



वार्षिक प्रतिवेदन ANNUAL REPORT (2019-20)



CENTRAL INSTITUTE OF HORTICULTURE

Department of Agriculture, Cooperation & Farmers Welfare
Ministry of Agriculture and Farmers Welfare
Government of India, Medziphema, Dimapur, Nagaland

केंद्रीय बागवानी संस्थान

कृषि, सहकारिता एवं किसान कल्याण विभाग

कृषि एवं किसान कल्याण मंत्रालय

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केंद्रीय बागवानी संस्थान

मेदजीफेमा, दीमापुर, नागालैंड — ७९७१०६

Published by:

Director

Central Institute of Horticulture

Medziphema, Dimapur, Nagaland- 797 106

संकलन:

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श्रीमती मेरीबेनी शिटिरी

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Correct Citation

Annual Report 2019-20

Central Institute of Horticulture, Medziphema, Nagaland

Printed at: Print House, Nagajan Junction, Dimapur - 797112, Nagaland

»» INDEX

Section	Description	Page No.
I	Message	3
II	Foreword	4
III	Executive Summary	5-8
1	About the Institute	9-10
2	Horticulture scenario in NE Region of India	11-12
3	Achievements	13-51
3.1	Production of quality planting material	13-15
3.2	Technology demonstrations under open field	15-23
3.3	Technology demonstrations under protected cultivation	24-27
3.4	Demonstrations at farmer's field	28-29
3.5	Human resource development	29-34
3.6	Agri-business promotion	34-40
3.7	Post harvest management	41-46
3.8	Accreditation and certification of nurseries in NER	47-49
3.9	Skill development & Certificate course	50-51
3.10	Infrastructure development	51
4	Publication	52
5	Important events celebrated	53-54
6	Personnel	55
7	Budget	56
8	List of Board of Management and Technical Advisory	57-58
9	Annual Action Plan 2019-20	59-66

»» LIST OF TABLES

Table No.	Title
1	Area and production of Horticulture crops category wise 2018-19 (3 rd Advance Estimate)
2	Rootstock raised by the Institute
3	Details of plants propagated
4	Success rate of propagated planting material
5	List of farmers training conducted
6	Schedule of consignment (via rail) movement from Molvom village, Nagaland to New Delhi
7	Nurseries Accredited during the year 2019-2020
8	List of nursery accreditation committee of NER
9	Skill development course conducted
10	Members of Board of Management (BOM)
11	Technical Advisory Committee (TAC)

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Government of India

Ministry of Agriculture and Farmers Welfare

Department of Agriculture, Cooperation

and Farmers Welfare

Krishi Bhawan, New Delhi-110001

MESSAGE

The North East region has congenial climatic condition for production of several horticultural crops and focus need to be given to further intensify our efforts to improve the production of horticultural crops. The overall production and productivity of horticultural crops has witnessed sharp improvement in recent years. As a result of increased availability of some of these crops even in the remote areas of the country, the horticulture sector is playing important role in nutritional security of a large section of the society besides helping farmers in poverty alleviation and employment generation. The diverse agro-climatic conditions, varied soil types and abundant rainfall have endowed NER with promising scope in horticultural crop production.



With its 14th year of establishment, Central Institute of Horticulture has come along way contributing tirelessly for the development of Horticulture sector in North East Region of India. I am happy that CIH, Nagaland has created a momentum in the field of horticulture through programmes such as imparting trainings to transfer modern technologies to the rural mass, establishing demonstration plots of various horticultural crops both under open field and protected cultivation, production of quality planting materials, accreditation of nurseries, post harvest management and value addition, agri business promotion and conducting certificate and skill development courses.

I am happy to note that the Central Institute of Horticulture is bringing out its 14th Annual Report highlighting the significant achievement of the Institute for the year 2019-2020.

I wish the Institute all success in its future endeavour.

(Dr. S.K. Malhotra)

Agriculture & Horticulture Commissioner

DAC & FW, Ministry of Agriculture & Farmers Welfare

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कृषि भवन, नई दिल्ली-११०००९



Government of India
Ministry of Agriculture and Farmers Welfare
Department of Agriculture, Cooperation
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Krishi Bhawan, New Delhi-110001

FOREWORD

Horticultural crops contribute to healthier lives and more resilient livelihoods through greater diversity. Since horticultural production is usually labour intensive, the cultivation of fruits and vegetables allows for productive employment where the labour/land ratio is high. Increasing horticultural production contributes to commercialization of the rural economy and creates many off-farm jobs. However, this spectacular growth of horticulture crop production in the country is accompanied with several challenges like low and uneven productivity across the country, perishability and high cost of cultivation; inadequacy of multipurpose varieties especially those suitable for processing and eco-friendly agro-techniques; poor management of dwindling natural resources and poor quality of the produce including food safety issues. In addition to this the issues like lack of market access and market information need to be addressed.



To bridge the productivity gap, concerted efforts have been made by the Institute in areas such as human resource development, on and off farm demonstrations, protected cultivation, quality planting material production, organic farming, post harvest management & value addition, agri-business promotions, certificate course & skill development courses and nursery accreditation.

In this backdrop, I am greatly pleased to present Annual Report of Central Institute of Horticulture, Nagaland which illustrates the activities and achievements accomplished for the year 2019-20. My sincere gratitude to Dr.N.K.Patle, Dy. Commissioner (Hort.), DAC & FW & Director (i/c), CIH and staff for the significant contributions made in fulfilling the mandate of the Institute.


(Dr. B. N. S. Murthy)

EXECUTIVE SUMMARY



Central Institute of Horticulture, Nagaland is presenting the 12th edition of its Annual Report for the year 2019-20. The Institute executed its programmes through capacity building by training of trainers and farmers/beneficiaries, on & off farm demonstration of improved production technologies, production and supply of quality planting material, accreditation and certification of nurseries in NE region, promotion of organic cultivation of horticulture crops, agri-business promotion through exhibitions, seminars, workshops, exposure trips, buyers & sellers meet, post harvest management and value addition of horticultural crops, skill development & certificate courses in horticulture; transfer of technology through method & result demonstration, publication of folders, manuals, leaflets etc and coordination with state horticulture departments of NER and other National organizations, NGOs, farmers' group and self help groups. The salient achievements are summarized below:

Human Resource Development

- Organized 42 nos of farmers training programme which were attended by 1783 farmers. The off campus trainings were conducted in collaboration with ICAR, KVKs and state departments
- Organized five days trainers training on the topic “Role of Horticulture in Doubling Farmers’ Income” for KVK Scientist/ extension functionaries from JNKVV, Madhya Pradesh with 17 participants.
- Organized a six days exposure visit for temperate fruit growers for eight progressive farmers from Phek district, Nagaland at CIH campus
- One technical staff of CIH underwent training on “Mushroom Cultivation for North Eastern Hill Region under Tribal Sub Plan” at DMR, Solan.

Farm development

- About 25 ha area has been established for different fruit crops, tree spices, vegetables and tuber crops.
- 22 nos. of mother blocks of fruit crops are established for scion which are used in propagation activities.
- In protected cultivation, ornamental crops such as gerbera, carnation, anthurium, orchid, and high value vegetables are being cultivated under nine polyhouses. Whereas,

nurseries and citrus mother block is being maintained in six greenhouses/polyhouses.

On & off farm demonstrations

- Establishment of Integrated Model of Drumstick (PKM-1), Turmeric and Ginger, Cultivation of Yardlong Bean, Sweet Potato, Cabbage, Broccoli, Improved Cabbage, Cassava, gap filling of tree spices
- Oyster Mushroom cultivation, production and construction of low cost vermicompost unit, introduction of Apis cerana bee colonies
- Plantation of new fruit crops such as HDP guava, loquat; gap filling of ber and carambola and cultivation of strawberry
- Protected cultivation of carnation and high value vegetables such as capsicum, tomato, musk melon and cucumber.
- Off farm demonstrations on plantation of Guava under Kohima district of Nagaland; plantation of Khasi Mandarin at Pongo village, Longleng district, Nagaland and cultivation of onion at Punglwa 'B' village, Peren district

Production of Quality Planting Material

- Raised 13,350 Guava (Local), 14,100 Citrus (Volkamariana & Rangpur lime) and 18,950 Cashew nut (Local).
- Propagated 33,520 Citrus (Khasi Mandarin, Mosambi & Acid lime), 9,125 Guava (Lucknow-49, Allahabad Safeda, Lalit & Shweta) and 9,385 Cashewnut (VRI-3, V-4, BBSR-1, H-2/16, H-1608).

Accreditation and Certification of Nurseries

- Six (6) nurseries were assessed/monitored which includes both fresh application and renewal applications, out of which 6 nurseries were accredited and certification were done with a rating **2 Star** to one nursery and with a **1 Star** rating to remaining five nurseries.

Publication

- During the preceding year, the Institute published one Annual report; two training manual for skill development course on gardener and protected cultivation; one training manual on post harvest management protocol development and value addition of horticultural crops; one training manual on value addition and processing of horticultural crops; one report on Model Training course on protocol development and value addition of

horticultural crops and two extension folders on Value addition of tomato (tomato soup and canning of tomatoes) & Value addition of tomato (tomato juice, ketchup & chutney).

Agri-business Promotion

- Buyers Sellers Meet programme was organized on at CIH, Medziphema, Nagaland where 12 buyers, 33 officials/guests from different states of North East and more than 200 farmers/entrepreneurs/FPOs participated in the programme.
- Took an initiative to link to pineapple growers of Molvom Village with Future Group, New Delhi.
- Two (2) nos. of farmer's awareness programmes on marketing strategies of horticulture crops was conducted at Tuensang, Nagaland and Nongpoh, Meghalaya.
- Organized two (2) sponsored training programme on Marketing & Value Chain Development of Horticulture Crops for extension staffs/marketing staffs at Assam Lingzey, Sikkim and at Shillong, Meghalaya
- Participated as an exhibitor in the International Agriculture & Horti Expo 2019 which was held at Pragati Maidan, New Delhi
- Participated in 3rd Edition of Emerging North East-2020 held at Maniram Dewan Trade Centre, Guwahati, Assam.
- Two exhibition programme was organized at CIH, Nagaland during Buyers Sellers Meet and trainers training
- Organised a Focused Group Discussion (FGD) between FPO members of Dimapur & Kohima, nurserymen with members of Ernst & Young, New Delhi

Post-harvest Management and Value Addition of Horticultural Crops

- Upgradation of minimal processing unit
- Product development of kiwi, pineapple, guava and plum squashes; RTS beverages of strawberry and pineapple; candies of kiwi, ginger, wild aonla, wild olive, strawberry and tuitty fruity; pickles from locally available vegetables.
- Organised Model training course on 'Protocol Development and Value addition of Horticulture Crops' with 20 participants.
- Organised 3 nos of awareness programmes and 3 nos of training programmes post harvest management and processing of horticultural crops

Skill Development & Certificate Courses

- Organized four (04) skill development courses for the farmers/ unemployed youth of

northeast states on Gardener and Protected cultivation. A total of 64 trainees registered of which, 45 trainees qualified for the course.

- Organised three months certificate course on “Post Harvest Management of Horticultural Crops” with 20 trainees.

The Institute carries out all programmes and activities in close collaboration with state horticulture department of NER and experts from ICARs, SAUs, CAU and KVKs and acts as capacity building centres to impart knowledge and relevant skills to extension functionaries and farmers of the region.

I am thankful to the members of the Board of Management (BOM) committee and Technical Advisory Committee (TAC) for their valuable guidance in all the programmes.

I place on record my sincere gratitude to Dr. B.N.S. Murthy, Horticulture Commissioner and officials at DAC & FW, Ministry of Agriculture & Farmers’ Welfare, Government of India for the support and guidance in the activities and progress of the Institute. I thank the entire staff of CIH for their sincere and dedicated efforts in executing and achieving the activities of the Institute.



(Dr. N.K. Patle)
Dy. Comm (Hort.) DAC & FW &
Director (I/c), CIH

1 | About the Institute

Recognizing the huge potential for development in the North-Eastern region and to provide institutional support to tap this potential, Government of India has set up the “Central Institute of Horticulture” at Medziphema, Nagaland in the year 2005-06 under the Central Sector Scheme. This Institute has been set up for holistic development of horticulture at Medziphema for NE Region in an area of 43.50 ha, which is situated at 35 km from Dimapur and 45 km from Kohima city on National Highway 39.

VISION: To emerge as the pioneering, innovative, farmer focused and self-supporting horticultural Institute in the country.

MISSION: To provide excellent, innovative and relevant training to all the stakeholders so as to empower individuals and enable horticulture industry to bring about socio-economic development and sustainability in North East Region.

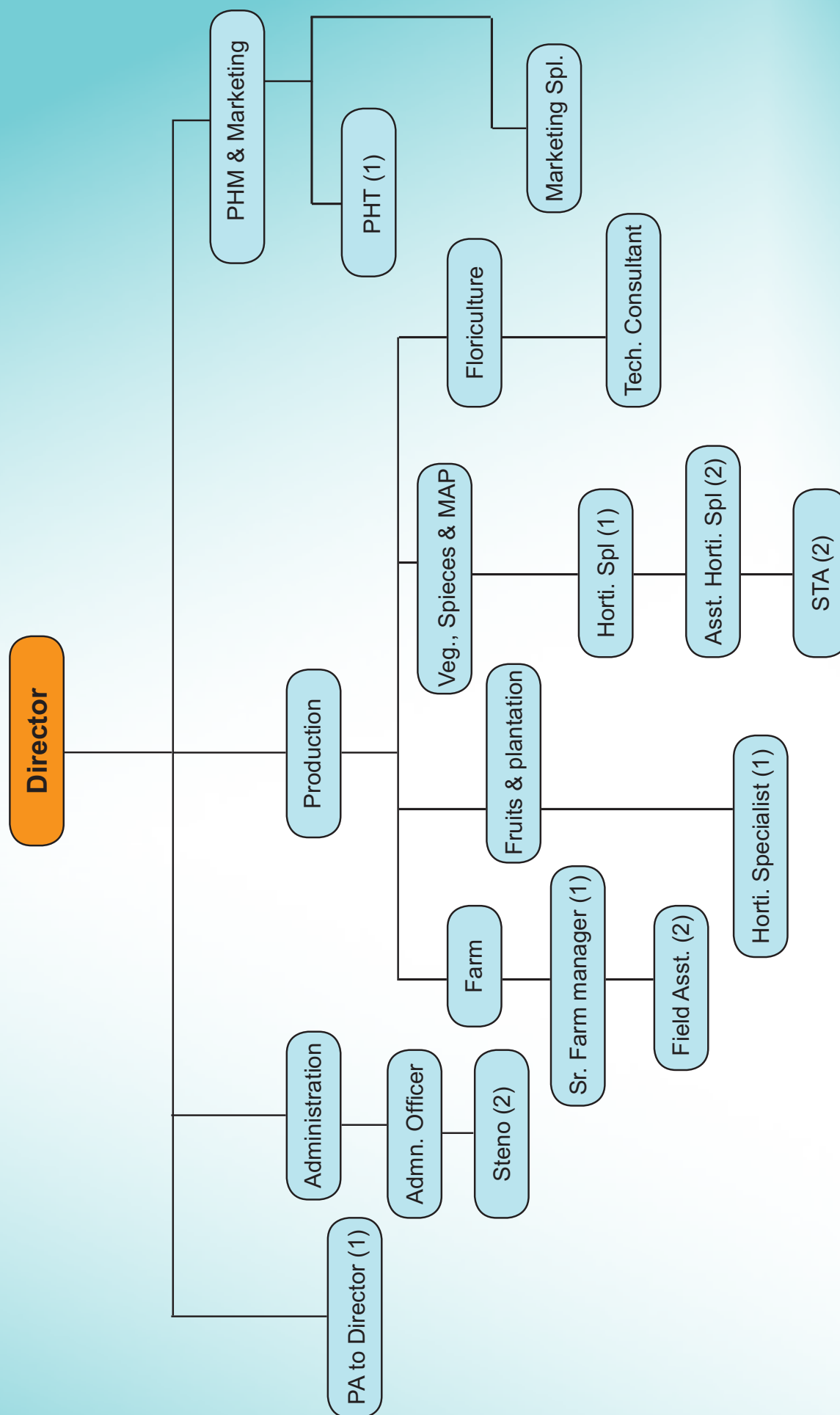
OBJECTIVES & PROGRAMMES OF THE INSTITUTE

- ❖ Capacity building by training of trainers and farmers/beneficiaries.
- ❖ Demonstration of improved production technologies.
- ❖ Certificate courses in horticulture.
- ❖ Accreditation and Certification of Nurseries in NE region.
- ❖ Follow-on extension support in the field of horticulture.
- ❖ Promotion of organic cultivation of horticulture crops.
- ❖ Establishing convergence and synergy among programmes in the field of horticulture.
- ❖ Monitoring of Centrally Sponsored Programmes in the area of horticulture.

FOCUS AREAS

- ❖ Training of state government officials and farmers/beneficiaries of North Eastern Region.
- ❖ Production and supply of quality planting material.
- ❖ Accreditation and certification of horticulture nurseries in NER.
- ❖ Certificate courses in horticulture.
- ❖ Skill development courses in horticulture.
- ❖ Transfer of technology through method & result demonstration & publication of folders, manuals, leaflets etc.
- ❖ Promotion of Organic Farming.
- ❖ Marketing and agri-business promotion through exhibitions, seminars, workshops, exposure trips, buyers & sellers meet.
- ❖ Coordination with state horticulture departments of NER and other National Organizations, NGOs, farmers' group and self help groups.

ORGANIZATIONAL SETUP



2 | Horticulture scenario in NE Region of India

The Northeast region is described as a reservoir richly endowed with a variety of horticultural crops with diverse genetic variability, hardy, disease and pest resistant which are grown in 3.14% of the total area of the Northeast region. The horticulture which includes a wide variety of crops such as fruits, vegetables, spices, plantation crops, floriculture, medicinal & aromatic plants and cashew etc. is now a day recognized as an important product for potential diversification and value addition in agriculture. The region has its own unique combination of living species, habitats and eco-systems, which together make up its diversity rich resource. The region is one of the richest reservoir of genetic variability and diversity of different crops *i.e.* various kinds of fruits, different vegetables, spices, ornamental plants and also medicinal & aromatic plants. The diversity for horticultural crops of this region has mainly been managed by local farmers.

The region offers scope for cultivation of a wide variety of horticultural crops such as fruits, vegetables, flowers, tuber & rhizomatous crops and spices because of its diversities in topography, altitude and climatic conditions. A range of fruit crops varying from highly temperate types like walnut, apple, etc., to subtropical as well as tropical fruits are coming up well in this region. Similarly wide and diverse types of vegetables including indigenous ones are cultivated in the region.

In Assam, out of the total gross cropped area of 38.43% lakh hectares, 712.19 lakh hectares is occupied by the major horticulture crops. Arunachal Pradesh has 62.7 lakh hectare area of horticulture crops. In Manipur, the total area of horticulture crops has been estimated at 104.79 lakh hectares. Meghalaya has 126.36 lakh hectare of total land available for cultivation of horticulture crops, Mizoram has 138.34 lakh hectares of land covered under horticulture crops. The total area of horticulture in Nagaland has been estimated as 87.35 lakh hectares, Sikkim has 101.19 lakh hectares of area under horticulture and Tripura has 120.60 lakh hectares of land under various horticultural crops. Total production of fruits in this region is estimated about 4693.07 MT per year which is 5.1% of the total production of the country. On the other hand, production of vegetables comprises 4.5% of the country. The region has a huge potential of horticultural development both in terms expansion and production.

Table 1: AREA AND PRODUCTION OF HORTICULTURE CROPS CATEGORY WISE 2019-20 (Final estimate)																							
Area in '000 ha																							
Production in '000 MT																							
Sl. No.	Sates/ UTs	Fruits			Vegetables			Plantation			Aromatics & Medicinal			Flowers			Spices			Honey	Total		
		A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P				
1	Arunachal Pradesh	48.14	125.84	2.62	17.39	0.07	0.21	0.24	0.16	0.00	0.00	0.00	0.00	0.00	0.00	15.62	29.21	0.12	66.68	172.94			
2	Assam	148.577	2247.745	301.027	3572.218	104.29	190.82	4.07	0.17	5.04	33.88	55.50	104.61	331.01	1.25	667.61			6432.59				
3	Manipur	47.32	500.15	34.93	362.78	0.90	0.30	0.04	0.12	0.06	0.00	0.09	8.12	83.87	0.40	91.37			947.71				
4	Meghalaya	37.60	393.51	49.12	515.87	26.47	34.40	0.00	0.00	12.41	0.00	1.55	15.53	74.94	0.25	141.12			1020.52				
5	Mizoram	63.76	344.91	40.48	188.10	13.03	10.94	0.77	0.78	0.08	0.00	0.80	28.22	101.49	0.25	146.34			647.27				
6	Nagaland	35.00	313.95	40.48	453.84	1.78	7.92	0.13	0.66	0.04	0.02	25.00	11.35	44.56	0.65	88.57			846.60				
7	Sikkim	19.54	55.45	38.80	231.40	0.00	0.00	0.00	0.00	0.24	16.50	0.09	42.61	106.54	0.45	101.20			410.42				
8	Tripura	55.04	565.79	46.46	813.29	16.08	40.42	0.00	0.00	0.00	0.00	0.00	6.59	24.78	0.20	124.16			1444.48				

Source : DAC & FW, Ministry of Agriculture Cooperation and Farmers welfare, Govt. of India, 2019-20 (Final estimate)

3 | Achievements

3.1. PRODUCTION AND DISTRIBUTION OF QUALITY PLANTING MATERIAL

3.1.1 Establishment of scion/mother block under field condition

The Institute has already established 22 nos. of mother blocks of Cashew, Citrus, Mango, Pomegranate, Kinnow Mandarin, Assam Lemon, Khasi Mandarin, Guava, Pineapple, Litchi, Aonla, Peach, Bael, Strawberry, Rambutan, Avocado, Dragonfruit, Carambola, Sapota, Ber, Custard apple, Persimmon blocks. Availability of good planting material being very important for horticulture development and one of the key mandates of CIH is production of quality planting material.

3.1.2. Raising of Rootstocks

The supply of good planting material is very vital for the development of good nursery management practices which include methods of propagation. As such, the Institute has been raising rootstock for crops such as citrus, cashew nut and guava for further multiplication. The rootstock that has been raised by the Institute during the period 2019-20 in the following crops is mentioned below:

Table 2. Rootstock raised by the Institute

Sl. No.	Crop	Rootstock raised	Source
1.	Guava (Local)	13350	Local
2.	Citrus (Volkamariana & Rangpur lime)	14100	ICAR, Basar, A.P. & ICAR-CCRI, Nagpur
3.	Cashew nut (Local)	18950	Local
	Total	46400	

3.1.3. Propagation

The availability of quality planting material is one of the major constraints in improving the production of horticulture crops and considering the huge demand for quality planting material of improved varieties, the Institute is putting its effort in carrying out propagation activities in crops like citrus, cashew and guava. During the period under report, the Institute has propagated 9385 nos of cashew nut in varieties V-4, VRI-3, H-1608, H-2/16 and BBSR-1. The propagation method followed in cashew nut is soft wood grafting. In guava var. L-49, Allahabad Safeda, Shweta and Lalit, 9125 nos of plants were propagated by wedge grafting method, 33520 nos of citrus var. Khasi Mandarin, Mosambi and Acid lime following T-Budding and nucellar method. The successful propagated plants are used for gap filling in farm and distributed to the farmers for demonstration programmes at farmer's field in NER. and sale to the various farmers.

The scion /bud stick has been produced from existing scion mother block at the Institute. During the year under report, the Institute has produced 12050 nos of scion stick of Cashewnut (V-4, VRI-3, H-1608, H-2/16, and BBSR-1), 12500 nos of scion stick of Guava (L-49, Allahabad Safeda, Shweta and Lalit), 8500 nos of bud stick of citrus (Khasi Mandarin, and Mosambi).

Table 3: Details of Plants Propagated

Sl. No.	Crop	Propagation method	Propagated Plants
1.	Citrus (Khasi Mandarin, Mosambi & Acid lime)	T- Budding, nucellar seedling	33520
2.	Guava (Lucknow-49, Allahabad Safeda, Lalit & Shweta)	Wedge grafting	9125
3.	Cashewnut (VRI-3, V-4, BBSR-1, H-2/16, H-1608)	Soft wood grafting	9385
		Total	52030

The scientific method is followed in the production of quality planting materials. The rootstocks were selected as per the crop and raised in the plastic portray under protected condition at Institute nursery unit. The Institute has propagated cashew nut cvs V-4, VRI-3, H-1608, H-2/16 and BBSR-1 through soft wood grafting, guava cvs. L-49, Allahabad Safeda, Sweta and Lalit, were propagated by wedge grafting method, citrus cvs Khasi Mandarin, Valencia, W. Murcot, Early Gold and Mosambi were propagated following T-Budding and Wedge grafting method. The citrus was propagated through 'T' budding method, Cashew nut was propagated through Soft wood grafting method and Guava. The propagated plants were monitor regularly and scientific cultural practices were followed as and when required as per need for better growth and to check the infestation of insect & pest and diseases in nursery unit. The plants were harden in shade net before distribution /sold to the farmers.

Table 4: Success rate of propagated planting material

Sl. No.	Crops	Methods of propagation	Success % of propagated plants
1.	Guava (Lucknow-49, Allahabad Safeda, Lalit & Shweta)	Wedge grafting	81%
2.	Citrus (Khasi Mandarin, Mosambi & Acid lime)	T- Budding, nucellar seedling	76%
3.	Cashew (VRI-3, V-4, BBSR-1, H-2/16, H-1608)	Soft wood grafting	74 %



Fig 1. Nursery units of various Horticultural Crops at CIH

3.2. TECHNOLOGY DEMONSTRATIONS UNDER OPEN FIELD

3.2.1. Integrated Model of Ginger, Turmeric and Drumstick

An integrated model of ginger, turmeric and drumstick (cv. PKM-1) was established in an area of 700 sqm. The objective of the demonstration is to study the response of organic manure FYM and Jeevamrutham on the growth and yield of ginger (cv. Nadia) and turmeric (cv. Megha Turmeric-1 and Lakadong).

Ginger is an important cash crop in the Northeast region and it is emerging as India's organic ginger hub. Field demonstration was conducted in CIH



Fig 2. Cultivation of Ginger and Turmeric in Integrated Model

to study the response of organic manures such as FYM and Jeevamrutham on the growth yield and quality of ginger (cv.Nadia). The rhizomes were planted in the first fortnight of May with a spacing of 20 cm x 25 cm in 3.6 x 3.0 m plots in an area of 100 sq m. Two different treatments were provided, the first with FYM and the second FYM + Jeevamrutham. Five plants from each plot were kept under observation. The crop was harvested on the 9th month when the leaves turned yellow and started drying up. From the data recorded it was observed that application of FYM + Jeevamrutham recorded the maximum plant height (55 cm), number of leaves (28), number of tillers/ clumps (12.5).the results indicates that the application of FYM + Jeevamrutham was found more beneficial and significantly improved the growth parameters. Demonstration on cultivation of turmeric variety Megha Turmeric-1 and Lakadong was undertaken with the objective to study the response of plots treated with FYM and FYM + Jeevamrutham on the growth and yield of turmeric. It was planted at a distance of 30 x 25 cm in an area of 700 sqm during the month of May 2019. The data collected revealed that the plot with FYM + Jeevamrutham performed better in both the varieties with plant height (153 cm), number of leaves (15), number of tillers/ clumps (6) in case of Megha Turmeric-1 and plant height (154 cm), number of leaves (15), number of tillers/ clumps (7) for Lakadong. Such demonstration where the use of Jeevamrutham has resulted in positive outcome may lead to improvement and empowerment of the farmers.

3.2.2. Vegetables

3.2.2.1. Broccoli (Green Magic)

With an objective to study the response of organic manures on growth and yield of broccoli (*Brassica oleracea*) variety Green Magic, a field demonstration was conducted at Central Institute of Horticulture, Nagaland during the crop growing season in an area of 700sqm. The treatments include FYM, Vermicompost and control was incorporated at the time of planting. FYM treated plot performed better followed by Vermicompost in plant characters viz., plant height (49 cm), stalk length (15), curd length (11.36), curd diameter (13), curd weight(370 g). It was also observed that the control treated plot where no extra additional nutrient was provided took longer time to mature with very small curd size.



Fig 3. Field Demonstration in Broccoli

3.2.2.2. Cabbage (Magic Ball)

A field demonstration was conducted at CIH, Nagaland during 2019-2020 in an area of 600 sqm to study the response of different organic manures on growth and yield of cabbage variety Magic ball. The plots were treated with FYM, Vermicompost and control and the data's were recorded. It was observed that the FYM treated plot gave the maximum plant height (17.20 cm), Head diameter



Fig 4. Field Demonstration in Cabbage

(15.1 cm), stalk girth (2.2 cm), fresh weight of head (958 g). Low incidence of small cabbage white butterfly (*Pieris rapae*) was identified in the field. Handpicking of caterpillars and spraying of neem oil on intervals was done to control the pest population.

3.2.2.3. Cabbage (Spring sun 60)

A field demonstration was conducted at CIH, Nagaland during 2019-2020 in an area of 180 sqm to study the response of different organic manures on growth and yield of Improved cabbage (*Brassica rapa* subsp. *pekinensis*) variety Spring sun 60. Two different treatments were provided namely FYM and vermicompost. Five plants from each plot was chosen randomly and kept in observation. Moderate level of



Fig 5. Field demonstration in Improved Cabbage

Aphid infestation was observed on the underside of the leaves. It was controlled by removing the infected leaves and destroying it away from the field. Spraying of neem oil was also done at intervals to control the infestation level. It was also observed that the head formation was not properly achieved. The peak period of its growth was in the month of November and early December where the desirable low temperature was not prevailing in the region and hence it might have led to non-formation of head. Despite the non-formation of head the FYM treated plot gave comparatively higher yield.

3.2.2.4. Onion (Red, Red-3 and Light Red)

A field demonstration is being conducted at Central Institute of Horticulture. Three winter varieties of onion namely Red, Red-3 and Light Red were planted. The nursery bed was prepared in open field condition as well as sown in protrays and kept under poly-house. The nursery beds in open condition were prepared using FYM and sowing was done during the second week of December. And for protrays the media used was mixture of cocopeat and

sand and sown during the same time. It was observed that the seeds sown in protrays under poly house condition was more healthy with faster growth rate while the growth rate of open field condition was comparatively slower. In open condition three nursery beds were prepared and it was also observed that the nursery with the most friable soil produced the healthiest plant. Irrigation is one of the most important factors for the growth of onion. Transplanting has been carried out in the last week of January up to first week of February. The different varieties have been transplanted by giving different treatments using FYM, vermicompost and neem cake. From the observations recorded, it indicates that the variety Red exhibited maximum Plant height (47.00 cm), fresh weight of bulb with leaves (125 gm), height of bulb (6.2 cm), diameter of bulb (5.5 cm) and total yield (62.9 kg) followed by Red-3.



Fig 6. Field Demonstration in Onion

3.2.2.5. Sweet Potato (Sree kanaka, Sree Vadra, ST-14, Kamala Sundari and S-1156)

Among different tuber crops, sweet potato [*Ipomoea batatas* (L.) Lam] is an important tuber crop belongs to family Convolvulaceae. During the reported year, demonstration on sweet potato was carried out in an area of 300 sqm to study the performance of different cultivars viz. Sree kanaka, Sree Vadra, ST-14, Kamala Sundari and S-1156. The vine cuttings of sweet potato were bought from AAU, Jorhat. Cuttings were planted and raised in nursery during June, 2019. The cuttings were then

planted in well prepared field during October, 2019. FYM and neem cake was incorporated at the time of planting and required intercultural operations were carried out time to time. The harvesting of the crop was done on March-April 2020. The data were recorded on three



Fig 7. Field Demonstration in Sweet Potato

randomly selected plants from each varieties and data indicates that the maximum growth and yield characters i.e, vine length (157.13), number of leaves per vine (119.05), number of tuberous roots per vine (4.30), fresh weight of tubers per vine (0.451 kg), tuber girth (14.08 cm), tuber length (21.09 cm) and tuber yield (29.10) was obtained in cv. Sree Vadra followed by cv Kamala Sundari

3.2.2.6. Yardlong Bean (Arka Mangala)

Yard long bean is one of the economically important vegetable crops in India. Production area of yard long bean in India is about 18,560–20,160 ha annually. To assess the effect of FYM and neem cake on growth, yield attributes and yields of Yardlong bean cv. Arka Mangala, a field demonstration was conducted at CIH, Nagaland during 2019-20 at a spacing of 60 cm × 10 cm in an area of 200 sq m. The data revealed that treatment FYM + neem cake was found to be best in terms of plant height (70.15 cm), number of leaves (56.07), number of branches (27.43), length of pods (32.24 cm), width of pods (0.67 cm), days of germination (3.3), number of pods per plant (32.50), number of seeds per pod (12.10), pod weight (14.53 g) and pod yield (151 kg). Hence, it is found that combined application of FYM and neem cake was found feasible and suitable on growth and yield of Yardlong bean cv. Arka Mangala under foot hill condition of Nagaland.



Fig 8. Field Demonstration in Yardlong Bean

3.2.2.7. Drumstick (PKM-1)

Drumstick (*Moringa oleifera* Lam.) is one of the important vegetable crops commercially grown in India. It is recognized as a vibrant and affordable source of phyto chemicals, having potential applications in medicines, functional food preparations, water purification and biodiesel production. During the reported year, drumstick variety PKM-1 was planted along the roadside of each block around the Institute farm as well as along the boundary walls.

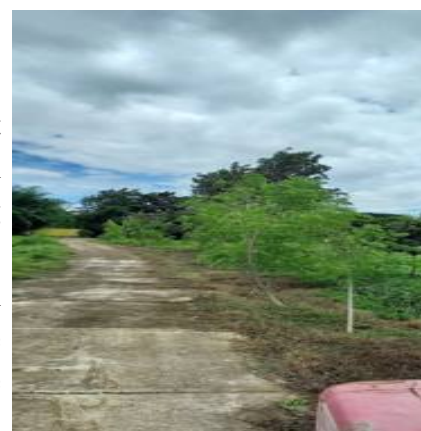


Fig 9. Planting of Drumstick

3.2.3. Oyster mushroom cultivation

Pleurotus spp. commonly called as oyster mushroom has been standardized on locally available substrates and is economically viable enterprise because of its low investment. A demonstration was carried out in the institute during the year 2019-2020. Generally straw is boiled to sterilize using firewood which becomes a tedious job, hence to minimize the time taken, to cut the cost of firewood as well as to make the work easier especially during hot summer period a trial was carried out to sterilize the straw using lime as a substitute. 500



Fig 10. Oyster Mushroom Cultivation

gm of lime was used in 200 litres of water, it was soaked for about 8-10 hours or kept overnight. Draining of water and directly filling of the bags was done which greatly reduced the time taken of shade drying in case of boiling method. During the trial it was found out that the mycelium growth was faster in case of lime sterilized straw as compared to boiling method but the time for fruiting took 2-3 days longer for lime sterilized bags. The yield from both the bags was about 500-1000g.

3.2.4. Vermicompost Unit

Vermicompost is the product of the decomposition process using various species of worms usually red wigglers, white worms and other earthworms, to create a mixture of decomposing vegetables or food waste, bedding material and vermin cast. It is highly useful in raising seedlings and for crop production. During the year 2019-2020 five new low cost vermin beds were erected in the institute for the purpose of demonstration as well as for increasing the production of organic input. Decomposable waste such as farm residues and litter are commonly used as composting materials. Animal dung mostly cow dung and dried chopped crop residues are the key materials used generally. About 500-800 earthworms are introduced per bed where red earthworm spp. is used because of its high multiplication rate.



Fig 11. Low Cost Structure of Vermicompost Unit

3.2.5. Fruits and Tree Spices

3.2.5.1. Strawberry (Camrosa)

The strawberry (*Fragaria sp.*) belongs to the family Rosaceae. The strawberry is one of several types of fruit bearing plant in the Rosaceae family that produce clusters of fruit from a single flower. Strawberry is best natural sources of antioxidant, vitamin C, proteins and minerals, anticarcinogenic and anti diabetic. The Institute has established a demonstration plot for strawberry varieties Camrosa (Improved) in an area of 500 sqm with an objective to study the performance under Nagaland condition.

3.2.5.2. High Density Planting (HDP) Guava (cv. L-49, Allahabad Safeda, Lalit and Shweta)

The Guava (*Psidium guajava*, Linn) belongs to the family Myrtaceae. Guava is a subtropical crop. Guava is the fourth most important fruit in area and production in India after Mango,

Banana and Citrus. Higher and quality production is achieved from densely planted orchards through judicious canopy management and adoption of suitable tree training systems. During the reporting period, the Institute has planted Guava (cv. L-49, Allahabad Safeda, Lalit and Shweta) in an area of 0.5 ha to establish demonstration block with spacing of 2 x 1m and the pit size (45 x 45 x 45 cm). The FYM and fungicides were incorporated during filling of pits. All the recommended intercultural operations were followed. The main objective to develop HDP Guava block is to popularize the basic principles in canopy management like maximum utilization of light, convenience in carrying out the cultural practices, maximizing productivity with quality fruit production.

3.2.5.3. Loquat (cv. Golden Yellow)

The loquat (*Eriobotrya japonica*) belongs to the family Rosaceae. Loquat is also known as Japanese plum. It is being cultivated successfully under sub-tropical conditions. During the reporting period, the Institute has planted Loquat (cv. Golden Yellow) in an area of 0.1 ha. Farmyard manure was incorporated at the time of planting and the saplings were transplanted in the field at a distance 5 m x 5 m in a pit size of 90 x 90 x 90 cm. All the intercultural operation was followed. The main objective to develop the Loquat block is to popularize the improved production technology in the NER States.

3.2.5.4. Gap filling of Ber (cv. Apple) and Carambola (cv. Taiwan)

The Institute has gap filled the Ber (cv. Apple) 12 nos. and Carambola (cv. Taiwan) 9 nos. during the year 2019-20. Farmyard manure was incorporated at the time of planting and the saplings were transplanted in the field. All the recommended intercultural operations were followed.

3.2.5.5. Tree Spices

In order to study the suitability and popularize the improved production technology, 70 plants of cinnamon were planted during the reported year. Gap filling of 20 plants each of Cinnamon cv. Navasree, Curry leaf cv. DWD-1, Allspice cv. Japanese allspice, Nutmeg cv. Viswashree and Bay leaf cv. Local was also done and recommended intercultural operations is being carried out at regular intervals.



Fig12. HDP Guava



Fig 13. Lemon & Kinnow plantation



Fig 14. Cultivation of Strawberry



Fig 15. Tree Spices Plantation

3.2.6. Existing demonstrations in the institute

3.2.6.1. Litchi (Shahi & China)

The Institute has established litchi block of varieties China & Shahi in an area of 0.5 ha. The main purpose is to evaluate the suitability of the cultivar in the north east region and thereby popularize the cultivar in this region. Growth, physical and chemical data was collected from demonstration plots and analyzed. The average yield was recorded 14.8 kg /plant.



Fig 16. Litchi fruiting plant

3.2.6.2. Mango (Langra, Bombay green, Pant Sinduri, Dashehari & Mallika)

The Institute has established mango block of varieties Langra, Bombay green, Pant Sinduri, Dashehari, Mallika in an area of 0.75 ha. The main purpose is to evaluate the suitability of the cultivar in the north east region and thereby popularize the cultivar in this region. Growth, physical and chemical data was collected from demonstration plots and analyzed. The average yield was recorded 26.25 kg /plant.



Fig 17. Mango fruiting plant

3.2.6.3. Peach (Shane-E-Punjab)

The Institute has established peach block in an area of 0.25 ha to study the performance of peach variety Shane-E-Punjab. Growth, physical and chemical data was collected from demonstration plots and analyzed. The yield was recorded 9.5 kg/plant



Fig 18. Peach fruiting plant

3.2.6.4. Bael (NB-6 and NB-9)

CIH, Nagaland has established a demonstration plot for bael varieties NB-6 and NB-9 in an area of 0.5 ha with an objective to study the performance under Nagaland condition. Growth, physical and chemical data was collected from demonstration plots and analyzed. The yield was recorded 35.15 kg /plant.



Fig 19. Bael fruit block

3.3. TECHNOLOGY DEMONSTRATION UNDER PROTECTED CULTIVATION

3.3.1. Cucumber (Hilton F1 & Fadia F1)

Cucumber (*Cucumis Sativas* L.) is one of the most preferred vegetable grown under protected condition in the developed world. Its demand is throughout the year because of its popular use in salad dish, sandwich, pizza preparation etc. In India it is grown in traditionally in Zaid and kharif season. However, being a high value low volume crop its exploitation on commercial scale in green house as off-season crop can generate handsome income to the growers compared to open field, very high



Fig 20. Cucumber Cultivation under Polyhouse

yielding cucumbers varieties have been reported even naturally ventilated poly house. There are several parthenocarpic cucumber hybrids available in India for cultivation under protected cultivation.

During 2019-20, the institute has under taken cultivation of parthenocarpic cucumber F1 hybrid varieties Hilton and Fadia under poly house no. 10 in an area of 500 sqm with the objective to demonstrate the latest technologies, high quality vegetables production system for domestic market and to active potential productivity per unit area. The seeds were sown during first week of Aug, 2019 and transplanted on first week of Sept.,2019 at spacing of 45 x 45cm. Basal dose of fertilizers and FYM were incorporated at the time of bed preparation and observation on plant growth and physic-chemical parameter were recorded.

The result showed that plant growth and physico-chemical parameters such as Maximum vine length (158.6 cm), No. of fruit per vine (15.8), Fruit wt (91.3 g), Fruit diameter (2.9 cm), yield (7.2 kg per sqm), was found significant in variety Faida F1 whereas fruit weight (3.02 g) was recorded highest in Faida F1. Hence, the result indicated that the variety Faida is suitable for growing under protected cultivation as it showed significant impact on growth, yield and other attributes.

3.3.2. Tomato (cv. NS4266)

Tomato is grown extensively in the plastic greenhouses for higher productivity. Tomatoes can be grown in every type of greenhouse, provided it is sufficiently high to manage and to train the plants vertically. High light transmission is very important and this varies between 70% and 81% in modern greenhouses. A field demonstration was conducted at Central Institute of Horticulture, Medziphema during 2019-2020 to study on the growth, yield and quality of Tomato F1 Hybrid cv. NS4266 under poly-house condition. All cultural practices such as

application of manures, irrigation and weeding etc. were done uniformly for each treatment. The seed were sown in nursery during first week of Aug, 2019 and was transplanted on first week of Sept.2019. The result showed that plant growth and physico-chemical parameters such as Fruit wt (55.8 g), Fruit diameter (2.4 cm), Acidity (0.60%), Lycopene (1.89 mg/ 100 g), Total sugar (3.14 %) was found significant in variety NS4266. Hence, the result indicated that the variety NS4266 is suitable for growing under protected cultivation as it showed significant impact on growth, yield and other attributes.



Fig 21. Tomato Cultivation under Polyhouse

3.3.3. Capsicum (Natasha and Swarna)

Capsicum (*Capsicum annuum*) is one of the important nutritious and highly remunerative vegetable crops. Agronomical practices play an important role for obtaining higher yields especially under protected structures. To make its cultivation successful, polyhouses and plastic-mulching are most



Fig 22. Capsicum Cultivation under Polyhouse

suitable solutions. Therefore, the present study was conducted with an objective to evaluate technical feasibility of protected technology for obtaining maximum yield, economic gain and to minimize biotic and abiotic stresses for capsicum under prevailing conditions in foot hill of Nagaland (Central Institute of Horticulture, Medziphema Nagaland). Natasha and Swarna variety of Capsicum was sown on Aug. 2019 in the nursery and transplanted on first week of Sept., 2019 in an area of 100 sqm. The result showed that maximum plant growth and physico-chemical parameters such as plant height (48.6 cm) fruit weight (69 g), fruit diameter (5.3 cm), fruit length (4.8 cm), number of fruits plant (13) and yield ha⁻¹ (60.53 t) were recorded in variety Swarna. Hence, the result indicated that the variety Swarna is suitable for growing under protected cultivation under prevailing conditions in foot hill of Nagaland.

3.3.4. Musk Melon (H406)

Profitability of vegetable especially muskmelon production in North eastern region is limited. Therefore, most growers' plant and harvest at the same time, which drives prices down sometimes below breakeven point negatively affecting income. The goal of this study was to investigate poly house technology as a means to improve profitability of fresh market vegetables in North eastern region. Low Poly tunnels allow growers to start planting earlier, so they can harvest earlier, and receive a higher price for their produce before vegetable prices begin to decline in mid-season.



Fig 23. Musk Melon Cultivation under Polyhouse

The present study was conducted with an objective to evaluate technical feasibility of protected technology for obtaining maximum yield, economic gain and to minimize biotic and abiotic stresses for musk melon under prevailing conditions of Central Institute of Horticulture, Medziphema Nagaland. Seeds of musk melon variety H406 was sown on first week of Aug, 2019 in the Nursery and transplanted in the first week of Sept., 2019 in an area of 100 sqm under polyhouse. The observations recorded indicates that plant growth and physico-chemical parameters such as plant height (133.9 cm), fruit wt (775 g), fruit diameter (23.7 cm), fruit length (18 cm), number of fruits per plant (4.6) and yield ha (49 t) was found maximum in variety H406 . Hence, the result indicated that the variety H406 is suitable for growing under protected cultivation.

3.3.5. Spinach (Local)

The main purpose of protected cultivation is to create a favourable environment for the sustained growth of crop so as to realize its maximum potential even in adverse climatic conditions. A field demonstration was conducted at Central Institute of Horticulture, Medziphema during 2019-2020 to study the evaluation on the growth, yield and quality of Local Spinach under poly-house condition. All cultural practices such as application of manures, irrigation and weeding etc. were done uniformly. The seeds were sown directly in line during last week of December 2019, in an area of 100 sqm. The local variety under poly house condition recorded very good result with a yield of 45 kg green leaves whereas, mother plants were retained for seed production.



Fig 24. Spinach Cultivation under Polyhouse

3.3.6. Carnation (Red Glow, Dona, White Dona, Vincidore, Purple Tango, Malaga, Hanabi, Giolele, Soto and Seycheles)



Fig 25. Carnation Cultivation under Polyhouse

Colourful flowers with pleasant fragrance have been a source of attraction to mankind. Flowers provide pleasure through enlightening colours and spreading fragrance. Therefore, man has always taken support of flowers as a token of expression of kind sentiments on number of occasions and consequently. Carnation (*Dianthus caryophyllus*) is also known as the divine flower. It belongs to the family of Caryophyllaceae, occupying the esteemed position among top ten flowers of the world for more than five decades. In India it is common practice to have the plants growing in greenhouses for the cut flower production resulting in increased crop production covering more than 600 hectares of area.

An experiment was conducted to study the performance of carnation cultivars on growth, flowering, flower yield, flower quality and vase life under semi-control poly house in Central Institute of Horticulture, Medziphema during 2018-19 & 2019-2020 with an objective to study the varietal evaluation on the growth, yield and quality of Carnation cut flower F1 Hybrid cv. Red Glow, Dona, White Dona, Vincidore, Purple Tango, Malaga, Hanabi, Giolele, Soto and Seycheles under poly-house condition. All cultural practices such as application of manures, irrigation and weeding etc. were done uniformly for each treatment. The result indicates that maximum plant height (83.6 cm) was recorded in Red Glow, No. of leave (75.2) in Vincidore, days taken to bud initiation (162.8 days), no. of flower (3.2), and vase life (8 days) in White Dona.

A total of 22,460 nos of flowers was harvested and the returns received from the sell of flowers was Rs. 1,66,910.00. Hence, it can be concluded that the demonstration was successful for cultivation under foothills of Nagaland.

3.4. TECHNOLOGY DEMONSTRATION AT FARMERS FIELD

3.4.1. Off Farm Demonstration on Plantation of HDP Guava

An off farm demonstration on plantation of guava var. Allahabad safeda, Sweta and Lalit was carried out in 0.5 ha area at a spacing of 3 x 3 m. The demonstration site is located in Mereima village under Kohima district of Nagaland. The objective of this demonstration programme is to show the farmers the efficient utilization of space and resource and the economic return.



Fig 26. Off Farm Demonstration on Plantation of Guava

3.4.2. Off Farm Demonstration on Plantation of Khasi Mandarin

An off farm demonstration on plantation of khasi mandarin (5x4m spacing) at an area of 0.5 ha has been undertaken by the Institute in Pongo village, Longleng district, Nagaland. The objective of the programme is to create awareness among the farming community on the improved production technology of mandarin orange, thus, to restore confidence amongst the farmers, as the orange growers are slowly shifting to cultivation of other crops due to difficulties faced in mandarin cultivation due to citrus decline, which is generally due to mismanagement of farm and lack of proper counter measures at the right stage.



Fig 27. Off Farm Demonstration on Plantation of Khasi Mandarin

3.4.3. Off Farm Demonstration on Plantation of Onion at Punglwa village, Distt. Dimapur, Nagaland

The institute conducted off farm demonstration on cultivation of onion variety “Nasik Red” at Punglwa ‘B’ Village, under Dimapur district of Nagaland with an objective to promote cultivation of onion in the State which is considered as non-traditional area for onion. Owing to low and fragmented land holding, the demonstration was conducted in 4 different plots covering a total area of 0.3 acre.

Organic inputs like FYM and bio formulations (Jeevamrutham) were used. The bio formulation was prepared by the farmers under the proper guidance of technical staffs. It was used in order to mitigate the predominant pest and disease like cut worms and purple blotch disease and also to boost soil fertility.

Harvesting was done 16 weeks after transplanting of onion seedlings. The farmers received a total yield of 5 quintal, which was sold in the local market at the rate of Rs.35/Kg.

The demonstration was identified as successful as the yield was satisfactory. The institute has decided to go for further trials on demonstration of organic onion cultivation in future so as to popularize and encourage the farmers to cultivate this highly remunerative crop.



CIH Medziphema promotes onion cultivation in Nagaland

MEDZIPHEMA, JUNE 4 (MEXN): Central Institute of Horticulture, Medziphema conducted off-farm demonstration from January to May on cultivation of onion variety 'Nasik Red' at Punglwa 'B' village, Nagaland with the objective to promote cultivation of onion in the State which is considered as non-traditional area for onion.

CIH Medziphema in a press release said that onion (*Allium cepa* L.) is one of the important commercial crops grown in India for both domestic consumption and export. Onion is a seasonal crop and grown in Kharif (June to October), late kharif (July to November) and Rabi (November to March). The yield of the crop depends upon various factors such as variety, irrigation, soil and climate. Generally irrigated crops in rabi season gives an approximate yield 25 to 30 t/ha and under rain fed condition it yield only 0.7 to 0.5 t/ha.

The institute provided the onion seeds (var. Red) to women SHGs of Punglwa 'B' village and also demonstrated proper hands on training to the farmers during land preparation, sowing and transplanting of onion seedlings. Owing to low and fragmented land holding, the demonstration was conducted in 4 different plots covering a total area of 0.3 acre.

As per the objective of the programme, only organic inputs like FYM and bio formulations (Jeevamrutham) were used. The bio formulation was prepared by the farmers under the proper guidance of technical staffs. It was used in order to mitigate the predominant pest and disease like cut worms and purple blotch disease and also to boost soil fertility.

Harvesting was done 16 weeks after transplanting of onion seedlings. The farmers received a total yield of 5 quintal, which was sold in the local market at the rate of Rs.35/Kg.

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Central Institute of Horticulture, Medziphema conducted off-farm demonstration from January to May on cultivation of onion variety 'Nasik Red' at Punglwa 'B' village.

3.5. HUMAN RESOURCE DEVELOPMENT

3.5.1. Farmers Training

During the year 2019-20 the institute conducted 42 nos of farmers training programme with a total of 1783 participants in various parts of Northeast states, the topic of the training are need based. The off campus trainings were conducted in collaboration with ICAR, KVKs and state departments.

Table 5: List of Farmers Training Conducted

Sl.	Topic	Date	Venue	Partt.	Organized/ sponsored
1	Mushroom Production & Value addition of Horticultural crops	23.04.19	Chumukedima, Dimapur	65	Organised
2	Mushroom Production & Value addition of Horticultural crops	24.04.19	CIH, Medziphema	65	Organised
3	Farmer Awareness Programme on Horticulture Aspect	25.04.19	Socunoma Village,	22	Organised
4	Farmer Awareness Programme on Horticulture Aspect	26.04.19	Bungsang village,	20	Organised
5	Farmer Awareness Programme on Horticulture Aspect	30.04.19	Piphema A village,	20	Organised
6	Farmer Awareness Programme on Horticulture Aspect	14.05.19	Mhainamisi, Peren dist	27	Organised
7	Farmer Awareness Programme on Horticulture Aspect	15.05.19	Punglwa, Peren dist	16	Organised
8	Farmer Awareness Programme on Horticulture Aspect	16.05.19	Meriema village, Kohima	17	Organised
9	Farmer Awareness Programme on Horticulture Aspect	17.05.19	Pfuchama village, Kohima	19	Organised
10	Farmer Awareness Programme on Horticulture Aspect (From Farm to Market)	17.05.19	Tuensang, Kohima	68	Organised
11	Post Harvest management and value addition	29.05.19	Sanis village, Wokha	85	In coll with DHO wokha
12	Post Harvest management and value addition	30.05.19	Sanis village, Wokha	85	In coll with DHO wokha
13	Advance Training on Food Processing and Value Addition of Hortl. Crops	04.06.19	CIH, Medziphema	16	
14	Advance Training on Food Processing and Value Addition of Hortl. Crops	05.06.19	CIH, Medziphema	16	
15	Advance Training on Food Processing and Value Addition of Hortl. Crops	06.06.21	CIH, Medziphema	16	
16	Advance Training on Food Processing and Value Addition of Hortl. Crops	07.06.19	CIH, Medziphema	16	Organised
17	Integrated Pest and Disease Management in Hortl. Crops	13.06.19	Pasighat, AP	50	Organised in coll with KVK
18	Integrated Pest and Disease Management in Hortl. Crops	14.06.19	CHF-KVK, Pasighat, AP	50	Organised in coll with KVK
19	Integrated Pest and Disease Management in Hortl. Crops	15.06.19	CHF-KVK, Pasighat, AP	50	Organised in coll with KVK
20	Doubling farmers Income through hortl. Innovation	19.06.19	Kolasib Mizoram	50	In coll with ICAR

21	Doubling farmers Income through hortl. Innovation	20.06.19	Kolasib Mizoram	50	In coll with ICAR
22	Doubling farmers Income through hortl. Innovation	21.06.19	Kolasib Mizoram	59	In coll with ICAR
23	Persimmon Cultivation and Post Harvest Management	25.07.10	HRF, Pfutsero, Nagaland	67	In coll with HRF
24	Persimmon Cultivation and Post Harvest Management	26.07.19	HRF, Pfutsero, Nagaland	67	In coll with HRF
25	Productivity enhancement of ginger and turmeric for doubling farmers income	30.07.19	Ri Bhoi, Meghalaya	26	In coll with KVK
26	Productivity enhancement of ginger and turmeric for doubling farmers income	31.07.19	Ri Bhoi, Meghalaya	26	In coll with KVK
27	Productivity enhancement of ginger and turmeric for doubling farmers income	01.08.19	Ri Bhoi, Meghalaya	26	In coll with KVK
28	Avenues for generating income through hortl innovation	26.08.19	CIH, Medziphema	47	Organised
29	Avenues for generating income through hortl innovation	27.8.19	CIH, Medziphema	50	Organised
30	Marketing and Value addition of hortl. Crops	30.08.19	Ri Bhoi, Meghalaya	51	Organised
31	Marketing and Value addition of hortl. Crops	31.08.19	Ri Bhoi, Meghalaya	51	Organised
32	Production technology of winter vegetables and value addition	16.09. 19	KVK. Peren	50	In coll with KVK
33	Production technology of winter vegetables and value addition	17.09. 19	KVK. Peren	52	In coll with KVK
34	Post Harvest management and value addition of hortl. Crops	14/10/19	ICAR, Manipur centre	50	In coll with ICAR
35	Post Harvest management and value addition of hortl. Crops	16/10/19	ICAR, Manipur centre	50	In coll with ICAR
36	Post Harvest management and value addition of hortl. Crops	17/10/19	ICAR, Manipur centre	50	In coll with ICAR
37	Post harvest management of Temperate fruit crops and its value addition	16/01/20	HRF, Pfutsero, Nagaland	50	In coll with HRF
38	Post harvest management of Temperate fruit crops and its value addition	17/01/20	HRF, Pfutsero, Nagaland	50	In coll with HRF
39	Mushroom Production & Value addition of fruits and vegetables	18/02/20	CIH, Medziphema	23	Organised
40	Mushroom Production & Value addition of fruits and vegetables	19/02/20	CIH, Medziphema	23	Organised
41	Training on vegetable cultivation and value addition of fruits and vegetables	6/03/20	Punglwa, Peren dist	46	Organised
42	Training on vegetable cultivation and value addition of fruits and vegetables	9/03/20	Punglwa, Peren dist	46	Organised
	Total			1783	



Fig 28. Awareness programme on Horticulture aspects for sustainable income conducted at various districts of Nagaland



Fig 29. Three days Farmers training conducted at ICAR, Mizoram Centre, Kolasib, Mizoram



Fig 30. Three days farmers training conducted at KVK, ICAR Manipur Centre, Lamphelphat



Fig 31. Three days Farmers training conducted at CHF, KVK Pasighat, Arunachal Pradesh



Fig 32. Three days Farmers training at ICAR-KVK, Ri Bhoi, Umiam, Meghalaya



Fig 33. Two days farmers training on processing and value addition at Wokha district, Nagaland



Fig 34. Farmers training on hortl avenues for income generation held at CIH campus



Fig 35. farmers training on Persimmon cultivation and post harvest management at Horticulture Research Farm, Pftusero, Nagaland.

3.5.2. Trainers training for KVK scientist/extension functionaries

Five days trainers training on the topic “Role of Horticulture in Doubling Farmers’ Income” was organized at CIH, Medziphema for KVK Scientist/ extension functionaries from JNKVV, Madhya Pradesh from 13th - 17th January 2020. The objective is to provide insight about the important horticultural crops and its management practices with special reference to organic farming in NEH region. A total of 17 participants attended the training programme.



Fig 36. Training for KVK scientist/extension functionaries from JNKVV, Madhya Pradesh conducted at CIH, Nagaland.

3.5.3. Exposure visit cum training to Ziro, Arunachal Pradesh

Central Institute of Horticulture organized a 6 days exposure visit for temperate fruit growers from Phek district, Nagaland at CIH campus w.e.f. 9th-14th March 2020. The main objective of the exposure visit is to capacitate the farmers with necessary knowledge and skills on post harvest management, value addition and processing of kiwi fruit. A total of eight progressive farmers and two horticulture officers from Phek district attended the programme.



Fig 37. Exposure visit cum training on production and post harvest processing of temperate fruits conducted at Ziro, Lower subansiri district, Arunachal Pradesh.

3.5.4. Capacity Building

3.5.4.1. Training on Mushroom Cultivation

Ms. Marina, Sr. Technical Assistant from Central Institute of Horticulture underwent training on “Mushroom Cultivation for North Eastern Hill Region under Tribal Sub Plan” at DMR, Solan, which was held from 5th – 8th August 2019.



Fig 38. Training on Mushroom cultivation at Solan

3.6. AGRI- BUSINESS PROMOTION

3.6.1. Buyers Sellers Meet

A Buyers Sellers Meet programme was organized on 8th November 2019 at CIH, Medziphema, Nagaland. The programme was organized with the objective to facilitate interaction of growers and horticultural crop buyers. The event was designed to deliberate upon the challenges faced by both the parties and work out suitable linkage between them.

The buyers and sellers meet was participated by a number of buyers from Delhi, Guwahati and Local buyers and farmers groups from different states of North East. The event had participation of 12 buyers, 33 officials/guests from different states of North East and more than 200 farmers/entrepreneurs/FPOs.



Fig 39. Inauguration of the programme by lighting of lamp by Chief Guest Smt. Vasudha Mishra, Guest of Honor Shri. Kikheto Sema and other dignitaries



Fig 40. Chief Guest Smt. Vasudha Mishra IAS, Special Secretary, DAC&FW delivering the inaugural address



Fig 41. Guest of Honor Shri. Y Kikheto Sema IAS Commissioner & Secretary delivering his address



Fig 42. Special Guest Dr. N Krishna Kumar giving brief remark during the inaugural programme



Fig 43. Dr. BNS Murthy, Horticulture Commissioner, DAC&FW delivering the welcome address



Fig 44. Dr. N K Patle, Dy. Commissioner (Hort.) DAC&FW & Director i/c delivering vote of thanks



Fig 45. Certificates of skill development trainees and nursery accreditation being issued.



Fig 46. Publications of CIH, Nagaland released by Chief Guest and dignitaries



Fig 47. Launch of Value Added Products of Entrepreneur by Chief Guest & Dignitaries



Fig 48. Opening remarks by Dr. BNS Murthy, Horticulture Commissioner during BS Meet



Fig 49. Participants of the Inaugural Programme of Buyers & Sellers Meet



Fig 50. Growers interacting with buyers during the meet

1.5.2. Market Linkage Initiative

Central Institute of Horticulture, Nagaland took an initiative to link to pineapple growers of Molvom Village with Future Group, New Delhi. The farmers were trained on harvesting, packaging, transportation and booking in railway station.

Initially, a consignment of 200 pineapples was planned for Delhi. The detail of the consignment is given below;

Table 6. Schedule of consignment (via rail) movement from Molvom village, Nagaland to New Delhi									
1st consignment									
Sl.	Crop	Quantity (pcs)	Dist./Vill.	Harvesting/ Packaging	Despatch from Farm	Arrival at Dmr Rly Stn	Despatch from Dmr Rly Stn	Arrival at Delhi Rly Stn	No. of days
1	Pineapple	200	Molvom	10.12.2019	10.12.2019	10.12.2019	11.12.2019	13.12.2019	2 days
							06.15 am	(06.05 am)	48 hrs



Fig 51. Harvesting & packaging



Fig 52. Booking at railway station

Due to protests over CAA in Assam, most trains got cancelled and the initiative did not materialize however the farmers were trained on all aspects and stages like harvesting stage for distant markets, packaging techniques, formalities in transit etc. for sending produce in Delhi through train. The initiative would be continued by the farmers during the next harvest.

3.6.3. Awareness Programme on Marketing

Farmers awareness programme are designed to create awareness among FPOs/FPCs on marketing strategies of horticulture crops. The training programme was focused on providing information on the recent innovations to facilitate agricultural marketing, use of electronic platforms, production planning and management, SCM, post harvest management and strategies for effective marketing.

Awareness programme for farmers on marketing was organized on 17th May 2019 at SP Conference Hall, Tuensang, Nagaland and on 30th & 31st August 2019 at District Horticulture Office, Nongpoh, Meghalaya.



Fig 53. Tuensang, Nagaland



Fig 54. Nongpoh, Ribhoi, Meghalaya

3.6.4. NIAM sponsored programme on Agricultural Marketing for officers

The Institute organized two (02) nos. of training programme on Marketing & Value Chain Development of Horticulture Crops for extension staffs/marketing staffs at Assam Lingzey, Sikkim w.e.f. 26-28 September 2019 and at Shillong, Meghalaya w.e.f. 20-22 January 2020. A total of 28 participated were trained in Sikkim and 22 participants were trained in Meghalaya. The cost towards organizing the programme was sponsored by CCS NIAM, Jaipur.



Fig 55. Group photo of participants at Sikkim



Fig 56. Field visit at Kameran, Sikkim



Fig 57. Group photo of participants at Meghalaya



Fig 58. Field visit at Umsning, Meghalaya

3.6.5. Exhibitions/trade fairs meet

3.6.5.1. Participation in International Agriculture & Horti Expo at New Delhi

Central Institute of Horticulture, Nagaland participated as an exhibitor in the International Agriculture & Horti Expo 2019 which was held at Pragati Maidan, New Delhi w.e.f. 01-03 August 2019. The Institute highlighted the various activities being carried out as per the mandates of the Institute. The focus horticulture crops available in the NEH region were displayed. Folders and other publications on production technologies, package of practices PHM on fruits, flowers, vegetables and spices were displayed and distributed during the programme. Quality planting material of major fruit crops propagated in the Institute was also displayed. Success stories of skill development course and other success stories were displayed through video in the event.



Fig 59. Horticulture Commissioner, Dr. B N S Murthy with Dy. Commissioner (Hort.) Dr. N K Patle at CIH stall.



Fig 60. Farmers interacting with CIH staffs

3.6.5.2. Participation in 3rd Edition of Emerging Northeast at Guwahati

The Institute participated in 3rd Edition of Emerging North East-2020 held at Maniram Dewan Trade Centre, Guwahati, Assam w.e.f. 27-29 February 2020. The event was organized by ASSOCHAM.



Fig 61. Inaugural programme of the event



Fig 62. Receiving of participation memento

3.6.5.3. Exhibition organized during Buyers Sellers Meet at CIH, Nagaland

An exhibition programme was organized on 8th November 2019 at CIH, Nagaland during Buyers Sellers Meet. Smt. Vasudha Mishra, IAS, Special Secretary, DAC&FW & Chief Guest of the Buyers Sellers Meet formally inaugurated the programme. Shri. Y Kikheto Sema, IAS, Commissioner & Secretary (Horticulture), Govt. of Nagaland graced the occasion as Guest of Honor.

The exhibition was participated by 12 exhibitors comprising of farmers groups, entrepreneurs, govt. departments and private sector involved in production, processing and marketing of horticulture crops. The exhibition programme also helped the buyers get a glimpse of the products/ produce available in the region. Variety of fresh and processed horticulture products was available for display and sale for the general public and participants of the programme.



Fig 63. An exhibition programme was organized during Buyers Sellers Meet at CIH, Nagaland

3.6.5.3. Exhibition organized during trainers training at CIH, Nagaland

An exhibition programme was organized on 13th January 2020 at CIH, Nagaland for FPOs in Dimapur & Kohima. The exhibition was formally inaugurated by Shri. B Pradhan IAS, Special Secretary & Financial Advisor, DAC&FW. The members of FPO Dimapur, FPO Kohima and local entrepreneur participated in the exhibition.



Fig 64. Shri. B Pradhan IAS, Special Secretary & Financial Advisor, DAC&FW visiting stalls

Focused Group Discussion

A Focused Group Discussion (FGD) was organized between FPO members of Dimapur & Kohima, nurserymen with members of Ernst & Young, New Delhi on 13th January 2020. The objective of the programme was to understand and analyze the real time problems faced by the farmers in production, processing and marketing of horticultural produce. A total of 21 FPO members participated in the Focused Group Discussion.



Fig 65. Group discussion in progress between Ernst & Young & members of FPOs

3.7. POST HARVEST MANAGEMENT

3.7.1. Upgradation of Minimal Processing Unit

The minimal processing unit has been set up at the institute for Farmers and entrepreneurs alike who would like to enhance their income through processing their Horticultural produce. The objective of this unit is to provide technical knowledge about food processing; and to guide the individuals/communities, who are willing to set up small agro processing unit, to tap the natural resources existing in their environments. Upgradation activities have been carried out at the Minimal processing Unit during the year 2019-2020. The list of work done is given as under:

- Setting up of the RO water filter and ensuring clean water supply to the unit.
- Purchase of stainless steel working tables.
- Purchase of packaging materials for Strawberry (Punnets)
- Installation of electricity back up inverter at the MPU

3.7.2. Product Development

Different products have been developed in the Institute and interested farmers and rural youths have been given hands on trainings for the processing of such products. The products developed in the Institute are listed as under:

3.7.2.1. Squashes

Squashes with different concentrations were prepared from different fruits such as kiwi, bael, starfruit, Plum, pineapple and Guava. The fruits were sorted, cleaned and washed and juice extraction was done. Sugar syrup was prepared and mixed with the juice. Permitted amount of Preservative was used to prolong the shelf life of the product. The processed products were then filled in clean sterilized PET bottles, labeled and stored.



Fig 66. Kiwi squash



Fig 67. Pineapple squash



Fig 68. Guava squash



Fig 69. Plum squash

3.7.2.2. Ready to serve (RTS) beverages

RTS beverages were prepared with strawberry and pineapple grown at the Institute. The RTS prepared contained 15% of the fruit juice mixed with sugar syrup. Permitted amount of preservative was added to prolong the shelf life of the product.



Fig 70. Strawberry RTS

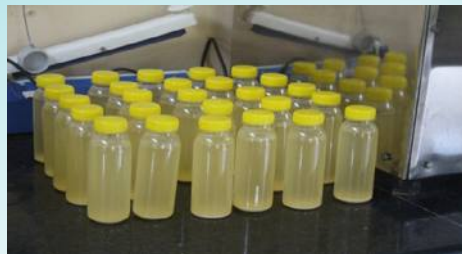


Fig 71. Pineapple RTS

3.7.2.3. Candy

Candies were prepared with kiwi, ginger, chow-chow, gooseberry, wild olive and strawberry. The raw materials were sorted, washed and cleaned. They were then sliced into uniform slices and blanched in hot water for 5-10 minutes. Sugar syrup was prepared upto 75°Brix and the sliced pieces were soaked overnight for 24 hours. After 24 hours the syrup was drained off and the pieces were either sundried or oven dried between 40°-50°C. The dried candies were then packed in clean pouches, labelled and sealed tight.



Fig 72. Kiwi Candy



Fig 73. Tuitty fruity



Fig 74. Ginger candy



Fig 75. Aonla candy



Fig 76. Wild olive candy



Fig 77. Strawberry candy

3.7.2.4. Pickles

Pickles were prepared with and without oil, using different spices and sun cooked. The sun cooked pickles were then stored in clean sterilized jars and stored.



Fig 78. Oil less pickle



Fig 79. Pickles from locally available vegetables

3.7.3. Model Training Course

The Model training course on 'Protocol Development and Value addition of Horticulture Crops', was conducted from 17th to 24th July 2019. The training course was attended by 20 functionaries of Agri and allied departments, SAUs and KVKs with the objective to highlight the prospects of Post Harvest Processing in Horticulture.



Fig 80. Participants of the Model Training Course at CIH

3.7.4. Awareness Programmes and Trainings

A total of 3 nos of awareness programmes and 3 nos of training programmes were conducted on Post Harvest management and processing of Horticultural crops by CIH.



Fig 81. Farmers awareness programme on marketing & value addition at Meghalaya and Nagaland



Fig 82. Training programmes on value addition of horticultural crops

3.7.5. Success stories of Post Harvest Management Trainees

3.7.5.1. Miss Viseno Yakhro, a 28 year old female from Kigwema Village, Kohima District after undergoing the 3 months Certificate course on Post harvest Management of Horticultural crops at Central Institute of Horticulture have successfully opened up her own Food outlet at Kigwema, Kohima, Nagaland. The Dwellingington Home is now the main source of income for Miss Viseno Yakhro. Her food joint started on 28th February 2020 and on an average she is earning approximately Rs 1000 to Rs 1200 per day.



Fig 83. Glimpses of the Food outlet at Kigwema, Kohima, Nagaland

3.7.5.2. Mr. Veipu , a 28 year old Male from Senapati District , Manipur has started processing value added products after undergoing the three months certificate course on Post Harvest Management at Central Institute of Horticulture.



Fig 84. Value added products developed by Mr. Veipu

3.7.5.3. Mr. Mika Shohe from Dimapur Nagaland underwent an advanced training course on Post Harvest Management and value addition of Horticultural Crops at CIH Nagaland. On successful completion of the training, he along with his sibling standardized a protocol for Pineapple RTS. The Pineapple RTS was launched by Smt Vasudha Mishra. Special secretary MoA&FW, at CIH Medziphema.



Fig 85. Pineapple RTS launched at CIH Medziphema

3.8. ACCREDITATION AND CERTIFICATION OF NURSERIES IN NER

Nursery Accreditation and Certification of horticulture nurseries has been one of the major activities of the institute. During the period of 2019-2020, a total of 6 nurseries were assessed/monitored which includes both fresh application and renewal applications, out of which 6 nurseries were accredited and certification were done with a rating **2 Star** to one nursery and with a **1 Star** rating to remaining five nurseries. The details of the nurseries are provided in the table below:

Table 7: Nurseries Accredited during the year 2019-2020

Sl. no.	Name of Nurseries	Location/ State	Crop	Production capacity per annum	Star rating	Remarks
1	Pudaite Nursery	Tuizual Zau Aizawl Mizoram	Dragonfruit	25000	"1 Star"	Fresh
2	Centre of Excellence for Fruits	Lunglei , Mizoram	Dragonfruit Citrus	40000 20000	"1 Star"	Fresh
3	Centre of Excellence	Serchhip, Mizoram	Dragonfruit Citrus	40000 12000	"2 Star"	Renewal
4	Horticulture Centre	Thingdawl, Mizoram	Dragonfruit Citrus	30000 6000	"1 Star"	Renewal
5	Evergreen Nursery	Sukhovi, Nagaland	Cashew nut	50000	"1 Star"	Renewal
6	Khamu & Sons Nursery	Rihuba, Pfutsero Nagaland	Kiwi fruit Persimmon	20000 5000	"1 Star"	Fresh

Table 8: List of Nursery Accreditation Committee of NER

State	Address	Contact/email
Nagaland		
Dr. V.J. Shivankar, Chairman	Former Director, NRCC, Nagpur	M-07972322680/9422988418, shivankarvj@yahoo.com
Dr. Aabon Yanthan	Scientist (Hort.), ICAR, Nagaland Centre	M-09718852675
Dr. Moa Walling	Deputy Director, Dept of Hort, Nagaland	M-7005287704
Assam		
Dr. V.J. Shivankar, Chairman	Former Director, NRCC, Nagpur	M-07972322680/9422988418, shivankarvj@yahoo.com

Dr. Nishant. A. Deshmuk,	Scientist (Hort.), ICAR Umiam	M-8974036747, nadeshmukh@gmail.com
State representative	-	
Arunachal Pradesh		
Dr. K.K. Jindal	Ex. ADG (Horticulture)	M-9418029482, kkjindal45@gmail.com
Dr. Hammylliende Talang	Scientist, ICAR, Umiam	M- 9436311164/8132887733 hammylliende@gmail.com
Shri. Tage Tatung	Joint Director (Horticulture), Govt. of Arunachal Pradesh	
Meghalaya		
Dr. Anjani Kumar Jha	Principle Scientist (Hort), ICAR Umiam	M-9402507059, akjhaicar@yahoo.com
Dr. Heiplanmi Rymbai	Scientist (Hort.), ICAR, Umiam	M- 8131076434, rymbaihort@gmail.com
State representative		
Sikkim		
Dr. Yog Raj Chanana	Former HOD, Hort., PAU, Lud- hiana	M-9876153322 yrchanana@yahoo.com
Dr. Sudip Kumar Dutta	Scientist, ICAR, Sikkim Centre	
State representative	-	
Manipur		
Dr. R.C.Upadhyaya	Ex. Director, NRC-Orchid, Sik- kim	M-9868645393 urc@hub.nic.in
Dr. Subhra Saikat Roy	Scientist (Hort.), Manipur Centre	M- 8730933835, subhra- saikat@gmail.com/ ssroy.icar@nic.in
State representative	-	
Tripura		
Dr. R. P. Gupta	Ex. Director, NHRDF, New Delhi	M-9850880668
Dr. H. Lembisana Devi,	Scientist (Hort.), Tripura Centre	M-8415917083

State representative	-	
Mizoram		
Dr. P.K.Singh	Ex. Deputy Managing Director, NHB	M-9868893701 Singhpraveen2017@gmail.com
Dr. Vishambhar Dayal/ Dr. Amit Goswami	Scientist, Mizoram centre, Scientist (Hort), IARI, New Delhi	M-7005453095 Vishamber5009@gmail.com
Shri. Lalremruata	HEO, Govt of Mizoram	M- 8119865660 remruatahamp@gmail.com
Spices		
Dr. R.K. Bhattacharya	Ex. Professor & Head, AAU, Jorhat	M-9435050790, ran- jitkb2010@gmail.com
Dr. Azeze Seyie/ Dr. Chongtham Tania,	Scientist, Nagaland Centre Scientist, Manipur centre	M-7085962272
State representative		

Fig 86. Glimpses of Horticulture Nurseries Assessment of NER States during 2019-20



3.9. SKILL DEVELOPMENT & CERTIFICATE COURSE

3.9.1. Skill development

Central Institute of Horticulture, Nagaland organized four (04) skill development courses for the farmers/ unemployed youth of northeast states. The institute has been accredited by ASCI to impart skill trainings in North East Region. The objective of the course is to equip the less educated unemployed youth of the region with the skills to work in the field of horticulture.

Table 9. Skill Development Course Conducted

For the year 2019-20

Sl.	Course	Batch ID	Duration	No. of registered trainees	No. of qualified trainees
1	Floriculturist-Protected Cultivation	5423	200 hours (18.06.19 to 15.07.19)	18	17
2	Gardener	11832	260 hours (20.08.19 to 03.10.19)	20	20
3	Floriculturist-Protected Cultivation	63669	200 hours (11.01.20 to 13.02.20)	13	08
4	*Gardener	122815	260 hours (05.03.20 to 21.04.20)	13	Cancelled due to lockdown
	Total			64	45

*Course was cancelled due to national lockdown to contain the spread of COVID-19



Fig 87. Practical session of trainees in progress

3.9.2. Certificate Courses

The three months certificate course on “Post Harvest Management of Horticultural Crops” commenced on 22nd October 2019 at Central Institute of Horticulture (CIH), DAC & FW, Ministry of Agriculture and Farmers Welfare, Government of India, Medziphema and concluded on the 20th of January 2020. The objective of the certificate course is to skill the rural unemployed youths on post harvest management, food processing and value addition of horticulture crops which will enable them to be fully equipped to run and manage pack houses, cold storage and food processing unit. A total of 20 trainees were selected to undergo the 3 months certificate course.



Fig 88. The certificate course trainees at CIH



Fig 89. The certificate course trainees at IIFPT, Guwahati



Fig 90. Glimpses of practical Classes on Processing during the 3 months course

3.10. INFRASTRUCTURE DEVELOPMENT

- ❖ Installation of irrigation pipe line in last block including motor pump and reservoir of 14,000 ltr capacity.
- ❖ Construction of farmers hostel
- ❖ Renovation of existing Farmers cum trainees hostel
- ❖ Renovation of old farm building to be used as farmers hostel
- ❖ Construction of terracing in last block and near pump house (0.8 ha)
- ❖ Renovation of mushroom unit
- ❖ Installation of light arrester in office building
- ❖ Installation of main irrigation pipe line including outlet for irrigation in middle block

4. | Publication

4.1. Annual Report/ Training manual/ extension folders

- ☞ N.K.Patle and Meribeni Shitiri. 2019. *Annual report (2018-19)*. Central Institute of Horticulture, DAC & FW, Ministry of Agriculture and Farmers' Welfare, Govt. of India, Medziphema, Nagaland.
- ☞ N.K.Patle, Meribeni Shitiri, A.K.Singh, Arvind Singh, Manzar Hossain, Prabin Das, Lichamo Yanthan, Moasosang Longkumer, Tabassum Parveen. 2019. Training manual on Floriculture-Protected cultivation. CIH/ Manual/ Pub. No.6 / pp 1-78.
- ☞ N.K.Patle, Meribeni Shitiri, A.K.Singh, Arvind Singh, Manzar Hossain, Prabin Das, Lichamo Yanthan, Moasosang Longkumer, Tabassum Parveen. 2019. Training manual on Gardener. CIH/ Manual/ Pub. No.7 / pp 1-64.
- ☞ N.K.Patle, Vinika K. Aomi. 2019. Training manual on protocol development and value addition of horticultural crops. CIH/ Manual/ Pub. No.8 / pp 1-72.
- ☞ N.K.Patle, Vinika K. Aomi. 2019. Training manual on value addition and processing of horticultural crops. CIH/ Manual/ Pub. No.9 / pp 1-87.
- ☞ N.K.Patle, Vinika K. Aomi. 2019. Report on Model Training course on protocol development and value addition of horticultural crops. CIH/ Manual/ pp 1-18.
- ☞ Vinika K. Aomi, Meribeni Shitiri and N.K.Patle. 2019. *Value addition of tomato (tomato soup and canning of tomatoes)*. CIH/ Tech. Folder 43/ pp 1-6.
- ☞ Vinika K. Aomi, Meribeni Shitiri and N.K.Patle. 2019. *Value addition of tomato (tomato juice, ketchup & chutney)*. CIH/ Tech. Folder 44/ pp 1-6.

5. | Important events celebrated

5.1. Independence Day Celebration

Central Institute of Horticulture observed the 73rd Indian Independence Day on 15th August, 2019. Mr. Arvind Singh unfurled the national flag and delivered the Independence Day speech.



Fig 91. CIH staff and workers

5.2. Republic Day Celebration

The Institute, with the rest of the country celebrated the 71st Republic Day on 26th January 2020. Mr. A.K. Singh hoisted the national flag and delivered the Republic Day speech.

5.3. Swachhta Hi Sewa (October 2019)

The Institute organized Swachhta Hi Sewa from 11th September to 2nd October 2019. The event began with taking the Swachhta Pledge by all the staffs and field workers of Central Institute of Horticulture, Nagaland. Cleanliness drive was undertaken in different areas of the Institute and all types of wastes were removed from the campus.



Fig 92. Staffs taking the Swachhta Pledge



Fig 93. Cleanliness drive outside the building & farm

5.4. Swachhta Pakhwada

The Institute organized Swachhta Pakhwada from 16th December to 31st December 2019.



Fig 94. Cleanliness drive organised during Swachhta Pakhwada organized at CIH campus

6. | Personnel

The Government of India has sanctioned 17 posts which include: Director (1), Horticulture Specialist (2), Marketing specialist (1), Post harvest technologist (1), Asst. Horticulture specialist (3), Farm Manager (1), Senior technical assistant (2), Administrative Officer (1), PA to Director (1), Stenographer (2), Field Assistant (2). All development, trainings and transfer of technology activities are being carried out at the institute under the administrative control of the Director, Central Institute of Horticulture supported by total staff strength of 16 comprising of technical, administrative staffs and 54 outsourced labours.

PRESENT STAFF POSITION AT CIH

- | | |
|-------------------------------|---------------------------|
| 1. Director | : Dr. N.K.Patle (i/c) |
| 2. Technical consultant | : Mr. Arvind Singh |
| 3. Horticulture Specialist | : Mr. Anjani Kumar Singh |
| | : Mrs. Meribeni Shitiri |
| 4. Post Harvest Technologist | : Ms. Vinika K. Aomi |
| 5. Marketing Specialist | : Mr. Prabin Das |
| 6. Assistant Horticulturist | : Dr. Moasosang Longkumer |
| 7. Senior Farm Manager | : Mr. Arvind Singh (i/c) |
| 8. Senior Technical Assistant | : Ms. Marina |
| 9. Administrative officer | : Mr. Babu Singh |
| 10. P A to Director | : Ms. Imtinaro Jamir |
| 11. Stenographer | : Mrs. Sharda Devi |
| | : Ms. Kevisetuono Krose |
| 12. Field Assistant | : Mr. Eliyamo Humtsoe |
| | : Mr. Anukul Roy |

7. | Budget

FINANCIAL PROGRESS REPORT OF CIH, NAGALAND FOR THE YEAR 2019-20

(Rs. in Lakhs)

HEAD OF ACCOUNT	Budget	Revised	Expenditure
Major Head-2401	Estimate	Estimate	2019-20
248-Crop Husbandry	2019-20	2019-20	
55-Green Rev.-Kris. Yojn.			
03-Estt. of CIH			
1	2	3	5
550501- Salary	10,00,000.00	4,00,000.00	2,75,424.00
550502- Wages	93,00,000.00	1,05,00,000.00	99,32,807.00
550506- Medical Treatment	3,00,000.00	-	-
550511- D T Expenses	10,00,000.00	-	-
550513- Office Expenses	35,00,000.00	25,00,000.00	18,97,365.00
550514- Rent rate & taxes	1,00,000.00	50,000.00	21,500.00
550516- Publication	13,00,000.00	6,25,000.00	88,480.00
550520- Other Admni. Expn.	69,12,000.00	45,00,000.00	33,18,606.00
550526- Advt. & Publicity	4,00,000.00	1,00,000.00	14,320.00
550527- Minor works	60,00,000.00	25,00,000.00	16,68,112.00
550528- Prof. services	5,00,000.00	2,00,000.00	31,000.00
550550- Other charges	1,75,00,000.00	1,00,00,000.00	78,99,699.00
96-Swachhta Action Plan	2,00,000.00	2,00,000.00	1,05,255.00
Total (2401 -Crop Husbandry)	4,80,12,000.00	3,15,75,000.00	2,52,52,568.00
4401 CO on Crop Husbandry			
119-Horti. & Veg. Crop			
14-Estt. of CIH			
170151-Motor Vehicle	-	-	-
170152-Machinery & Equip.	15,50,000.00	-	-
170153- Major Works	3,84,50,000.00	-	1,12,82,555.00
Total – Major Head 4401-	4,00,00,000.00	-	1,12,82,555.00
Grand Total	8,80,12,000.00	3,15,75,000.00	3,65,35,123.00

8. | List of Board of Management & Technical Advisory committee members

8.1. Table 10: Members of Board of Management (BOM)

Sl. no	BOM Members	Details
1	Horticulture Commissioner, Department of Agriculture Cooperation & Farmers Welfare, Govt. of India, Krishi Bhawan, New Delhi	Chairman
2	Secretary/Director (Horticulture), Govt. of Arunachal Pradesh, Itanagar, Arunachal Pradesh	Member
3	Secretary/Director (Horticulture), Govt. of Assam, Guwahati, Assam	Member
4	Secretary/Director (Horti. & Soil Cons.), Govt. of Manipur, Imphal, Manipur	Member
5	Secretary/Director (Horticulture), Govt. of Meghalaya, Shillong, Meghalaya	Member
6	Secretary/Director (Horticulture), Govt. of Mizoram, Aizwal, Mizoram	Member
7	Secretary/Director (Horticulture), Govt. of Nagaland, Kohima, Nagaland	Member
8	Secretary/Director (Horticulture), Govt. of Sikkim, Gangtok, Sikkim	Member
9	Secretary/Director (Horticulture), Govt. of Tripura, Agartala	Member
10	Vice Chancellor/Director (Research), Assam Agriculture University, Jorhat, Assam	Member
11	Vice Chancellor/Director (Research), Central Agriculture University, Imphal, Manipur	Member
12	Prof.D.P.Ray, Ex-Vice Chancellor of OUAT, Bhubaneshwar, Orissa -Expert	Member
13	Sh. Diwakar Kachari, Resident of Dimapur, Nagaland as a Farmer member	Member
14	Sh.Khiubangdibo, Resident of Dimapur, Nagaland as a Farmer member	Member
15	Representative of North East Council, Nongrim Hills, Shillong, Meghalaya	Member
16	Director ICAR, Umroi Road, Umiam-793103, Meghalaya	Member
17	Managing Director, NABARD, Plot No-C24, G Block, Bandra Kurlar Complex, P.O.Box-8121, Bandra East, Mumbai	Member
18	Sh.Shiv Anjan Dalmia, Dalmia Greens, Meghalaya - Successful entrepreneur of NER	Member
19	Representative of M/s. Zopar Exports Pvt.Ltd. (North East Circle)	Member
20	Director, CIH, Medziphema, Dimapur, Nagaland	Member Secretary

8.2. Table 11: Technical Advisory Committee (TAC)

Sl.no	Members	Details
1.	Dr.S.D.Upadhyaya, Ex-Director Instruction, J.N. Agriculture University, Jabalpur, M.P	Chairman
2.	Dr.R.C.Upadhyaya, Ex-Director, ICAR-NRC Orchids, Sikkim (for guidance on fruit/vegetable crops)	Member
3.	Dr.Ramesh Mittal, Director, NIAM, Jaipur (for guidance on market linkages in NE Region)	Member
4.	Dr.B.C.Deka, Director, ICAR-ATARI, Meghalaya for guidance (on Post Harvest Management)	Member
5.	Dr.M.Tamil Selvan, Ex-Additional Commissioner (Hort.), DAC&FW (for guidance on spice crops)	Member
6.	Dr.D.J.Rajkhowa, Joint Director, ICAR Regional Centre, Nagaland (for guidance on Integrated Farming System)	Member
7.	Shri.Anand Zambre, Executive Director, NCPAH (for guidance on protected cultivation)	Member
8.	Director, Central Institute of Horticulture, Nagaland	Member Secretary

9. | Annual Action Plan 2019-20

(375)

Central Institute of Horticulture				
Annual Action Plan (2019-2020)				
Sl. no	Components	Physical Targets	Approx. cost per unit	Approx. Financial Allocation
			(Rs.)	(Rs. In lakh)
1	SALARIES			10.00
2	WAGES (Labour & Security persons)			93.00
3	MEDICAL			3.00
4	DOMESTIC TRAVEL EXPENSES			10.00
5	OFFICE EXPENSES			
	1) Office Furniture			4.00
	2) Telephone bill			2.50
	3) Electricity bill			5.00
	4) Repair of motor vehicle and farm implements			3.00
	5) Purchase of rubber stamp			0.10
	6) Stationary			1.00
	7) Office equipment etc.			1.00
	8) Computer & accessories			1.00
	9) Printing & binding jobs			0.20
	10) POL			5.50
	11) AMC			8.00
	12) Postage & Telegraph			2.00
	13) Misc./others			1.70
	Sub total			35.00
6	RATE, RENT & TAXES			1.00
7	PUBLICATION		Annexure I	
1	Annual Report 2018- 2019	1 No.(100 copies)		
2	Technical bulletin	3 Nos(600 copies)		
3	Folders	5 Nos.(500 copies)		
4	Reprinting of exhausted Technical folders	15 Nos. (500 copies)		
5	Procurements of books and journals	Need based		
6	Impact analysis of CIH, Nagaland	1 No.(100 copies)		
	Sub total			13.00

Pl put up with BOM minutes meeting for HC.

8	OTHER ADMINISTRATIVE EXPENSES A. Human Resource Development B. Meetings C. PHM D. Marketing & Agri-Business Promotion			
8.A	Human Resource Development			
1	Farmers Training	37 nos.(50 trainees/batch	0.50 Annexure II	18.50
2	Training of Trainers	03 nos. (40 trainees/batch	2.50 Annexure II	7.50
3	Exposure trip cum training	03 nos.	2.70 Annexure II	8.10
4	Capacity Building			
i	ISTM Training	01 nos.	2.00	2.00
ii	Individual training	01 nos.	1.12	1.12
5	Skill Development Trainings			
a.	Floriculturist-Protected Cultivation / Gardener/ Mushroom grower as per MIDH norms	02 nos.	3.30	6.60
b.	RKVY (Gardener & Floriculturist)	03 nos.	Subject to the availability of funds by RKVY division.	
	Sub total			43.82
8.B	SEMINAR/ WORKSHOPS/ CONFERENCES/MEETINGS			
1	Workshop on Marketing & Supply Chain Management (2 days) {as per MIDH norms}	1 no.	2.00	2.00
2	Technical Advisory Committee (TAC) meeting	1 no	2.00	2.00
3	Board of Management (BOM) meeting	1 no	2.00	2.00
	Sub total			6.00
8.C	PHM			
1	Upgradation of the Minimal Processing Unit	1 unit	6.00	6.00
2	Product developments (candy, pickle, jam, fruit squash, juice etc)		1.30	1.30
3	Setting up of Incubation Centre	1 unit	(Subject to availability of funds)	
	Sub total			7.30

377

8.D	Marketing & Agri-Business Promotion			
8.D.i	Linking of Farmers/Farmers Group with Financial Institutions for Availing Agricultural Credit			
1	Facilitation in preparation of projects for farmers to avail agricultural credit			
a)	Awareness programme/training on govt. schemes for horticulture development	2 programs	0.50	1.00
8.D.ii	CREATE AWARENESS AMONG FARMERS FOR FORMATION OF CLUSTERS/FARMERS GROUP/GROWERS SOCIETY THROUGH SFAC			
1	Awareness programme/ training on marketing of horticulture crops	2 programs	0.50	1.00
2	Exposure Visit	1 no.	2.50	2.50
8.D.iii	Creating of Market Linkage for the Farmers			
1	Entrepreneurship Development Programme (3 days)	1 no.	1.50	1.50
2	Buyers & Sellers Meet	1 no.	2.50	2.50
3	Capacity Building for Agripreneurs at National Institute of Agriculture Marketing, Jaipur for 25-30 participants for 03 days.	1 no	Rs 3000/person x 3 days (excluding travel) As per norms of NIAM	3.50
4	Training on Agriculture Marketing in NE States (3 days)	3 nos.	Subject to availability of fund from NIAM, Jaipur	
	Sub total			12.00
	Total (OAE)			69.12
9	ADVERTISEMENT & PUBLICITY			
10	MINOR WORKS			
1	Construction of Shade net for Nursery unit as per MIDH norms	1no.(500sqm)	5.00	5.00
2	Soil filling/land development for shade net construction & renovation of existing water pond	1000 sqm	5.00	5.00
3	Construction of G-Nap water tank at farm	1 Nos.	9.00	9.00
4	Installation of Solar System back up in poly house, bamboo guest house and solar lights	1 unit	10.00	10.00
5	Construction of low cost visitor's hut near to pump house	01 nos	1.00	1.00
6	Terracing in farm for new block development	0.8 ha	35.00/ ha	30.00
	Sub total			60.00

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278

11	PROFESSIONAL SERVICES A. Consultancy fees as per actual B. Professional fees as per actual C. Invigilator fees as per actual D. Legal services as per actual				5.00
12	OTHER CHARGES A. Demonstration of production technologies at Institute level i. Management of existing demonstrations ii. Demonstrations of Technology in the Institute iii. Demonstration of improved Technologies in NE States B. Quality Planting Material Production C. Accreditation of Horticulture Nurseries in NER D. Certificate Course E. Exhibitions/Trade Fairs/Meets/Mela F. Chemical & glassware's for laboratory G. Farm development & beautification H. Contractual staff remuneration				
12.A	Demonstration of production technologies at Institute level				
i.	Management of existing demonstrations				
1	Maintenance of organic vermicompost	4 units			0.20
2	Purchase of fertilizers, chemicals & manures for 10 nos. of polyhouse (Water Soluble fertilizers)	For 10 nos. (1000 sqm) & 04nos. (100sqm) poly houses. 12 truck load FYM	Annexure III		2.00
3	Purchase of FYM, Fertilizer & chemicals (for farm)		2.00		2.00
4	Poly house maintenance (plastic and drip system)	11000 sqm			8.50
5	Shade net ceiling for poly house no. 12	1000 sqm.	0.70		0.70
6	Disinfection chamber in poly house no. 12	1	1.0		1.0
7	Repair and renovation of fan & pad system in poly house no. 6 & 7	2 units	2.5		5.0
8	Repairing of poly house and shade net	-	-		4.0
9	Installation of pipe fitting/Drip irrigation/sprinklers in fruit blocks	4 ha	2.50		10.00
10	Maintenance of existing bee colonies	39 colonies	0.30		0.30
11	Maintenance of Mushroom unit	2 unit	0.25		0.50
12	Maintenance of Herbal Garden	0.02	0.10		0.10
13	Intercropping of green manure in all fruit crops	10 ha	0.05		0.50
14	Gap filling Flowers (tissue culture) i.-Anthurium	1000 nos.	-		2.00
	ii. Gerbera Plants	2000 nos.	-		1.00
15	Demonstration on water shed management	1 unit	1.50		1.50
	Sub total				39.30

379

ii.	Demonstrations of Technology in the Institute			
1	Establishment of Rambutan, Loquat and Longan block.	0.5 ha	0.30 Annexure IV	0.30
2	Establishment of strawberry block including mulching for varietal evaluation	0.01 ha	1.00 Annexure V	1.00
3	Gap filling of Custard Apple, Sapota, Ber, Carambola & Fig		0.45 Annexure VI	0.45
4	Establishment of pineapple var. Kew, Queen, Mauritius on slope area and intercropping with tree spices	1.0 ha	1.30 Annexure VI	1.30
5	Demonstration on Improved production technology of yardlong bean, french bean, broccoli & knol-khol (Source, ICAR)	1.1 ha	0.50 Annexure VII	0.50
6	Plantation of tuber crops (cassava, sweet potato)	0.5 ha	0.20	0.20
7	Integrated model of drumstick, ginger, turmeric and vegetables	500 sqm		0.20
8	Production of flowers seedling (gladiolus corm, anthurium & carnation plant) /potted plants/ vegetable seedlings on demand basis.	15,000 nos.	3.50	3.50
9	Performance of high value vegetables under protected cultivation (tomato & coloured capsicum, Cherry tomato, Cucumber, Musk melon, king chilli and exotic vegetables etc)	1500 sqm	0.60 Annexure VIII	0.60
10	Production of Shitake mushroom	1 unit	0.97	0.97
11	Construction of Vermicompost unit	8 unit	4.50 Annexure IX	4.50
12	Establishment of organic input production units (compost, bio-enhancer & bio pesticides)	1 unit	0.50	0.50
	Sub total			14.02
iii.	Demonstration of improved Technologies in NE States (As per MIDH norms)			
1	Rejuvenation of senile citrus orchard and canopy management	1 ha	0.40	0.40
2	High Density Planting of Guava 3x3m spacing	1 ha	0.75	0.75
3	Demonstration on plantation of kiwi fruit at 4x4m spacing in Meghalaya (without trellis)	1ha	1.20	1.20

780

4	Improved production technology of citrus decline at Tuensang, Nagaland (2 nd year)	5 ha	0.04	0.20
5	Demonstration on plantation of mango var. Amrapali and Dashehari in Manipur (2 nd year)	1 ha	0.23	0.23
6	Demonstration on Khasi Mandarin and Passion Fruit	0.5 ha each	-	1.00
	Sub total			3.78
B.	Quality Planting Material Production			
	Mass multiplication of quality planting material			
i.	Asexually propagated plants (Cashew 50000, Citrus 10000, Assam lemon 10000, Acid lime 10000, Mango 10000, Guava 10000)	1,00,000 nos	Annexure X	8.00
	Sub total			8.00
C.	Accreditation of Horticulture Nurseries in NER	15 Nos.	1.00	15.00
D.	Certificate Course			
i.	Certificate course on post harvest Management and Value addition of Horticultural crops	1no. (20 trainees)	8.90	8.90
E.	Exhibitions/ Trade Fairs/ Meets/Mela			
1	National/ State level exhibitions/ Seminar (To organize)	1 no	5.00	5.00
2	National/ State level exhibitions (To participate)	2 nos.	3.00	6.00
3	District level promotional event	2 nos.	2.00	4.00
	Sub total			15.00
F.	Farm Development & Beautification		Annexure XI	
	Landscaping i) Annual seasonal, ornamental plants ii) Turf grass iii) Popup irrigation system in old lawn. iv) Maintenance of land scape area	3500 sqm. 18000sqft (Old lawn area and along with road)	5.00	5.00
	Sub total			5.00
G.	Contractual Staff Remuneration			66.00
	Total (OC)			175.00
	Grand total			478.12
13	Major Head (Machinery & Equipment)			
1)	Farm Tools & Implements			
i.	Mini Rotary (5.5HP) Model KKCRT550-D	01	1.00	1.00

(38)

ii.	Power Sprayer (4HP) Petrol operated	01	0.45	0.90
iii.	Power chain saw (battery operated)	02	0.50	1.00
iv.	Pruning loopers, diggers, pruning saw, secateurs, gumboots, hand gloves etc.			1.00
v.	Power tillers based weed cutter	01	2.00	2.00
vi.	Repairing, maintenance and servicing of farm machinery			1.00
vii.	Pipeline (GI) from pump house to Fig block			2.00
viii.	Cultivator (tractor operated)	01	1.00	1.00
ix.	Lawn mower (Hand operated)	02	0.05	0.10
x.	Air compressor for vehicles & tractors	01	0.50	0.50
	Sub total			10.50
2)	Major works			
i	Residential quarter building i. Type V - 1 No. ii. Type II - 5 Nos.			125.00
ii	Existing boundary to be converted with brick wall	2.6 km		99.50
iii.	Farmers Hostel			150.00
iv.	Renovation and Re-electrification of CIH Bamboo Guest house cum Hostel			15.00
	Sub total			389.50
	Grand total			400.00

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782

Budget Projection for the year 2019-2020		
Sl. no	Head of Account	Allocation of Budget for 2019-20 (Rs. In Lakhs)
A	Major Head -2401	
1	Salary	10.00
2	Wages	93.00
3	Medical Treatment	3.00
4	Domestic Travel Expenses	10.00
5	Office expenses	35.00
6	Rent, Rates & Taxes	1.00
7	Publication	13.00
8	Other Administrative Expenses	69.12
9	Advertisement & Publicity	4.00
10	Minor works	60.00
11	Professional Services	5.00
12	Other Charges	175.00
	Sub	
	Total	478.12
B	Major Head -4552	
1	Major works	389.50
2	Machinery & Equipment	10.50
	Sub	
	Total	400.00
	Grand Total	878.12

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CENTRAL INSTITUTE OF HORTICULTURE

Department of Agriculture, Cooperation & Farmers Welfare

Ministry of Agriculture and Farmers Welfare

Government of India, Medziphema, Dimapur, Nagaland

केंद्रीय बागवानी संस्थान

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