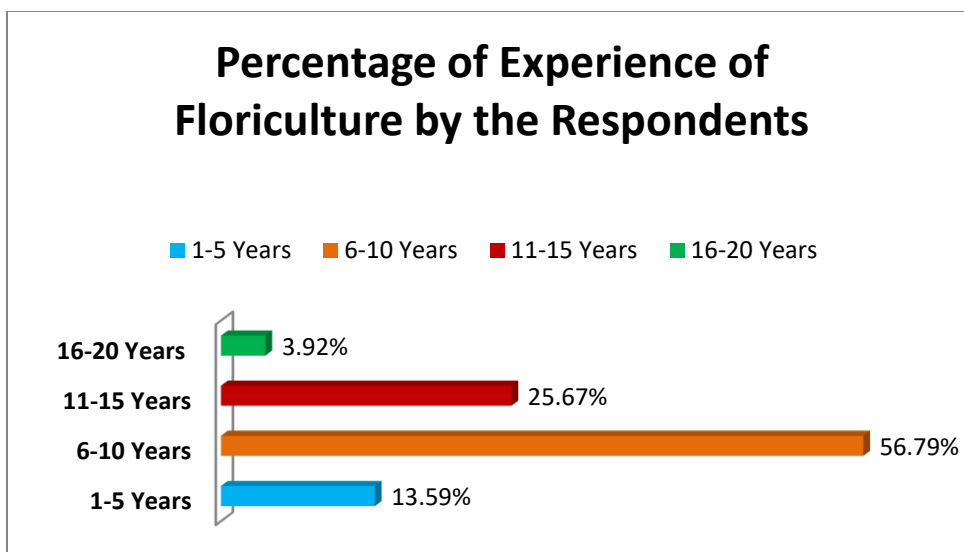


Fig. 5.14: Graphical representation of percentage of experience of floriculture by the respondents flower growers

Sex: The above table shows that out of 331 respondents 214(64.65%) were male flower growers and 117 (35.34%) were female flower growers.

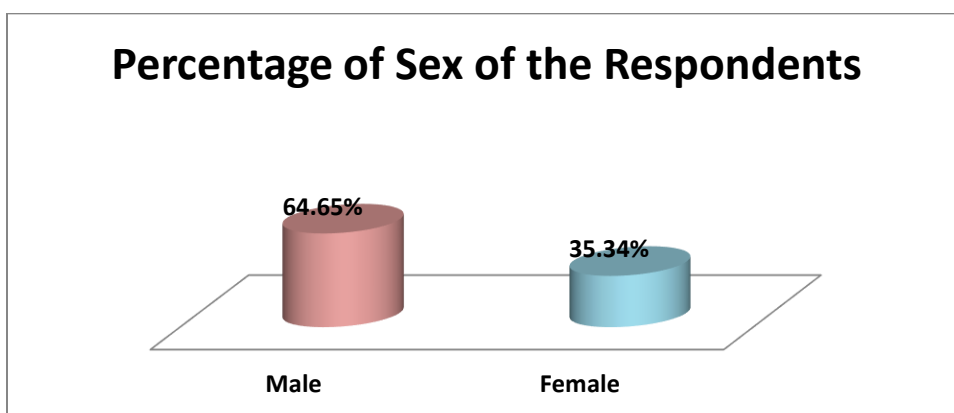


Fig. 5.15: Graphical representation of percentage of sex of the respondent flower growers

5.2.3.2 RESPONDENT FLOWER GROWERS' PERCEPTION REGARDING FLORICULTURE INFORMATION SYSTEM IN WEST BENGAL

This section is dealing with the perception of flower grower respondents regarding Floriculture Information System to understand the present situation of Floriculture Information System in West Bengal.

- ❖ During the survey all the 331 (100%) respondents have been agreed to the statement that flower cultivation is much more profitable than other crops.

❖ Types of flower cultivated

Categories	Frequencies	Percentage
Loose flowers	68	20.54%
Cut flowers	263	79.45%
Both	44	13.29%

Table 5.8: Types of flowers cultivated by the respondent flower growers

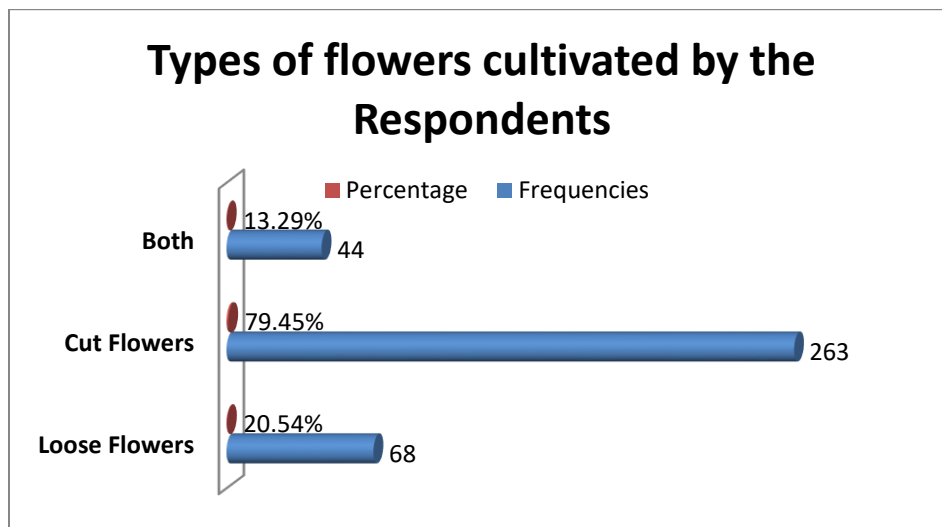


Fig. 5.16: Graphical representation of percentage of types of flowers cultivated by the respondents flower growers

The above table and graphical representation highlight that out of 331 respondents 68 (20.54%) were cultivated Loose flowers (mainly-Marigold, Hibiscus, Beli, Jasmine, Balsam and Aparajita). 263 (79.45%) respondents were cultivated Cut flowers (mainly-Rose, Dutch Rose, Tuberose, Gerbera, Gladiolus, Orchids, Anthurium, and Chrysanthemum) and 44(13.29%) respondents were cultivated both types of flowers.

❖ **Types of Seeds /Saplings used by the respondents**

Categories	Frequencies	Percentage
Local/Traditional	82	24.77%
Hybrid	169	51.05%
Both	80	24.16%

Table 5.9: Types of seeds/saplings used by the respondent flower growers

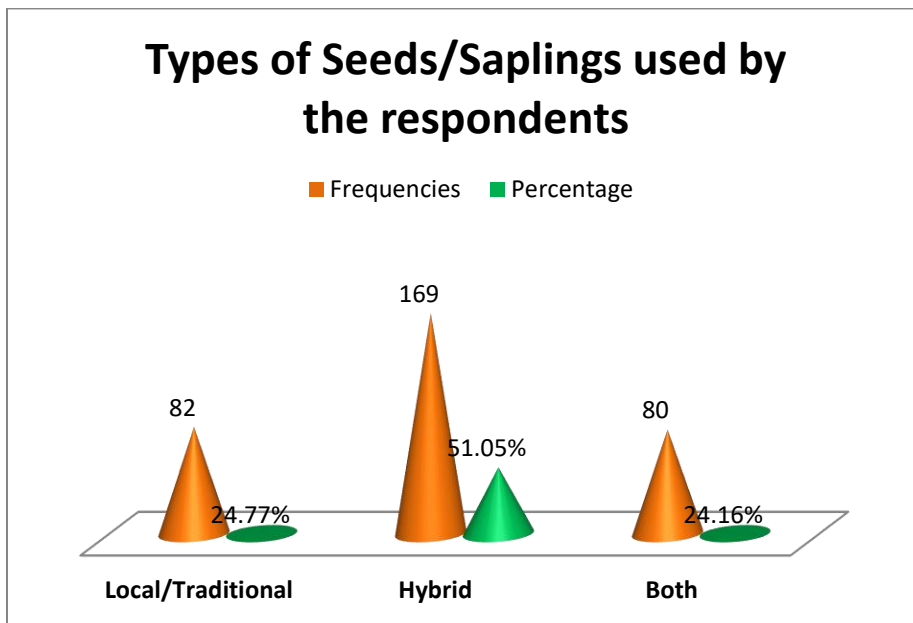


Fig. 5.17: Graphical representation of percentage of types of seeds/saplings used by the respondents flower growers

The above table and graphical presentation shows the data about the type of seeds/saplings used by the respondent flower growers. Out of 331 respondents 82(24.77%) respondents have used local/traditional seeds/saplings, 169 (51.05%) respondents have used hybrid seeds/saplings and 80 (24.16%) respondents have used both types of seeds/saplings.

❖ **Mode of flower selling by the respondents:**

Categories	Frequencies	Percentage
In Open Market /Mandi	226	68.27%
Through Middle Man	105	31.71%

Table 5.10: Modes of flower selling by the respondents

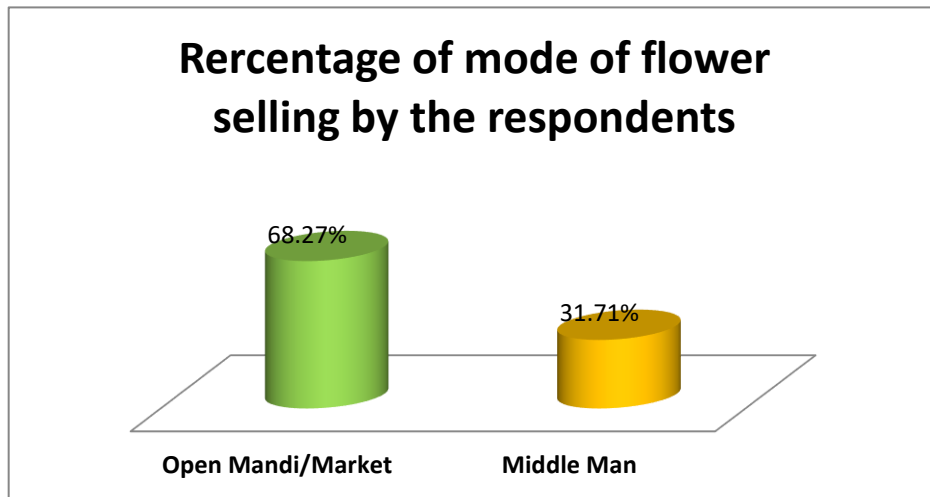


Fig. 5.18: Graphical representation of percentage of mode of flower selling by the respondents flower growers

The above table and graphical representation stated that out of 331 respondents 226 (68.27%) respondents used to sell their flowers in Open Market/ Mandi and 105(31.71%) respondents used to sell through Middle Man.

❖ **Purchased centre for seeds and fertilizers by the respondents**

Categories	Frequencies	Percentage
Government Organization	28	8.45%
Private Organization	259	78.24%
Both	44	13.29%

Table 5.11: Purchased centre of seeds and fertilizers by the respondents

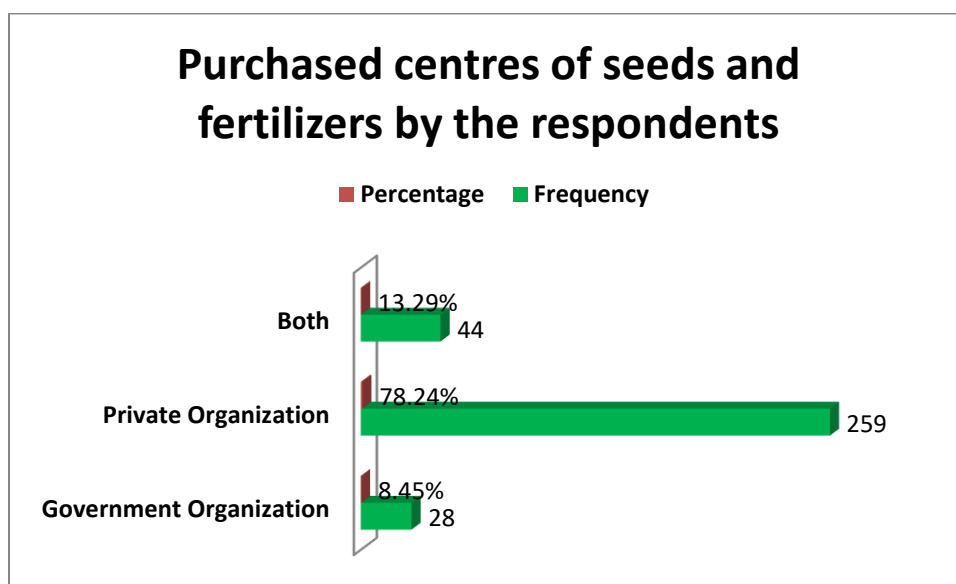


Fig. 5.19: Graphical representation of percentage of purchased centre of seeds and fertilizers by the respondents flower growers

The above table and graphical representation stated that out of 331 respondents 28(8.45%) have used to purchase seeds and fertilizers from government organizations, 259(78.24%) respondents have used to purchase seeds and fertilizers from private

organizations and 44(13.29%) have used to purchase seeds and fertilizers from both types of organizations.

❖ **Sources to access floriculture related information by the respondents**

Categories	Frequencies	Percentage
Agricultural Experts of Govt. Organization	37	11.17%
Agricultural expert of Private organization	52	15.70%
Local Shop	168	50.75%
Self Friends	74	22.35%

Table 5.12: Sources to access of floriculture related information by the respondent flower growers

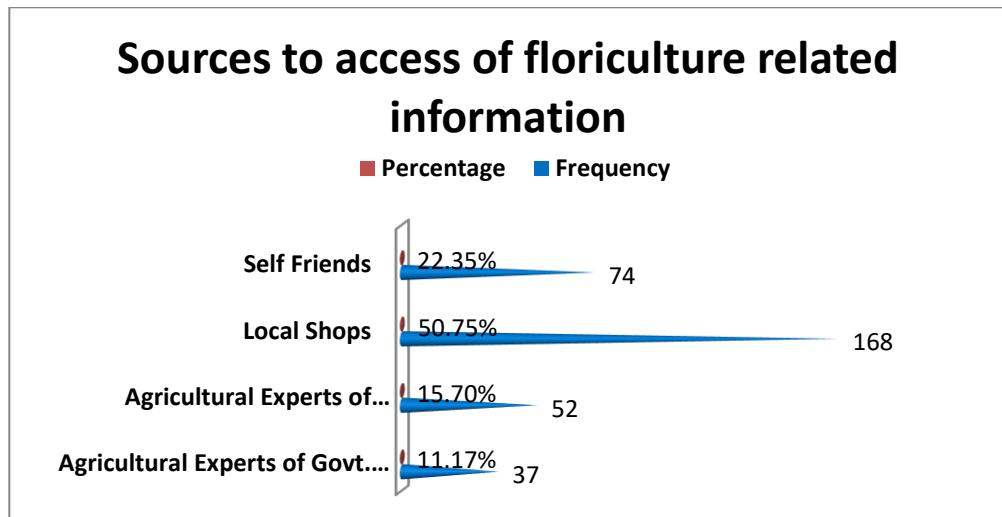


Fig. 5.20: Graphical representation of sources to access of floriculture related information by the respondents flower growers

The above table shows that in case of floriculture related information such as selection of Seeds/Saplings, Fertilizers and Pesticides out of 331 respondents 37 (11.17%) respondents have taken information from the experts of govt. organizations, 52(15.70%) respondents

have taken information from the experts of private organizations, 168 (50.75%) respondents have taken information from local shop and 74 (22.35 %) respondents have taken information from self friends i.e. other flower growers.

❖ Awareness of respondents about the government schemes related to floriculture

This section of the study discuss about the awareness of respondents about the related schemes of floriculture in West Bengal. There are three govt. schemes of floriculture have been identified for the small and marginal farmers and other farmers such as Rashtriya Krishi Vikas Yojana, Mission for Development of Horticulture Schemes and Schemes of National Horticulture Mission.

Categories	Frequencies	Percentage
One scheme	106	32.02%
More than one schemes	13	3.92%
None	212	64.04%

Table 5.13: Awareness of respondents on Government Floriculture Schemes

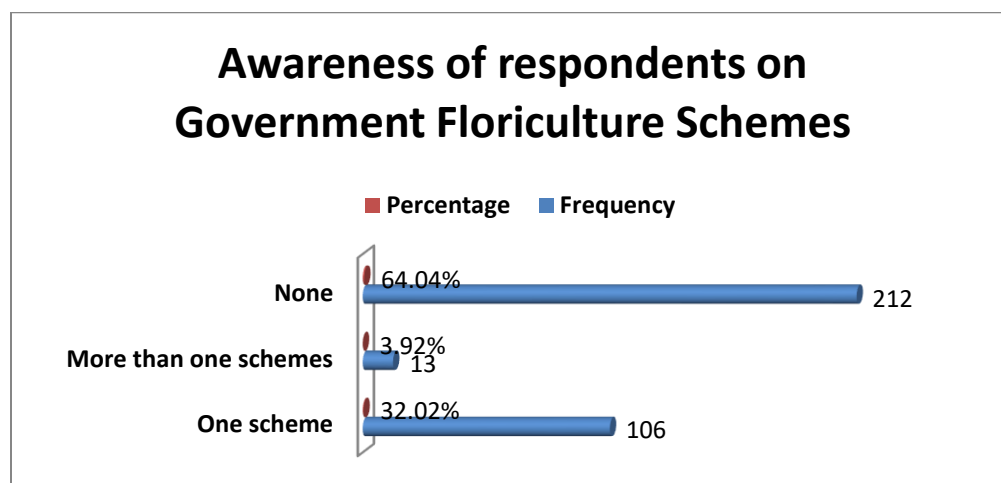


Fig. 5.21: Graphical representation of awareness of respondents about govt. schemes on floriculture

The above table and graphical representation states that during the survey out of 331 respondents 106 (32.02%) respondents have heard about one schemes i.e. Rashtriya Krishi Vikash Yojana, 13 (3.92%) respondents have heard about More than one mentioned schemes ie. Rashtriya Krishi Vikash Yojana and National Horticulture Mission and 212 (64.04%) respondents did not heard about any of these three schemes.

5.2.3.3 USEFULNESS OF ON-FIELD INFORMATION BY THE GOVERNMENT ORGANIZATIONS REGARDING FLORICULTURE

This section of the study discusses about the information services, provided by the government organization regarding agriculture as well as floriculture. There are two types of services have been provided by these centres a) On-field services -provided by the extension workers of Krishi Vigyan Kendras and collaboratively by the extension workers of District Horticulture Department-Block Development Office-Panchayat Samiti and b) Off-field services provided by Kisan Call Centre.

❖ Usefulness of On-field Information by Government Organizations regarding Floriculture

Categories	Frequencies	Percentage
Yes	89	26.88%
No	242	77.11%
Frequency of usefulness of on-field information by Govt. organizations		
Categories	Frequencies	Percentage
Regularly	18	20.22%
Occasionally	42	47.19%
Rarely	29	32.58%

Table 5.14: Usefulness of On-field Information by Government Organizations regarding Floriculture

This section of the study shows the usefulness of on-field information regarding soil test, use of fertilizers, selection of seeds/saplings of appropriate variety and disease of plants from govt. organizations such as – Krishi Vigyan Kendras, District Horticulture Offices and Block Level Offices by Front Line Demonstration, Krishi Mela, and Field Day. The above results states that out of 331 respondents 89(26.88%) were getting information from the govt. organizations about this matter and 242(77.11%) were not getting any information about the stated matter from the govt. organizations.

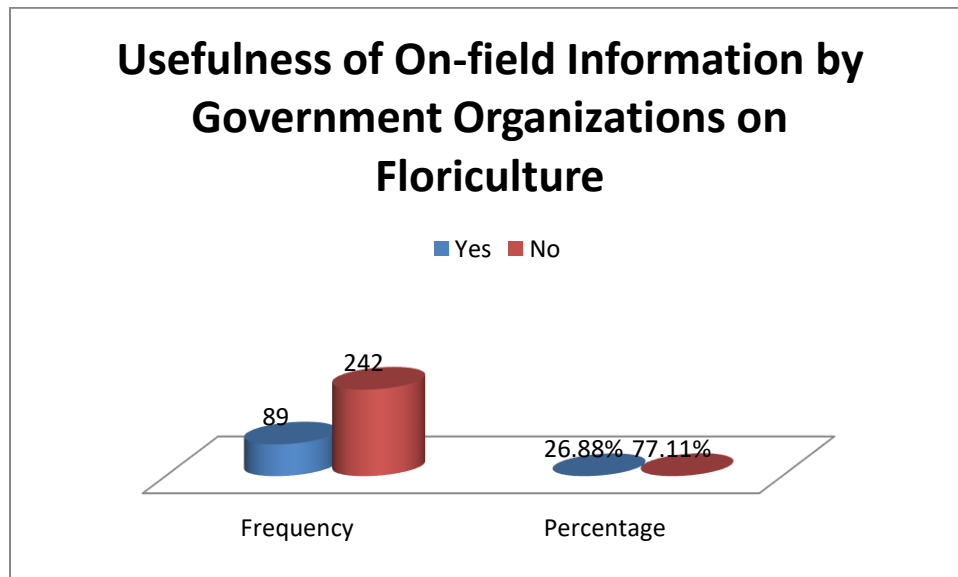


Fig. 5.22: Graphical representation of usefulness of On-field Information by government organizations on floriculture by the respondent flower grower

It has been also found that out of 89 respondents 18(20.22%) were getting on-field information at regular intervals from the govt. organization, 42(47.19%) respondents were getting on-field information at occasionally intervals and 29(32.58%) respondents were getting on-field information at rarely intervals.

5.2.3.4 USEFULNESS OF OFF-FIELD INFORMATION BY THE GOVERNMENT ORGANIZATIONS REGARDING FLORICULTURE

This section of the study shows the usefulness of Off-field information regarding soil test, use of fertilizers, selection of seeds/saplings of appropriate variety, and disease of plants from govt. agencies such as – Kisan Call Centre and Matir Katha App by calling toll-free number to get information.

❖ Knowledge of respondents about Kisan Call Centre

Categories	Frequencies	Percentage
Yes	76	22.96%
No	255	77.03%

Table 5.15: Showing knowledge of respondents about Kisan Call Centre and its services

The above table states that out of 331 respondents 76(22.96%) respondents have heard about Kisan Call Centre and 255(77.03%) respondents have not informed about Kisan Call Centre.

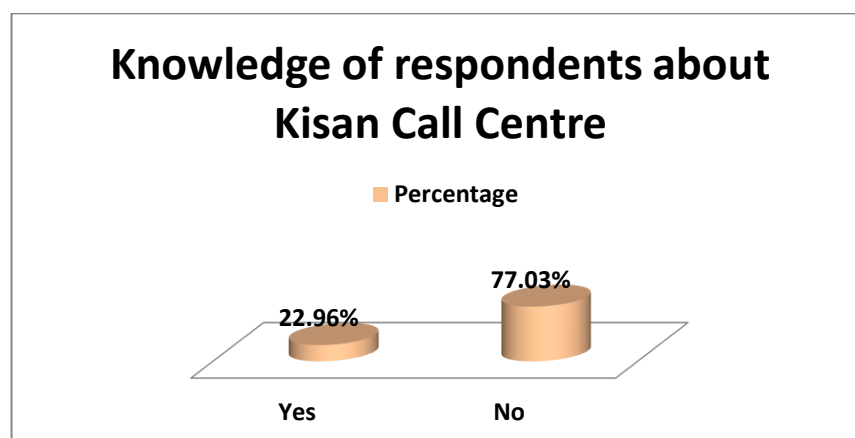


Fig. 5.23: Graphical representation of knowledge of respondents about Kisan Call Centre and its services

❖ **Knowledge of respondents about Matir Katha-Krishaker Katha App**

Categories	Frequencies	Percentage
Yes	64	19.33%
No	267	80.66%

Table 5.16: Showing knowledge of respondents about Matir Katha-Krishaker Katha App

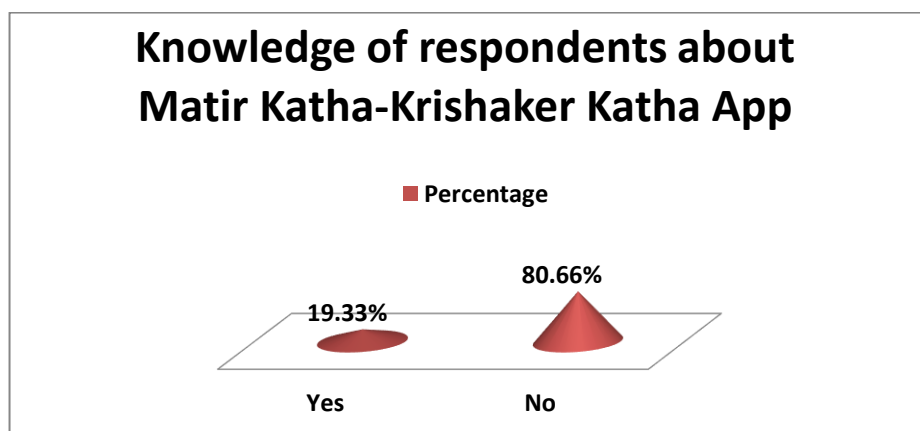


Fig. 5.24: Graphical representation of knowledge of respondents about Matir Katha-Krishaker Katha App

The above table and graphical representation states that out of 331 respondents 64(19.33%) respondents have heard about Matir Katha-Krishaker Katha App and 267(80.66%) respondents have not informed about Matir Katha-Krishaker Katha App.

❖ **Reason to not achieve desirable position in floriculture among the states in India**

Categories	Frequencies	Percentage
Lack of proper communication of floriculture related information	84	25.37%
Lack of proper infrastructure related to floriculture	53	16.01%

Both	194	58.61%
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Table 5.17: Showing reason to not achieve desirable position in floriculture among the states in India

The result shows that flower growers are facing lots of problem in the field of floriculture during their cultivation process. The main reasons are 1) Lack of proper communication of floriculture related information 2) Lack of proper infrastructure related to floriculture.

The results states that out of 331 respondents flower growers 84 (25.37%) have accepted Lack of proper communication of floriculture related information, 53 (16.01%) have accepted Lack of proper infrastructure related to floriculture and 194 (58.61%) have accepted both issues are responsible for their problems.

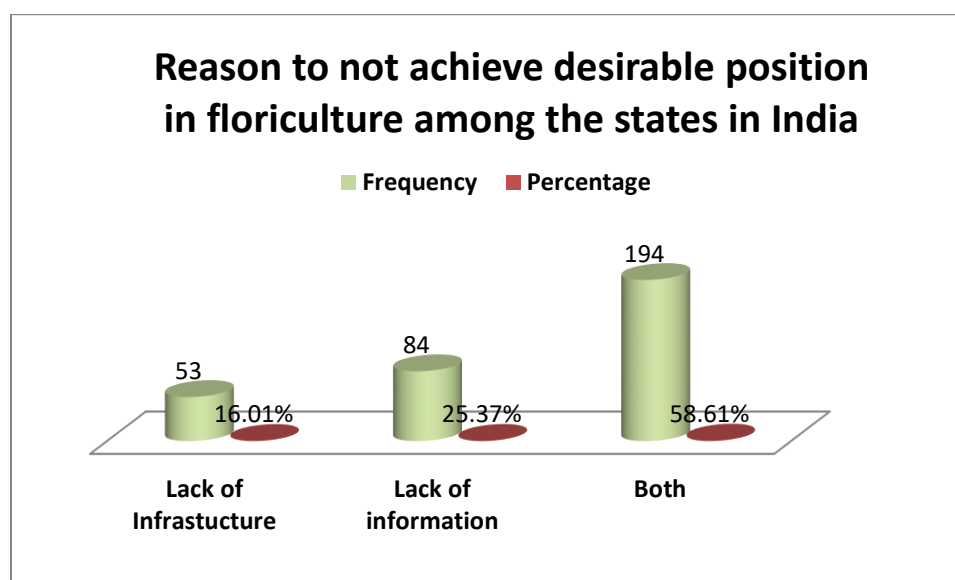


Fig.5.25: Graphical representation of the reason to not achieve desirable position in floriculture among the states in India.

5.2.3.5 SOCIO-ECONOMIC CHARACTERISTICS OF RESPONDENT FLOWER SELLERS

Characteristic	Categories	Frequencies	Percentage
Age	18 – 25 Years	36	16.5%
	26 - 35 Years	75	34.40%
	36 – 45 Years	86	39.44%
	46- 55 Years	14	6.42%
	56- 65 Years	07	3.21%
Educational Qualification	Primary level	71	32.56%
	Secondary Level	87	39.90%
	Higher Secondary Level	53	24.31%
	Graduation and above	7	3.21%
Financial Status	Below Poverty Level	91	41.74%
	Lower Poverty Level	115	52.75%
	Upper Middle Class	12	5.50%
Experience of Flower Selling	1-5 Years	57	26.14%
	6-10Years	72	33.02%
	11-15 Years	81	37.15%
	16-20 Years	8	3.66%
Sex	Male	147	67.43%
	Female	71	32.56%

Table 5.18: Shows the socio-economic characteristics of flower sellers

❖ Socio- economic characteristic of Flower sellers

There are two hundred eighteen (218) flower sellers have been selected from the different flower producing zones of West Bengal mentioned in Chapter-3. The socio-economic characteristics such as age, educational level and financial status, experience and sex of flower growers have been described below in tabular form.

- **Age:** The above table shows that out of 218 respondent flower sellers 36(16.5%) respondents were the age between 18-25, 75(34.40%) respondents were the age between 26-35, 86(39.44%), respondents were the age between 36-45, 14 (6.42%) respondents were the age between 46-55 and 7(3.21%) respondents were the age between 56-65.

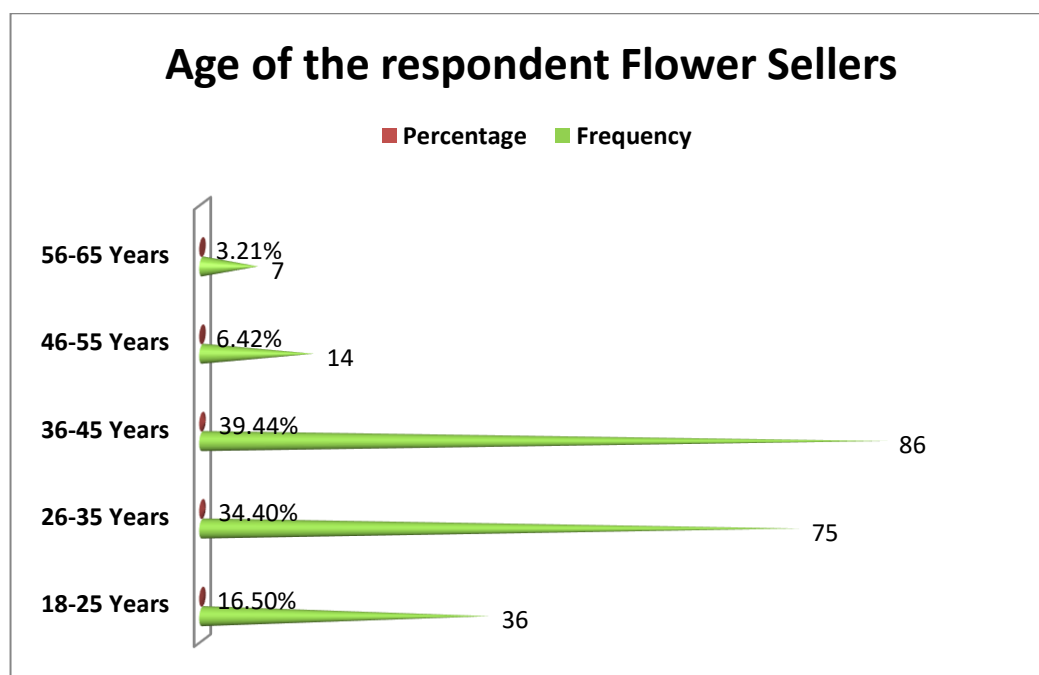


Fig. 5.26: Graphical representation of age of the respondent flower sellers

- **Educational Qualification:** The above table shows that out of 218 respondents 71 (32.56%) respondent flower sellers had completed Primary Education, 87 (39.90%) respondents had completed Secondary Education, 53 (24.31%) respondents had completed Higher Secondary Education and 7 (3.21%) had completed Graduation.

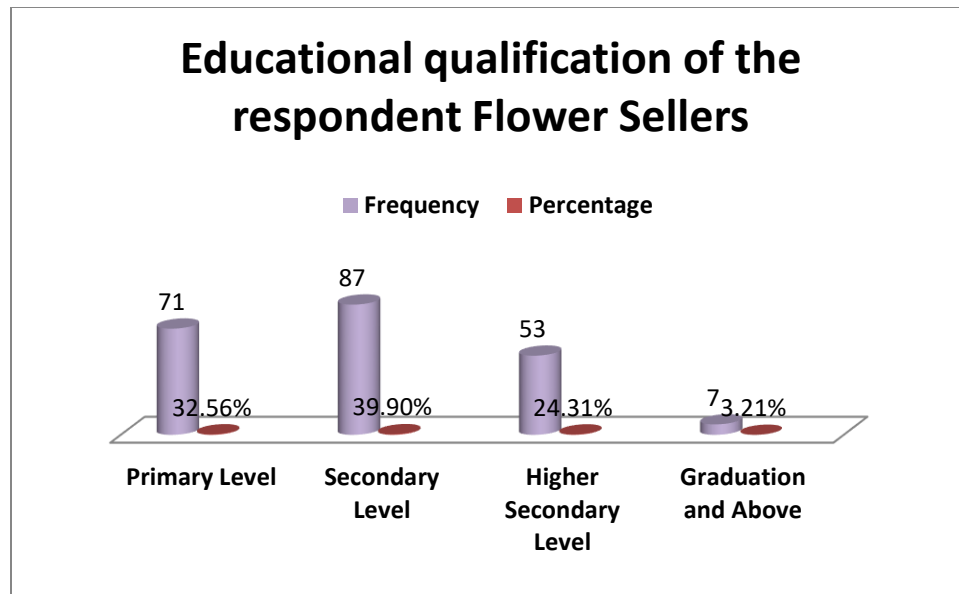


Fig. 5.27: Graphical representation of educational qualification of the respondent flower sellers

- **Financial Status:** The above table shows that out of 218 respondents flower sellers 91 (41.74%) were Below Poverty Level, 115 (52.75%) were Lower Middle Class and 12 (5.50%) were Upper Middle Class.

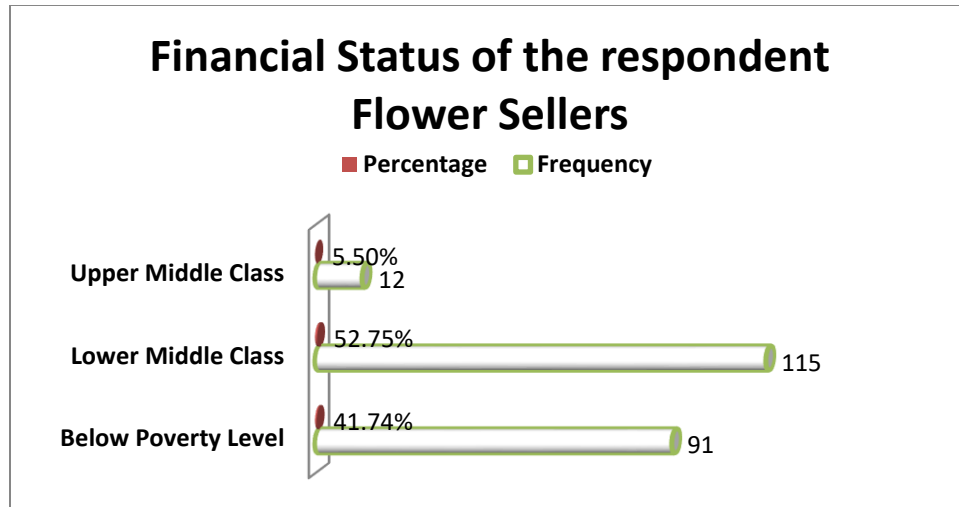


Fig. 5.28: Graphical representation of financial status of the respondent flower sellers

- **Experience of Flower Selling:** The above table shows that out of 218 respondents flower sellers 57 (26.14%) respondents have 1-5 years of experience in floriculture, 72 (33.02%) respondents have 6-10 years of experience in floriculture, 81 (37.15%) respondents have 11-15 years of experience in floriculture and only 8 (3.66%) respondents have 16-20 years of experience in floriculture.

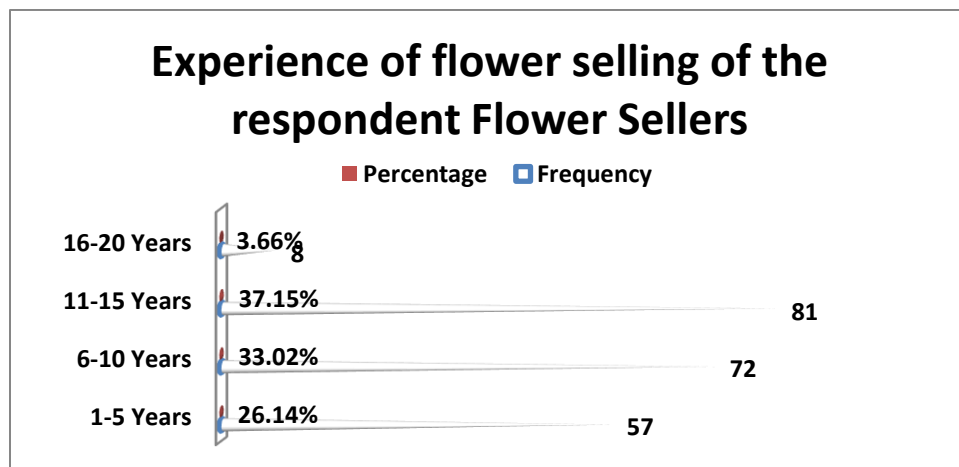


Fig. 5.29: Graphical representation of experience of flower selling of the respondent flower sellers

- **Sex:** The above table that out of 218 respondent flower sellers, 147 (67.43%) respondents were male farmers and 71 (32.56%) respondents were female farmers.

5.2.3.6 PERCEPTION OF FLOWER SELLERS REGARDING EXISTING INFRASTRUCTURE OF FLORICULTURE IN WEST BENGAL

Issues in flower market	Categories	Frequencies	Percentage
Availability of permanent sitting arrangement	Yes	67	30.73%
	Not Sufficient	57	26.14%
	No	94	43.1%
Types of Market Land Area	Government	174	79.81%
	Private	44	20.18%
Stability of the Market	Permanent	72	33.02%
	Not Permanent	146	66.97%
Pay to the Market Land Owner	Yes	190	87.15%
	No	28	12.84%
Toilet facilities	Yes	107	49.08%
	Not Sufficient	40	18.34%
	No	71	32.56%
Shading in Rainy Season	Yes	64	29.35%
	Not Sufficient	134	61.46%
	No	20	9.17%
Drinking Water	Yes	52	23.85%
	Not Sufficient	77	35.32%

	No	89	40.82%
Waste Disposal Area	Yes	75	34.40%
	Not Sufficient	55	25.22%
	No	88	40.36%
Cold Storage near market	Yes	101	46.33%
	No	117	53.66%
Types of Cold Storage	Government	00	00%
	Private	218	100%

Table 5.19: Shows perceptions of flower sellers regarding existing infrastructure of floriculture

The above table shows the perceptions of flower sellers on different issues regarding infrastructure of floriculture.

- ❖ **Availability of permanent sitting arrangement:** The results shows that out of 218 flower seller respondents, 67(30.73%) respondents said yes, 57(26.14%) respondents said not sufficient and 94(43.1%) respondents said no to the availability of permanent sitting arrangement in the flower market.

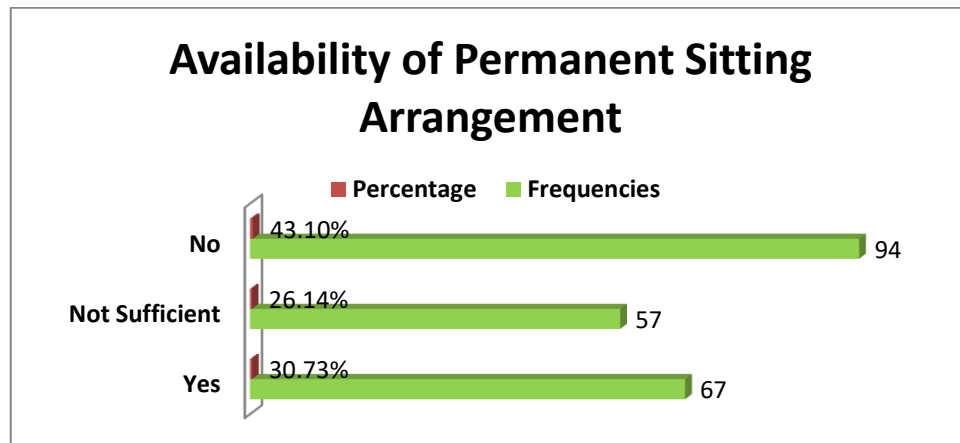


Fig. 5.30 Graphical representation of availability of permanent sitting arrangement

- ❖ **Types of market land area:** Out of 218 flowers seller respondents, 174(79.81%) respondents said the types of market land area is government undertaking and 44(20.18%) respondents said the types of market land area is under the private organizations.

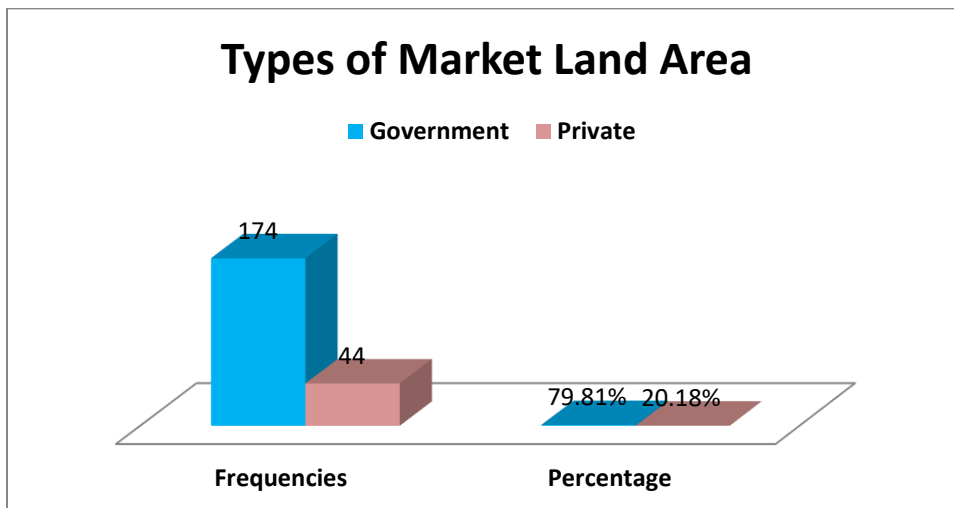


Fig. 5.31 Graphical representation of types of market land area

- ❖ **Stability of the market:** Out of 218 flowers seller respondents, 72(33.02%) respondents said they sell their flowers in permanent market and 146(66.97%) respondents were selling their flowers in non-permanent market.

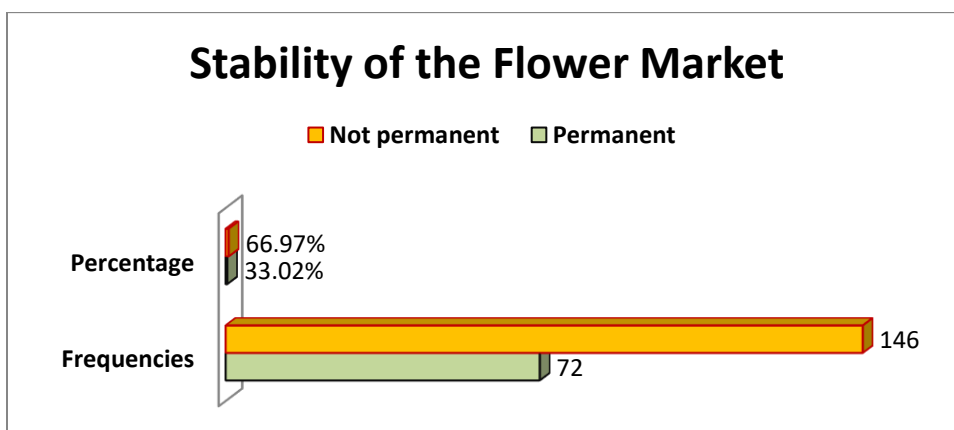


Fig. 5.32 Graphical representation of stability of flower market

- ❖ **Pay to the market land owner:** Out of 218 flowers seller respondents, 190(87.15%) respondents said yes they have to pay, and 28(12.84%) respondents said that they don't have to pay for selling their flowers in flower market.

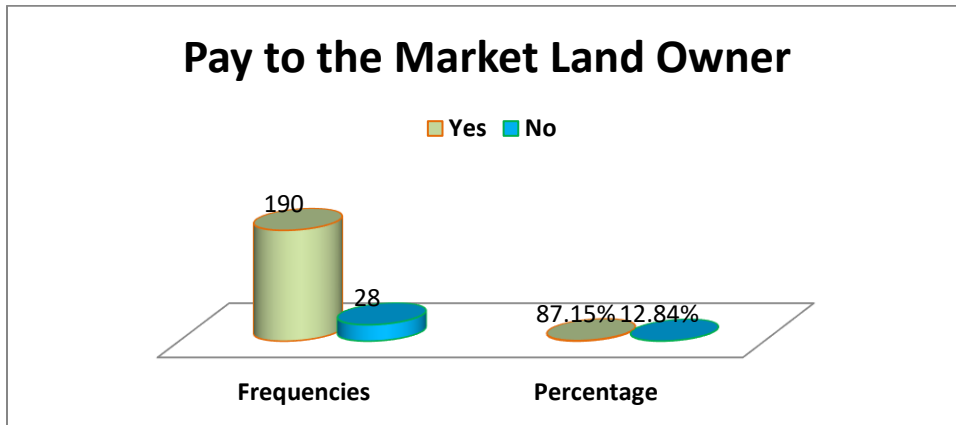


Fig 5.33: Graphical representation of pay to the market land owner of the flower market

- ❖ **Toilet facilities:** Out of 218 flowers seller respondents, 107(49.08%) respondents have said yes, 40(18.34%) respondents have said not sufficient and 71(32.56%) respondents have said no to the availability of toilet facility in the flower market area.

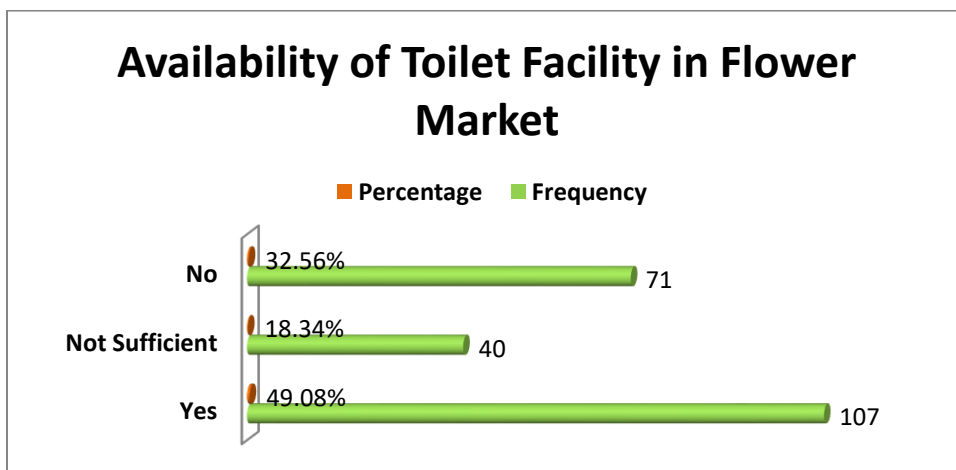


Fig 5.34: Graphical representation of availability of toilet facility in flower markets

- ❖ **Availability of shading in rainy season:** Out of 218 flowers seller respondents, 64(29.35%) respondents have said yes, 134(61.46%) respondents have said not sufficient and 20(9.46%) respondents have said no to the availability of permanent shade arrangement in the flower market during all season as well as rainy season.

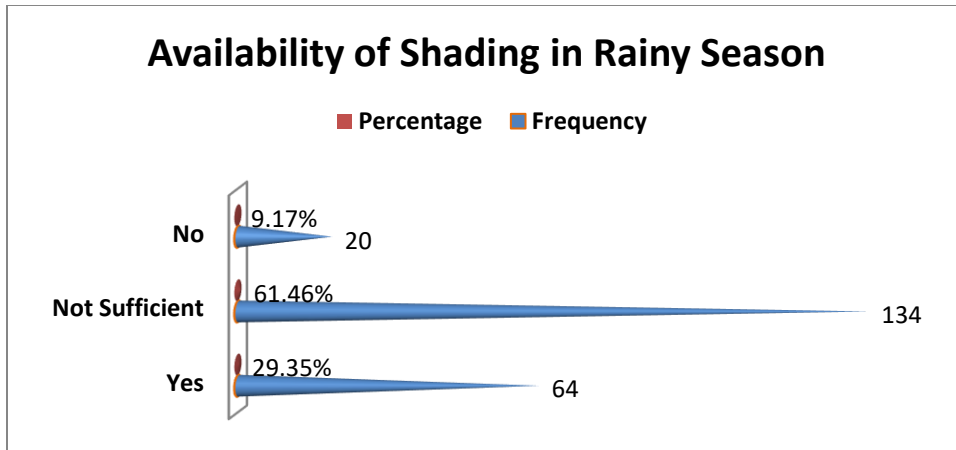


Fig. 5.35: Graphical representation of availability of shade in flower markets during rainy season

- ❖ **Drinking Water:** Out of 218 flowers seller respondents, 52(23.85%) respondents have said yes, 77(35.32%) respondents have said not sufficient drinking water and 89(40.82%) respondents have said no to the availability of drinking water in the flower markets.

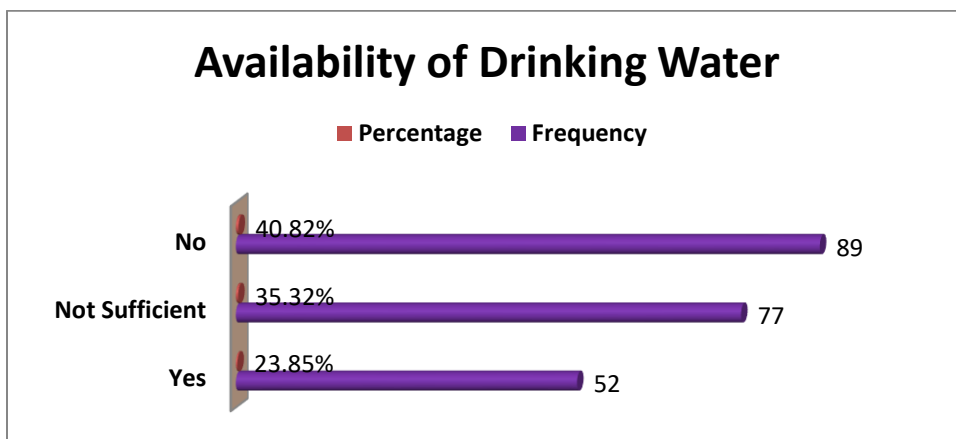


Fig 5.36: Graphical representation of availability of drinking water in flower markets

- ❖ **Waste disposal area:** Out of 218 flowers seller respondents, 75(34.40%) respondents have said yes, 55(25.22%) respondents have said not sufficient and 88(40.36%) respondent have said that no, the market has not any disposal areas for waste materials.

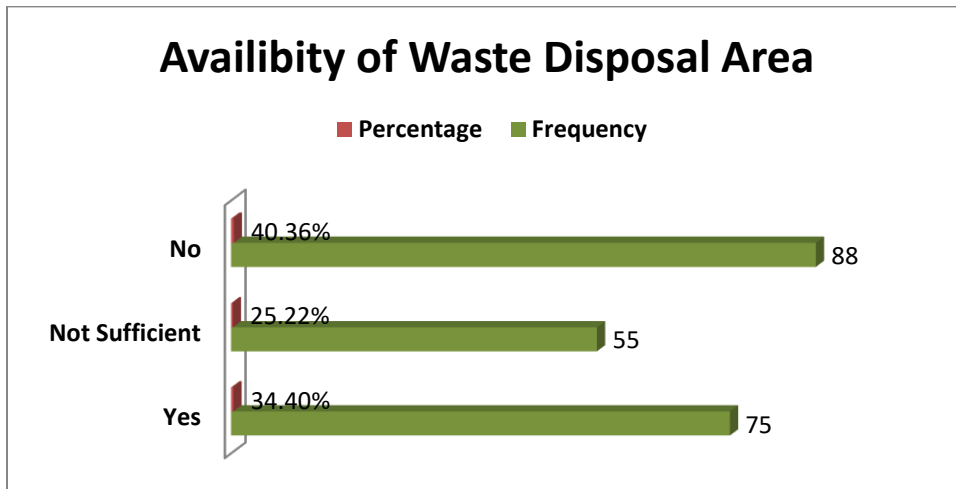


Fig 5.37: Graphical representation of availability of waste disposal area in flower markets

- ❖ **Cold storage near market:** Out of 218 flower seller respondents, 101(46.33%) respondents said yes, and 117(53.66%) respondents said that there is no cold storage facility near flower market.

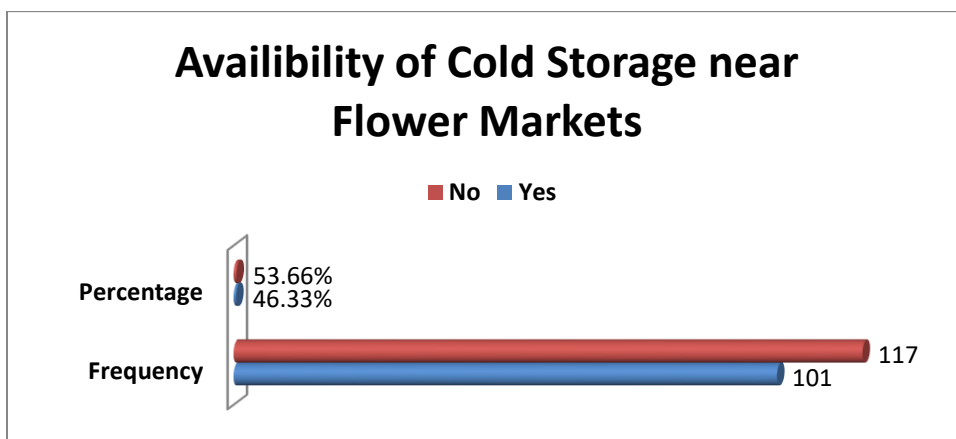


Fig 5.38: Graphical representation of availability of cold storage near flower markets

❖ **Types of cold storage:** 100% respondents said that the available cold storages near flower market are maintained by private organization.

- Requirements of respondents flower sellers for the development of Floriculture Information System in West Bengal

5.2.3.7 REQUIRMENTS OF RESPONDENT FLOWER SELLERS FOR THE DEVELOPMENT OF FLORICULTURE INFORMATION SYSTEM

Requirements of Flower Seller	Categories	Frequencies	Percentage
Lack of permanent Govt. mandi for flower selling	Yes	190	87.15%
	No	28	12.84%
Lack of adequate storage facility	Yes	164	75.22%
	No	54	24.77%
Poor market Information	Yes	218	100%
	No	00	00%
Requirement of arrangement of fairs and exhibitions for floriculture products	Yes	218	100%
	No	00	00
Requirement of establishment of Flower Auction Centre	Yes	218	100%
	No	00	00
Requirement of establishment of strong information network between local, national and international markets	Yes	218	100%
	No	00	00

Table 5.20: .Shows requirements of flower sellers for the development Floriculture Information System in West Bengal

- **Lack of permanent govt. mandi for flower selling:** The above results shows that out of 218 flower seller respondents, 190(87.15%) respondents said that they have lack of permanent Govt. Flower Mandi to sell their flowers, and 28(12.84%) respondents said that they have Govt. Mandi for sell their flowers.
- **Lack of adequate storage facility:** Out of 218 flower seller respondents, 164(75.22%) respondents said yes, and 54(24.77%) respondents said that they don't have adequate cold storage to keep flowers.
- **Poor market information:** All 218 (100%) flower seller respondents agreed that market related information is not available. For this reason many times middleman captured the share of other flower sellers.
- **Requirement of arrangement of fairs and exhibitions for floriculture products:** All 218 (100%) flower seller respondents agreed that the arrangement of different kind of fairs and exhibitions by the help of government organizations as well as private sectors have needed to sell their flowers to get global recognition to get appropriate value of their flowers.
- **Requirement of establishment of flower auction centre:** All 218 (100%) flower seller respondents agreed that an Auction Centre have needed to sell their flowers to get appropriate value of their flowers.
- **Requirement of global information network:** All 218 (100%) flower seller respondents, agreed to the statement that a strong information network have to build the by government in between local, national and international market to pick the chance to entering into global market.

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CHAPTER – 6

FINDINGS & DISCUSSIONS

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6.1 INTRODUCTION

By the analysis and interpretation of collected data through the help of questionnaires, interviews and observations method on the three components of Floriculture Information System viz., 1) Research & Education 2) Extension and 3) Farmers, the major findings has been prepared and inferences have been made to justify the objectives of this study.

6.2 FINDINGS OF COMPONENT-I: RESEARCH & EDUCATION

To know the existing condition of Education & Research in West Bengal Bidhan Chandra Krishi Viswavidyalaya and Uttar Banga Krishi Viswavidyalaya has been selected. The findings on the **Component-I: Education & Research** are as follows:

a) Bidhan Chandra Krishi Viswavidyalaya (BCKV):

- The university established on 1974.
- **Research Area:** Germplasm Collection & Conservation, Mutation Breeding, In vitro tissue culture, Dehydration of flowers.
- **Library Collections:** Maintained huge collection of print as well as digital repositories to strengthen Research & Education. The collections including -Books- 76,057, Pamphlets- 8,252, Bound Journals- 25,023, International Standards- 95, Thesis and Dissertations- 4315, Annual Reports-190, Current Indian Journals (Hard Copy) – 10, Research Bulletin – 9893

CD ROM Database, Non-Book Materials like- Video Cassettes (37), Audio Cassettes (06), Book Accompanying CDs (55), Thesis Soft Copies (309), and Proceedings Soft Copies (36), Indian & Foreign Journals through 'CeRA'- 2200+, Krishikosh- More than 1,60,000 digital volumes and Krishiprabha- 10500+ Doctoral Dissertations

- **Special Library Facility to Farmers:** Library services have also given to the local participated farmers during the period of different training programs, seminar and workshops organized by different departments of BCKV.
- **Initiatives:** Initiatives have been taken by BCKV is both research and extension oriented due to sufficient infrastructure.
- **Barriers to conduct Research:** Though enough infrastructures developed for research and education purpose at BCKV campus, but research on floriculture is being treated as secondary requirement due to non-edible value of flower than other horticultural crops. Due to this reason funding in floriculture research purpose is comparatively low than other horticultural crops
 - ❖ **Inferences:** In spite of having huge library collection and infrastructure to conduct research and education in the field of floriculture, funding issue is the main barrier to promote floriculture at BCKV in West Bengal.

b) Uttar Banga Krishi Viswavidyalaya (UBKV):

- The University was established in the year 2000.
- **Research Area:** Micro-propagation of high-valued ornamental plants, Germplasm Collection & Conservation, post-harvest management and packing of flowers, protected cultivation of high valued ornamental crops.
- **Library Collections:** Collections are comparatively less than BCKV. Digital repository accessed as a registered university of ICAR. The collections including Books - 31,917, Bound Journals – 4034, Periodicals – 95, Thesis and Dissertations (Digitized) – 310, CD ROM -131, CD ROM Database-08, Indian & Foreign Journals through ‘CeRA’- 2200+, Krishikosh- More than 1,60,000 digital volumes and Krishiprabha- 10500+ Doctoral Dissertations
- **Library Facility to Farmers:** No such kinds of facilities are provided to the farmers like BCKV.
- **Initiatives:** Initiatives are taken by UBKV is mainly extension oriented due to insufficient infrastructure.
- **Barriers to Conduct Research:** Infrastructure, man power and funding are the main barriers to conduct research in UBKV.
- ❖ **Inferences:** It is seen that due to lack of funding, infrastructure and manpower, in UBKV, research and education has not promoted in at larger extent.

6.3 FINDINGS OF COMPONENT-II: EXTENSION

To know the existing situation of Extension Services in West Bengal 9 Krishi Vigyan Kendras have been selected for this study. The following findings have been prepared by the present study.

- **Extension services provided by the Krishi Vigyan Kendras:** a) Training to farmers including farm women, b) Extension Functionaries, c) Front Line Demonstration d) Soil Testing, e) Seed production and distribution, f) Irrigation facilities g) Weather and Climate related information, h) Market related information i) Disease Forecast j) Training of Rural youth for employment k) Group Meeting l) Advisory services m) Scientist visit on farmers field n) Soil Health Camp o) information related to govt. schemes on floriculture as well as agriculture p) Talk shows.
- **Initiatives taken in the field of Floriculture:** a) On-Field Demonstration on Floriculture b) Awareness camp to promote scientific floriculture c) Post-harvest management d) Supply of quality planting material e) Cultivation of export oriented high value flowers like- Gladiolus, Anthurium, Chrysanthemum, Orchid etc. f) Technical intervention was made like quality seedling production, quality bunch production for Gerbera, Orchid, Chrysanthemum, Marigold and Tuberose g) Value added products from flower by preparation of dry flower, scent, organic colour h) Awareness on nursery development and protected cultivation.
- **Challenges faced by the experts of the Krishi Vigyan Kendras:** a) Lack of Infrastructure b) Lack of funding c) Low literacy rate of farmers to deal with application of new technology d) Lack of marketing related information e) Less number of efficient

workers f) Limitations of land for poor and marginal farmers to adopt new technology g) Most of the time the generated technology by the scientists and researchers are not farmers friendly (cost effective).

❖ **Inferences:** In spite of taking many initiatives to promote floriculture by the selected Krishi Vigyan Kendras, due to some challenges like- lack of infrastructure to conduct research, lack of man power, lack of marketing related information, lack of farmers friendly research output, a communication gap has been identified in between the agricultural experts and farmers.

6.4 FINDINGS OF COMPONENT-III: FARMERS (FLOWER GROWERS & SELLERS)

To know the ground reality of farmers as a component of Floriculture Information System in West Bengal, 311 flower growers from 9 leading flower producing districts and 218 flower sellers from 5 popular flower markets have been selected. The following findings on flower growers and flower sellers are as follows:

- **Flower Growers:** Those who cultivate flowers.
 - a. **Socio-economic characteristics of flower growers-**
 - **Age:** The results shows that out of 331 respondent flower grower **38(11.48%)** respondents were the age between 18-25, **93(28.09%)** respondents were the age between 26-35, 104(31.41%), respondents were the age between 36-45, **62 (18.73%)**

respondents were the age between 46-55 and **34(10.27%)** respondents were the age between 56-65.

❖ **Inference:** The data states that the categories of age i.e. 18-25 and 26-35 have higher respondents due to enough energy to engaged flower cultivation compare to other categories.

➤ **Educational Qualification:** The results shows that out of 331 respondents **79 (23.86%)** respondent flower growers had completed Primary Education, **172 (51.96%)** respondents had completed Secondary Education, **53 (16.01%)** respondents had completed Higher Secondary Education and **27 (8.15%)** had completed Graduation.

❖ **Inference:** The data revealed that majority of respondents flower growers in the rural areas have not gone for higher level of education. The results show that the percentage of respondents up to secondary level is high, that means literacy rate of respondents is lower.

➤ **Financial Status:** The results shows that out of 331 respondents flower grower **156 (47.12%)** were Below Poverty Level, **123 (37.16%)** were Lower Middle Class and **52 (15.70%)** were Upper Middle Class.

❖ **Inference:** The data shows that 47.12 % respondents were under Below Poverty Level and 37.16% respondents were under Lower Middle Class because the marginal and small farmers are large in number. Due to get less amount of share, their income is not sufficient.

➤ **Experience in Floriculture:** The results shows that out of 331 respondents flower grower **45 (13.59%)** respondents have 1-5 years of experience in floriculture, **188 (56.79%)** respondents have 5-10 years of experience in floriculture, **85 (25.67%)** respondents have 10-15 years of experience in floriculture and only **13 (3.92%)** respondents have 15-20 years of experience in floriculture.

❖ **Inference:** The data states that majority of the respondent not very experienced because they are gradually shifting from traditional cultivation (Paddy, Jute) to floriculture due to incremental income.

➤ **Sex:** The result shows that out of 331 respondents, **147 (67.43%)** respondents were male farmers and **71 (32.56%)** respondents were female farmers.

❖ **Inference:** Male respondents are large in number than female respondents because female respondents also engaged with their houses hold works. But they are also work in field whenever they get time.

b. Flower Growers' Perceptions regarding Floriculture Information System:

➤ **Types of flowers cultivated by the respondents:** The results shows that out of 331 respondents **68 (20.54%)** have cultivated Loose flowers (mainly-Marigold, Hibiscus, Beli, Jasmine, Balsam and Aparajita). **263 (79.45%)** respondents have cultivated Cut flowers (mainly- Rose, Dutch Rose, Tuberose, Gerbera, Gladiolus, Orchids, Anthurium, and Chrysanthemum) and **44(13.29%)** respondents have cultivated both types of flowers.

- ❖ **Inference:** During the survey it has been noticed that in South Bengal both types of flowers are cultivated but loose flowers cultivation is predominant and in North Bengal, cut flowers are predominant due to the varied agro-climatic condition of that place.
- **Types of seeds/saplings used by the respondents:** The result shows the data about the type of seeds/saplings used by the respondent flower growers. Out of 331 respondents **82(24.77%)** respondents have used local/traditional seeds/saplings, **169 (51.05%)** respondents have used hybrid seeds/saplings and **80 (24.16%)** respondents have used both types of seeds/saplings.
 - ❖ **Inference:** The data states that percentage of Hybrid seeds/saplings used respondents are larger in number, the reason behind the use of hybrid type of seeds/saplings because these are highly productive in nature and has disease resistance power. The reason behind the use of local or traditional seeds/saplings is easy availability of the seed/saplings in local market. In present time the respondents are shifting from traditional seed/saplings to hybrid seeds/saplings due to huge demand of flowers in domestic as well as national and international markets and also for high profitability.
- **Mode of selling flowers by the respondents:** The result states that out of 331 respondents **226 (68.27%)** respondents used to sell their flowers in open market/mandi and **105(31.71%)** respondents used to sell through middle man.

❖ **Inference:** Due to lack of market information, farmers have compelled to sell their flowers in lower price through middle man.

➤ **Sources to access of floriculture related information:**

The results shows that in case of floriculture related information such as selection of seeds/saplings, fertilizers and pesticides out of 331 respondent flower growers, **37 (11.17%)** respondents have taken information from the agricultural experts of govt. organizations such as Krishi Vigyan Kendra, District Horticulture Office, Block Development Office and Krishi Prajukti Sahayak of Panchayat Samiti, **52(15.70%)** respondents have taken information from private organization, **168 (50.75%)** respondents have taken information from local agricultural shop and **74 (22.35 %)** respondents were taken information from self friends/other flower growers.

❖ **Inference:** From the above results it is clear that to seek information related to floriculture, flower growers are mainly prefer local shop, self friends/other local farmers and private organizations respectively than govt. organizations as a source of information. The main reason behind this situation is due to lack of coordination in between agricultural extension workers and farmers.

➤ **Awareness of flower growers about the government schemes related to floriculture:**

This section of the study discuss about the related schemes of floriculture in West Bengal. There are three govt. schemes on floriculture are available for the small and marginal farmers and other farmers such as Rashtriya Krishi Vikas Yojana, Mission for Development of Horticulture Schemes and Schemes of National Horticulture Mission.

The collected data shows that out of 331 respondents **106 (32.02%)** respondents benefitted by one scheme ie. Rashtriya Krishi Vikash Yojana, **13 (3.92%)** respondents benefitted by more than one mentioned schemes ie. Rashtriya Krishi Vikash Yojana and National Horticulture Mission and **212 (64.04%)** respondents did not heard about any of these three schemes.

❖ **Inference:** The above result showed that a huge communication gap has been identified in the floriculture information dissemination process by the extension workers of government organizations. So, the data revealed that maximum number of respondents were not aware about the govt. schemes related to floriculture. Therefore, it is clear that there is a big gap in floriculture information dissemination process by the government organizations, schemes related information is not properly reaching to the farmers by the agricultural extension personnel.

➤ **Usefulness of On-field services to the farmers by Government Organizations :**

This section of the study shows the usefulness of on-field information regarding soil test, use of fertilizers, selection of seeds/saplings of appropriate variety and disease of plants from govt. organizations such as – Krishi Vigyan Kendras, District Horticulture Offices and Block Level Offices by Front Line Demonstration, Advisory Services, Field Day. The results states that out of 331 respondents flower growers **89(26.88%)** got information from the govt. organization about this matter and **242(77.11%)** did not have any kind of information about the stated matter from the govt. organizations.

- ❖ **Inference:** From the analysis of data it can be state that dissemination of floricultural information by the government organizations are not up to the mark, it should be improved to provide right information to the right person at right time. Due to lack of communication farmers are not getting information properly.

➤ **Intervals of getting On-field services to the farmers by the Govt. Organization:**

This section of the study shows the intervals of getting of on-field information regarding soil test, use of fertilizers, selection of seeds/saplings of appropriate variety and disease of plants from govt. organizations such as – Krishi Vigyan Kendras, District Horticulture Offices and Block Level Offices by Front Line Demonstration, Advisory Services, Field Day. The results states that out of **89** respondents flower growers **18(20.22%)** get information regularly from the govt. organization about this matter, **42 (47.19%)** respondent get information occasionally and **29 (32.58%)** get rarely information about the stated matter from the govt. organizations.

- ❖ **Inference:** The results pointed out about the frequency of usefulness of getting on-field information from the government organizations. From the above data it can be state that on-field services have not properly provided by the extension workers. Due to less number of efficient extension workers and lack of proper attention, dissemination of agricultural information is not timely reaching to the grass root level.

➤ **Usefulness Off-field services by Government Organization:**

This section of the study shows the usefulness of off-field information by toll-free number regarding soil test, use of fertilizers, selection of seeds/saplings of appropriate variety and disease of plants, weather forecast from govt. organizations such as- Kisan Call Centre and via Matir Katha App. The results states that out of 331 respondents flower growers only **76(22.96%)** flower growers have contacted to Kisan Call Centre to seek information about the stated matter and **255 (77.03%)** flower growers didn't have any information about such kind of organizations and out of 331 respondents **64(19.33%)** respondents heard about Matir Katha-Krishoker Katha App and **267(80.66%)** respondents not informed about Matir Katha-Krishoker Katha App.

❖ **Inferences:** The result states that though government has taken many initiatives to provide off-field information to the farmers but the fact is that most of the farmers have not familiar about this kind of services because of lack of awareness of them. In this respect, if the extension workers would organize awareness camp to provide information on this kind of services then the farmers would be information enriched. By analysis of the above data it can be requested that Govt. has to take initiatives to build awareness about the Kisan Call Centre and Matir Katha App and its services to practice proper utilization of information in this field.

➤ **Reason to not achieve desirable position in floriculture among the states in India:**

The result shows that flower growers are facing lots of problem in the field of floriculture during their cultivation process. The main reasons are 1) Lack of proper

communication of floriculture related information by the extension workers 2) Lack of proper infrastructure related to floriculture. The results states that out of 331 respondents flower growers **84 (25.37%)** have accepted due to lack of proper communication of floriculture related information West Bengal not achieve the desirable position among the states in India, **53 (16.01%)** have accepted due to lack of proper infrastructure related to floriculture and **194 (58.61%)** have accepted both issues are responsible to not achieve the desirable position among the states in India.

❖ **Inference:** In spite of huge potentiality of West Bengal in floriculture due to lack of information and infrastructure the state does not achieve the desirable status in floriculture among the states in India. For this reason a well developed, well coordinated floriculture information system has been needed to provide a platform that can provide required information services to the farmers which will improve the standard of quality of living of them.

- **Flower Sellers:** Those who sell flowers called flower sellers.

a. Socio-economic characteristics of flower sellers-

- **Age:** The results shows that out of 218 respondent flower sellers **36(16.5%)** respondents were under the age group 18-25, **75(34.40%)** respondents were under the age group 26-35, **86(39.44%)** respondents were under the age group 36-45, **14 (6.42%)** respondents were under the age group 46-55 and **7(3.21%)** respondents were under the age group 56-65.

- ❖ **Inference:** The data states that the categories of age i.e. 26-35 and 36-45 have higher respondents due to enough energy to engaged flower carrying and selling compare to other categories.

- **Educational Qualification:** The results shows that out of 218 respondents **71 (32.56%)** respondent flower sellers have completed Primary Education, **87 (39.90%)** respondents have completed Secondary Education, **53 (24.31%)** respondents have completed Higher Secondary Education and **7 (3.21%)** have completed Graduation.

- ❖ **Inference:** The data states that like flower growers majority of flower sellers in the rural areas have not gone for higher level of education. The results show that the percentage of respondents up to primary and secondary level is high, that means literacy rate of respondent is lower.

- **Financial Status:** The results shows that out of 218 respondents flower sellers **91 (41.74%)** were Below Poverty Level, **115 (52.75%)** were Lower Middle Class and **12 (5.50%)** were Upper Middle Class.

- ❖ **Inference:** The data shows that 41.74 % respondents were under Below Poverty Level and 52.75% respondents were under Lower Middle Class because the marginal and small farmers are large in number. Due to get less amount of share, their income is not sufficient.

➤ **Experience in Flower selling:** The results shows that out of 218 respondent flower sellers **57 (26.14%)** respondents have 1-5 years of experience in floriculture, **72 (33.02%)** respondents have 5-10 years of experience in floriculture, **81 (37.15%)** respondents have 10-15 years of experience in floriculture and only **8 (3.66%)** respondents have 15-20 years of experience in floriculture.

❖ **Inference:** The data states that majority of the respondent have not very experienced because they are shifting from selling traditional crops (Paddy, Jute) to flower due to incremental income.

➤ **Sex:** The results shows that out of 218 respondent flower sellers, **147 (67.43%)** respondents were male farmers and **71 (32.56%)** respondents were female farmers.

❖ **Inference:** The data states that male respondents are larger in number than female respondents.

b. Perception of flower sellers regarding existing infrastructure of floriculture

➤ **Availability of permanent sitting arrangement:** The results shows that out of 218 flower seller respondents, 67(30.73%) respondents said yes, 57(26.14%) respondents said not sufficient and 94(43.1%) respondents said no to the availability of permanent sitting arrangement in the flower market.

➤ **Types of market land area:** Out of 218 flowers seller respondents, 174(79.81%) respondents said the types of market land area is government undertaking and 44(20.18%) respondents said the types of market land area is under the private organizations.

- **Stability of the market:** Out of 218 flowers seller respondents, 72(33.02%) respondents said they sell their flowers in permanent market and 146(66.97%) respondents were selling their flowers in non-permanent market.
- **Pay to the market land owner:** Out of 218 flowers seller respondents, 190(87.15%) respondents said yes they have to pay for sell their flowers, and 28(12.84%) respondents said that they don't have to pay for their selling in flower market.
- **Toilet facilities:** Out of 218 flowers seller respondents, 107(49.08%) respondents said yes to have toilet facility, 40(18.34%) respondents said not sufficient and 71(32.56%) respondents said no to the availability of toilet facility in the flower market area.
- **Availability of shading in rainy season:** Out of 218 flowers seller respondents, 64(29.35%) respondents said yes to have shade in flower markets, 134(61.46%) respondents said not sufficient and 20(9.46%) respondents said no to the availability of permanent shade arrangement in the flower market during all season as well as rainy season.
- **Drinking Water:** Out of 218 flowers seller respondents, 52(23.85%) respondents said yes to have drinking water, 77(35.32%) respondents said not sufficient drinking water and 89(40.82%) respondents said no, to the availability of drinking water in the flower markets.
- **Waste disposal area:** Out of 218 flowers seller respondents, 75(34.40%) respondents said yes to have disposal area, 55(25.22%) respondents said not sufficient and 88(40.36%) respondent said that no, the market has not any disposal areas for waste materials.

- **Cold storage near market:** Out of 218 flower seller respondents, 101(46.33%) respondents said yes to have cold storage near the market, and 117(53.66%) respondents said that they don't have cold storage facility near flower market.

❖ **Inferences:** The above data states about the existing infrastructure of floriculture in West Bengal. Most of the flower markets in West Bengal are going on government property such as-Mallickghat flower market is going on the land of the Calcutta Port Trust (**Gangyapadhyay, 2016**)¹, Kolaghat flower market is going on the land of Indian Railway (**Gangyopadhyay, 2019**)³, Dhantala Market is going on the road side area that is under PWD except Thakurnagar flower market (private market). The land authority of these markets takes money from the sellers for their day to day business but due to overcrowding the sellers cannot get basic facilities from the market authority such as- sufficient toilet; sufficient drinking water; shades in rainy season; proper sitting arrangement; sufficient garbage place for waste and rotten flowers and cold storage near flower market for unsold flowers.

c. Problems & Requirements of Flower Sellers for the Development of Floriculture Information System

- **Lack of permanent govt. markets/mandi for flower selling:** Out of 218 flower seller respondents, **190(87.15%)** respondents said yes, to lack of permanent govt. flower markets/mandi, and only **28(12.84%)** respondents said that they sell their flowers in govt. markets / mandi.

❖ **Inference:** During the survey it has been seen that most of the whole-seller flower markets/mandi in West Bengal are not permanent because the land owners are

central government authority such as Mallickghat flower market under Calcutta Port Trust, Kolaghat flower market under Indian Railway (Eastern), except Nokari flower market(Govt. flower mandi). Due to lack of coordination between central and state government, these markets are still not permanent. Thakurnagar flower market is a permanent market but it is a private market.

- **Lack of adequate storage facility:** Out of 218 flower seller respondents, **164(75.22%)** respondents said yes, to lack of adequate storage facility, and **54(24.77%)** respondents said that they don't have shortage of cold storage to keep flowers.

❖ **Inference:** The data states that in West Bengal, there is need to be set up of cold storage to store valuable unsold flowers. It has been seen that due to inadequate storage facility sellers compelled to throw their flowers here and there **(Basu, 2018)²**.



Figure 6.1: Unsold flowers near Thakurnagar Flower Market, North-24-Parganas

- **Poor market information:** All **218 (100%)** flower seller respondents agreed that market related information is not available. For this reason many times middleman captured the share of other flower sellers.

❖ **Inference:** The result of survey states that there is no marketing related information provided by any government organizations.

- **Requirement of arrangement of fairs and exhibitions for floriculture products:** All the 218 (100%) flower seller respondents agreed that the arrangement of different kind of fairs and exhibitions by the help of government organizations as well as private sectors needed to sell their flowers as well as to get global recognition and appropriate value of their flowers.

❖ **Inference:** The data states that there is need to organize different kind of fairs and exhibitions by the help of government organizations as well as private sectors to sell flowers and for global recognition to get appropriate value of their flowers.

- **Requirement of establishment of flower auction centre:** All the **218 (100%)** flower seller respondents agreed that an Auction Centre have needed to sell their flowers to get appropriate value of their flowers.

❖ **Inference:** The data states that there is need to be set up of flower auction centre because there is no flower auction centre is built to sell flowers in West Bengal.

- **Requirement of global information network:** All 218 (100%) flower seller respondents, agreed to the statement that a strong information network should be build in this state in between local, national and international market to pick the chance to entering into the global market.

- ❖ **Inference:** In West Bengal, there is no marketing information provided by any govt. organization. There is no inter- linkage between local flower markets as well as national and international flower market. The farmers produce flowers and sell according to demand for auspicious ceremony (locally called lagan).

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CHAPTER – 7

SWOC (STRENGTHS, WEAKNESSES, OPPORTUNITIES, AND CHALLENGES) ANALYSIS OF FLORICULTURE INFORMATION SYSTEM IN WEST BENGAL

CHAPTER – 7

SWOC (STRENGTHS, WEAKNESSES, OPPORTUNITIES, AND CHALLENGES) ANALYSIS OF FLORICULTURE INFORMATION SYSTEM IN WEST BENGAL

7.1 INTRODUCTION

In general, a SWOC (Strength, Weakness, Opportunity and Challenge) Analysis is a structured planning method used to evaluate the Strength, Weakness, Opportunity and Challenge involved in any organization, project or business sector (**Pathak, 2016**)³.

A SWOC (Strength, Weakness, Opportunity and Challenge) Analysis can be carried out for a product, place, organization, project or industry. It involves satisfying the objectives of the business venture or project and identifying the internal and external factors that are favourable and unfavourable to achieve the objectives.

❖ **Strength:**

Strength is the characteristics of a business or a project that gives an advantage over others. Strengths are the qualities enable us to accomplish the organizations' mission. These are the basis on which the success of an organization or sector can be sustained. These are the distinct features that give an organization's or sector's consistency. Strengths are the beneficial

aspects of the organizations or the capabilities of the organizations which include human competencies, loyalty, products and services.

❖ **Weakness:**

Weaknesses are the characteristics that place the sector or organization in disadvantage position relative to others. Weaknesses are the characteristics that prevent the sector or organization from accomplish its mission and achieving its full potential. These weaknesses deteriorate influences on the organizational success and growth. Weaknesses are the factors which do not meet the standards of the sector that it should be meet. Weaknesses in an organization may be lack of service facilities, insufficient infrastructural development, insufficient research etc. Weaknesses are controllable; they must be minimized and eliminated.

❖ **Opportunities:**

Opportunities are the elements that an organization or a sector could exploit to its advantage. Opportunities are presented by the environment within which the organization or sector operates. These arise when an organization can take benefit of conditions in its environment to plan and execute strategies that enable it to become more profitable. Any organization or sector can gain competitive advantage by making use of opportunities. Any organization or sector should be careful and recognize the opportunities and grasp them whenever they arise.

❖ **Challenge:**

Challenges are those elements in the environment that could cause trouble for the organization or sector. Challenges are arisen when conditions in external environment jeopardize the reliability and profitability.

Advantages of SWOC Analysis:

SWOC Analysis of any organization or sector can help in strategic planning in following manner-

- It is a source of information for strategic planning.
- Builds organizational strength.
- Reserve its weaknesses.
- Maximize its response to opportunities.
- Helps to overcome organization's challenges.
- It helps in identifying core competencies of the sector.
- It helps in setting the objectives for strategic planning of any organization or sector and
- It helps in knowing past, present and future so that by using past and current data, future plans can be chalked out.

7.2 STRENGTHS OF FLORICULTURE INFORMATION SYSTEM IN WEST BENGAL

➤ Suitable Agro-climatic condition

West Bengal endowed with suitable agro-climatic condition and abundance of natural resources for diversified floricultural production.

The climatic condition of this state is very unique. The climatic condition of South Bengal and North Bengal is totally different from each other. The climatic condition of South Bengal is mainly hot and humid in nature with adequate rainfall and

moderate winter while the hilly areas of North Bengal have tropical and pre-humid climatic condition, adequate rainfall, moderate temperature and prolonged winter (Chakraborty, 2019)⁷. These unique climatic conditions of West Bengal are most favourable for the production of various types of flowers. The average rainfall of this state is ranging in between 1234 mm to 4136 mm. The temperature is varies in between 24⁰c to 40⁰ c during summer and 7⁰c to 26⁰c during winter.

The soil of West Bengal is very fertile; predominance of alluvial soil is responsible for huge amount of flower production. In West Bengal well developed irrigation system facilitating higher cropping intensity. Many rivers traversed by this state and many canals and tanks supporting the irrigation system of this state and maintain underground water level.

➤ **Availability of Labour and Land**

West Bengal is an agrarian state. The total area of this state is 86.84 ha, of which 52.98 lakh ha area is net sown area from which the total area of flower cultivation is 27.62 ha. It is seen that the area of flower cultivation is increasing day by day due to incremental income and availability of land.

Floriculture is generally a labour intensive sector in which care and attention is required to grow flowers from cultivation to marketing. In rural areas of West Bengal, there is no scarcity of labours to work for cultivation of flowers. There is a vast resource of comparatively cheap labour is an advantage for floriculture.

➤ **Large Network of Agricultural Extension System**

India as well as West Bengal has a large network of agricultural extension system in terms of professional and technical agricultural staffs. In state level different institutions and organizations such as State Agricultural University, Krishi Vigyan Kendra, Kisan Call Centre, District Agriculture Department, District Horticulture Department, Sub-divisional office, Block level office, Panchayat Samiti are involved in agricultural extension program to disseminate information and knowledge in the field of agriculture and its allied sectors such as- Horticulture (Floriculture), Animal Science, Fisheries and Dairy farming.

7.3 WEAKNESSES OF FLORICULTURE INFORMATION SYSTEM IN WEST BENGAL

➤ **Lack of funding in the field of research at university level and for extension in KVKs**

During the survey it has been noticed that at university level the main barrier to conduct research is funding. Due to lack of funding, the required infrastructure has not been developed for research purpose in State Agricultural University. The reason behind the low funding is because floriculture being treated as secondary requirements due to non-edible value than other horticultural crops.

Lack of funding is also a big issue in case of infrastructural development for extension purpose in Krishi Vigyan Kendras.

➤ **Lack of Information**

a. Market related information :

In order to compete with other states as well as in global markets, the flower sellers of West Bengal needed updated marketing information.

In case of grass root level due to lack of market information the small and marginal flower growers are exploited by middle man or intermediaries. They reduce the share of the profit of the small and marginal farmers. Because government has no control on market price for that reason needy farmers don't get the exact price of the flowers.

In case of flower sellers, due to lack of information related to major flower trade fairs and exhibitions at national level and international level, information related to consumer profiles, types of demand at national and international auction, they do not compete with other states. The farmers of this state produce flowers according to demand for auspicious ceremony.

There is no sale promotion activities, no information related to inter-linkage between local, national and international markets. There are no organized co-operatives which can take care of floriculture trade in West Bengal.

Government has no control on market price for that reason small and marginal farmers do not get the exact price of flowers. For this reason productivity of flowers are still not up to the mark as compare to the other leading flower producing states like-Tamil Nadu, Andhra Pradesh and Karnataka.

b. Technological information

Different types of technologies are invented in the field of floriculture by the researchers, but it has no value unless it is applied by the farmers. Due to lack of technological information at grass root level, maximum number of flower growers are cultivated their flowers in traditional way.

Some government organizations like Krishi Vigyan Kendras are involved in dissemination of technological information and knowledge by extension work. But in many cases at ground level the information has not reached properly. Different technological information related to floriculture like advanced cultivation practice by protected cultivation under green house, poly house and shade net, organic method of flower cultivation, irrigation management, plant protection technology, post-harvest management related information are not reached properly to the small and marginal farmers.

c. Government schemes related information:

Many government initiatives have been taken to promote floriculture by central as well as state government like different kind of subsidies for making Green House, Poly House, Shade Net, Creation of water resources, loan through Kisan Credit Card etc. During the survey according to the flower growers of this state the problem is that the proper information related to these initiatives or schemes are not reached to the actual needy farmers in timely manner.

➤ **Lack of Research-Extension-Farmer Linkage**

It is very important to grow latest varieties of flowers to compete with the changing needs of floriculture at national and international level. There is lack of appropriate planting materials, tissue culture units to produce good export quality flowers. There is lack of information on new varieties which continuously keep changing in the international markets and lack of knowledge about importing and exporting countries. Due to lack of proper research in plant breeding, tissue culture units for flowers in this state, farmers have to purchase planting materials from other states like Karnataka, Maharashtra and also from outside of the country like Holland. Government should set up need based research by its Research & Development institutes in the field of floriculture. There is need to create a strong linkage to disseminate generated information through scientific research by the extension personnel to the farmers.

➤ **Lack of Efficient Extension Workers**

Agricultural as well as floricultural information is mainly disseminated by Agricultural Extension personnel such as through front line demonstration, training, advisory services etc. But due to lack of efficient extension workers, in many cases agricultural information are not reached to the grass root level properly. A wide gap in between extension personnel and farmers has been noticed by this study such as lack of emphasis on farmers training, inadequate communication capability, little focus on empowering farmers, lack of infrastructural support below district level, inadequate support for promotion of floriculture. Though having large agricultural extension network with large human resources for the development of floricultural community, the support is not reached properly.

➤ **Infrastructural Problems**

a. Lack of Cold Storage

In West Bengal shortage of multipurpose cold storage and pre-cooling unit is a big issue to store flower. Being highly perishable in nature, flower growers and sellers sometime needs pre-cooling unit for refrigerated transport to reach flower market and cold storage to store unsold flowers or to store huge amount of flowers in festive season for making profit but due to lack of cold storage facility, in many times huge amount of unsold flowers are thrown by the flower growers and sellers. Especially in flower producing district and near flower market multipurpose cold storage is needed for the flower sellers **(Ghosh, 2016)⁵**.

For instance, due to lack of multipurpose cold storage and pre-cooling unit, flower sellers of Mallick Ghat Flower Market, Dhantala Flower Market, Kolaghat Flower Market are facing lots of problems. During the survey, most of the flower growers and sellers of West Bengal complaining about the absence of multipurpose cold storage due to their financial loss.

b. Lack of Permanent Flower Market

In West Bengal another big infrastructural drawback of floriculture is lack of permanent flower market. Maximum big flower markets of West Bengal such as Kolaghat Flower Market, Dhantala Flower Market, Mallick Ghat Flower Market have not any shade to sell flowers except Mallick Ghat Flower Market, there is only 244 stalls are present. All these markets are not permanent markets such as- Mallick Ghat Flower Market is on the area of Calcutta Port Trust, Kolaghat Flower Market is on the area of Eastern Railway, Dhantala

Flower Market is on the road side area and Siliguri also has not any permanent flower market (Gangyapadhyay, 2016)⁴.

Regularly approximately 2000-4000 flower sellers come to sell their flowers in the market. In spite of taking money from the flower sellers minimum facilities are not provided by the land authorities. In these markets, there are no proper sitting arrangements, no sufficient water, and no toilet is available for the sellers. Especially in rainy season the sellers face lots of difficulties to sell their flowers.

7.4 OPPORTUNITIES OF FLORICULTURE INFORMATION SYSTEM IN WEST BENGAL

➤ Demand of flowers in Domestic, National and International markets

With the progression of civilization human are exploring the arena of floriculture and attempt to satisfy to their aesthetic needs. Gradually the consumption of flowers became regular in our daily life for this reason demand of flowers is rising day by day due to various social and religious functions round the year, West Bengal must grab on such opportunity. The state produces 221.64 MT cut flowers and 77.25 MT loose flowers in 2018-19 which is a good share among the states of India. Huge amount of flowers are exported in different parts of country like Delhi, Bhubaneswar, Chennai, Jamshedpur, Mumbai, Varanasi etc and as well as outside of this country like Dhaka, Nepal, Amsterdam, Dubai, Europe and Auckland. So, West Bengal has the potential to increase the productivity of flowers and pick the chance to entering into the global market (Pratim, 2014)¹.

➤ **Job Creation**

Floriculture emerged as an agri-business sector in West Bengal providing employment opportunity and entrepreneurship in both rural and urban areas. Floriculture basically is a labour intensive sector, where proper care and attention is needed from cultivation to marketing.

Large number of people in West Bengal earn either by cultivation or marketing of flowers. The economy of West Bengal is boosting by floriculture because it is the way of earning for marginal and small farmers and poor people also those who are associated with this. It is noticed that in this state, especially small and marginal farmers are shifting their farming from traditional to commercial floriculture which uplift the quality of standard of living of the farmers (**Chakrabarty, 2015**)².

➤ **Government Initiatives**

To promote floriculture different initiatives have been taken by the Central Government as well as Government of West Bengal. Different schemes are implemented for the development of floriculture under the different schemes of National Horticulture Mission, Rashtriya Krishi Vikash Yojana and Integrated Mission for Horticulture Development. At present, government gives stresses on protected cultivation like Green House cultivation, Shade- Net cultivation, and Poly-House cultivation by financial assistance by these schemes.

➤ **Demand of Value-Added Products of Floriculture**

Besides flowers, the demand of value- added products of floriculture like organic colours, dry flowers, and essential oils are gradually increasing at national markets as well as in international markets. Due to the eco-friendliness nature organic colours and dry flowers have high demand in throughout the year. Essential oils are used in perfume industry. Therefore West Bengal has a big opportunity to explore this section of floriculture **(Bandyopadhyay, 2017)⁶**.

7.5 CHALLENGES OF FLORICULTURE INFORMATION SYSTEM IN WEST BENGAL

➤ **Weak Research-Extension-Farmers Linkage**

In West Bengal, there is a big challenge to build coordination in between research in the field of floriculture and dissemination of the research product to the farmers by extension service. Only by the strong coordination and linkage, generated information would be disseminated to the farmers for their sustainable development. In West Bengal many research work is going on for the bright future of floriculture but it will be successful only when generated information and technologies have to be disseminated properly to the floriculture community by the extension functionaries.

➤ **Lack of sufficient government facilities**

In West Bengal, maximum flower growers are small and marginal farmers. Therefore the subsidies provided by the central as well as state government are not enough for them. We know that floriculture is a blooming industry for West Bengal, so it is requested to

the policy makers to think about this matter. There are some more financial assistance should be provided by the government especially for small and marginal farmers. Another thing for farmers of West Bengal is largely depending on floriculture in present days but flower is not included in Fasal Bima Yojana, where other crops are enlisted. Due to natural calamity like heavy rainfall, storm, flood or insufficient rainfall the growers are facing huge losses because flower is a perishable goods (**Absar, 2019**)⁸. In this case, it is requested to the government to think about this matter.

➤ **Quality of flowers**

One of the main challenges is quality of flowers. To enter into international trade flowers require to meeting international standards. In West Bengal, there is a vast scope of floriculture, but the cultivation process and post-harvesting process is not done in scientific way, for this reason the quality of flowers do not meeting the quality requirement of International standards. The reason behind this, most of the farmers of this state are economically weak and have low literacy level, so they don't have much idea about protected cultivation or organic farming to get good quality of flowers. Other states like Tamil Nadu, Karnataka and Maharashtra are take advantage over this situation and capture a high share of National and International flower markets. In this situation, the government organizations like Krishi Vigyan Kendra, Horticulture Department have to step forward to deal with this situation in this state.

➤ **Political Issues:**

During the survey it has been identified that due to different political issues in many places, different initiatives related to floriculture are still pending. For instances: **a) Flower Market in Thakurnagar:** By the government initiation a flower mandi was started to set up in the year 2017 at Thakurnagar near the railway station close to the old flower market. The market will be developed on a 3acre land of PWD. In this permanent market all the sellers will be accommodate under one roof. There will also be a cold storage and a processing unit for organic flower which will be prepared from waste flower. The budget of this project was 25 crore rupees from which 9 crore rupees was handover to the local administration to inaugurate the mandi. But after starting of this project within one year the construction work has been stopped due to political reason.

b) Nokari Cold Storage: In the year 2010, the then chief minister inaugurated the cold store at Nokari village in Nadia district to store different kind of flowers but the cold store become out of order within one year.

In Dhantala and Nokari flower market of Nadia district farmers bring their flower in every morning then after trading as the market varies regularly, farmers often left with unsold flowers of huge quantities which they throw on the streets and dumping area. According to the grower and sellers of the district, they have requested many times to the district administration for long time for make the cold store functional but nothing has been done yet.

c) Mallickghat Flower Market: Mallickghat Flower Market is the property of Calcutta Port Trust. but in the year 2000 the then Sate Government of West Bengal taken lease that place in just one rupee for 99 years from Calcutta Port Authority. But it was decided

at that time that a well decorated flower market will built at that place for reducing day to day problem of flower seller. It was also decided that not only a flower market, a cold storage for flower, a packaging centre, export centre and a canteen will be built in that place. But after 18 years the place remains same due to lack of government support. According to State Horticulture Department, in the year 2004, 37 crore rupees were imposed for this purpose of the flower market building. For this purpose 5 crore rupees were given by the then Central Government to the then State Government. A blueprint of well infrastructured flower market on 3400 square feet area of port trust also prepared at that time. But the work was not started timely, for this reason the package money returned to the then central government (Gangyapadhyay, 2016)⁴.

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CHAPTER – 8

CONCLUSION & SUGGESTIONS

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8.1 CONCLUSION

With the progression of human civilization, floriculture has emerged as an important agri-business sector providing employment opportunities in both, rural as well as in urban areas. Flowers which once adorned the gardens now become a potential source of lucrative business in global perspectives.

West Bengal is very much resourceful as a flower producing state in the atlas of Indian floriculture. There is no denying fact that floriculture continues to generate employment and earning opportunities to the people in rural areas of West Bengal. West Bengal is the highest producer of cut flowers in 2019 among the states in India.

Information is vital for rural development (**Wishart, 1995**). According to **Munyua, 2000**, information is the least expensive input for rural development, and it can also be viewed as a basic, necessary ingredient for bringing about social and economic change in rural areas. For the smooth running of floriculture sector in West Bengal, timely information is very essential, because information is very important for the development of every sector. For this reason, a well developed Floriculture Information System is needed to disseminate floriculture related information to the floriculture community. From the present study, it has been noticed that the low level of awareness,

lack of information of advanced cultivation at grass root level, unavailability of ample hi-tech infrastructure, dearth of knowledge regarding the downward dissemination of technical know-how and unorganized marketing channels; have undoubtedly threatened the profitable aspect of the floriculture sector of West Bengal. In this state, a wide gap is noticed in between research, extension work and farmers. The result of various research programs on floriculture practiced at different level, is not properly reaching to the floriculture community by the agricultural extension personnel. The policy makers should think about to strengthen the agricultural extension function at below district level, such as sub-division level, block level and panchayat level because the extension personnel have the responsibility to disseminate floriculture related information to the floriculture community in timely manner. Apart from this, many infrastructural problems are also associated with the floriculture sector, identified by this study. By the SWOC (Strength, Weakness, Opportunity and Challenge) analysis the positive side like strengths and opportunities of the Floriculture Information System are highlighted and the negative sides like weaknesses and challenges are also bring in focus by this study. To convert weaknesses and challenges of Floriculture Information System into strength, a well developed Floriculture Information System is required.

8.2 SUGGESTIONS

The following suggestions have been suggested for the development of Floriculture Information System in West Bengal.

❖ **Strengthen the Research-Extension-Farmers Linkage**

The present study reveals that in existing Floriculture Information System a wide gap has been noticed. The gap is poor linkage between Research-Extension-Farmers. The generated information and knowledge is disseminated by agricultural extension functionaries. Therefore to provide information and knowledge properly at the grass root level, there should be need for a cooperative agricultural extension system, which will work in the following manners:

- a. Develop strong linkage between National Institutions, State Agricultural Universities, District Agriculture Department, and District Horticulture Department to collect research and developments products, information and knowledge.
- b. To promote floriculture, the respective organization should organize need based training programs for farmers.
- c. To promote floriculture, the respective organization should organize awareness program, to aware the farmers in different issues related to floriculture, such as-aware the farmers on government facilities, schemes, subsidies, information on seeds and planting materials appropriate for the particular place, application of modern technologies, appropriate fertilizers and pesticides needed for a particular floriculture crops.

- d. Build adequate communication capacity to inform the farmers time to time on different issues related floriculture and need to increase focus on farmers' empowerment program.

❖ **Incorporation of floriculture in Fasal Bima Yojana**

Flower is not included in Fasal Bima Yojana, where other crops are enlisted. Due to natural calamity like heavy rainfall, storm, flood or insufficient rainfall the growers and sellers are facing huge losses because flower is a perishable goods. According to the flower growers and sellers of this district they take loan through Kisan Credit Card for their flower cultivation but when they face losses due to the natural calamity they don't able to repay the loan due to huge loss. And also they have not left enough money for starting further cultivation because most of the farmers are financially weak. So, it is requested to government to think about this matter.

❖ **Public Libraries as Floricultural Community Information Centres:**

Our society is now-a-days going through a vast change due to generation of huge information in the field of agriculture. In this context, public libraries can play a vital role to disseminate agricultural information to the agricultural community. According to **Giggey, 1988**, "community is a group of people who have something common". This can be their age, education, religion, interest, political affiliation, activities, work, profession or a combination of two or more of these". In West Bengal, there 12 Government Public Libraries, 2460 Government Sponsored Public Libraries, 7 added libraries and 27771 non-government public libraries are situated (**Majumder, 2016**). The public libraries of main flower producing districts of West Bengal can help the

floriculture community to solve their day to day problem and can improve the quality of standard of living.

By careful research, public libraries can preserve the knowledge and information of past and present to solve the future problem of floriculture community. Public libraries can store books, leaflets, newsletters, magazines, news paper cutting related to floriculture as well as agriculture by contacting Rural Agricultural Information Centres time to time for the literate and progressive farmers.

Library professionals of public libraries of West Bengal can arrange discussion program, talk show by contact experts of Rural Agricultural Information Centres for the floriculture community to solve their day to day problem in the field of floriculture.

❖ A proposed Model of Floriculture based Information System:

By this present study it has been identified that floriculture related information generally provided by two ways in state level, viz. 1. Krishi Vigyan Kendra 2. Directorate of Horticulture.

The work flow system and function of Krishi Vigyan Kendra and Directorate of Horticulture as information and knowledge providing centres are described in details in the Chapter-5. But during the survey it has been noticed that generated information by education and research is not reaching to the needy flower farmers in timely manner by the agricultural extension workers. There is a big gap has been identified in research-extension-farmers linkage. Therefore, the flower farmers are suffering due to unscientific low production and low profit.

By the SWOC (Strength, Weakness, Opportunity and Challenge) analysis of existing Floriculture Information System in West Bengal different factors has been identified such as-

1. The research product materials being prepared by the government organizations containing information related to floriculture fail to communicate to the flower farmers at grass root level.
2. Due to lack of funding and man power agricultural extension workers are unable to cover all the areas falling under their jurisdiction.
3. There is no proper coordination in between the government and private agencies for this reason, the traders of private agencies communicate with the floriculture community through the advertisement of selected products for their commercial interests.
4. Documents like periodicals, pamphlets, leaflets, newsletters in regional language related to floriculture are insufficient.

Due to the all the above factors the existing Floriculture Information System does not properly meet the information needs of the floriculture community. To cope with this situation, the only way of proper dissemination of floriculture related information is the establishment of village-based rural Floriculture Information Centre. These centres would work at Panchayat level. Rural Floriculture Information Centre is basically an information centre that is provided for the survival and growth of the rural floriculture community. Rural information services basically tailored towards analyzing and providing for information needs of rural people (**Kempson, 1990**).

Generally a Panchayat Samiti is consists of 10 to 12 villages. These Panchayat Samitis of flower producing blocks in West Bengal may set up the floriculture based Floriculture Information Centres to disseminate floriculture related information to the flower farmers.

- If under each Panchayat Samiti of flower producing blocks at least one Floriculture Information Centre is established, then the flower farmers will be benefitted from the centres. These Floriculture Information Centres will contain all documentary sources related to floriculture in regional languages such as periodicals, magazines, pamphlets, leaflets, different government facilities related documents.



Fig. 8.1: Documentary sources related to floriculture in regional language

Basic infrastructure shall be required such as- a computer with internet connection, a printer, a scanner, an android tab with GPRS and a projector. By the help of information communication technology these centres can arrange audio-visual programs, talk shows, discussion programs, weekly or monthly meeting with power point presentation by contacting agricultural experts of different government organizations in their regional language to solve the day to day problem of flower growers and sellers.

- These centres should function under the charge of – 1 Library and Information Science Professional and 1 Agricultural Science Professional having training in their respective fields (at least 6 months certificate course), appointed by the

Panchayat Samiti. The professionals would pay by the Panchayat Samiti for their voluntary service with a consolidated monthly remuneration of Rs. 3000/- to each of them.

- The agricultural professional should visit farmer's fields to collect data as images and texts then put into the system. Then the system produces the advice and the library professional retrieves the advice and explain to concerned farmers in timely manner. Documents management (classification, cataloguing and accessioning) in those centres should be done by the library professional. The library professional should create a database on floriculture for the development of floriculture community.
- These centres also responsible to supply feedback to the panel of experts of District Horticulture Department and Krishi Vigyan Kendrs who analyze and provide solutions to the problems of the farmers that are relayed to them by the agricultural professional.
- **Financial Proposal:** To implement this proposal, a sum of Rs 80,000/- (approximately) per year is required by the Panchayat Samiti.

Cost per Centre-Rs. 80,000/-(approximately)/year

Man power-2 professionals (1-Agricultural Science professional and 1- Library and Information Science professionals)

Rs. 3000/-/month/professional=Rs. 3000/-x 2 = Rs. 6000/- per month

Per year- Rs. 72,000/- + *Contingencies Rs. 8000/- =80,000/-

(*Contingencies = Telephone and stationeries)

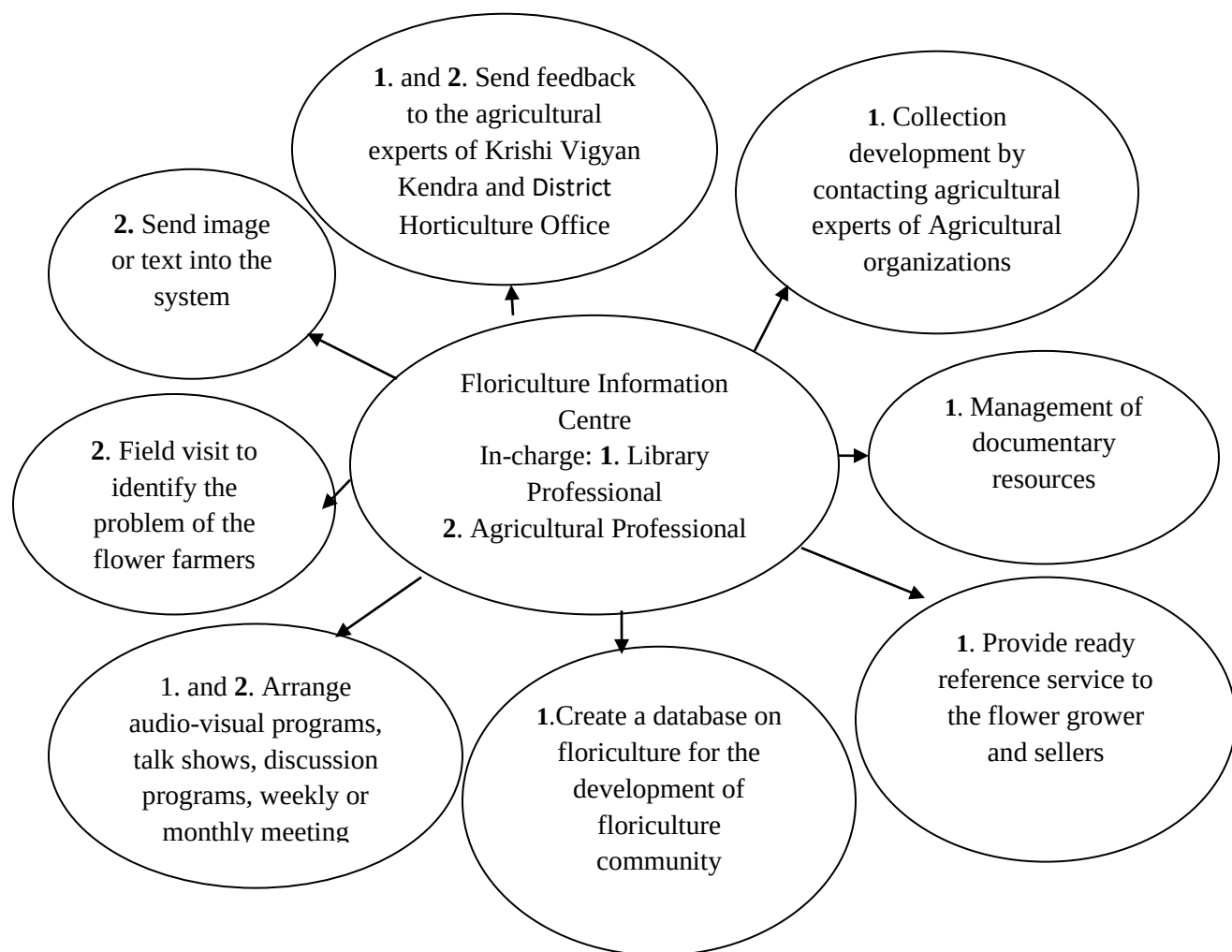


Fig. 8.2: Diagrammatic representation of work flow of proposed Floriculture Information Centre under each Panchayat Samiti

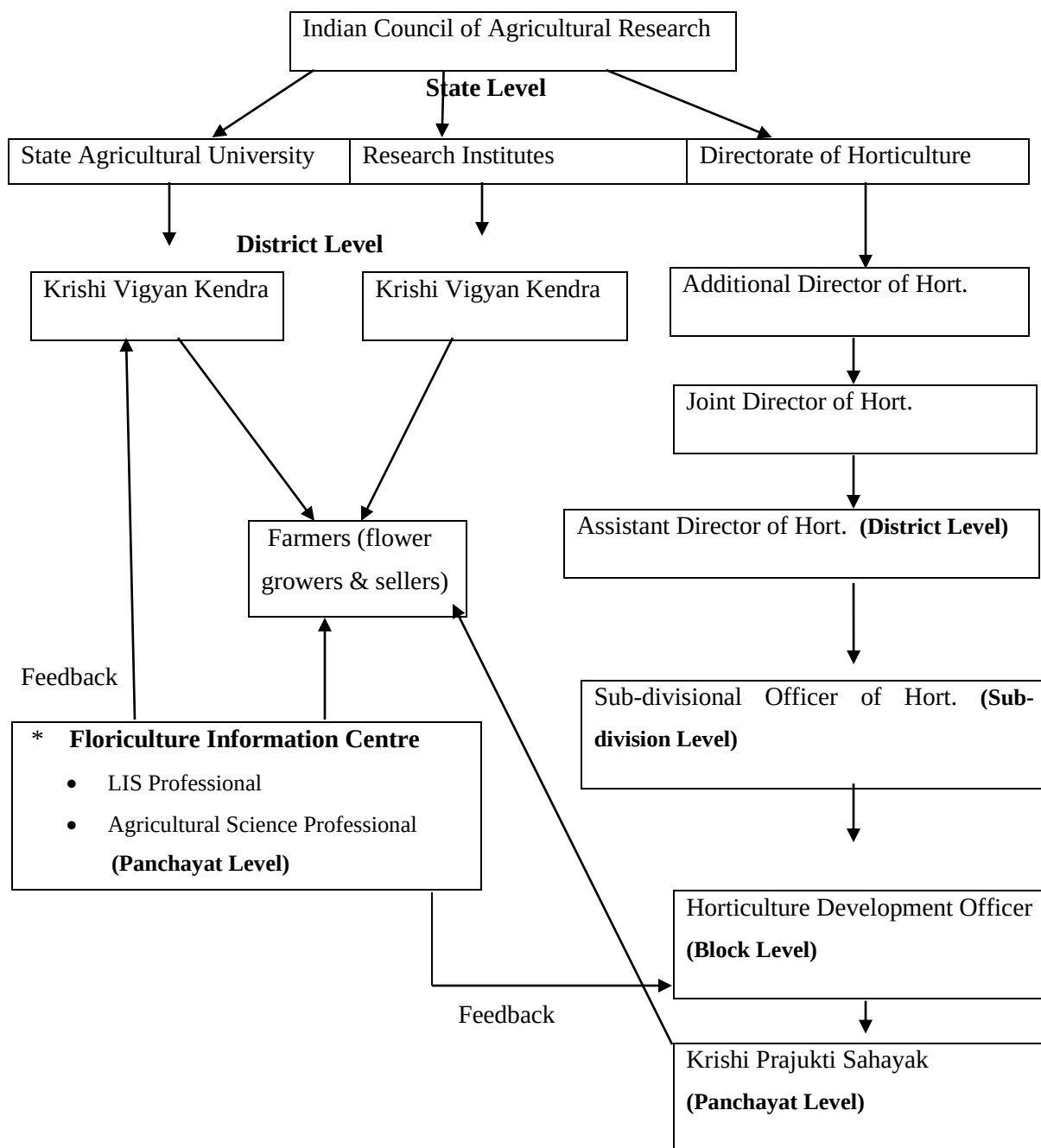


Fig. 8.3: Diagrammatic representation of information flow of proposed Floriculture Information System.

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ANNEXURES

ANNEXURE-I

INVESTIGATOR'S INTRODUCTION AND STATEMENT OF INFORMED CONSENT

I am **Bela Mondal**, a research scholar in the **Dept. of Library and Information Science, Jadavpur University**. I am carrying out a study on “Development of Floriculture Information System in West Bengal: A SWOC Analysis” for my PhD work. I am conducting the survey to know the kind of facilities and services provided by the Agricultural Organization of West Bengal on the issues related to Floriculture Information System. I seek your kind cooperation in responding to the following questionnaire. Please mark tick to the relevant information. The information will be kept confidential and used strictly for academic purpose.

Organizational Profile

Name of the Organization	
Address of the Organization (with Website address if available)	
Year Of Establishment	
Person Interviewed	
Position in the Organization	
Male/Female	
Contact No./Email Address	
Date of Interview	

**SURVEY QUESTIONNAIRE FOR THE AGRICULTURAL OFFICERS OF KRISHI
VIGYAN KENDRA (KVK)**

1. Type of Organization

a. Government ☐

b. Non-Government Organization ☐

2. Does the Organization work at any of the following level?

a. Local ☐

b. Regional(within Country) ☐

c. National ☐

d. International ☐

3. Describe the locality where the organization works

.....

4. How long the organization been working in this area?

.....

5. Dose the organization provide information regarding floriculture?

a) Yes ☐

b) No ☐

6. If Yes, What types of services and information does the organization provide to farmers and their communities regarding floriculture?

- a. Training to farmers including farm women ☐
☐
- b. Extension Functionaries
- c. Front Line Demonstration (Seasonal Agricultural inputs) ☐
- d. Technology Refinement (Testing of Technology) ☐
- e. Soil Testing ☐
- f. Seed production and distribution ☐
- g. Water recourse management training ☐
- h. Weather and Climate related information ☐
- i. Market related information ☐
- j. Disease Forecast ☐
- k. Training of Rural youth for employment ☐

7. Apart from the above services have any other types of services provided by the organization in the field of floriculture?

- a. Yes ☐
- b. No ☐

8. If Yes, Please specify the services

.....

9. What types of flowers are cultivated in this area?

.....

.....

10. Is there any initiatives are taken for the development of floriculture in this area by the organization?

a) Yes ☐

b) No ☐

11. If Yes, please mention the initiatives

.....

.....

.....

12. Is the organization working together with other organizations?

a. IFFCO (Indian Farmers Fertilizer Cooperative) ☐

b. ATMA (Agricultural Technology Management Agency) ☐

- c. DAO (District Agriculture Office) ☐
- d. DHO (District Horticulture Office) ☐

13. Apart from the above organizations, have the organization working together with any other organizations? Please specify the name of the organizations.

.....

14. What is the source of funding for this organization? Please specify the name of the funding agency.

.....

.....

15. What is the source of information used for the users to provide information on floriculture?

.....

.....

16. Does the organization process the information in any way for the target audience (eg. Restructuring, reformatting, repackaging, re-analysis)?

a. Yes ☐

b. No ☐

17. If Yes, what does the organization do, how and why?

.....

.....

.....

18. How does the organization communicate to pass the generated information to the farm communities?

- a) Through SMS ☐
- b) By direct interface ☐
- c) By training ☐
- d) By contact of extension functionaries ☐
- e) By giving published document on floriculture ☐

19. Apart from the above activities, does the organization perform any other kind of activities to communicate the farm communities? Please describe

.....

.....

20. What kind of extension services provided by the organization in the field of floriculture?

- a) Village Survey on floriculture ☐
- b) Exhibition on floriculture ☐

- c) Video Show regarding floriculture ☐
- d) TV show regarding floriculture ☐
- e) Radio Talk on floriculture ☐
- f) Farmers interface meeting ☐

21. Apart from the above services, does the organization provide any other kind of services in the field of floriculture?

- a) Yes ☐
- b) No ☐

22. If Yes, please mention the kind of extension activities performed by the organization

.....

.....

23. Is there any kind of publication to provide information to the farm communities?

- a. Yes ☐
- b. No ☐

24. If Yes, please mention the published documents to provide information

- a) Charts ☐
- b) Posters ☐
- c) Leaflets ☐
- d) Magazine ☐
- e) Journal ☐

25. Apart from the above publication of information, is there any other kind of publication to provide information?

a) Yes ☐

b) No ☐

26. If Yes, Please mention the name of the publication

.....

.....

27. What are the main challenges / difficulties to provide services to the farm communities?

a) Infrastructural Problem ☐

b) Funding Problem ☐

c) Less number of efficient worker ☐

d) Low Literacy rate of farm communities ☐

28. Apart from the above challenges, is there any other kind of challenges or difficulties is present?

a) Yes ☐

b) No ☐

29. If Yes, Please mention

.....

.....

ANNEXURE-II

SURVEY QUESTIONNAIRE FOR THE FLOWER GROWERS

Name of the Interviewer: _____ Date: _____

Farmer's Details:

Name of the farmer: _____

Gender: _____

Age: _____

Education: _____

Address: _____

INVESTIGATOR'S INTRODUCTION AND STATEMENT OF INFORMED CONSENT

I am **Bela Mondal**, a research scholar in the **Dept. of Library and Information Science, Jadavpur University**. I am conducting a survey to know the opinion of farmers of West Bengal on the issues related to Floriculture Information System. The findings of this survey will be used for PhD Thesis. This survey is an independent study, whatever information you provide will be kept strictly confidential. I hope that you will take part in this survey because your participation is important. Please spare some time for the interview and help me in successfully completing the survey.

1. For how long are you living here?

_____ (years)

2. What is your financial status?

a) Below poverty line ☐

b) Lower middle class ☐

c) Upper middle class ☐

d) High income group ☐

3. Is agriculture your main occupation?

a) Yes ☐

b) No ☐

4. How many members of your family are involved in farming?

(Total Members) _____

5. How many crops do you grow in a year?

(Total Numbers) _____

6. Do you cultivate flowers?

a) Yes ☐

b) No ☐

7. What kind of flowers you cultivate?

- a) Cut flowers ☐
- b) Loose flowers ☐
- c) Both types of flowers ☐

8. Is floriculture profitable than other commercial crops?

- a) Yes ☐
- b) No ☐

9. Is there any government purchase centre for flowers?

- a) Yes ☐
- b) No ☐

10. Then how did you sell your flowers?

- a) In open market/Mandi ☐
- b) Through Middle Man ☐

11. Generally which kind of seeds/saplings do you use for floriculture?

- a) Local/Traditional seeds ☐
- b) Hybrid seeds ☐
- c) Foreign seeds (GM) ☐

12. What is the main reason for using traditional/local or hybrid or foreign seeds?

- a) Easily available ☐
- b) High productivity ☐
- c) Disease resistant quality ☐

13. Do you get seeds/saplings and fertilizers in time?

a) Yes ☐

b) No ☐

14. If Yes, from where do you get seeds/saplings and fertilizers?

a) Govt. Organization ☐

b) Private Organization ☐

15. People take suggestions from different quarters to gather information about seeds, fertilizers etc. in order to increase their production. Generally from whom do you get suggestions on the following issues?

a) Agricultural experts of government organization ☐

b) Agricultural experts of private organization ☐

c) Agricultural Shop ☐

d) Self Friend/Other Farmers ☐

16. Now I will read out some of the schemes and some organizations which are related to floriculture. Please tell me, have you heard or read about these schemes?

a) Rashtriya Krishi Vikas Yojana (RKVY) ☐

b) National Horticulture Mission (NHM) ☐

c) Mission for Integrated Development of Horticulture (MIDH) ☐

17. Have you or your family members benefitted from any of these scheme or from above mentioned organization?

a) Yes ☐

b) No ☐

18. If, 'Yes' then, what kind of benefit you get?

.....

.....

19. Do you hear about Krishi Vigyan Kendra?

a) Yes ☐

b) No ☐

20. If 'Yes' then, do you get any kind of services or information from agricultural expert of this organization regarding floriculture?

a) Yes ☐

b) No ☐

21. If 'Yes' then, what kind of services or information you get from this organization?

.....

.....

22. If Yes, Do you receive this services or information regularly, occasionally, or rarely?

a) Regularly ☐

b) Occasionally ☐

c) Rarely ☐

23. Do you hear about Kisan Call Centre?

a) Yes ☐

b) No ☐

24. If 'Yes' then, do you ever contacted to this centre to enquire about any information regarding floriculture?

a) Yes ☐

b) No ☐

25. What is your satisfaction level with the services or information provided by them?

a) Satisfied ☐

b) Partially satisfied ☐

c) Not satisfied ☐

26. Do you hear about Matir Katha-Krishaker Katha App?

a) Yes ☐

b) No ☐

27. If 'Yes' then, do you ever contacted by this app to enquire about any information regarding floriculture?

a) Yes ☐

b) No ☐

28. In your opinion what are the main reason to not achieve desirable position in floriculture among the states in India?

a) Lack of proper communication of information related to floriculture ☐

b) Lack of proper infrastructure related to floriculture ☐

c) Both of the above ☐

ANNEXURE-III

SURVEY QUESTIONNAIRE FOR THE FLOWER SELLERS

Name of the Interviewer: _____ Date: _____

Trader's Details:

Name of the seller: _____

Gender: _____

Age: _____

Education: _____

Address: _____

Information Regarding Flower Market:

Name of the Flower Market	
Place of the Flower Market	
Year of Starting	
Land Owner of the Market	
Number of Sellers and Buyers gather per day	

1. For how long are you engaged with flowers trading?

- a. Less than 3 years ☐
- b. 3 years to 5 years ☐
- c. 5 years to 10 years ☐
- d. More than 10 years ☐

2. From which place do you come from to sell your flowers?

.....

.....

3. What kind of flowers you sell?

- a. Loose flowers ☐
- b. Cut flowers ☐
- c. Both ☐

4. Is flower trading profitable than other crops?

- a. Yes ☐
- b. No ☐

5. Is there any permanent sitting arrangement for the flower traders?

- a. Yes ☐
- b. No ☐

6. Do you have to pay to the market land owner for your flower trading?

a. Yes ☐

b. No ☐

7. How much you have to pay for your flower trading?

.....
.....

8. Do you get the following facilities from the market during flower trading?

a. Toilet Yes ☐ No ☐

b. Shade during rainy season Yes ☐ No ☐

c. Sufficient drinking water Yes ☐ No ☐

d. Waste disposal area for unsold and rotten flowers Yes ☐ No ☐

9. Is there any cold storage facility nearby the market place to store flowers?

a. Yes ☐

b. No ☐

10. If Yes, then the cold storage is maintained by whom?

a. Government organization ☐

b. Private organization ☐

11. Do you export flowers?

a. Yes ☐

b. No ☐

12. If 'Yes', in which places flowers are exported from this market?

.....
.....

13. Do you import flowers?

a. Yes ☐

b. No ☐

14. If 'Yes', from which places flowers are imported into this market?

.....
.....

15. If 'Yes', please mentioned what types of flowers are imported into this market?

.....
.....

16. Is there any system to utilize your unsold flowers for making different value added product like organic colour in this market?

a. Yes ☐

b. No ☐

17. Kindly indicate the level of problems you face in floriculture trade in West Bengal

a. Infrastructural drawbacks for reaching market in time Yes ☐ No ☐

b. Lack of adequate storage facility Yes ☐ No ☐

c. Poor market information Yes ☐ No ☐

d. Poor Post-Harvest Management Yes ☐ No ☐

e. Lack of efficient market channel Yes ☐ No ☐

18. In your opinion, what are the facilities required for the development of Floriculture in West Bengal?

a. Development of physical infrastructure for floriculture Yes ☐ No ☐

b. Development of efficient market channel Yes ☐ No ☐

c. Arrangement of fairs and exhibitions for floriculture products Yes ☐ No ☐

d. Establishment of Auction Centre Yes ☐ No ☐

e. Establishment of strong information network between local, national and international flower markets. Yes ☐ No ☐

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