

# Annual Report

2017-18



Department of Floriculture, Medicinal and Aromatic Plants  
**Uttar Banga Krishi Viswavidyalaya**  
**Pundibari : Cooch Behar**

## THE DEPARTMENT AND ITS MANDATES

The Department of Floriculture, Medicinal and Aromatic Plants is a component of the Faculty of Horticulture of Uttar Banga Krishi Viswavidyalaya since its inception on the 1<sup>st</sup> February, 2001. It is an academic department under the Faculty of Horticulture wherein the UG courses related to Floriculture, Medicinal and Aromatic Plants of all the three faculties namely Agriculture, Horticulture and Technology are being taught.

The Doctoral Degree Programme of the department was introduced in 2009 and the Master Degree Programme was initiated in 2011. From 2017-18 academic sessions the **Post-Graduate** part of Medicinal and Aromatic Plants have been separated from the Department and presently the Department is offering Master Degree and Doctoral Degree Courses on Floriculture and Landscape Architecture only.

The Department of Floriculture, Medicinal and Aromatic Plants was established with the objective to cater the courses on the relevant subjects for both UG and PG programmes, to conduct need based research on ornamental, medicinal and aromatic plants and transfer technology to the peasantry of North Bengal Region under the jurisdiction of the University. The research mandate of the discipline of Floriculture and Landscape Architecture includes:

- Collection, conservation and evaluation of germplasm of different ornamental crops
- Development of techniques for raising of QPM of ornamental plants
- Standardization of protocol for micropropagation of high-valued ornamentals
- Standardization and/or refinement of agrotechniques of relevant crops suitable to North Bengal Region
- Standardization of package of practice for organic farming of commercial flowers
- Standardization of post-harvest management practices for commercial ornamentals
- Value-addition and development of value-chain in ornamentals
- Application of conventional and non-conventional approaches for improvement of ornamental plants
- Standardization of techniques for protected cultivation of high valued ornamental crops
- Appraisal of promotion of cultivation and identification of supply-chain for ornamental crops

## A. TEACHING AND NON- TEACHING STAFFS OF THE DEPARTMENT

### 1. TEACHING STAFF

#### Present Strength

Name	Designation	Contact number	Email ID	Remark
Prof. S. Maitra	Professor	8900433272	soumenmaitra@rediffmail.com	Continuing
Dr. I Sarkar	Associate Professor & Head	9434814181	Indrajitsarker_kpg@yhoo.co.in	Continuing
Dr. S. Koluknde	Assistant Professor	8276871965	kswathi006@gmail.com	Resigned on 18.04.2018
Dr. ArpitaMandal Khan	Assistant Professor	9434061440	meet.arpitakhan@gmail.com	Continuing

### 2. NON-TEACHING STAFF

#### Present Strength :

Sl. No.	Name	Designation	Contact number	Remark
1.	Mr. M.H. Khandakar	Superintendent Tech.	9734942436	Continuing
2.	Mr. S. Neogi	Record Supplier	9593952277	Continuing

### 3. STUDENT STRENGTH

- a) **B.Sc. (Hort.) Hons:-**20 in each Academic Session under the Faculty of Horticulture
- b) **M. Sc. Students:** Intake capacity of the department is 08 for each academic session. Present strength of Masters Student is three. Two students were admitted in the academic session 2015-16 and one in 2017-18.

- c) **Ph.D. Student:** Present intake capacity of University Research Scholar in Ph.D programme under the department is 04. Present strength of Ph.D students is four, admitted in the academic session 2017-18 (02 URS and 02 self-financed).

## B) DEPARTMENTAL ACTIVITIES

### 1. Teaching Programme

#### a) Courses Offered in UG level

Sl. No.	Course No.	Course Title	Credit	Course Leader	Associated teachers
1.	FAM-101	Principles of Landscape Architecture	1 (0+1)	Dr. S. Maitra	Ms. S. Kolukunde
2.	FAM-201	Commercial Floriculture	3(2+1)	Dr. I Sarkar	Dr. S. Maitra
3.	FAM-251	Ornamental Horticulture	3(2+1)	Dr. I Sarkar	Dr. S. Maitra
4.	FAM-301	Medicinal and Aromatic Plants	3(2+1)	Dr. S. Maitra	
5.	FAM-301 (IV <sup>th</sup> Dean )	Breeding and Seed Production of Flower and Ornamental Crops	3(2+1)	Ms. S. Kolukunde	Dr. A. M. Khan

#### b) Courses Offered in PG level

Sl.No	Course No	Course Title	Credit	Course Leader	Associated teachers
1	FLA 501	Production technology of Cut Flowers	3 (2+1)	Dr. I Sarkar	Dr. S. Maitra Dr. A. M. Khan
2	FLA 502	Breeding of Flower crops and Ornamental Plants	3 (2+1)	Dr. S. Maitra	Dr. A. M. Khan Ms. S. Kolukunde
3	FLA 551	Production Technology of Loose Flowers	3 (2+1)	Dr. S. Maitra	
4	FLA552	Landscaping and	3 (2+1)	Dr. A. M. Khan	Dr. I Sarkar

		Ornamental Horticulture			
5	FLA 601	Protected Floriculture	3 (2+1)	Dr. S. Maitra	Ms. S. Kolukunde Dr. I Sarkar
6	FLA 602	Value Addition in flowers	3 (2+1)	Ms. S. Kolukunde	Dr. A. M. Khan
7	FLA 701	Advances in Flower production Technology	3 (2+1)	Dr. I Sarkar	Dr. A. M. Khan
8	FLA 702	Advances in protected and precision floriculture	3 (2+1)	Dr. S. Maitra	Dr. A. M. Khan
9	FLA751	Advances in breeding of flower crops	3 (2+1)	Dr. S. Maitra	Dr. A. M. Khan
10	FLA 752	Advances in Landscape Architecture	3 (2+1)	Dr. I Sarkar	Dr. S. Maitra

## 2. PG Students

### a) Master Degree

Sl No	Name of the students	Semester	Thesis title	Advisory committee
1.	Ms. Harshitha L. H-2016-05-M	3 <sup>rd</sup> - 4 <sup>th</sup>	Evaluation of spray chrysanthemum cultivars for quality, productivity and aphid tolerance under varied growing conditions in the terai region of west bengal	Dr. I Sarkar (Chairman) Dr. A M Khan Dr. S. Maitra Dr. AvijitKundu Dr. Suprakash Pal
2.	Ms. Mingma Diki Sherpa H-2016-07-M	3 <sup>rd</sup> - 4 <sup>th</sup>	Standardization of Dehydration Technology of Chrysanthemum, African Marigold and Gerbera in the Terai Region of West Bengal	Dr. S. Maitra (Chairman) Dr. I Sarkar Dr. A M Khan Dr. M. Prema Devi
3.	Mr. Bishal Chakraborty H-2017-05-M	1 <sup>st</sup> - 2 <sup>nd</sup>	Effect of organic foliar sprays on growth and flowering of china aster ( <i>Callistephus chinensis</i> nees.) in terai zone of	Ms. S. Kolukunde transferred to Dr. I Sarkar (Chairman) Dr. S. Maitra

Sl No	Name of the students	Semester	Thesis title	Advisory committee
			West Bengal.	Dr. A M Khan Dr. S.Bandhopadhyay
4.	ManasMandal Reg. No.-H- 2015-08-M	4 <sup>th</sup>	Studies on the effect of cytokinin on growth and quality production of African marigold ( <i>Tagetes erecta</i> Linn.) cv. PusaNarangiGainda	Dr. S. Maitra (Chairman) Dr. I Sarkar Ms. S. Kalukunde Dr. J.C. Jana

**b) Doctoral Degree**

Sl. No.	Name of the students	Semester	Thesis title	Advisory committee
1.	Mr. ManasMandal	1 <sup>st</sup> -2 <sup>nd</sup>	Standardization of dehydration technology of China Aster [ <i>Callistephus chinensis</i> (L.) Nees], Chrysanthemum [ <i>Dendranthema grandiflora</i> (Ramat.) Kitam.], Hanging Lobster Claw [ <i>Heliconia rostrata</i> ( Ruiz&Pavon)], Pot Marigold ( <i>Calendula officinalis</i> L.) and Rose ( <i>Rosa</i> sp.) in the Terai region.	Dr. S. Maitra (Chairman) Dr. I Sarkar Dr. A M Khan Dr. P. K.Paul Dr. J. C. Jana Dr. S.Mandal
2.	Mr. SujitRai	1 <sup>st</sup> -2 <sup>nd</sup>		Dr. S. Maitra (Chairman) Dr. I. Sarkar Dr. A M Khan
3.	Mr. PravasSidya H-2017-7-D	1 <sup>st</sup> -2 <sup>nd</sup>	Growth and flowering performance of chrysanthemum cultivars along with role of different organic nutrients	Dr. I Sarkar (Chairman) Dr. S. Maitra Dr. A M Khan Dr. A. Roy Dr. S. Pal
4.	Ms. Chandrakala Rai	1 <sup>st</sup> -2 <sup>nd</sup>	Nutrition optimization for maximizing yield and response of floral preservatives for enhancing vase life of <i>dendrobium</i> hybrid	Dr. I Sarkar (Chairman) Dr. S. Maitra

				Dr. A M Khan Dr. D. Mukhopadhyay Prof.(Dr.) Ashok Choudhury
5.	Khwairakpam Lily Devi Reg. No. - H-2010-1-D		Studies on the effect of Gibberellic acid (GA <sub>3</sub> ) on growth, development, flowering, yield and quality of African Marigold ( <i>Tagetes erecta</i> Linn.) Cv. Pusanarangainda	Dr. S. Maitra (Chairman)
6.	Abhinash Moirangthem Reg. No. - H-2012-7-D		Studies on growth, development, flowering and regeneration ability of tuberose ( <i>Polianthes tuberosa</i> L.) cultivars in sub Himalayan Terai region of West Bengal	Dr. S. Maitra (Chairman)
7.	Rocky Thokchom Reg. No. - H-2013-3-D		Studies on the effect of plant bio-regulators on the regeneration abilities of Anthurium ( <i>Anthurium andraeanum</i> Lind.) and Iris ( <i>Iris ensata</i> Thunb.) <i>in-vitro</i>	Dr. S. Maitra (Chairman)
8.	Sachin Sharma Reg. No. H-2013-04-D		Studies on nutrient and post-harvest management of gladiolus ( <i>Gladiolus grandiflorus</i> L.) cv. American Beauty in Terai region of West Bengal	Dr. I Sarkar (Chairman) Dr. S. Maitra Dr. J.C. Jana Dr. A. Roy

### 3. Research Programme

#### a) Departmental Research programme

Sl. No.	Title	Associated Teacher	Status
1.	Collection and maintenance of germplasm of Chrysanthemum	Dr. I Sarkar Dr. A. M. Khan Ms. S. Kolukunde Dr. S. Maitra	Thirty-nine varieties of spray type chrysanthemums were collected and maintained in the instructional farm of the dept. sixteen of the varieties were evaluated under field and greenhouse condition
2.	Collection and maintenance of	Dr. I Sarkar Dr. A. M. Khan	Four cultivars of china aster have been collected from IIHR,

<b>Sl. No.</b>	<b>Title</b>	<b>Associated Teacher</b>	<b>Status</b>
	germplasm of China Aster	Ms. S. Kolukunde Dr. S. Maitra	Bengaluru, and are presently under field evaluation
3.	Collection and maintenance of germplasm of Tuberose	Dr. I Sarkar Dr. S. Maitra Ms. S. Kolukunde Dr. A. M. Khan	Thirteen cultivars of tuberose are presently under field evaluation.
4.	Collection and maintenance of germplasm of Orchids	Dr. A. M. Khan Dr. I Sarkar Dr. S. Maitra	Initiative has been taken for collection of orchid species of the Terai and Duars region of West Bengal. Nearly twenty germplasm of orchids are maintained presently
5.	Organic cultivation practices of marigold.	Ms. S. Kolukunde Dr. I Sarkar Dr. S. Maitra	Paper published on the topic
6.	Value addition of flowers and ornamentals	Dr. A. M. Khan Ms. S. Kolukunde Dr. I Sarkar	Paper presented in national seminar, several product developed

#### **b) Projects Handled**

<b>Sl. No.</b>	<b>Project Title</b>	<b>Sponsoring Authority</b>	<b>Associate Teacher</b>
1	Improving water use for dry season agriculture by marginal and tenant farmers in the Eastern Gangetic Plains	ACIAR, Australia	Dr. S. Maitra
2	Technology standardization for lab to land of Asiatic Lily for development of tribal community in Terai-Dooars region of North Bengal under phase - I	Department of Science and Technology, Govt. of W.B.	Dr. S. Maitra
3.	Establishment of a plant tissue culture unit for research, training and commercial QPM production at UBKV	Directorate of Research, Uttar Banga Krishi Viswavidyalaya	Dr. S. Maitra
5.	Survey of pests and diseases of medicinal Plants in West Bengal	National Medical Plant Board	Dr. I Sarkar

#### **c) Research findings**



### **Marigold**

Results disclosed that African Marigold cultivar PusaNarangiGainda performed better in the Terai region of West Bengal as compared to the cultivar PusaBasantiGainda and application of plant growth regulators pronounced the effect much further, out of which, application of 50 ppm BA at 21 and 42 days after transplanting improved the flower production and diameter of flowers.

Application of FYM (5Kg/m<sup>2</sup>) + *Azotobacter* (5g/Kg of FYM) + *Phosphate Solubilizing Bacteria* (5g/Kg of FYM) in African Marigold cultivar PusaNarangiGainda showed sustainable production of organic Marigold in the Terai region of West Bengal.

### **Asgand**

For direct *in vitro* regeneration of *Withania* seedlings, a culture medium containing MS+ 5.0mg l<sup>-1</sup> GA<sub>3</sub>+ 5.0 mg l<sup>-1</sup> Kinetin was found superior in terms of growth and development, whereas, for regeneration from nodal explants, medium having MS+1.0 mg l<sup>-1</sup> BAP+2.0 mg l<sup>-1</sup> IAA recorded the maximum response percentage and number of multiple shoots. However, for obtaining maximum rooting percentage, early root initiation and maximum root growth of plantlets, use of MS medium supplemented with 5.0 mg l<sup>-1</sup>IBA was found better.

### **Gladiolus**

Results suggested that during dormancy to vegetative stage a rapid change occurred in corm reserve compositions of gladiolus reflected in the changes in reducing sugar, non-reducing sugar, starch, lipids, ascorbic acid, phenols and enzymes giving an idea of key regulatory mechanism during dormancy to sprouting of corms.

GA<sub>3</sub> @ 50 ppm improved the quality and yield attributing characteristics of Gladiolus, like - leaf phenol content, non-reducing sugar and protein content of corms, spike length and number of florets per spike. BA @ 100 ppm and Triacntanol @ 50 ppm showed results in several qualitative and quantitative characters of Gladiolus which were very near to the effect of GA<sub>3</sub> @ 50ppm.

### **Ornamental Annuals**

Twenty different genotypes of ornamental annuals were evaluated under two different growing environments (open field and polyhouse conditions) and the results revealed that variability exists within the genotypes under each growing environment or in the same genotype under different growing conditions. Variability exists within the genotype as well as in the growing environment in respect of growth characters, earliness and floriferousness, duration of blooming, quality of flowers, chlorophyll, protein and anthocyanin content on the basis of which the annuals were grouped for different landscaping purposes. The experiment gave a precise database of the comparative performance of 20 different winter annuals in respect of the duration between the major stages of flowering in both ways from the DAT as well as from the preceding stage.

### **Dry flower technology**

The standardized dehydration technique reflected that African Marigold needed 18hrs in silica gel under hot air oven and 4 minutes in microwave oven, French Marigold needed 12hrs in silica gel under hot air oven and 3 minutes in microwave oven, Star Marigold, Roses and crotons needed the same as French Marigold, Mussaenda that needed 6hrs in silica gel under hot air oven and 2 minutes in microwave oven and Bougainvillea needed 12hrs in silica gel under hot air oven and 2 minutes in microwave oven for complete drying.

### **Tuberose**

The study represented that pulsing of tuberose cv. Prajwal with Sucrose (9%)+8-HQ (200ppm) for 24 hours extended the post-harvest longevity of cut spikes as well as improved the floret opening. On the other hand holding or vase-solution containing Sucrose (6%)+BA (30ppm) improved the vase-life, changes in fresh weight, floret opening, water uptake and water balance and hence may be recommended.

### **DOCTORAL DEGREE PROGRAMME**

#### **Gladiolus**

The study recommended five gladiolus genotypes i.e ACC04, ACC11, ACC13, ACC14, and ACC15 for commercial cultivation under Terai region of West Bengal. These lines, having high rate of seed set in open pollination, were also identified as potential parent material for future breeding programme. The study also indicated presence of additive, additive epistatic

and dominant gene effect governing different vegetative and floral traits of gladiolus. The investigation recommended MS +GA<sub>3</sub> 5mg/l + kinetin (0.5mg/l) as best media for gladiolus seed germination and VSM + vermiculite +sand (1:1) followed by vermiculite + vermicompost (1:1) for higher seedling survival rate.

Azotobacter @2 gm/ plant + PSB @ 2 gm/plant +RDF -75%+ FYM@ 50 tons /ha as basal were showed better results in early emergence of spike (58.50 days), First floret show colour (62.16 days ) Spike length (118.68cm) and spike girth (13.09) cm of gladiolus. Vase life were found maximum (11.37 days) with the 10% sucrose +HQ 200ppm in the factor A. In case of factor B Silver Nitrate @ 50ppm gave the better vase life of (10.80days). In the interaction effect treatment combination 8 %sucrose + HQ 200 ppm + citric acid @2000 ppm gave maximum vase life of (11.94 days).

### **Marigold**

The study opined that exogenous application of GA<sub>3</sub>in African Marigold at 250 ppm during 21 and 42 days after transplanting showed earliness with increased duration of flowering, induced greater chlorophyll synthesis and produced higher amount of biomass, reducing and non-reducing sugars, carotenoid content of flower petal, number of flowers per plant with greater diameter and fresh weight, thereby higher yield and B:C ratio.

### **Micropropagation**

The study indicated that MS medium supplemented with 4mg/l 2, 4 - D is suitable for callus induction of Gerbera and Gladiolus but culture media containing MS + 6mg/l 2, 4 - D + BAP (0.5 mg/l) showed earliest callus initiation. Better and higher shoot regeneration in Gerbera and Gladiolus was achieved with MS medium supplemented with 4mg/l BAP but earlier shoot regeneration was noticed with the culture medium MS + BAP (6mg/l) + NAA (0.5mg/l). A potting medium containing Garden soil, sand and vermicompost was found better for acclimatization of plantlets. The processes of differentiation and organogenesis in both the species showed high metabolic activity resulting rapid growth and multiplication.

**Chrysanthemum:** Sixteen genotypes of spray type chrysanthemums were evaluated under six growing conditions. Based on their morphological characterization,genotypes White Anemone, Yellow Baby, BCC-1, Basanti were suitable for pot culture and ground cover. BCC-22 and BCC-150suitable for pot cultureNanako Yellow, Nanako White, Local Yellow, BidhanAntara, BCC-38, BCC-24, BCC-4 genotypes as cut flower and Local Yellow, White

Prolific, BCC-22, BCC-4, BCC-29, BCC-34 genotypes as loose flower chrysanthemums. Genotypes Local Yellow and BCC-4 showed an all-round performance. High productivity of flowers (85-100 flowers per plant) was recorded in genotypes Nanako White, Nanako Yellow. BCC-38 and BCC-150 yielded an average of 60-70 flowers per plant, whereas, the flower productivity of BCC-22, BidhanAntara, BCC-4, BCC-34 and Basanti ranged between 50-60 flowers per plant. Maximum productivity was recorded when the crop was planted in 1<sup>st</sup> week of July under polyhouse condition. Early planting in July promoted taller plants with luxurious vegetative growth. September planting encouraged both horizontal and vertical growth. Chrysanthemum plants grown under Terai region of West Bengal showed escape resistance to aphids when planted in July.

#### 4. Developmental Programme

Sl. No.	Title of Training	Associated Teacher
1.	Organizing training on 30.05.2017 at Dhalaguri and workshop for linkage of beneficiaries to the government programmes under LWR project at the Faculty of Technology, UBKV on 13.07.2017.	Dr. S. Maitra
2.	Delivered a lecture on “ <i>Production and utilization of vermicompost in floriculture</i> ” on 08.02.2018 in the skill development training programme on vermicompost producer sponsored by Agriculture Skill Council of India (ASCI), Govt. of India and organized by UBKV from 02.02.2018 to 02.03.2018 at UBKV, Pundibari.	Dr. S. Maitra
3.	Delivered a lecture on “ <i>Value addition and economics of medicinal plants</i> ” on 20.02.2018 in the Awareness-cum-training programme on medicinal plants cultivation and conservation organized by Department of Forestry, UBKV and supported by NMPB, Govt. of India.	Dr. S. Maitra
4.	Delivered a lecture on “ <i>Problem and Prospect of Medicinal Plant Cultivation in CoochBehar District</i> ” in the Diploma in Agricultural Extension Services for Input Dealers (DAESI) programme organized by CoochBehar KVK on 28.02.2018 at 11.00AM to 2.00PM	Dr. S. Maitra
5.	Conducted one theory and one practical class on propagation technique of different flowers and medicinal plants in the STRY training programme organized by CoochBehar KVK on 22.03.2018.	Dr. S. Maitra

6.	Conducted one practical class on propagation technique of different flowers and medicinal plants in the STRY training programme organized by CoochBehar KVK on 29.03.2018.	Dr. S. Maitra
7.	Delivered a lecture on ' <i>Present status and scope of flower production and business in West Bengal</i> ' in the Farmers-Scientist Interaction Programme (sponsored by NHB) on 5.01.2018 during " <u>National Symposium on Floriculture and Urban Horticulture in Global Perspective (NASRAFUH - 18)</u> " organized by Bidhan Chandra Krishi Viswavidyalaya, West Bengal, India on 4-5 January, 2018 at FACC, BCKV, Kalyani, Nadia, West Bengal.	Dr. S. Maitra

## 5. PUBLICATIONS

### a) Research papers:

- i. Thokchom, R. and Maitra, S. (2017). Micropopagation of *Anthurium andreanum* cv. Jewel from leaf explants. *Journal of Crop and Weed*. ISSN: P-0974-6315/E-2349-9400. 13(1):23-27.
- ii. Thokchom, R., Maitra, S. and Sharma, S. (2017). *In vitro* mass propagation of endangered terrestrial orchid -*Phaiustankervilliae* (L' Her.) Blumethroygh green seed pod culture. *International Journal of Current Microbiology and Applied Sciences*. ISSN: 2319-7706. 6(5):722-728.
- iii. Swathi, K., Maitra, S. and Sarkar, I. (2017). Influence of temperature and embedding media on production of quality dry flowers of African Marigold cv. PusaNarangiGainda. *Plant Archives*. ISSN 0972-5210. 17(2):911-915.
- iv. Sharma, S. and Sarkar, I. (2018) Influence of pulsing and holding solutions in vase life of gladiolus cv. American Beauty. *Int. J. Chem. Studies*. 6 (2): 2471-74.
- v. Khangjarkpam, G and Maitra, S. (2017). Specialty cut flower: a new panorama of Indian floriculture. *Innovative Horticulture Concepts for Sustainable Development, Recent Trends, Vol. – II* [Ed(s) – Deb, P., Bhowmick, N., Munsi, P. S. and Ghosh, S. K.]. New Delhi Publishers, New Delhi, India. pp.- 109-116. ISBN: 978-93-86453-075.
- vi. Swathi, K., Sarkar, I., Maitra, S. and Sharma, S. (2017). Organic manures and bio-inoculants mediated influence on growth and flowering of African Marigold(*Tagetes erecta* L.) cv. PusaNarangiGainda. *International Journal of Bio-*

*resource and Stress Management*. 8(3): 429-432. Doi: [HTTPS://DOI.ORG/10.23910/IJBSM/2017.8.3.1690](https://doi.org/10.23910/IJBSM/2017.8.3.1690)

- vii. Maitra, S. and Gantait, S. S. (2018). Landscaping and gardening ornamentals: an alternative source of essential oils. Proceedings of the *National Symposium on Floriculture and Urban Horticulture in Global Perspective (NASRAFUH - 18)*, organized by Bidhan Chandra Krishi Viswavidyalaya, West Bengal, India on 4-5 January, 2018 at Kalyani, Nadia, West Bengal. pp. 344-349. ISBN – 978-93-85883-65-1.
- viii. Moirangthem, A., Maitra, S., Heisnam, P. and Devi, N. M. (2018). Comparative performance of different Tuberose (*Polianthes tuberosa* L.) genotypes on flower spike yield under Sub-Himalayan Terai region of West Bengal. Proceedings of the *National Symposium on Floriculture and Urban Horticulture in Global Perspective (NASRAFUH - 18)*, organized by Bidhan Chandra Krishi Viswavidyalaya, West Bengal, India on 4-5 January, 2018 at Kalyani, Nadia, West Bengal. pp. 86-88. ISBN – 978-93-85883-65-1
- ix. Mandal, M., Maitra, S. and Sarkar, I. (2018). Effect of benzyl adenine on production of African Marigold (*Tagetes erecta* L.) cv. PusaNarangiGainda. Proceedings of the *National Symposium on Floriculture and Urban Horticulture in Global Perspective (NASRAFUH - 18)*, organized by Bidhan Chandra Krishi Viswavidyalaya, West Bengal, India on 4-5 January, 2018 at Kalyani, Nadia, West Bengal. pp. 140-143. ISBN – 978-93-85883-65-1.
- x. ArpitaMandal Khan, Ram Pal and Singh, D.R (2018) Value added packaging of single Cymbidium flowers –A technology for augmenting farmers’ income. Proceedings of *National Conference on Floriculture for Rural and Urban Prosperity in the Scenario of Climate Change*, Feb-16-18, 2018, Ranipool, Sikkim.
- xi. Sarkar, A., Biswas, S., Malakar, M. and Maitra, S. (2018). Effect of 8-HQC based vase solutions on the post-harvest life of cut flowers of different *Heliconia* species. Proceedings of the *National Symposium on Floriculture and Urban Horticulture in Global Perspective (NASRAFUH - 18)*, organized by Bidhan Chandra Krishi Viswavidyalaya, West Bengal, India on 4-5 January, 2018 at Kalyani, Nadia, West Bengal. pp. 395-398. ISBN – 978-93-85883-65-1.

**b) Abstract published**

- i. Maitra, S. and Chattopadhyay, C. (2018). Strategies for conservation of medicinal and aromatic plants in Northern part of West Bengal. In: *Abstracts Book - Seminar on Recent Advances in Medicinal Plants Sector in India and Their Sustainable Uses in Human Welfare and Poverty Alleviation* organized by Medicinal Plants Research and Extension Centre, Ramkrishna Mission Ashrama, Narendrapur, Kolkata – 700103 and sponsored by National Medicinal Plants Board, New Delhi on 28.01.2018.
- ii. Chandra K. Rai, ArpitaMandal Khan, Swathi, K. SujitRai and Sarkar, I. ( 2018) Effect of extraction methods on quality of organic dyes from flowers and their utility. Proceedings of *National Conference on Floriculture for Rural and Urban Prosperity in the Scenario of Climate Change*, Feb-16-18, 2018, Ranipool, Sikkim.
- iii. Swathi, K. ArpitaMandal Khan, Mingma Diki Sherpa and Harshitha L. (2018) Socio-economic upliftment of rural women through value-added agroforestry products. Proceedings of *National Conference on Floriculture for Rural and Urban Prosperity in the Scenario of Climate Change*, Feb-16-18, 2018, Ranipool, Sikkim.
- iv. ArpitaMandal Khan and Ram Pal (2017) Technology for value added packaging of cymbidium flowers. Proceedings of *7th International Science Congress*, International Science Community Association, 8-9 December, 2017, Bhutan.
- v. Sachin Sharma, Indrajit Sarkar and Harshita L. (2017) Influence of integrated nutrient management on the corm and cormels development of gladiolus (*Gladiolus grandiflorus*) Cv. American beauty in Terai Region of West Bengal, India. Proceedings of *7th International Science Congress*, International Science Community Association, 8-9 December, 2017, Bhutan.

### c) Popular articles

#### *English*

1. Maitra, S. (2018). Value addition and economics of medicinal plant cultivation. *Training Manual on Medicinal Plants*. (Publ. Dept. of Forestry, UBKV and supported by NMPB, Govt. of India). pp. 53-56.

#### *Bengali*

1. Maitra, S. (2018). Vesazaudviderchas-abaderorthonaitikdik o juktamulyakaran [Value addition and economics of medicinal plant cultivation].

*Vesazaudviderprasikshanpustika [Training Manual on Medicinal Plants]*. (Publ. Dept. of Forestry, UBKV and supported by NMPB, Govt. of India). pp. 53-57.

#### d) Bengali Booklets

- i. Sarkar, R., Mitra, B., **Maitra, S.**, Chatterjee, R., Pradhan, K., Laskar, N., Khalko, S., Chaturvedi, O., Roy D. and Ghosh, M. (2017). *TaraiAnchalerKichuPradhanSasyer (Dhan, Alu, Sarshe) Chashabad[Production technology of some major field crops (Rice, Potato, Mustard) of Terai region of West Bengal]*. Published by – Uttar Banga Krishi Viswavidyalaya, Pundibari, CoochBehar, West Bengal, India & CDHI, Jalpaiguri, West Bengal, India under ACIAR- DIS4MTF Project.
- ii. Sarkar, R., Mitra, B., **Maitra, S.**, Chatterjee, R., Pradhan, K., Laskar, N., Khalko, S., Chaturvedi, O., Roy D. and Ghosh, M. (2017). *TaraiAnchaleBandhakapiChash [Production technology of Cabbage in the Terai region of West Bengal]*. Published by – Uttar Banga Krishi Viswavidyalaya, Pundibari, CoochBehar, West Bengal, India & CDHI, Jalpaiguri, West Bengal, India under ACIAR- DIS4MTF Project.
- iii. Sarkar, R., Mitra, B., **Maitra, S.**, Chatterjee, R., Pradhan, K., Laskar, N., Khalko, S., Chaturvedi, O., Roy D. and Ghosh, M. (2017). *TaraiAnchale Lanka Chash [Production technology of Chilli in the Terai region of West Bengal]*. Published by – Uttar Banga Krishi Viswavidyalaya, Pundibari, CoochBehar, West Bengal, India & CDHI, Jalpaiguri, West Bengal, India under ACIAR- DIS4MTF Project.
- iv. Sarkar, R., Mitra, B., **Maitra, S.**, Chatterjee, R., Pradhan, K., Laskar, N., Khalko, S., Chaturvedi, O., Roy D. and Ghosh, M. (2017). *TaraiAnchale Tomato Chash [Production technology of Tomato in the Terai region of West Bengal]*. Published by – Uttar Banga Krishi Viswavidyalaya, Pundibari, CoochBehar, West Bengal, India & CDHI, Jalpaiguri, West Bengal, India under ACIAR- DIS4MTF Project.
- v. Sarkar, R., Mitra, B., **Maitra, S.**, Chatterjee, R., Pradhan, K., Laskar, N., Khalko, S., Chaturvedi, O., Roy D. and Ghosh, M. (2017). *TaraiAnchaleFulkapiChash [Production technology of Cauliflower in the Terai region of West Bengal]*. Published by – Uttar Banga Krishi Viswavidyalaya, Pundibari, CoochBehar, West Bengal, India & CDHI, Jalpaiguri, West Bengal, India under ACIAR- DIS4MTF Project.

#### e) Book Chapter



1. I. Sarkar, Mishra, S. Mishra, R.L. Ranjan, P. Hatibarua, P., Kumar, A. and Dubey, R.K. (2017) Bromeliads (Family: Bromeliaceae) In commonly Used Ornamental Plants. Eds. Mishra, R.L. and Mishra, S. Pub. KrujerBrentt Publishers U.K. Ltd. ISBN-978-1-78715-006-5.

#### **f) Practical Manual**

1. Practical Manual on FAM-201: Ornamental Horticulture and FAM-301: Breeding and seed production of ornamental crops. By- Dr. I Sarkar, Dr. A.M. Khan and Dr. S. Maitra.

### **C. EXTENSION PROGRAMME**

#### **1. Radio Talk**

<b>Topic</b>	<b>Resource Person</b>
Participated as the expert for a Live Phone in programme entitled ' <i>Uttar BangeLavjanakPhulerChas</i> ' (Cultivation of Profitable Flowers in North Bengal) on PrasarBharati, Broadcasting Corporation of India, All India Radio, Siliguri in regional language (Bengali).  Date of broadcast : 22.02.2018	<b>Dr. S. Maitra</b>

### **D. OTHER ACTIVITIES:**

#### **1. Members of different committee, Assignment, Additional responsibility**

<b>Sl. No.</b>	<b>Committee/Assignment</b>	<b>Teacher associated</b>
1.	Member of Academic Council	Dr. I Sarkar
2.	Member of Faculty Council	Dr. I Sarkar, Dr. S. Maitra, Dr. A. M. Khan

<b>Sl. No.</b>	<b>Committee/Assignment</b>	<b>Teacher associated</b>
3.	Member of Central Admission Committee for Under Graduate	Dr. I Sarkar, Dr. S. Maitra, Dr. A. M. Khan
4.	Member of Admission Committee for Post- Graduate	Dr. I Sarkar, Dr. S. Maitra,
5.	Member of Computer and Network Management Committee	Dr. A. M. Khan
6.	Advisory Member of Library	Dr. S. Maitra,

## **2. Participation in Seminar/Symposium/Conference/Workshop**

- i. Dr. S. Maitra - Participated in the “**Hill Businesss Summit**” organized by the Departments of MSME, Textiles and Tourism, Government of West Bengal in association with Confederation of Indian Industry (CII) at Darjeeling, West Bengal on 13.03.2018.
- ii. Dr. A. M. Khan – Oral Presentation on ‘Value added packaging of single Cymbidium flowers –A technology for augmenting farmers’ income’. In *National Conference on Floriculture for Rural and Urban Prosperity in the Scenario of Climate Change*, Feb-16-18, 2018, Ranipool, Sikkim.
- iii. Dr. A. M. Khan – Oral Presentation on Technology for value added packaging of cymbidium flowers. In *7th International Science Congress*, International Science Community Association, 8-9 December, 2017, Bhutan.
- iv. Indrajit Sarkar - Oral Presentation on- Influence of integrated nutrient management on the corm and cormels development of gladiolus (*Gladiolus grandiflorus*) Cv. American beauty in Terai Region of West Bengal, India. In, *7th International Science Congress*, International Science Community Association, 8-9 December, 2017, Bhutan.

## **3. Act as Resource person in Training/Meeting/Workshop/Interaction**

- i. Dr. S. Maitra - Class Lecture of KPS (Krishi PrayuktiSahayak) at UBKV on High-Tech Horticulture and Medicinal and Aromatic Plants organized by Agriculture Training Centre, CoochBehar, Department of Agriculture, Government of West Bengal on 24.05.2017 and 25.05.2017
- ii. Dr. S. Maitra - Delivered a lecture on '*Present status and scope of flower production and business in West Bengal*' in the Farmers-Scientist Interaction Programme (sponsored by NHB) on 5.01.2018 during "National Symposium on Floriculture and Urban Horticulture in Global Perspective (NASRAFUH - 18)" organized by Bidhan Chandra Krishi Viswavidyalaya, West Bengal, India on 4-5 January, 2018 at FACC, BCKV, Kalyani, Nadia, West Bengal.
- iii. Dr. S. Maitra - Delivered a lecture on "*Production and utilization of vermicompost in floriculture*" on 08.02.2018 in the skill development training programme on vermicompost producer sponsored by Agriculture Skill Council of India (ASCI), Govt. of India and organized by UBKV from 02.02.2018 to 02.03.2018 at UBKV, Pundibari.
- iv. Dr. S. Maitra - Delivered a lecture on "*Value addition and economics of medicinal plants*" on 20.02.2018 in the Awareness-cum-training programme on medicinal plants cultivation and conservation organized by Department of Forestry, UBKV and supported by NMPB, Govt. of India.
- v. Dr. S. Maitra - Delivered a lecture on "*Problem and Prospect of Medicinal Plant Cultivation in CoochBehar District*" in the Diploma in Agricultural Extension Services for Input Dealers (DAESI) programme organized by CoochBehar KVK on 28.02.2018 at 11.00AM to 2.00PM
- vi. Dr. S. Maitra - Conducted one theory and one practical class on propagation technique of different flowers and medicinal plants in the STRY training programme organized by CoochBehar KVK on 22.03.2018.
- vii. Dr. S. Maitra - Conducted one practical class on propagation technique of different flowers and medicinal plants in the STRY training programme organized by CoochBehar KVK on 29.03.2018.
- viii. Dr. A. M. Khan - acted as Resource Person in 'Skill Development Training on Vermicompost Producer' on Feb- 2<sup>nd</sup> March 2018, under Agriculture Skill Council of India (ASCI) Govt. of India. Imparted training on 'Flower waste based vermicompost production and utilization in flower nursery'.

#### 4. Resource person in Seminar/Symposium/Conference/Workshop

- i. Dr. S. Maitra - Rapporteur in the technical session – 2 of the seminar on Recent Advances in Medicinal Plants Sector in India and Their Sustainable Uses in Human Welfare and Poverty Alleviation organized by Medicinal Plants Research and Extension Centre, Ramkrishna Mission Ashrama, Narendrapur, Kolkata – 700103 and sponsored by National Medicinal Plants Board, New Delhi on 28.01.2018.
- ii. Dr. S- Maitra -Delivered an invited lecture on ‘*Landscaping and gardening ornamentals: an alternative source of essential oils*’ in the “National Symposium on Floriculture and Urban Horticulture in Global Perspective (NASRAFUH - 18)” organized by Bidhan Chandra Krishi Viswavidyalaya, West Bengal, India on 4-5 January, 2018 at Kalyani, Nadia, West Bengal.
- iii. Dr. S. Maitra - Delivered a lecture on ‘*Strategies for conservation of medicinal and aromatic plants in Northern part of West Bengal*’ in the seminar on Recent Advances in Medicinal Plants Sector in India and Their Sustainable Uses in Human Welfare and Poverty Alleviation organized by Medicinal Plants Research and Extension Centre, Ramkrishna Mission Ashrama, Narendrapur, Kolkata – 700103 and sponsored by National Medicinal Plants Board, New Delhi on 28.01.2018.

#### 5. Participation in Summer/Winter School/Training:

Sl. No.	Training	Organizer	Associated Teacher
1.	One day training workshop on – Capacity Building on e-Waste Management conducted for the Government Officials on 08.05.2017 at CoochBeharPolytechnique College	by National Institute of Electronics and Information Technology (NIELIT)	Dr. S. Maitra
2.	“Agro Business Synergy 2017: Focus North Bengal” on 19.05.2017 at Hotel Barsana, Siliguri, Darjeeling, West Bengal	Government of West Bengal and Confederation of Indian Industry	Dr. S. Maitra resource person and attended the Help Desk on Floriculture

3.	“National Symposium on Floriculture and Urban Horticulture in Global Perspective (NASRAFUH - 18)”	Bidhan Chandra Krishi Viswavidyalaya, West Bengal, India on 4-5 January, 2018 at Kalyani, Nadia, West Bengal.	Dr. S. Maitra resource person
4.	Recent Advances in Medicinal Plants Sector in India and Their Sustainable Uses in Human Welfare and Poverty Alleviation on 28.01.2018	Medicinal Plants Research and Extension Centre, Ramkrishna Mission Ashrama, Narendrapur, Kolkata – 700103	Dr. S. Maitra resource person
5.	Massive Open Online Course on Teaching Management	ICAR- NAARM	Dr. A. M. Khan
6.	Refresher Course on Protected cultivation with special reference to soilless cultivation, hydroponics and aeroponics from 09.01.2018-29.01.2018	UAS, Dharward, karntaka	Dr. I. Sarkar

## 6. Judge in show

Dr. S. Maitra - Acted as a judge in the 36<sup>th</sup> Annual Flower Show - 2018 at N N Park (10.02.2018- 11.02.2018), CoochBehar organized by the Directorate of Forests, Government of West Bengal on 10.02.2018

## E. OTHER ACADEMIC ACTIVITIES

### 1. Paper Setter/Moderator/Evaluation of Answer Script

Sl.No.	Name of the Course	University	Associate Teacher
1.	Hort - 243: Production technology of Spices, Aromatic, Medicinal and Plantation Crops (2+1)	College of Agriculture, Central Agricultural University, Iroisemba, Imphal, Manipur 2017	Dr. S. Maitra
2.	Hort. 204: Principles of	Faculty of Horticulture, BCKV,	Dr. S. Maitra

Sl.No.	Name of the Course	University	Associate Teacher
	Landscape Architecture: 2(1+1)	Mohanpur, Nadia, West Bengal, PIN 741252	
3.	FLA – 503: Production technology of loose flowers (2+1)	College of Agriculture, Central Agricultural University, Iroisemba, Imphal, Manipur for the year 2017	Dr. S. Maitra
4.	HFL-511 Production Technology of Cut Flowers (2+1) 2017	Dept. of Horticulture, North Eastern Hill University, Tura Campus, Meghalaya	Dr. I. Sarkar
5.	FLS -311 Medicinal and Aromatic Crops (2+1)	College of Horticulture Central Agricultural University , Bermiok, Sikkim	Dr. I. Sarkar
6.	Ornamental horticulture	Sikkim University	Dr. I. Sarkar
7.	Genetic resource Managenet and Intellectual Property Rights	Sikkim University	
8.	Principles of Landscaping	Sikkim University	Dr. I. Sarkar
9.	FLA – 503: Production technology of loose flowers (2+1)	College of Agriculture, Central Agricultural University, Iroisemba, Imphal, Manipur	Dr. S. Maitra
10.	FLS-321 Breeding and seed production of Ornamental crops (2+1)	College of Horticulture Central Agricultural University , Bermiok, Sikkim	Dr. A. M. Khan

## **2. Teaching of Students of Other Institutes**

- Dr. S. Maitra delivered Class Lecture of KPS (Krishi PrayuktiSahayak) at UBKV on High-Tech Horticulture and Medicinal and Aromatic Plants organized by Agriculture Training Centre, CoochBehar, Department of Agriculture, Government of West Bengal on 24.05.2017 and 25.05.2017

## **3. M.Sc / PhD Thesis Evaluation:**

Sl. No	Assignment	University	Associated teacher
1.	External examiner M. Sc. Horticulture in Floriculture and Landscaping Thesis	Bidhan Chandra Krishi Viswavidyalaya	Dr. I. Sarkar
2.	External examiner M. Sc. (Agriculture) in Horticulture Thesis	Department of Horticulture, SASRD, Medziphema Campus, Nagaland University, Medziphema on 11.07.2017.	Dr. S. Maitra

#### 4. Member of the Advisory Committee of other departments:

Sl. No.	Name of Student	Department	Associated Teacher
1	Tapas Das	Vegetable Sciences	Dr. S. Maitra
2	SangyeGoley	Vegetable Sciences	Dr. I Sarkar
3	BinitaBaidya	Pomology and Post Harvest Technology	Dr. A. M.. Khan

#### 5. Member of editorial board

1. Dr. S. Maitra -Member of Editorial board cum Publication committee of UTTARERKRISHIKATHA - the seasonwise agriculture based bulletin of Uttar Banga Krishi Viswavidyalaya in Bengali from its inception – October, 2013
2. Dr. S. Maitra- Member of Editorial Board of Glacier Journal of Scientific Research from September, 2016
3. Dr. S. Maitra - Editorial Board Member of the Bilingual Magazine ‘Prajukti’ published from BCKV from 24.08.2016

#### F. HONORS/AWARDS/RECOGNITION

1. Dr. S. Maitra - Distinguished Scientist Award in the field of Floriculture offered in the occasion of VIRA – 2017 on 11.11.2017

2. Dr. S. Maitra - Member of the Technical Expert-cum-Screening Committee of West Bengal State Medicinal Plants Board
  
3. Dr. A. Mandal Khan – **Best Paper Award** for Value added packaging of single Cymbidium flowers –A technology for augmenting farmers’ income. *National Conference on Floriculture for Rural and Urban Prosperity in the Scenario of Climate Change*, Feb-16-18, 2018, Ranipool, Sikkim.
  
4. **Best Poster Award**-Chandra K. Rai, Arpita Mandal Khan, Swathi, K. Sujit Rai and Sarkar, I. ( 2018) Effect of extraction methods on quality of organic dyes from flowers and their utility. Proceedings of *National Conference on Floriculture for Rural and Urban Prosperity in the Scenario of Climate Change*, Feb-16-18, 2018, Ranipool, Sikkim.
  
5. **Best Poster Award**-Swathi, K. Arpita Mandal Khan, Mingma Diki Sherpa and Harshitha L. (2018) Socio-economic upliftment of rural women through value-added agroforestry products. Proceedings of *National Conference on Floriculture for Rural and Urban Prosperity in the Scenario of Climate Change*, Feb-16-18, 2018, Ranipool, Sikkim.
  
6. Ms. Harshitha L. and Ms. Mingma Diki Sherpa qualified the ICAR- NET exam 2017.