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2018-19

सत्यमेव जयते

CENTRAL INSTITUTE OF HORTICULTURE

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कृषि भवन, नई दिल्ली.११०००१

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

FOREWORD

It gives me immense pleasure to present the Annual Report of Central Institute of Horticulture, Nagaland. It is a compendium of the activities of Institute during the year 2018-19. Central Institute of Horticulture, located in Nagaland has completed thirteen years since its inception on 27th March, 2006. It was established with the vision to emerge the institute as the pioneering, innovative, farmer focused and self supporting horticulture institute so as to bring socio economic development of horticulture in NER.

The Institute has laudable work to its credit in its mandate areas viz., human resource development, on and off farm demonstrations, protected cultivation, quality planting material production, organic farming, post harvest management, marketing & agri-business promotions, certificate course & skill development courses and nursery accreditation.

This institute has been taking active initiatives in disseminating information on improved package of practices, production of genuine quality planting materials, processing and value addition of different horticultural crops, technology like high density planting, organic farming, protected cultivation of various horticulture crops. This institute also provides excellent, innovative and relevant training to all the stake holders' to raise the standards of the farmer's cultivation practices to enhance the crop productivity thereby uplifting the economy of the region. The Institute carried out extension and demonstrations work in the entire North east states in coordination with state horticulture department of NER and experts from ICAR, SAUs and KVKs and acts as capacity building centres to impart knowledge and relevant skills to extension functionaries and farmers of the region.

I commend Dr.N.K.Patle, Dy. Commissioner (Hort.), DAC & FW & Director (i/c), CIH and his staff for working as a team in providing all the technical support which clearly shows the initiatives taken and progress made by the Institute for the development of horticulture sector in NER.

I wish the Institute all success in its future endeavour.

(Dr. B. N. S. Murthy)

EXECUTIVE SUMMARY

The development activities of Central Institute of Horticulture, Nagaland are being carried out under the programmes, viz. capacity building by training of trainers and farmers/beneficiaries; demonstration of improved production technologies; production and supply of quality planting material; accreditation and certification of nurseries in NE region; skill development & certificate courses in horticulture; promotion of organic cultivation of horticulture crops; post harvest management and value addition of horticultural crops; marketing and agri-business promotion through exhibitions, seminars, workshops, exposure trips, buyers & sellers meet; 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.

Some significant achievements of all the development activities undertaken by the Institute under various programmes have been highlighted in the Annual Report (2018-19) of Central Institute of Horticulture, Nagaland. Under farm development, about 25 ha area has been established consisting of different fruit crops, tree spices, vegetables and tuber crops. Fruit blocks of mother plants for scion collection are planted which are to be used under different propagation activities. Under protected cultivation, ornamental crops such as gerbera, rose, anthurium, orchid, carnation and high value vegetables are being cultivated.

Under production and supply of quality planting material, the Institute has raised about 77,205 rootstocks in citrus, cashewnut, guava and mango and propagated 55,940 of citrus, cashewnut, guava and mango plants. In terms of technology demonstrations, on farm demonstration such as cultivation of turmeric and ginger; plantation of new fruit crops such as avocado, custard apple, sapota, ber, rambutan, papaya; cultivation of vegetables (okra, tomato, cowpea, yardlong bean, cabbage and broccoli); plantation of tree spices; cultivation of tuber crops sweet corn, strawberry, pineapple, gladiolus; oyster mushroom cultivation; production of vermicompost; maintenance and extraction of honey etc were taken up during the reported year. Under protected cultivation, cultivation of carnation, high value vegetables such as capsicum, musk melon and cucumber were demonstrated. With regard to off farm demonstrations, plantation of mango var. Amrapali & Dashehari was established in an area of 1 ha Manipur in collaboration with ICAR-KVK, Ukhrul, Manipur, Rejuvenation of 1 ha declining citrus orchard var. Khasi mandarin in Nagaland in collaboration with ICAR-KVK, Tuensang, Nagaland, INM/IPM demonstration on citrus at Tuensang, Nagaland in an area of 5 ha and demonstration on 1 ha plantation of kiwi in Nagaland, in collaboration with Horticulture Research Farm, Dept. of Horticulture, Govt. of Nagaland was implemented during the reported year.

In human resource development, the Institute has organized 31 farmers training which were attended by 1355 farmers and two trainers training with 23 officials was conducted in identified areas of horticulture in the region. The Institute has also organized two numbers of exposure trips cum training for 38 farmers of Nagaland and Manipur at CCRI, Nagpur and IHT, Greater Noida. The technical staff of CIH also underwent two capacity building programmes on "Scientific bee keeping for alternative livelihood and higher yield of crop plants through efficient pollination" for eight days at ICAR-CISH RRS, Malda, West Bengal and three days training programme on "Mushroom spawn production technology" organized by ICAR Research Complex Nagaland Centre, Medziphema. Besides these, various extension bulletins, booklets, impact documents and folders with reference to the programmes of the Institute and focus horticultural crops of NER were also published by the institute for technology dissemination.

In marketing and agri-business promotion, the Institute took initiatives to facilitate the farming community in creating awareness on govt. schemes, facilitating in market linkage & promoting the produce of the region through exhibitions. During the year 2018-19, three (3) nos. of farmer's awareness programmes were conducted. The objective of the programme was to create awareness among the farming community on government schemes meant for horticulture development. CIH has also organized one exhibition cum buyers sellers meet programme with the objective to create a platform for the buyers and growers to interact and discuss on possible market linkage. Two (2) nos. of exhibition programme was also organized at CIH, Nagaland during for the farming community during the reported year. The Institute also participated in International Agriculture & Horti Expo 2018 held at Pragati Maidan, New Delhi and exhibition programme organized by ICAR, Nagaland Centre, Medziphema. In addition, the Institute in technical collaboration with National Institute of Agricultural Marketing, Jaipur organized a 3 days Entrepreneurship Development Programme cum Skill Development Trainees Meet at its campus in Medziphema, Nagaland with the objective to highlight the prospects of entrepreneurship in horticulture to the educated and unemployed youth.

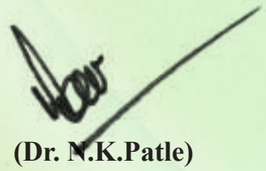
Under post harvest management and value addition, the activities undertaken by the Institute includes setting up of minimal processing unit in order to provide technical knowledge about food processing and assist the farmers and entrepreneurs in setting up small home scale processing unit. Different value added products from various horticultural crops such as squashes, RTS beverages, jams, pickles and candies have been developed besides imparting training programmes to the farmers and rural youths of the region.

Central Institute of Horticulture, Nagaland has been accredited by ASCI to impart skill trainings in North East Region. The courses are designed to equip the less educated unemployed youth of the region with the skills to work in the field of horticulture. During the year 2018-19, the

Institute organized five (5) skill development programmes, two course on 'Floriculturist-Protected Cultivation' and three course on 'Gardener' with a total of 85 trainees registered for the course. A three months duration certificate course on "Post Harvest Management" was also conducted at CIH where a total of 19 trainees from different parts of North East Region successfully registered and completed the certificate course.

Nursery Accreditation and Certification of horticulture nurseries has been one of the major activities of the institute to establish a network of quality nurseries across the region for the purpose of propagation and distribution of quality planting material. The Institute during the reported year has accredited ten nurseries with a rating **2 star** to two nurseries and with a **1 star** rating to remaining eight nurseries.

Constant encouragement, support and guidance from Dr. B.N.S. Murthy, Horticulture Commissioner and officials at DAC & FW, Ministry of Agriculture & FW, Government of India have helped tremendously in accomplishing the targets and achievements by the Institute. The contributions and hard work of the entire CIH staff is also thankfully acknowledged.



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

1. ABOUT THE INSTITIUTE

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.

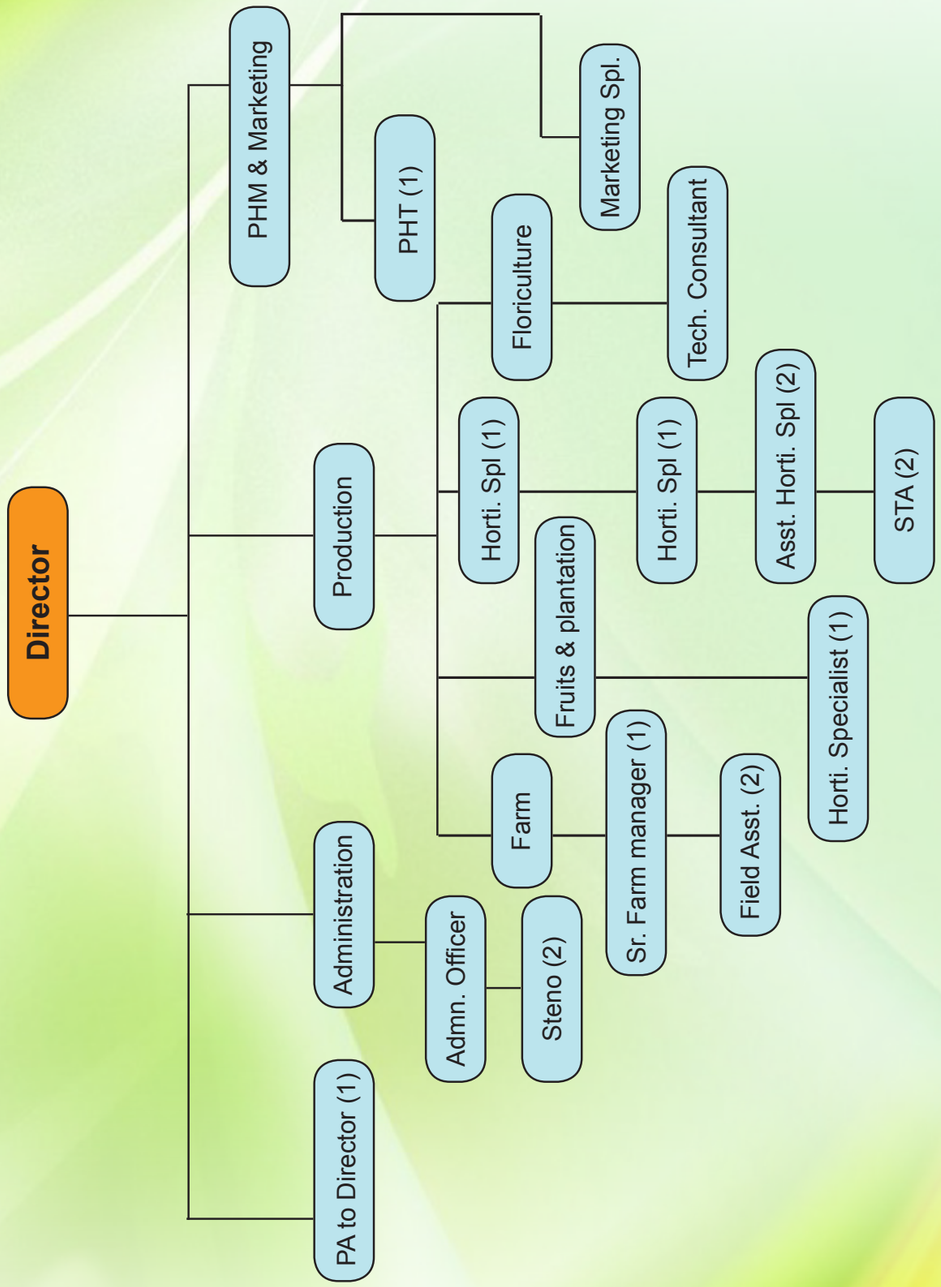
OBJECTIVES & PROGRAMMES OF THE INSTITUTE

- 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

North Eastern states offer ample scope for cultivation of a wide variety of agricultural crops because of its diversities in topography, altitude and climatic conditions. The extent of cultivable land in the NE region varies from state to state. Land is a critical resource in many of the NE states, and availability and management of land for agricultural activities are essential for raising the region's overall agricultural production and productivity. The region's agricultural system is predominantly traditional. The overall geographical land to man ratio for the NE region (0.67 hectare /person) is much higher than the national average (0.32 hectare/person). Population to land ratio is highest in Arunachal Pradesh followed by Mizoram, Sikkim and Manipur.

The per cent utilization of cultivable area in the NE regions (62.04%) less than the national average (73.05%). About 80% of the farmers in the NE region belong to small (less than 1.44ha) and marginal (less than 0.40 ha) category. Moreover, with increase in population, the average size of land holding is gradually reducing over the years. This is primarily because hilly terrain constitutes nearly two third of the regions geographical area, and large sized holding are not feasible. The average size of land holding for the NE States (1.60 ha) is marginally higher than the all India (1.57 ha). Among the NE States the average size of land holding is highest in Nagaland (6.92 ha) and lowest in Tripura (0.97ha). High value crops such as different types of flowers will provide high remuneration from limited resources since the average plot size is very small for mechanization of agriculture and adoption of modern farming practices.

There is immense potential in horticulture sector in the region and at present horticultural crops account for only 18.60% of cultivated area. This share is highest in Sikkim followed by Manipur, Arunachal Pradesh, Meghalaya, Tripura, Mizoram, Assam and Nagaland. There is need to expand area under horticultural crops particularly in Assam, Mizoram and Nagaland where at present it is less than 20% of the cultivated area. In terms of its contribution to the national production, the Region accounts for about 5.1% (fruits) and 4.5% for vegetables.

Table 1: AREA AND PRODUCTION OF HORTICULTURE CROPS CATEGORY WISE 2018-19 (2nd Adv. Est.)																	
Area in '000 ha																	
Production in '000 MT																	
Sl. No.	Sates/ UTs	Fruits		Vegetables		Plantation		Aromatics & Medic-inal		Flowers			Spices		Hon-ey	Total	
		A	P	A	P	A	P	A	P	A	P		A	P	P	A	P
											Loose	Cut					
1	Arunachal Pradesh	48.14	125.84	2.62	17.33	0.07	0.21	0.24	0.16	0.00	0.00	0.00	11.64	71.29	0.10	62.71	214.94
2	Assam	167.20	2518.89	324.13	4060.14	107.56	198.90	4.53	0.17	5.20	34.89	58.34	103.58	309.78	1.25	712.20	7182.37
3	Manipur	47.63	444.74	45.28	340.85	0.90	0.31	0.04	0.12	0.13	0.31	0.18	10.61	23.99	0.30	104.59	810.78
4	Meghalaya	35.75	331.67	49.02	514.72	26.14	30.86	0.00	0.00	0.01	0.00	0.02	18.10	91.30	0.28	129.01	968.84
5	Mizoram	62.91	339.18	34.65	163.74	12.17	9.20	0.77	0.78	0.17	0.00	2.37	27.67	100.93	0.20	138.34	616.40
6	Nagaland	39.50	380.52	46.21	561.61	2.29	10.58	0.08	0.49	0.07	0.00	8.79	9.96	67.26	0.70	98.10	1029.89
7	Sikkim	19.54	55.45	38.80	231.39	0.00	0.00	0.00	0.00	0.24	16.50	0.09	32.54	69.04	0.40	91.12	372.87
8	Tripura	53.92	555.66	46.18	802.49	14.13	29.60	0.00	0.00	0.00	0.00	0.00	6.15	30.22	0.18	120.39	1418.17

Source : DAC & FW, Ministry of Agriculture Cooperation and Farmers welfare, Govt. of India, 2018-19 (2nd *Advance estimate)*

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 20 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, blocks. Availability of good planting material is very important for productivity of horticultural crops and Institute is involved in planting material production also.

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, cashewnut, guava & mango for further multiplication. The numbers of rootstock raised at the Institute during the year 2018-19 are Rangpur lime (27500), volkamariana (20455), cashewnut (9500), guava (17250) and mango (2500).

Table 2. Rootstock raised for the following crops -

Sl. No.	Crop	Rootstock raised	Source
1.	Guava (Local)	17250	Local
2.	Citrus (Rangpur lime)	27500	ICAR-CCRI,Nagpur
3.	Citrus (Volkamariana)	20455	ICAR-CCRI,Nagpur
4.	Mango(Local)	2500	Local
5.	Cashew nut (Local)	9500	Local
	Total	**77205**	

Fig 1. Mango rootstock seedling

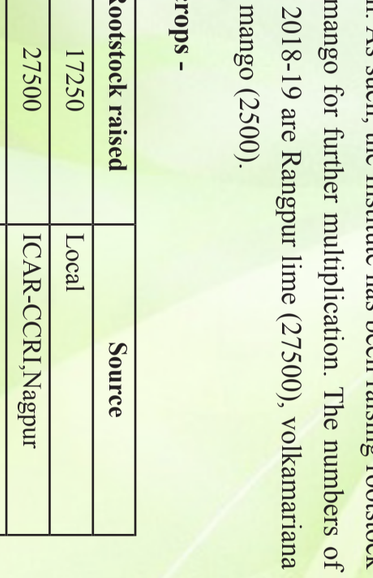


Fig 2. Guava rootstock seedling

Fig 3. Cashewnut rootstock seedling

Fig 4. Citrus rootstock seedling

3.1.3. Propagation

The availability of quality planting material is one of the major constraints in improving the production and productivity of horticulture crops. 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, mango and guava. During the period under report, the Institute has propagated 1125 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, Sweta and Lalit, 9125 nos of plants were propagated by wedge grafting method, 45165 nos of citrus var. Khasi Mandarin, Mosambi and Acid lime following T-Budding and nuceller method. The propagation method in mango is wedge grafting methods, 425 nos. mango var. Amrapali, Langra & Mallika were propagated. 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 2100 nos of scion stick of Cashewnut (V-4, VRI-3, H-1608, H-2/16, and BBSR-1), 13000 nos of scion stick of Guava (L-49, Allahabad Safeda, Sweta and Lalit), 6700 nos of bud stick of citrus (Khasi Mandarin, and Mosambi) , 1500 nos. of scion sticks of Mango (Amrapalli, Langra & Mallika).

Table 3. Crops propagated by the Institute:

Sl. No.	Crop	Propagation method	Propagated Plants
1.	Guava (Lucknow-49, Allahabad Safeda, Lalit & Shweta)	Wedge grafting	9125
2.	Citrus (Khasi Mandarin, Mosambi & Acid lime)	T- Budding, nuceller seedling	45165
3.	Mango (Mallika, Langra, Dasehari & Amrapali)	Wedge grafting	425
4.	Cashewnut (VRI-3, V-4, BBSR-1, H-2/16, H-1608)	Soft wood grafting	1125
		Total	**55940**

Scientific method of propagation is followed in the production of quality planting materials. The rootstocks were selected as per the crop and raised in the plastic pro-tray under protected condition in the nursery unit. Cashew nut cvs V-4, VRI-3, H-1608, H-2/16 and BBSR-1 is propagated 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 propagated plants are monitored regularly following scientific cultural practices as and when required for better growth and also to check the infestation of insect & pest and diseases in nursery unit. The plants are kept for hardening in shade net before distribution /sale 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	82 %
2.	Citrus (Khasi Mandarin, Mosambi & Acid lime)	T- Budding, nucellar seedling	78%
3.	Mango (Mallika, Langra, Dasehari & Amrapali)	Wedge grafting	81%
4.	Cashew (VRI-3, V-4, BBSR-1, H-2/16, H-1608)	Soft wood grafting	77 %

Fig 5. Grafted Guava

Fig 6. Grafted Cashewnut

Fig 7. Citrus budded

Fig 8. Mango Grafted

3.2. TECHNOLOGY DEMONSTRATIONS UNDER OPEN FIELD

3.2.1. Spices

3.2.1.1. Ginger

Ginger is an important cash crop in Northeast region. About 3 lakhs tonnes of ginger are being produced annually from 47,641 ha land and the Northeast region is emerging as India's organic ginger hub. During the reported year, a demonstration was conducted to study the response of organic manures such as FYM + bio fertilizer on the growth, yield and quality of ginger (cv. Nadia). The rhizomes (20 g) were planted in the last week of March with a spacing of 20 cm x 25 cm in 3.6 x 3.0 m plots in an area of 200 sq m.

Fig 9. Organic Ginger cultivation

The observations on growth and yield were recorded randomly from five plants of each plot. The crop was harvested at 8 months after planting when the leaves turned yellow and start drying up. From the data recorded, it was observed that application of FYM + bio fertilizer recorded the maximum plant height (70.20 cm), Number of tillers /clump (7.67), Number of Leaves/plant (22.67), Finger Length (8.86 cm), Rhizome yield (50 kg) and Oleoresin (5.33%). The result indicates that application of FYM + bio fertilizer was found more beneficial and significantly improved growth parameters, yield and yield components over control which recorded plant height (64.07 cm), Number of tillers /clump (6.70), Number of Leaves/plant (16.52), Finger Length (5.90 cm) and Oleoresin (5.03%).

3.2.1.2. Turmeric

Turmeric is third largest spice crop produced in country and contributed 20.34% of total spice produced in India. The climatic condition of the North eastern region is quite conducive for commercial cultivation of turmeric. But inspite of the favourable agro-climatic conditions, production level is low due to lack of proper package of practices. During the reported period, demonstration on cultivation of turmeric variety Megha Turmeric-1 and Lakadong was undertaken in an area of 0.5 ha with the objective to study the response of FYM + biofertilizers on the growth and yield of turmeric. It was planted at a distance 30 x 25 cm during the month of April, 2018 in an area of 800 sq m by following recommended package of practices.

Fig 10. Organic turmeric cultivation

Parameters on growth and yield data was collected and the result revealed that the Plant height (144.8 cm) and No. of leaves (7.6) was recorded maximum in Lakadong, whereas, the maximum wt. of rhizome/plant (0.48 kg), Yield (260 kg) and Cucurmin content (4.57%) was recorded in Megha Turmeric -1. The result indicates that the yield of turmeric could be increased with the help of proper package of practices coupled with the proper management of disease. The suitable technology for enhancing the productivity of turmeric crop, and need to conduct such demonstrations may lead to the improvement and empowerment of farmers.

3.2.1.3. Tree spices

During 2018-19, an area of 400 sq m was clear felled and planting of Cinnamon cv. Navasree, Curry leaf cv. DWD-1, Allspice cv. Japanese allspice, Nutmeg cv. Viswashree and Bay leaf cv. Local was taken up. The main objective of plantation is to serve as demonstrations, to study the suitability of the different cultivars under Nagaland condition and also to provide planting material and popularize the improved production technology in the NER States.

Fig 11. Tree spices plantation

3.2.2. Vegetables

3.2.2.1. Okra

Okra being short duration and high yielding, growers get more profit per unit area. Mulches are used to cover the surface of the soil nearby crop plants to develop eco-friendly and favourable conditions for crop growth and development. The factors like mulching and organic manures play an important role for increasing growth, fruit yield and quality of okra. Therefore, a demonstration was undertaken to study the effect of plastic mulches and FYM on growth, fruit yield and quality of okra var. Arka Anamika. The demonstration was carried out in an area of 200 sq m with treatments viz., FYM + plastic mulch, Vermicompost + plastic mulch and control.

Fig 12. Field demonstration in okra

The data recorded indicates that the maximum plant height (92.00 cm), Number of fruits per plant (9.7), fresh weight of fruit (21 g) and yield per plant (0.290 kg) was obtained in treatment FYM + plastic mulch. The better growth with plastic mulch may be attributed to reduce weed population resulting in less competition of weeds with plants making more availability of nutrients to the plant for growth. Hence, it is found that application of FYM + plastic mulch was found feasible and suitable on growth and yield of okra cv. Arka Anamika under foot hill condition of Nagaland.

3.2.2.2. Tomato

During 2018-19, a field demonstration has been carried out to study the varietal performance of tomato cv**.** Arka Rakshak F1 and Arka Samrat with treatment viz., FYM + plastic mulch, Vermicompost + plastic mulch and Control under open field agro-climatic condition. Observations were recorded on growth and yield characters. From the data recorded, it was observed that cv**.** Arka Rakshak F1 with treatment FYM + plastic mulch resulted in higher Number of branches (8.15), Number of fruits per plant (34.20), Fruit yield (72 kg)/100 sq m and maximum plant height (57.15cm). Higher T.S.S (3.75ºBrix) was observed in cv. Arka Samrat with treatment Vermicompost + plastic mulch whereas, maximum content of Vitamin C (30 mg/100g) was found in cv**.** Arka Rakshak F1 with FYM + plastic mulch treatment. Hence, it is suggested that application of organic manure with plastic mulch is a better source of nutrient input for obtaining higher yield as well as in sustaining soil fertility under the foothill agro-climate conditions.

Fig 13. Field demonstration in tomato

3.2.2.3. Cowpea

Cowpea (*Vigna unguiculata* L. Walp) is a traditional leguminous crop grown mainly in the tropics and subtropics. The seeds are a major source of plant protein and vitamins for humans. The forage is also an important feed for livestock. Moreover cowpea is a valuable cash crop providing a stable income for local people. To assess the effect of FYM and plastic mulch on growth, yield attributes and yields of cowpea cv. CP-4, a field demonstration was conducted at CIH, Nagaland during 2018 -19 main cropping season at a spacing of 60 cm × 10 cm an area of 200 sq m. The data revealed that treatment FYM + plastic mulch was found to be best in terms of plant height (54.15 cm), number of leaves (56.07), number of branches (27.43), length of pods (34.64 cm), width of pods (0.67 cm), days of germination (3.3), number of pods per plant (35.50), number of seeds per pod (12.10), pod weight (17.63) and pod yield (72 kg).

Fig 14. Field demonstration in cowpea

3.2.2.4. Yardlong bean

Although organic crop production is not a new idea, there is insufficient information regarding the organic cultivation of yard long bean. In this, an attempt is made to evaluate the effects of FYM and vermicompost under plastic mulch on productivity of yard long bean cv. Arka Mangala in an area of 200 sqm. From the data recorded, it was observed that treatment FYM + plastic mulch resulted in higher Plant Height (71.47cm), Pod weight (220.15g), Number of pod (20.86), Single pod weight (10.81g) and Pod length (30.00 cm) followed by treatment Vermicompost + plastic mulch. Hence, it is found that application of FYM + plastic mulch was found suitable on growth and yield of yard long bean cv. Arka Mangala under foot hill condition of Nagaland.

Fig 15. Field demonstration in yardlong bean

3.2.2.5. Amaranth

A field demonstration was conducted during the reported year to assess the performance of yield and yield attributes of amaranthus (Var. Arka Arnima and Arka Suguna) in an area of 100 sq m under low cost polyhouse. The treatment includes FYM, vermicompost and control. Sowing was done with amaranthus seeds by following a seed rate of 2.5 Kg ha^{-1}. Forty days after sowing, the crop was harvested and the yield of leaves was recorded. From the data recorded, it was observed that the leaf yield of amaranthus increased spectacularly due to the application of FYM in var. Arka Arnima with Leaf wt (51.89 g /plant), Stem wt (22.96 g/ plant), Yield (20 kg) closely followed by var. Arka Suguna. This study shows that Amaranth var. Arka Arnima responded to the well application of FYM.

Fig 16. demonstration of amaranth under low cost polyhouse

3.2.2.6. Tuber crops

Imperata cylindrica (L.) commonly known as thatch grass/ speargrass / cogongrass is a noxious perennial grass which is a strong competitor with crops. Crop yield losses vary as a function of crop type, cultural practices and environmental conditions. Therefore, a demonstration was carried out in an area of 400 sq m to assess the growth of tuber crops such as colocasia, sweet potato and elephant foot yam in CIH farm in controlling the growth and reclaimed from the menace of thatch grass. It was observed that the

Fig 17. demonstration of cassava for controlling thatch grass

density of thatch grass continued to be smaller on plots which were ploughed or hoed and planted to tuber crops such that at the time of planting the crops, there were no thatch grasses on these plots. However, it also leads to poor growth of the tuber crops and severe crop losses. Hence, there is the need to develop effective and sustainable methods for managing the deleterious effect of thatch grass. The average yield was recorded 4 kg /plant.

3.2.2.7. Sweet corn

Sweet corn (*Zea mays* L. Saccharata) grown successfully for vegetable purpose is a new economic product of maize having higher sugar content in green cobs (14 -20 %), more delicious and it has thinner pericarp (seed coat) than normal corn, making it tender for diversification and value addition of maize as well as the growth of the food processing industry. In India, its cultivation is popular in Haryana, Maharashtra, Meghalaya, Karnataka, and Andhra Pradesh. It has potentiality not only in domestic market but also in an international market. The lack of knowledge about the use and economic importance of sweet corn and unavailability of appropriate production technologies are the major constrains for its popularization among Indian maize growers.

Fig 18. demonstration of sweet corn

To enhance the production and income per unit area, it is very essential to grow high value short duration crops like sweet corn which not only increase awareness about this crop but also meet requirement of demand. Therefore, a field demonstration was conducted at CIH, Nagaland during 2018-19 in an area of 700 sq m with the objective to demonstrate the improved technologies in sweet corn. The improved technologies consisting use of improved variety (KSP- 1190 Bhavika), integrated nutrient and weed management. From the demonstration, it was observed that the sweet corn variety KSP- 1190 Bhavika recorded green cob yield of 70 kg. The results of demonstration showed that farmers could increase the sweet corn productivity notably by switching over to improved variety and adoption of improved production technology.

3.2.2.8. Broccoli

With an objective to study the response of different organic manures on growth and yield of broccoli (*Brassica oleracea* var. Italica) variety Green Magic and Centauro, a field demonstration was conducted at Central Institute of Horticulture, Nagaland during the crop growing season in an area of 500 sqm. The treatments include FYM, Vermicompost and control and were incorporated at the time of planting. Among the two varieties, Green Magic performed better with FYM treatment followed by vermicompost in plant characters viz., plant height (51.40 cm), stalk length (18 cm), Curd length (11.42 cm), Curd diameter (12.75 cm), Curd weight (430 g), Yield (320.06 kg). Hence, the results revealed that among the two varieties and different organic manure treatments, broccoli variety Green Magic responded well to the application of FYM.

Fig 19. Field demonstration in broccoli

3.2.2.9. Cabbage

A field demonstration was conducted at CIH, Nagaland during 2018-19 in an area of 400 sqm to study the response of different organic manures on growth and yield of cabbage and also study the performance of varieties Rare Ball and Green Express. There were three treatments involving different organic manures viz. FYM, Vermicompost and control and data on the growth and yield attributing characters were recorded. The recorded data indicated that FYM treatment and variety Green Express gave the maximum plant height (43.70 cm), Stalk girth (2.2 cm) and Yield (51.10 kg). However, stalk girth (3.60 cm), Diameter of head (15.13 cm), Fresh wt of head/plant (1.33g) was found higher in FYM + Vermicompost. This significant influence on growth characters might have been due to the enhancement of uptake of nutrients favoured by the addition of organic manures. The increase in yield could be attributed to previous residual effect of earlier crop residue or due to higher fertility of FYM treatment plot as compare to FYM + Vermicompost treatment plot.

Fig 20. Field demonstration in broccoli

3.2.3. Fruits

3.2.3.1. Dragon fruit:

The Dragon fruit (*Hylocereus undatus*) belongs to the family Cactaceae. It is very strange looking fruit. During the reporting period, the Institute has planted Dragon fruit (cv Vietnam Red & White) 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 apart along road side in a pit size of 60 x 60 x 60 cm. For plant proper development and growth, the support of concrete columns are provided. All the intercultural operation was followed. The main objective to develop the Dragon fruit block is to popularize the improved production technology in the NER States.

3.2.3.2. Custard apple:

Custard apple *(Annona squamosa L.)* also known as Sitaphal in India, is a delicious dry land fruit. The main use of custard apple fruits generally makes ice cream and custard powder. The fruit provides high nutritional value. It is very rich in Vitamin- C. During the reporting period, the Institute has planted Custard apple (cv Arka Sahan & Balanagar) in an area of 0.2 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 Custard apple block is to popularize the improved production technology in the NER States and to provide the planting material.

3.2.3.3. Sapota:

Sapota *(Manilkhara zapota L.)* belongs to the family Sapotaceae. Sapota fruits are good source of sugar (12 to 14 %). Sapota when fully ripe is delicious and is eaten as dessert fruit. During the reporting period, the Institute has planted Sapota (cv Cricket Ball) in an area of 0.06 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 Sapota block is to popularize the improved production technology in the NER States.

3.2.3.4. Ber:

Ber (*Ziziphus mauritiana*) belongs to the family Rhamnaceae. The ripened ber fruit are rich in nutritive value. During the reporting period, the Institute has planted Ber (cv Apple) in an area of 0.12 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 Ber block is to popularize the improved production technology in the NER States.

3.2.3.5. Avocado:

Avocado *(Persea Americana)* belongs to the family Lauraceae. The fruits are rich in fat, proteins and minerals and can be recommended as a high energy food for diabetics. During the reporting period, the Institute has planted Avocado (cv Pinkerton) in an area of 0.12 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 Avocado block is to popularize the improved production technology in the NER States.

Fig 21. Dragon fruit cv. Vietnam Red

Fig 22. Sapota cv. Cricket Ball

Fig 23. Custard Apple cv. Arka Sahan

Fig 24. Avocado cv. Pinkerton

The Institute has been conducting several trials on focus horticultural crops of North East to evaluate the varietal performance of fruit crops suitable for the region.

❖ **Litchi**

The Institute has established litchi block of varieties China & Shahi in an area of 0.5ha. 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 23.5 kg /plant.

Fig 25. Litchi block

❖ **Crop: Mango**

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 31.25 kg /plant.

Fig 26. Mango block

Crop: Peach

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 14.5 kg/plant.

Fig 27. Peach block

❖ **Crop: Strawberry**

CIH, Nagaland has established a demonstration plot for strawberry varieties Camrosa in an area of 500 sqm 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 165 kg in 500 sq.m area.

Fig 28. Strawberry block

3.2.3. Flowers

3.2.3.1. Gladiolus

On account of availability of huge market for cut flowers due to rise in socio-economic status, change in life style of people and want for novelty, every year large number of varieties are being added to the public domain. Therefore, it is necessary to study the performance of existing cultivars for their desirable characters, Moreover exotic varieties are known for their better quality of spike and multiplication. During the reported period, a demonstration was carried out to study the varietal performance of different gladiolus cultivars Pink Friendship, White Prosperity, Euro Vision and Nova Lux in open field in an area of 500 sq m at CIH Farm, Medziphema during the year 2018-19**.** The demonstration was conducted with uniform cultural practices to ensure optimum good quality flowers as well as response of vegetative growth. Corms of 4.5 cm diameter were planted at 5-7 cm depth at a spacing of 20 x 30 cm.

Fig 29. Gladiolus cultivation under open field

The data were recorded on three randomly selected plants from each verities in each replication on 11character, and data indicates that the maximum growth characters i.e, Plant height (70.69 cm), Number of leaves per plant (7.80), leaf length (43.46 cm), leaf width (3.45 cm) was found in cv. Pink Friendship followed by White Prosperity. In case of flowering and yield attributing characters highest Spike length (65.41 cm), Number of floret per spike (9.61), Flower diameter (6.68 cm), Flower length (5.55 cm), Diameter of corm (4.30 cm), Number of cormels (10.37) was obtained in cv. Pink Friendship followed by White Prosperity and Nova Lux. The performance of cv. Pink Friendship, White Prosperity and Nova Lux indicated strong adaptability and good association with foot hill agro climatic condition of Nagaland.

3.2.4. Vermicompost unit

Fig 30. Vermicompost unit at CIH

Vermicompost is stable, fine granular organic manure, which enriches soil quality by improving its physicochemical and biological properties. It is highly useful in raising seedlings and for crop production. Vermicompost is becoming popular as a major component of organic farming system. There are four vermicomposting units in the institute for demonstration and for the production of organic inputs with a dimension of 6 m x1.2 m x 0.9 m. Decomposable organic wastes such as farm residues and litter are commonly used as composting materials. In general, animal dung mostly cow dung and dried chopped crop residues are the key raw materials. Mixture of leguminous and non-leguminous crop residues are also used which enriches the quality of vermicompost. About 800 earthworms are introduced per bed where red earthworm spp. is used because of its high multiplication rate and thereby converts the organic matter into vermicompost within 45-50 days. The annual yield is around 957 kg from four harvests.

Oyster mushroom cultivation

Fig 31. 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 investments. A demonstration was carried out in small unit area of 18 x 12 ft room at the Institute during the reported year. Some basic parameters were collected where it was found that the weight of sterilized straw+ spawn was recorded 2.5 kg, time taken for incubation (20-25 days), temperature recorded (22-27°C), time taken for first harvest (25-30 days), Cropping cycle (45-60 days) and Total yield/ bag (500g-1000 g).

3.3. TECHNOLOGY DEMONSTRATIONS UNDER PROTECTED CULTIVATION

3.3.1. Tomato

Fig 32. Tomato cultivation under polyhouse

Tomato in large quantities is used to produce soup, juice ketchup, puree, paste and powder; it supplies vitamin C and adds variety of colours and flavours to the food. Green tomatoes are also used for pickles and preserves. Most of the farmers in the region grow vegetables traditionally with little technological inputs. Therefore, new technologies have to be adopted to increase the production and productivity.

During 2018-19, the Institute has undertaken cultivation of tomato variety Himsona under poly house in an area of 300 sq m with the objectives to produce high quality vegetables production systems for domestic market and to achieve potential productivity per unit area. The seedlings were transplanted after 5 weeks of sowing at a spacing of 45 x 45 cm. Manures and basal doses fertilizers were incorporated at the time of transplanting and observations on plant growth and physico-chemical parameters were also recorded. The result indicates that the variety Himsona is suitable for growing under protected cultivation as it showed significant impact on growth, yield and other attributes. The yield was recorded 700 kg/100 sq m in three pickings.

3.3.2. Gerbera

Fig 33. Gerbera cultivation under polyhouse

Gerbera (*Gerbera jamesonii*) commonly known as Transwal Daisy or African Daisy is an important flower grown throughout the world under wide range of climatic conditions. The existing demonstration of Gerbera under polyhouse started from the year 2016-17 and is still continuing. The performance of the trial revealed that cv. Lieke significantly recorded maximum plant height (75.30 cm), number of leaves per plant (10.00), leaf length (32.40 cm), leaf breadth (8.78 cm), plant spread (54.10 cm), number of suckers per plant (20.04), flower size (11.20 cm), flower weight (16.71 g), number of flowers per plant (53.17), stalk length (49.51 cm) and diameter of flowers (10.54) followed by Daikan and Ice queen respectively. The other promising cultivars suitable for Nagaland condition are Daphane, Shaina and Jaffana which also exhibited acceptable morphological and flowering quality characteristics.

3.3.3. Anthurium

Anthurium (*Anthurium andreanum)* is slow growing perennial flowering plants that require shady, humid condition as found in tropical and sub tropical climate. Anthuriums are very popular with flower arrangers because of the bold effect and lasting qualities of flowers when cut. These contribute to the elegance and attractiveness which are the prerequisites for a quality design. A field demonstration on anthurium was undertaken from the year 2016-17 with an objective to study the performance of Anthurium cultivars Tropical, Xavia, Momento and Pistachi under protected condition at CIH Farm, Medziphema. The observations recorded showed that the No. of leaves (11.00), Flower's stalk length (52.63 cm), Flower's stalk diameters (0.65 cm), Leaf length (33.76 cm), Leaf breadth (19.46 cm), Spadix length (10.80 cm), Spadix diameters (1.03 cm), No. of sucker/ plant (2.66) and Vase life (21.33 days) was found highest in variety Xavia. Whereas, maximum Spathe length (17.16cm), Spathe breadth (11.03 cm) is recorded in variety Tropical. Therefore, it may be concluded that variety Xavia is suitable for cultivation under Nagaland condition followed by Tropical and Pistachi.

Fig 34. Anthurium cultivation under polyhouse

3.3.4. Orchid

Dendrobium orchids are popular flowering potted plants and cut flowers throughout the world due to their diversity in flower size, shape and colour, round the year availability and long keeping qualities. There are large numbers of areas in NEH region where many commercially important indigenous and exotic orchid species may be grown besides commercial hybrids of *Phalaenopsis* and *Dendrobium.*

Fig 35. Orchid cultivation under polyhouse

Demonstration on evaluation two varieties of *Dendrobium* was carried out to study the growth habit, flowering behaviour and yield under Nagaland condition. The study revealed that variety Sonia recorded maximum plant height (55.42 cm), length of internodes (4.07 cm) and number of pseudo bulbs per plant (8.71), where as White Singapore more number of leaves (16.3) and maximum pseudo bulb girth (6.23 cm). Maximum leaf length (16.5 cm) was recorded in White Singapore where as leaf breadth was maximum (5.1 cm) in the variety Sonia. The number of spikes per plant per year (8.67) was recorded maximum in the variety Sonia. Therefore, from the study, it may be concluded that variety Sonia is suitable for growing under foot hill condition of Nagaland and North East Region.

3.3.4. Carnation

Carnation (*Dianthus caryophyllus* L.) is one among the most popular commercial cut flowers of the world, ranking second in commercial importance next only to rose. Carnation is the national flower of Spain. In India, Sim carnations are reported to have been introduced first by the Maharaja of Patiala at his farm at Dochi. However, its cultivation could not be perpetuated in India due to lack of interest and technology for its growing. Later on, growing of Sim carnation was taken up in Ludhiana and Nasik and it spread to other places.

Fig 36. Carnation cultivation under polyhouse

An experimental demonstration was carried out during 2018-19 to study the performance growth and flower production of different varieties of Carnation under semi protected condition at Central Institute of Horticulture, Medziphema Nagaland. The study was designed with three replication by following standard cultivation practices to observe various growth and yield parameters of cv. Red glow, Dona, White Dona, Vincidore, Purple tango, Soto, Malaga, Giole, Hanabi and Seycheles**.** A total of 17,550 flowers were harvested during the month from May-August, 2019.

3.3.5. Capsicum

A field demonstration was conducted at Central Institute of Horticulture, Medziphema during 2018-19 to study the varietal evaluation on the growth, yield and quality of Capsicum cv. Bachata RZ and Inspiration RZ under poly-house condition. All cultural practices such as application of manures, irrigation and weeding etc. were done uniformly for each treatment. The results revealed that application of different organic manures significantly influence the growth, yield and quality parameters of capsicum as compared to control.

Fig 37. Capsicum cultivation under polyhouse

The maximum plant height (91.65 cm), Number of branches plant^{-1} (6), Number of leaves plant^{-1} (75), fruit length (6.50 cm), fruit diameter (5.50 cm), Number of fruits plant^{-1}(11.20) and yield ha^{-1} (62.53 t) were recorded in the treatment FYM followed by Vermicompost. The highest value for TSS (8.36 ^{0} Brix) and vitamin –C (115.40 mg 100g^{-1}) was recorded in the treatment vermin-compost. The result suggested that organic manures have significant influence on its growth, yield characters and quality characters as compared to control. Hence, it may be concluded that the both the varieties are suitable for growing under protected cultivation as it showed significant impact on growth, yield and other attributes.

3.3.6. Parthenocarpic Cucumber

The tendency to produce parthenocarpic fruit in response to controlled variations in photo-period, temperature and nutrient uptake differed according to variety, must be healthy and vigorous. It is usually cultivated in controlled condition since it has the ability to bear more number of fruits per plant but needs high management.

A demonstration was undertaken during 2018 -19 at CIH under naturally ventilated greenhouse of 500 m^2 area. The main objective of the demonstration was to study the performance and adaptability of cucumber variety Kian under foot hill condition of Nagaland and also to ensure uniformity performance evaluation in control condition. Good Agricultural Practices (GAP) along with all the production and protection technologies from IARI, New Delhi was followed. The yield was recorded 10 kg/plant.

Fig 38. Cucumber cultivation under polyhouse

3.4. DEMONSTRATIONS AT FARMERS' FIELD

Various demonstration plots of focus fruit crops were established in farmer's field to demonstrate the recent improved technology and create awareness so as to acquaint them of the horticultural technologies. The Institute has supplied all inputs and technical guidance for establishing the demonstration plots. The activities carried out for off farm demonstration during the year 2018-19 are mentioned below.

Table 5: Demonstration on improved production technology in farmers' field

Sl	Components	Target	Achievements
1	Demonstration on plantation of mango var. Amrapali & Dashehari in Manipur	1 ha	1 ha area covered in Ukhrul district of Manipur, in collaboration with ICAR-KVK, Ukhrul, Manipur
2	Rejuvenation of declining citrus orchard var Khasi mandarin in Nagaland	1ha	1 ha area covered in Tuensang district of Nagaland in collaboration with ICAR-KVK, Tuensang, Nagaland
3	INM/IPM demonstration on citrus at Tuensang, Nagaland	5 ha	5 ha area covered in Tuensang district of Nagaland in collaboration with ICAR, KVK, Tuensang, Nagaland
4	Demonstration on plantation of kiwi in Nagaland	1 ha	1 ha area covered in Phek district of Nagaland, in collaboration with Horticulture Research Farm, Dept. of Horticulture, Govt. of Nagaland

Fig 39. Demonstration of mango var. Amrapali & Dashehari in Manipur

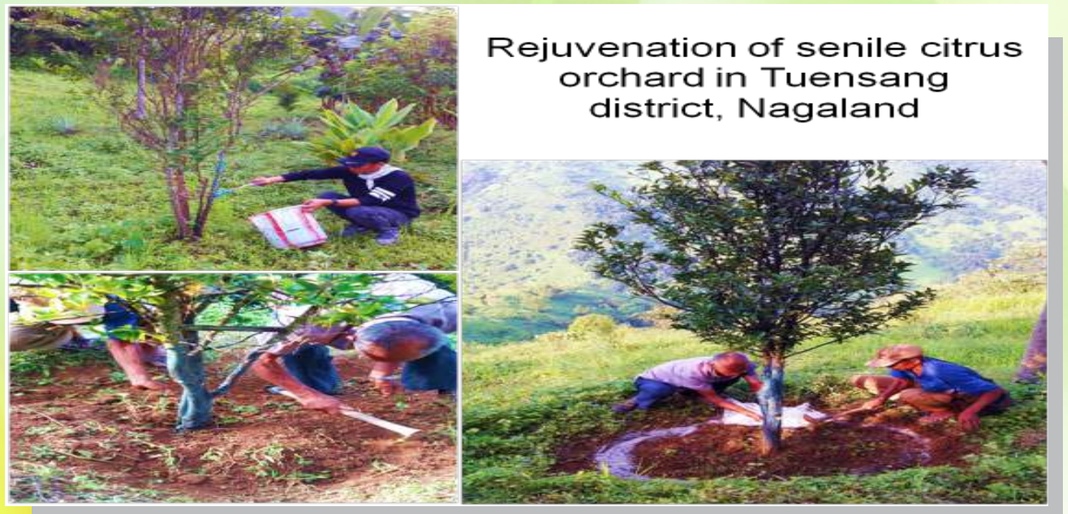


Fig 40. Demonstration on Rejuvenation of declining citrus orchard in Nagaland

Fig 41. INM/IPM demonstration on citrus at Tuensang, Nagaland

Fig 42. Demonstration on plantation of kiwi at Phek, Nagaland

3.5. HUMAN RESOURCE DEVELOPMENT

3.5.1. Farmers training

During the year 2018-19, the Institute conducted 31 nos of farmers training with a total of 1355 participants in various parts of northeast states, the trainings were conducted on-campus or off campus as per the need of the farming community. The off campus trainings were conducted in collaboration with ICAR, KVKs and state departments, where, technical staffs and nominated resource persons train the farmers.

Table 6: List of farmers training conducted

Sl.no	Topic	Date	Venue	Participants	Organized/ sponsored
1	Kiwi cultivation under Nagaland condition problem & constraints	19.05.18	HRF, Pfutsero Nagaland	56	In collaboration with HRF, Pfutsero
2	Supply and marketing of Kiwi fruit	20.05.18	HRF, Pfutsero Nagaland	56	In collaboration with HRF, Pfutsero
3	Value addition of horticultural crops on Livelihood	22.05.18	CIH, Medziphema Nagaland	54	Organized
4	Awareness programme on Nursery Accreditation & certification of horticultural Crops	5.06.18	Guwahati Assam	32	Organized
5	Food processing and value addition of Horticulture crops	6.06.18	CIH, Medziphema Nagaland	50	Organized
6	Farmers awareness programme of government schemes	7.06.18	CIH, Medziphema Nagaland	54	Organized
7	Value addition of fruits and vegetables	19.06.18	CIH, Medziphema Nagaland	52	Organized
8	Focus horticultural crops	27.06.18	Hopongkyu Memorial Hall, Kipheri, Nagaland	67	In collaboration with State Horti. Dept.
9	Focus horticultural crops	28.06.18	Hopongkyu Memorial Hall, Kipheri, Nagaland	50	In collaboration with State Horti. Dept.
10	Nursery Management and propagation techniques of focus fruit crops	3.07.18	ICAR RC Tripura centre	50	In collaboration with ICAR RC Tripura centre

11	Nursery Management and propagation techniques of focus fruit crops	4.07.18	ICAR RC Tripura centre	50	In collaboration with ICAR RC Tripura centre
12	Nursery Management and propagation techniques of focus fruit crops	5.07.18	ICAR RC Tripura centre	50	In collaboration with ICAR RC Tripura centre
13	Horticultural Crop management and Improved nursery techniques	23.08.18	AAU, KVK, Jorhat, Assam	47	In collaboration with AAU, KVK, Jorhat
14	Horticultural Crop management and Improved nursery techniques	24.08.18	AAU, KVK, Jorhat, Assam	47	In collaboration with AAU, KVK, Jorhat
15	Horticultural Crop management and Improved nursery techniques	25.08.18	AAU, KVK, Jorhat, Assam	47	In collaboration with AAU, KVK, Jorhat
16	Post Harvest Management and value addition of horticultural crops	14.09.18	CIH, Medziphema Nagaland	72	CIH Nagaland
17	Post Harvest Management and value addition of horticultural crops	15.09.18	CIH, Medziphema Nagaland	50	CIH Nagaland
18	Protected cultivation and organic input production & Utilization	25.09.18	KVK Ri Bhoi Meghalaya	50	In collaboration with ICAR KVK, Meghalaya
19	Integrated farming, PHM and formation of FPO & SHG	26.09.17	KVK Ri Bhoi Meghalaya	50	In collaboration with ICAR KVK, Meghalaya
20	Bee keeping and Mushroom production	27.09.18	KVK Ri Bhoi Meghalaya	50	In collaboration with ICAR KVK, Meghalaya
21	Integrated Pest and Disease Management in Horticultural crops for doubling farmers income	31.10.18	KVK, East Siang Arunachal Pradesh	55	In collaboration with CAU, KVK, Pasighat
22	Integrated Pest and Disease Management in Horticultural crops for doubling farmers income	01.11.18	KVK, East Siang, Arunachal Pradesh	55	In collaboration with CAU, KVK, Pasighat
23	Integrated Pest and Disease Management in Horticultural crops for doubling farmers income	02.11.18	KVK, East Siang, Arunachal Pradesh	55	In collaboration with CAU, KVK, Pasighat
24	Framers awareness programme on Govt. Schemes for horticulture development and formation o FPOs	14.11.18	SAMETI, Tadong, Sikkim	48	In collaboration with SAMETI, Sikkim
25	Framers awareness programme on Govt. Schemes for horticulture development and formation o FPOs	15.11.18	SAMETI, Tadong, Sikkim	48	In collaboration with SAMETI, Sikkim
26	Value addition of horticultural Crop for livelihood improvement	07.01.19	KVK, Longleng	60	In collaboration with ICAR KVK, Longleng
27	Value addition of horticultural Crop for livelihood improvement	08.01.19	KVK, Longleng	60	In collaboration with ICAR KVK, Longleng
28	Mushroom Production technology	29.01.19	CIH, Medziphema	56	CIH Nagaland
29	Post harvest processing of fruits and vegetables	30.01.19	CIH, Medziphema	56	CIH Nagaland
30	Post harvest Value Addition of Horticulture crops	18.02.19	CIH, Medziphema	25	CIH Nagaland
31	Post harvest Value Addition of Horticulture crops	19.02.18	CIH, Medziphema	25	CIH Nagaland
	Total Farmers training conducted			**1355**	

Fig 43. Farmers Training held in collaboration with AAU-KVK, Jorhat, Assam

Fig 44. Farmers Training held in collaboration with ICAR-KVK, Ri Bhoi, Meghalaya

Fig 45. Farmers Training held in collaboration with CAU-KVK, Pasighat, Arunachal Pradesh

Fig 46. Farmers Training held in collaboration with ICAR Tripura Centre, Lembucherra

Fig 47. Farmers Training held in collaboration with ICAR-KVK, Tuensang, Nagaland

Fig 48. Farmers Training held in collaboration with DHO, Kiphire, Govt of Nagaland

3.5.2. Trainers training

3.5.2.1. Trainers training for Department of Horticulture, Nagaland.

Three days trainers' training on the topic "Production of quality planting materials and accreditation of nursery of focus fruit crops" was organized at CIH, Medziphema for Horticulture officers of Nagaland from 9th to 11th October 2018. The objective of the training was to give individual attention to the trainees for imparting theoretical and practical knowledge on the subject, who will in turn be the master trainers for the farmers of the state. A total of 18 officers attended the training programme.

Fig 49. Training of officers from Department of Horticulture, Nagaland

3.5.2.2. Trainers training for officials from Department of Horticulture & Farm Forestry, Bhopal, Madhya Pradesh.

The Institute also imparted training of 5 officers from Department of Horticulture and Farm Forestry, Bhopal, Madhya Pradesh on Biodiversity and Conservation of Horticulture Crops in NEH Region.

Fig 50. Training of Officials from Department of Horticulture and Farm Forestry, Bhopal, MP

3.5.3. Exposure visit

CIH conducts exposure trips cum trainings for the officials, farmers and SHGs of North East Region at regular intervals to various reputed Institutions and Research centres in the country. The main objective is to build and strengthen their capacities and help them to sharpen their skills and ability. During the year 2018-19, the Institute has conducted **2 nos** of exposure trips cum trainings for the farmers of NER in different high tech horticulture programmes.

3.5.3.1. Exposure visit cum training to ICAR-CCRI, Nagpur, Maharashtra

3 days exposure visit cum training programme on "Advances in Nursery Raising, Method of Production Technology and Rejuvenation" at ICAR-CCRI, Nagpur, Maharashtra conducted from 19th to 21st July, 2018 for 21 farmers from Manipur and Nagaland attended the programme.

Fig 51. Exposure visit cum training to ICAR-Central Citrus Research Institute, Nagpur, Maharashtra

3.5.3.2. Exposure visit cum training to IHT, Greater Noida, UP.

CIH conducted 4 days Exposure visit cum training programme on "Modern Horticulture Practices with special reference to protected cultivation and micro irrigation". The training was conducted at the Institute of Horticulture Technology, Greater Noida, UP from 25th to 28th February, 2019. A total of 17 participants from Kiphire and Longleng district attended the programme.

Fig 52. Exposure visit cum training to Institute of Horticulture Technology, Greater Noida, UP

3.5.4. Capacity building

3.5.4.1. Model training course on scientific bee keeping

Two officials from Central Institute of Horticulture attended a model training course on "Scientific bee keeping for alternative livelihood and higher yield of crop plants through efficient pollination" at ICAR-CISH RRS, Malda, West Bengal, which was held from 1st to 8th February 2019.

Fig 53. Participants of MTC course along with resource persons

3.5.4.2. Training on mushroom spawn production technology

The institute also deputed two technical staffs to attend a three days training programme on "Mushroom spawn production technology" organized by ICAR Research Complex Nagaland Centre, Medziphema from 5th to 7th March 2019.

Fig 54. Trainees on Mushroom spawn production technology at ICAR, Nagaland Centre Medziphema

3.6. MARKETING & AGRI-BUSINESS PROMOTION

Marketing & Agri-Business programmes of the Institute are designed to provide a platform to the farmers/ stakeholders to learn, promote and to create avenues for market linkage. The objective is to strengthen the knowledge base and to provide exposure so that the products of the region are highlighted.

Central Institute of Horticulture with the objective to work towards holistic development of horticulture sector in NER took several initiatives to facilitate the farming community in creating awareness on govt. schemes, facilitating in market linkage & promoting the produce of the region through exhibitions. The programmes organized are given below;

3.6.1. Farmers awareness programme on government schemes for horticulture development

During the year 2018-19, three (3) nos. of farmers awareness programmes were conducted. The objective of the programme was to create awareness among the farming community on government schemes meant for horticulture development. The programme has helped the farmers in understanding various schemes of Govt. of India which they can avail. Resource persons from various organizations like NABARD, NHB, Spices Board, State Horticulture Dept., Entrepreneurs delivered lectures on the procedures to avail government schemes. The details of farmers awareness programme conducted are given below;

Table7. List of farmers awareness programme conducted

Sl. No.	Name of program	Date	Venue	No. of participants
1	Farmers awareness programme on Govt. Schemes	7th June 2018	CIH, Nagaland	54 farmers
2	-do-	14th November 2018	SAMETI, Tadong, Sikkim	48 farmers
3	-do-	15th November 2018	SAMETI, Tadong, Sikkim	48 farmers

Fig 55. Farmers awareness programme on Govt. Schemes conducted at CIH, Nagaland and Sikkim

3.6.2. Buyers & Sellers Meet

Central Institute of Horticulture, Nagaland organized an Exhibition cum Buyers Sellers Meet programme on 14th September 2018 at its campus in Medziphema. The programme was organized with the objective to create a platform for the buyers and growers to interact and discuss on possible market linkage. The event has also helped both the parties in understanding the market dynamics and planning production/procurement as per market requirement.

The programme was formally inaugurated by Shri. M K Mero, Principal Secretary (Horticulture), Government of Nagaland who graced the occasion as Chief Guest. Dr. B N S Murthy, Horticulture Commissioner, Dept. of Agriculture, Cooperation & Farmers Welfare graced the programme as Guest of Honor. Brief remark was given by Dr. B C Deka, Director, ATARI-ICAR, Meghalaya while Director CIH, Dr. N K Patle delivered the welcome address during the inaugural programme.

A number of buyers from Mumbai, Delhi, Nagpur & Guwahati interacted with farmers groups from different states of North East. The meet provided a platform for the business houses and growers to have direct face to face discussion and work out avenues for procurement of horticulture crops from the farmers. The meet was facilitated by staffs of CIH, Nagaland. The event had participation of 11 buyers, 227 farmers/entrepreneurs and 34 Officials from different states of North East.

Table 8: List of buyers

Sl.	Name	Organization	Location
1	Dr. Ajay Deore	Gro-Organic	Mumbai
2	Shri. Abhishek	Pure Agroproducts	New Delhi
3	Mrs. Anchal	Pure Agroproducts	New Delhi
4	Shri. N Shuya	Radiant Manufacture	Guwahati
5	Shri. Vinod Lama	Radiant Manufacture	Guwahati
6	Shri. Sujit Sharma	Radiant Manufacture	Guwahati
7	Shri. Sandeep Arora	Global Entrade	Guwahati
8	Mrs. Chandrakanta	Global Entrade	Guwahati
9	Mrs. Preeti	Global Entrade	Guwahati
10	Mr. Mahendra Thakur	Ruchi Biochemicals	Nagpur
11	Mrs. Cherie Singh	Narita Food Products	Dimapur

Table 9: OUTCOME OF BUYERS SELLERS MEET

COMPANY PROFILE	OUTCOME OF DISCUSSION	GROWER DETAILS
Company Name: Global Entrade, Guwahati Contact person: Mr. Sandeep Arora Mob: 7086063555	Interested to associate with the group for procurement of fresh and dry **turmeric**	Mr. Wanbor 9612206067
	Interested to associate with the group for procurement of fresh and dry **large cardamom**	Mr. Kikheto Phuheshe 9436427952 8413941442
	Interested to associate with the group for procurement of fresh and dry **turmeric**	Mr. A Namei 7085841470
	Interested to associate with the group for procurement of fresh **broccoli**	Mr. Jongma Jamir 8787605893
	Interested to associate with the group for procurement of **organic beans & dried cardamom**	Mr. Anaho 8837466998
Company Name: Radiant Manufacture, Guwahati Contact person: Binod Lama Mob: 9435117881	Interested to purchase **kiwi** however cost of product and transportation is high. Will further communicate with farmer	Awolsa Kilemi Village, Nagaland
	Interested to procure fresh **kiwi** on further discussion reg price and quantity	Thephuzu Village, Nagaland
	Interested however quantity **local spice & local rice** is less with the seller. Seller will coordinate with other growers	Mr. Nonspong 8974009244
Company Name: Narita Food Products Contact person: Cherie Mob: 9774020428	Looking forward for procurement of **ginger and local cucumber**	Mr. Subachandra 9612880462
Company Name: Ruchi Biochemicals Contact person: Mahendra Thakur Mob: 9767533399	Interested in **turmeric, ginger, cardamom & rice**	FPO Dimapur 9612643154

The buyers have shown their interest in bulk procurement of products like apple, kiwi, rice, maize, local spices, rosella, local ginger, herbal plants, black pepper etc..

The Buyers & Seller Meet has helped the farmers in understanding the product and market specifications and to plan their production as per the requirements of the consumers. The issues of lack of connectivity and price fixation as per the cost of production have also been discussed during the meet. It has also been observed that many of the farmers groups are unaware of the advanced production technologies and still practice traditional methods of cultivation and post harvest management.

The event has also brought to light many of the challenges faced by the growers and buyers in the hilly terrain of north east where connectivity is a big issue. Farmers groups who have participated from different parts of the region actively interacted with the buyers during the meet.

Fig 56. Lighting of lamp by Chief Guest & dignitaries

Fig 57. Shri. M K Mero, Principal Secretary, Horticulture, Govt. of Nagaland delivering the inaugural address

Fig 58. Dr. B N S Murthy, Horticulture Commissioner, DAC&FW and Guest of Honor of the programme

Fig 59. Dr. B C Deka, Director, ATARI-ICAR giving brief remark during the inaugural programme

Fig 60. Dr. N K Patle, Dy. Commissioner (Hort.), DAC&FW & Director i/c, CIH delivering the welcome address

Fig 59. Dr. B C Deka, Director, ATARI-ICAR giving brief remark during the inaugural programme

Fig 62.Interaction between buyers & sellers

3.6.3. Exhibition cum promotional activity

With the objective to highlight and promote the horticultural produce of the region, exhibition programmes were organized by the Institute for the farmers and groups.

During the year 2018-19, two (2) nos. of exhibition programme was organized at CIH, Nagaland during for the farming community.

3.6.3.1. Exhibition organized on 14th September 2018.

An exhibition programme was organized on 14th September 2018 during Buyers & Sellers Meet where 28 exhibitors comprising of farmers group, state horticulture dept., central govt. departments, universities, research institutes & entrepreneurs from different parts of North East and the country participated and displayed varieties of fresh and processed horticulture crops. The focus was to provide a platform to the farmers to exhibit and showcase their produce through the exhibition programme.

Table 10: List of Exhibitors

SL.	EXHIBITORS	STATE
1	APEX GROWERS ASSOCIATION	SIKKIM
2	RAPA	MANIPUR
3	FARMERS PRODUCERS COMPANY NAMSAI	ARUNACHAL PRADESH
4	MEDZIPHEMA VILLAGE FARMERS UNION	NAGALAND
5	FARMERS' PRODUCERS' ORGANIZATION, DIMAPUR	NAGALAND
6	ORGANIC PINEAPPLE GROWERS SOCIETY, MOLVOM	NAGALAND
7	DREAM DRAGON FRUIT NURSERY	NAGALAND
8	AKIVI MCS	NAGALAND
9	RENLOK SHG	NAGALAND
10	RAKHO KIWI NURSERY	NAGALAND
11	WHISO FOOD PRODUCTS	NAGALAND
12	CENTRAL INSTITUTE OF HORTICULTURE	NAGALAND
13	DBD ENTERPRISE, GUWAHATI	ASSAM
14	DHARAMBIR FOOD PROSESSING TECH. PVT. LTD.	HARYANA
15	BHARTYA FARMERS AGRO BUSINESS DEV. CORP. LTD.	NAGALAND
16	LIJA-U FOOD PRODUCTS, DIMAPUR	NAGALAND
17	UTIVCS, SHILLONG	MEGHALAYA
18	AGROLINE TECHNOLOGIES & INDUSTRIES, GUWAHATI	ASSAM
19	DEPT. OF HORTICULTURE	NAGALAND
20	DEPT. OF HORTICULTURE	MIZORAM
21	DEPT. OF HORTICULTURE	ARUNACHAL PRADESH
22	DEPT. OF HORTICULTURE, SASRD, NU	NAGALAND
23	DEPT. OF HORTICULTURE	MEGHALAYA
24	KRISHI VIGYAN KENDRA, DIMAPUR	NAGALAND
25	NAGALAND BAMBOO DEVELOPMENT AGENCY	NAGALAND
26	NAGALAND BEEKEEPING & HONEY MISSION	NAGALAND
27	PFDC GUWAHATI	ASSAM
28	NERFMTTI, GUWAHATI	ASSAM

Fig 63. Inauguration of Exhibition by Shri. M K Mero, Principal Secretary, Horticulture, Nagaland

Fig 64. Exhibitors interacting with Chief Guest and Guest of Honor

Fig 65. Exhibitors displaying their products during the exhibition

Fig 66. Chief Guest, Guest of Honor and dignitaries visiting exhibition stalls of farmers group

3.6.3.2. Exhibition organized on 29th January 2019.

An exhibition programme was also organized on 29th January 2019 where nine (9) exhibitors from various state govt., central govt., private entrepreneurs & farmers group showcased their products and highlighted upon their schemes & services to the participants. Variety of fresh and processed horticulture products was available for display and sale for the general public and participants of the programme.

Table 11: List of Exhibitors

SL.	EXHIBITORS	STATE
1	DEPARTMENT OF HORTICULTURE, SASRD, NU	NAGALAND
2	DEPARTMENT OF HORTICULTURE, GOVT. OF NAGALAND	NAGALAND
3	KRISHI VIGYAN KENDRA-ICAR, JHARNAPANI	NAGALAND
4	NAGALAND HONEY & BEEKEEPING MISSION	NAGALAND
5	CENTRAL INSTITUTE OF HORTICULTURE, MEDZIPHEMA	NAGALAND
6	KOHIMA DISTRICT FARMERS PRODUCERS ORGANIZATION	NAGALAND
7	M/S. SALT RANGE FOODS (P) LTD.	GUWAHATI
8	EX-TRAINEES, SKILL DEVELOPMENT, MEGHALAYA SFAC	MEGHALAYA
9	EX-TRAINEES, CERTIFICATE COURSE	NAGALAND

Fig 67. Inauguration of Exhibition by Dr. B N S Murthy, Horticulture Commissioner, DAC&FW

Fig 68. Chief Guest & dignitaries visiting stalls

3.6.4. Participation in exhibition/trade fairs/ meets

3.6.4.1. Participation in International Agriculture & Horti Expo-2018

Central Institute of Horticulture, Nagaland participated in the International Agriculture & Horti Expo 2018 held at Pragati Maidan, New Delhi w.e.f. 27-29 July 2018. 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 69. Dr. N K Patle, Director i/c, CIH at International Agriculture & Horti Expo 2018

Fig 70. Shri. M K Mero, Pr. Secy, Horti, Nagaland and Dr. R E Lotha, Director, Horti, Nagaland at CIH stall

Fig 71. A glimpse of CIH stall at InternationalAgriculture & Horti Expo 2018

Fig 72. Farmers interacting with CIH staffs during the exhibition programme

3.6.4.2. Participation in exhibition at ICAR Nagaland

CIH, Nagaland participated in exhibition programme organized by ICAR, Nagaland on 24th November 2018 at ICAR, Jharnapani, Nagaland. The Institute highlighted the various activities being carried out as per the mandates. Publications of the Institute were distributed to the farmers. The technical staffs interacted with the farmers and discussed on the various issues faced by the farmers in production of horticulture crops.

Fig 73. Shri P.B. Archarya, Hon'ble Governor of Nagaland visiting CIH stall

Fig 74. Visitor at CIH Stall

3.6.5. Entrepreneurship Development Programme

Central Institute of Horticulture, Nagaland in technical collaboration with National Institute of Agricultural Marketing, Jaipur organized a 3 days Entrepreneurship Development Programme cum Skill Development Trainees Meet at its campus in Medziphema, Nagaland w.e.f. 29-31 January 2019. The programme was organized with the objective to highlight the prospects of entrepreneurship in horticulture to the educated and unemployed youth.

The programme was formally inaugurated by Dr. B N S Murthy, Horticulture Commissioner, Dept. of Agriculture Cooperation & Farmers Welfare who graced the occasion as Chief Guest. In his address, he mentioned the importance and prospects of entrepreneurship in horticulture. Citing several success stories, he encouraged the participants to take up the challenge of starting their own enterprise. Brief remarks were given by Dr. Venketesh Hubbali, Director, Directorate of Cashew & Cocoa Development, Kochi & Dr. R E Lotha, Director, Dept. of Horticulture, Govt. of Nagaland while Director CIH, Dr. N K Patle delivered the welcome address during the inaugural programme.

The resource persons of the programme were Shri. Taliwati Longchar, Dy. Director, Micro, Small & Medium Enterprise, Govt, of India, Shri. Promod Patil, Manager, NABARD, Mrs. Lucy Thomas Ngullie, Proprietor, Dream Dragon Fruit Nursery, Dimapur, Dr. Ajay Deore, Founder, Gro-Organic, Mumbai, Dr. Mahendra Thakur, Director, Ruchi Biochemicals, Mumbai and Dr. Ramesh Mittal, Director, NIAM, Jaipur

Altogether 54 participants attended the 3 days Entrepreneurship development Programme. The inaugural programme had participation of 162 persons comprising of EDP participants, ex-trainees of skill development & certificate courses, exhibitors, farmers and officials.

Fig 75. Dr. B N S Murthy, Horticulture Commissioner delivering inaugural address

Fig 76. Dr. N K Patle, Dy. Commissioner (Hort.) & Director i/c CIH delivering inaugural address

Fig 77. Resource person delivering lecture during EDP

Fig 78. Director CIH interacting with participants during closing programme

Fig 79. Distribution of certificates to participants

3.7. POST HARVEST MANAGEMENT

Post harvest loss of horticultural crops varies from 10-30% depending upon the crops, cultivar and weather condition. To minimize the post harvest loss, the institute carried out several activities on shelf life extension, value addition and certificate courses on post harvest management. The details of the activities are mentioned below.

3.7.1. Setting up 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.

Fig 80. Screw type juice extractor

Fig 81. Canning machine

Fig 82. Tray dryer

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 Aonla, kiwi, bael, starfruit, Assam lemon with ginger (Ginger ale) and pineapple. The fruits were 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 83. Ginger ale, Starfruit and pineapple squash

Fig 84. Bael and Kiwi Squash

3.7.2.2. Ready to serve (RTS) beverages

RTS beverages were prepared with Assam Lemon and Aonla fruit. The RTS prepared contained 10% of the fruit juice mixed with sugar syrup. Permitted amount of preservative was added to prolong the shelf life of the product.

Fig 85. Assam Lemon RTS

Fig 86. Aonla RTS

3.7.2.3. Jams

Roselle, Star fruit, pineapple and aonla jam were prepared and its recipe standardized. Fully ripened fruits were harvested and brought to the processing site. The fruits were then washed, peeled and grinded to a smooth pulp. The pulp was then mixed with required amount of water, sugar and citric acid and boiled in a slow flame while stirring continuously. The consistency of the jam was checked on regular intervals till a consistency of 60 to 65 °Brix was achieved. The finished product was then filled when hot, in clean sterilized jars. The Jars were sealed tight after the product cooled down.

Fig 87. Starfruit and pineapple Jam

Fig 88. Roselle Jam

3.7.2.4. Candy

Candies were prepared with wild apple (*Malus sylvestris*) and ginger. The raw materials were washed and cleaned thoroughly and its peel and core were removed. 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 89. Wild apple candy

Fig 90. Ginger candy

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 2018-2019, a total of 10 nurseries were assessed/monitored which includes both fresh accreditation and renewal of accreditations with a rating of **2 Star** to two nurseries and with a **1 Star** rating to remaining 8 nurseries. The details of the nurseries are provided in the table below:

Table 12. Horticulture Nurseries Accredited by CIH in NER (2018-2019)

Sl no	State	No. of Nurseries Visited	No of Nurseries Accredited
1	Arunachal Pradesh	1	1
2	Assam	4	4
3	Manipur	1	1
4	Mizoram	1	1
5	Nagaland	2	2
6	Tripura	1	1
	Total	**10**	**10**

Table 13. Nurseries Accredited during the year 2018-2019

Sl. no.	Name of Nurseries	Location/ State	Crop	Production capacity per annum	Star rating	Remarks
1	Namthung Agri Horti Multipurpose nursery	Dirang, Arunachal Pradesh	Kiwi, Apple, Persimmon	80000 20000 5000	Two star	Renewal
2	Rhakho Kiwi Nursery	Pfutsero, Nagaland	Kiwi	95000	One Star	Renewal
3	Ato Nursery	Khuzama, Kohima, Nagaland	Plum, Peach	20000 5000	One star	Renewal
4	Daffodil Nursery	Bherakuchi, Kamrup, Assam	Mango, Litchi, Guava, Mandarin/Orange, Lemon	23000 50000 25000 30000 60000	Two Star	Renewal
5	Ms/Naltali Nursery	Kathpara, Nagaon, Assam	Lemon, Litchi, Banana	150000 15000 20000	One star	Fresh
6	Ali Baruah Nursery	Kathpara, Nagaon, Assam	Litchi, Guava, Lemon	25000 28000 25000	One Star	Fresh
7	Farmers Career Point Nursery	Kismat Bangsar, Hajo, Assam	Litchi, Mango, Guava, Lemon	20000 5000 10000 10000	One Star	Fresh
8	Eden Estate Nursery	Toribari, Kangpokpi Manipur	Citrus Guava Kiwi Nectarine	20000 20000 20000 5000	One Star	Fresh
9	Pudaite Nursery	Tuizual Zau Aizawl Mizoram	Dragon fruit Mandarin Lemon	25000 20000 1500	One Star	Fresh
10	Holy Nursery	Ashrampalli Unakoti Tripura	Mango Sweet Orange Mandarin Lemon	3500 5000 3000 10000	One Star	Fresh

Fig 91. Horticulture nurseries Assessment of NER States by the members during 2018-19

3.9. SKILL DEVELOPMENT & CERTIFICATE COURSE

3.9.1. Skill development

Central Institute of Horticulture, Nagaland has been accredited by ASCI to impart skill trainings in North East Region. The Institute regularly conducts Skill Development Programmes to the farmers & unemployed youth of the region. The courses are designed to equip the less educated unemployed youth of the region with the skills to work in the field of horticulture. There is a need to empower more and more people with the skills and technical knowledge in horticulture sector. The right techniques and the proper management practices would help them to increase their production, productivity and cut down their production costs and would also help them in getting employment.

During the year 2018-19, the Institute organized five (5) skill development programmes. The details of courses undertaken are given below;

Table 14. Skill trainings conducted

	2018-19					
Sl.No.	Course	Batch ID	Duration	No. of registered trainees	No. of qualified trainees	Placement
1	Floriculturist-Protected Cultivation	405428	200 hours (14.05.18 to 22.06.18)	17	13	Coordinating with state dept. for employment
2	Gardener	407218	260 hours (03.07.18 to 16.08.18)	17	17	-do-
3	Floriculturist-Protected Cultivation	413314	200 hours (10.09.18 to 10.10.18)	14	13	-do-
4	Gardener	417652	260 hours (23.10.18 to 07.12.18)	19	19	-do-
5	Gardener	430849	260 hours (25.02.19 to 15.04.19	18	14	-do-

Glimpses of skill development course

Fig 92. Practical classes of skill development course on Floriculturist-Protected Cultivation & Gardener

3.9.2. Certificate Course

During the year 2018-19, a three months duration certificate course on "Post Harvest Management" was conducted at CIH. A total of 19 trainees from different parts of North East Region successfully registered and completed the certificate course. Various demonstrations and hands on trainings on food processing, value addition, assessment of maturity indices, harvesting techniques etc were covered during the three months course.

Fig 93. The trainees with their certificates

Fig 94. Hands on training on processing

Fig 95. The trainees exhibiting their processed products

3.10. Infrastructure development

- Completion of CC road in lane no. 1 to 5.
- Construction of drainage in lane no.3.
- Construction of Terracing in Block E.
- Construction of boundary wall near pump house.
- Completion of boundary wall near the playground.
- Construction of platform and flooring in processing unit.
- Construction of flooring in store office.
- Electrification in processing unit and old farm house.
- Installation of solar street light in lane no. 3, 4 and 5 (15 nos.).
- Installation of new centrifugal pump with standby including power stabilizer.
- Repairing/ change of plastic in polyhouse no. 2 and 6.
- Installation of sprinkler irrigation system in exotic citrus fruit block.
- Installation of light arrester in existing electric sub-station along with new electric meter.
- Completion of CC pavements from hostel to processing unit and in between polyhouses.
- Installation of LED street lights in middle block and LED focus light in CIH main gate.

Fig 96. Completion of CC road in lane no. 1 to 5

Fig 97. Construction of Terracing in Block E

Fig 98. Installation of LED street lights

Fig 99. Installation of sprinkler irrigation system

4. PUBLICATION

4.1. Annual Report/ Training manual/ Booklet/ extension folders

- N.K.Patle and Meribeni Shitiri. 2018. ***Annual report (2017-18)***. Central Institute of Horticulture, DAC&FW, Ministry of Agriculture cooperation & FW, Govt. of India, Medziphema,Nagaland.

- N.K.Patle 2018. Infornmation brochure of Skill development course on floriculture-protected cultivation. Central Institute of Horticulture, DAC&FW, Ministry of Agriculture cooperation & FW, Govt. of India, Medziphema, Nagaland.

- N.K.Patle, Meribeni Shitiri, Prabin Das, A.K.Singh, Arvind Singh, Manzar Hossain, Lichamo Yanthan, Moasosang Longkumer, Diganta Gohain, Imtinaro. 2018. Impact Evaluation of Central Institute of Horticulture. CIH/ Booklet/ pp 1-48.

- N.K.Patle, Prabin Das, Meribeni Shitiri, A.K.Singh, Arvind Singh, Manzar Hossain, Lichamo Yanthan, Moasosang Longkumer. 2018. Impact document of skill development course. CIH/ Booklet/ pp 1-18.

- N.K.Patle, Lichamo Yanthan, Meribeni Shitiri. 2018. Accreditation of horticulture nurseries in North east states. CIH/ Booklet/ pp 1-31.

- N.K.Patle, Moasosang Longkumer, Meribeni Shitiri. 2018. Human resource development through training programmes. CIH/ Booklet/ pp 1-16.

- 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.

- Meribeni Shitiri, Lichamo Yanthan and N.K.Patle. 2019. ***Oyster mushroom cultivation***. CIH/ Tech. Folder 57/ pp 1-6.

5 SEMINARS, CONFERENCES, WORKSHOPS, MEETINGS

5.1. Meetings

5.1.1. Attended NSLEC meeting under MIDH under Horticulture Department, Nagaland at APC conference hall, Nagaland on 24th July 2018.

5.1.2. Attended Scientific Advisory Committee meeting of KVK, Dimapur on 26th February 2019 at the conference hall, ICAR, Nagaland Centre, Medziphema

5.1.3. Technical Advisory Committee meeting conducted on 19th March 2019 at CIH, Nagaland under the chairmanship of Dr. V.A Parthasarathy, Ex- Director, ICAR-IISR, Calicut with 10 members and 8 invited members.

5.1.4. Board of Management meeting conducted on 2nd May, 2019 at Room No.243, Krishi Bhawan, New Delhi under the chairmanship of Dr. B.N.S Murthy, Horticulture Commissioner, DAC & FW, Govt. of India, New Delhi.

Fig 100. Technical Advisory Committee meeting

Fig 101. Board of Management meeting

6. IMPORTANT EVENTS CELEBRATED

6.1. Independence Day Celebration

Central Institute of Horticulture observed the 72nd Indian Independence Day on 15th August, 2018. Director CIH (i/c), Dr. N.K.Patle unfurled the national flag and delivered the Independence Day speech. A brief remark was also delivered by Dr. Anand Zambre, Executive Director, NCPAH, New Delhi and Shri L.A. Khan, Section officer, DAC & FW, New Delhi. The main highlight of the programme was the distribution of award. An award for the best staff and workers of CIH was proposed by Director CIH (i/c), Dr. N.K.Patle for the first time in the Institute since its inception. The award for best staff (technical) was bagged by Dr. Moasosang and best staff (non-technical) was awarded to Mrs. Sharda Devi. The other awards were bagged by Mr. Vilhou (farm worker), Mr. Rakam (polyhouse worker) and Mr. Atovi (Nursery worker). Other highlights of the programme included song presentations by farm and polyhouse workers.

Fig 102. Director CIH (i/c), Dr. N.K.Patle unfurling the National flag and delivering his speech

Fig 103. Dr. Moasosang receiving best staff award (technical)

Fig 104. Mrs. Sharda receiving best staff award best staff (non technical)

Fig 105. Mr. Vilhou receiving best worker award (farm)

Fig 106. Mr. Atovi receiving best worker award (Nursery)

Fig 107. Mr. Rakam receiving best worker (polyhouse)

Fig 108. Director CIH (i/c) with CIH staff and workers

6.2. Republic Day Celebration

The Institute, with the rest of the country celebrated the 70th Republic Day on 26th January 2019. Dr. N.K.Patle, Director CIH (i/c) unfurled the National flag and delivered his speech. A brief programme was organized where all the staffs and field workers participated.

Fig 109. Director CIH (i/c) delivering the Republic Day speech

Fig 110. Director CIH (i/c) with CIH staff and workers

6.3. Organized Swachhta Hi Sewa at CIH, Nagaland

Central Institute of Horticulture, Nagaland organized Swachhta Pakhwada from 15th October to 2nd October 2018. 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 111. Cleanliness drive undertaken by the Institute during Swachhta Pakhwada inside the campus

6.4. Organized Vigilance Awareness Week on 1st November 2018 at CIH, Nagaland

Fig 112. Vigilance Awareness Week organized at CIH

6.5. Organized cleanliness drive in office campus on 21st December during Swachhta Pakhwada w.e.f. 16-31 December 2018

Fig 113. Swachhta Pakhwada organized at CIH campus

7 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.

7.1. 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
12.	Field Assistant	: Mr. Eliyamo Humtsoe
		: Mr. Anukul Roy

8. BUDGET

FINANCIAL PROGRESS REPORT OF CIH, NAGALAND FOR THE YEAR 2018-19

(Rs. in Lakhs)

HEAD OF ACCOUNT Major Head-2401 248-Crop Husbandry 55-Green Rev.-Kris. Yojn. 03-Estt. of CIH	Budget Estimated 2018-19	Revised Estimated 2018-19	Total Expenditure 2018-19
1	2	3	3
550501- Salary	12.00	6.50	4.47
550502- Wages	93.00	79.97	77.22
550506- Medical Treatment	3.00	1.00	0.00
550511- D T Expenses	10.00	2.00	0.00
550513- Office Expenses	35.00	22.00	18.32
550514- Rent rate & taxes	1.00	1.00	0.22
550516- Publication	13.00	13	4.07
550520- Other Admni. Expn.	70.00	60.00	41.40
550526- Advt. & publicity	4.00	1.00	0.20
550527- Minor works	60.00	34.70	7.18
550528- Prof. services	5.00	1.00	0.00
550550- Other charges	200.00	130.00	96.40
Total (2401 -Crop Husbandry)	**506.00**	**352.17**	**249.48**
Major Head, Cap. outlay on Crop Hus-4401	**1.00**	**1.00**	**0.00**
Major Head-4552, 17-Green			
Revolution -Kris. Yojana,			
01-MIDH-CIH			
170151-Motor Vehicle	0.00	0.00	0.00
170152-Machinery & Equip.	15.00	15.00	0.00
170153- Major Works	384.00	384.00	56.98
Total – Major Head 4552-	**399.00**	**399.00**	**56.98**
Grand total	**906.00**	**752.17**	**306.46**

9. LIST OF BOARD OF MANAGEMENT, TECHNICAL ADVISORY AND NURSERY ACCREDITATION COMMITTEE MEMBERS

9.1. Members of Board of Management (BOM)

1. Dr. B.N.S. Murthy,
Horticulture Commissioner,
DAC & FW, Govt. of India, Khrishi Bhawan, New Delhi - Chairman

2. Secretary/Director (Horticulture),
Govt. of Arunachal Pradesh,
Itanagar, Arunachal Pradesh - Member

3. Secretary/Director(Agriculture),
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 - Member

13. Dr.Kirti Singh,
Former Chairman ASRB and Vice Chancellor - Member

14. Joint Secretary/Representative of
Ministry of Food Processing Industries
(MOFPI), New Delhi - Member

15. Representative of Ministry of DONER,
Vigyan Bhavan Annexe, Mulana,
Azad Road, New Delhi - Member

16. Secretary/ Representative of North East Council,
Nongrim Hills, Shillong, Meghalaya - Member

17. Director ICAR,
Umroi Road, Umiam-793103, Meghalaya - Member

18. Dr.V.B.Singh,
Ex-Prof, Horti. Dept., SASARD-NU,
Medziphema, Nagaland - Member

19. Chairman/Representative, NABARD,
Plot Np-c24, G Block,Bandra Kurlar Complex,
P.O.Box-8121, Bandra East, Mumbai - Member

20. Representative of M/s. Zopar Exports Pvt.Ltd.
(North East Circle) - Member

21. Mr.Zion Lalremruata, General Secretary,
All Mizoram Farmers Union, progressive farmer of NER - Member

22. Mr.Shiv Anjan Dalmia,
Dalmia Greens,
Meghalaya - Successful entrepreneur of NER - Member

23. Director, CIH, Medziphema- Dimapur, Nagaland - Member secretary

9.2. Members of Technical Advisory Committee (TAC)

1. Dr.V.Parthasarathy,
   Ex-Director, IISR, Calicut - Chairman

2. Dr. R.K.Pal,
   Ex-Director, NRC for Pomegranate, Sholapur - Member

3. Dr.N.K.Mohan,
   Chief Consultant of CIH, Nagaland - Member

4. Dr.Ramesh Kumar,
   Ex- Director, DFR, Ex-Director of Research, PAU, Ludhiana - Member

5. Dr. Ramavadh,
   Principal Scientist, CISH, Lucknow - Member

6. Dr.M.Tamil Selvan,
   Ex-Addl.Comm.(Horti.), DAC&FW, New Delhi - Member

7. Dr. D.J.Rajkhowa,
   Jt.Director, ICAR- Jharnapani, Nagaland - Member

8. Dr. A.K. Srivastav,
   Principal Scientist, NRC-Citrus, Nagpur - Member

9. Dr. L.C.Bora,
   Professor, AAU, Jorhat, Assam - Member

10. Mr. R Anand Zambre,
    Executive Director, NCPAH, New Delhi - Member

11. Director, CIH - Member Secretary

9.3. MEMBERS OF NURSERY ACCREDITATION COMMITTEE

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, Ludhiana	M-9876153322 yrchanana@yahoo.com
Dr. Sudip Kumar Dutta	Scientist, ICAR, Sikkim Centre	
State representative	-	
Manipur		
Dr. R.C.Upadhyaya	Ex. Director, NRC-Orchid, Sikkim	M-9868645393 urc@hub.nic.in
Dr. Subhra Saikat Roy	Scientist (Hort.), Manipur Centre	M- 8730933835, subhrasaikat@gmail.com/ ssroy.icar@nic.in
State representative	-	

Tripura		
Dr. V.V. Sulladhmath	Ex. Principal Scientist, IIHR, Bangalore	M-9980928644 drvvsulladhmath@gmail.com
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, ranjitkb2010@gmail.com
Dr. Azeze Seyie,/ Dr. Chongtham Tania,	Scientist, Nagaland Centre Scientist, Manipur centre	M-7085962272
State representative		

10. ANNUAL ACTION PLAN 2018-19

CENTRAL INSTITUTE OF HORTICULTURE Annual Action Plan 2018-2019				
Sl	**Components**	**Physical Targets**	**Approx. cost Per unit (Rs.)**	**Approx Financial Implication (Rs. In Lakh)**
1	**SALARIES**			**12.00**
2	**WAGES**			**93.00**
3	**MEDICAL**			**3.00**
4	**DOMESTIC TRAVEL EXPENSES**			
5	**OFFICE EXPENSES**			
	1) Office furniture		1.00	
	2) Telephone bill		2.00	
	3) Electricity bill		3.00	
	4) Repair of motor vehicle		2.00	
	5) Purchase of rubber stamp		0.02	
	6) Stationery		1.00	
	7) Office equipment		1.00	
	8) Computer		1.00	
	9) Contingent staffs remuneration		1.00	
	10) Printing & Binding jobs		0.20	
	11) POL		7.00	
	12) AMC		8.00	
	13) Postage & Telegraph		2.00	
	Sub total			**35.00**
6	**RATE, RENT & TAXES**			**1.00**
7	**PUBLICATION**		**Annexure I**	
	1) Annual Report 2017-2018	1 No.		
	2) Technical bulletin	3 Nos.		
	3) Folders	6 Nos.		
	4) Reprinting of exhausted Technical folders	15 Nos.		
	5) Procurements of books and journals			**13.00**
	Sub total			
8	**OTHER ADMINISTRATIVE EXPENSES** **A. Human Resource Development** **B. Meetings** **C. PHM** **D. Marketing & Agri-Business Promotion**			
8.A	**Human Resource Development**			

	1) Farmers Development	40 nos. (50 trainees/ batch)	**Annexure II**	20.00
	2) Training of Trainers	03 nos. (40 trainees/ batch)		6.00
	3) Exposure trip cum training	02 nos.		5.00
	4) Capacity Building of CIH Staffs & State officials	04 nos		2.00
	5) Skills Development training (MIDH cost norms)			
	a. Floriculturist-Protected Cultivation	02 nos.	3.30	6.60
	b. Gardener	02 nos.	3.30	6.60
	c. RKVY (Gardener, Floriculturist and Bee keeping)	03 nos.	Subject to the availability of funds by RKVY division.	
	Sub total			**46.20**
8.B	**Meetings**			
	1) Technical Advisory Committee (TAC) meeting	1no		2.00
	2) Board of Management (BOM) meeting	1no		2.00
	Sub total			4.00
8.C	**PHM**			
	1) Setting up of minimal processing unit for spices			14.50
	2) Product developments (Wild apple candy, garlic pickle, guava jam, kiwi and passion fruit squash) and packaging material for strawberry	2 kg each (jam, pickle, candy) Squash (8 ltr)		0.30
	3) Installation of false ceiling and acrylic sheet in existing spice processing unit and pack house	2 unit	0.50	1.00
	Sub total			**15.80**
8.D	Marketing & Agri-Business Promotion			
8.D.i	**Linking of Farmers/Farmers Group with Financial Institutions for Availing Agricultural Credit**			
	a) Facilitation in preparation of projects for farmers to avail agricultural credit	3 groups	0.50	1.50
8.D.ii	**Creating of Market Linkage for the farmers**			
	1) Entrepreneurship development programme (3 days)	1no.	1.50	1.50
	2. Facilitation of branding of horticultre crops	2nos.	0.50	1.00
	Sub total		2.50	**4.00**
9	**ADVERTISEMENT & PUBLICITY (wall paintings for promotion of horticulture/ Tender documents etc)**			

10	**MINOR WORKS**			
	1) Construction of shade net for nursery unit as per MIDH norms	1no.(500 sqm)	4.00	4.00
	2) Soil filling/land development for shade net construction	1000 sqm	2.00	2.00
	3) Installation of voltage stabilizer neraby the pump house (As per CPWD)	1 no.	2.00	2.00
	4) Construction of G- Nap water tank at 3 locations (Block - C,D&E)	2 Nos.	11.00	22.00
	5) Construction and repairing of platform for D.G. Set	20 x 20 sq. ft	1.00	1.00
	6) Construction of toilet for hostel and renovation of farm office and furnishing	3 Nos.		3.00
	7) Land development work at Block A & E		2.00	2.00
	8) C/o Ground water harvesting structure near polyhouse	1 no	1.50	1.50
	9) Installation of solar pump system back up in poly house and bamboo guest house.	2 unit	8.00	16.00
	10) Installation of solar LED street light in newly constructed cc pavement Road	15 units		4.00
	11) C/o of platform for PHM machineries			2.00
	12) C/o low cost watch tower near pump house	1 no	0.50	0.50
	Sub total			**60.00**
11	**PROFESSIONAL SERVICE** **A. Consultency fees as per actual** **B. Professional fees as per actual** **C. Invigilator fees as per actual** **D. Legal service as per actual**			**5.00**
12	**OTHER CHARGES**			
	A. Demonstration of production of production technologies at Institute level			
	i. Management of existing demonstrations			
	ii. Demonstrations of Techonology 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 Courses			
	E. Exhibitions/Trade Fairs/Meets/Mela			
	F. Chemical & glassware's for laboratory			
	G. Farm development & beautification			
	H. Contractural staff remuneration			
12. A	**Demonstration of production technologies at Institute level**			
i.	**Management of existing demonstrations**			
	1) Maintenance of Organic Vermicompost	4 units		0.15

	2) Purchase of fertilizers, chemicals & manures for open cultivation & 10 nos. of polyhouse	13 ha	Annexure III	7.62
	3) Repair & re-installation of drip irrigation system in existing fruit blocks including laying of plastic mulching	8 ha	0.80/ha	6.40
	4) Setting up shadenet ceiling for poluhouse No. 12	1000 sqm	0.70	0.70
	5) Construction of disinfectant chamber in poly-house No. 12	1 no.	0.50	0.50
	6) Repair & renovation of fan & pad system in polyhouse no. 6&7	2 nos.	1.00	2.00
	7) Intercropping of Leucana in all fruit blocks	10 ha	0.50	0.50
	8) Repairing of polyhouse (AMC)	12 nos	0.50	6.00
	Sub total			23.87
ii.	Demonstrations of Technology in the institute			
	1) Establishment of strawberry block var. Winter Dawn, Sabrina, Barak, Gili and Hada including mulching for varietal evaluation	0.10 ha	1.00 Annexure IV	1.00
	2) Demonstration on Improved production trchonlogy of Gladious in open field var. Nova Lux,, Taderhorn, White Prosperty, Eurovision, gold field. Jestur, Oscar & Red Beauty (ICAR, Barapani Technology)	0.2 ha	2.00 Annexure V	1.00
	3) Establishment of New mother block of Rambu-tan, Avocado, Dragonfruit, carambola, Sapota, ber, Custard Apple, mango (early & pickling variety), papaya, passion fruit var. Kaveri and Pineapple	0.80 ha	2.00 Annexure VI	2.00
	4) Demonstration on improved production tech-nology of bay leaf and black pepper	0.20 ha	0.50	0.50
	5) Demonstration on improved production tech-nology of Turmeric, Ginger, garlic, vegetable cafetaria on Okra, Naga king chilli, tomato, bird eye chilli, local cucumber, cowpea, brinjal (round type), broccoli, red cabbage, cabbage, sweet corn (ICAR, Barapani & AAU, Jorhat)	0.40 ha	0.25	1.00
	6) Demonstration on Improved production tech-nology of Capsicum (Sweet pepper) var bomble (red), shwarna (yellow) & Oroble Red (F1Hybird) under polyhouse, Tomato var. Himsona & F1 Hybird indeterminate type, Cucumber (Partheno-carpic) var. Hilton & Kian and Musk Melon var. Bobby F1 Hybird (ICAR, Barapani Technology)	0.12 ha	0.24	0.50
	7) Demonstration on Improved production tech-nology of Carnation var. Indius, Tempo, Red King , Dark Dona, Purple niht, Luna and White Dona under polyhouse	0.01 ha	2.50 Annexure VII	2.50

	8) Demonstration on soil less cultivation on Ger-bera under Polyhouse var. Rosalin Paradise, Zun-garo., Shimmer, White house & Imperial (ICAR, Barapani Technology)	0.3 ha	4.16 Annexure VIII	4.16
	9) Establishment of apiculture unit for pollination through bee keeping	20 unit		2.00/National bee board
	10) Oyster Mushroom production / Setting up of mushroom unit	2 unit	0.50	1.00
	11) Terracing in farm for new block development	0.5 ha	0.50	0.50
	12) Terracing farm for new block development	0.8 ha	3.50 Annexure IX	28.00
	13) Establishment of herbal garden	0.02 ha	0.50	0.50
	Sub total		42.66	
iii.	Demonstration of improved Technologies in NE States (As per MIDH norms)			
	1) Establishment of mother block of khasi manda-rin (Assam/ Nagaland)	1 ha	0.48	0.48
	2) Demonstration on plantation of Mango var. Amrapalli & Dashehari in Manipur	1 ha	0.40	0.40
	3) Demonstration on plantation of Khasi Manda-rin in Arunachal Pradesh	1 ha	0.45	0.45
	4) Rejuvenation of declining Citrus orchard var. Khasi Mandarin in Nagaland, Meghalaya & Arunachal Pradesh	1 ha each	0.20	0.60
	5) INM/IMP demonstration on citrus at Tuensang , Nagaland	5 ha	0.4 Annexure X	0.20
	6) Demonstration on plantation of kiwi fruit at Nagaland and Meghalaya (including trellis)	1 ha	3.00 Annexure XI	3.00
	7) Demonstration on Improved production tech-nology of Gladiolus in open field var. Nova Lux,, Taderhorn, White Prosperty, Eurovision,gold field. Jestur, Oscar & Red Beauty (ICARBarapani Tech-nology)	0.2 ha	1.00 Annexure V	1.00
	Sub total			6.13
B.	Quality Planting Material Production			
	1) Mass multiplication of quality planting material			
	Asexually propagated plants (Cashew 2000nos. var. BBSR-1, VRI-3, V-4; citrus 20000nos. var. Khasi mandarin, Assam lemon 10000 nos. var. Amrapali, Dashehari & Mallika, guava 20000 nos. var. L-49, Allahabad Safeda, Lalit & Sweta	1,50,000 nos	Annexure XII	15.48
	2) Production of vegetable seedings	10,000 nos		0.50
	Sub total			15.98
C.	Accredutation of Horticulture Nurseries in NER	20 nos.	1.00	20.00
D.	Certificate Course	1 Course	Annexure XIII	8.86
E.	Exhibitions/Trade Fairs/Meets/Mela			
	1) National/ State level exhibitions (To participate)	2 nos	1.50	3.00

	2) District level promotional festival /buyers seller meet	2 nos.	2.00	4.00
	Sub total			7.00
F.	Chemical & glassware's for laboratory		Annexure XIV	2.20
G.	Farm development & beautification			
	1) Irrigation in old lawn area as well as in avenue plants	2000sq mt	200/sqmt	2.00
	2) Annual seasonal flower seeds	(Annexure XV)		0.50
	3) Ornamental and topiary plants (Proper shaped) and Mucuna Bracteata	100	10000	1.50
	4) Vertical gardening	1 unit	1.00	1.00
	5) Installation of flower stand/iron racks for beautification	1 nos	2.00	2.00
	Sub total			7.30
H.	Constractual staff remuneration			66.00
	Grand total			506.00

Budget Projection for the year 2018-2019		
Sl	Head of Account	Tentative budget for 2018-19 (Rs. In Lakhs)
A	Major Head - 2552	
1	Salary	12.00
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	70.00
9	Advertisement & Publicity	4.00
10	Minor works	60.00
11	Professional Services	5.00
12	Other Charges	200.00
	Sub Total	506.00
B	Major Head - 4552	
1	Major works	
	a. C/o Residential quarters i. Type IV - 4 Nos. ii. Type III - 5 Nos. iii. Type II - 7 Nos. (Subject to availability of fund)	500.00
	B. C/o boys training hostel (1st floor)	354.00
	c. Tissue Culture laboratory (subject to availability of fund and man power)	250.00
2.	Machinery & Equipment (Annexure XVI)	15.00
	Sub Total	1149.00
	Grand Total	1655.00

11 RECOMMENDATION OF TECHNICAL ADVISORY COMMITTEE AND BOARD OF MANAGEMENT

11.1. Minutes of the 11th Technical Advisory Committee (TAC) meeting of CIH held on 18th and 19th March, 2019 at conference hall, CIH, Medziphema, Nagaland

The meeting was chaired by Dr. V.A Parthasarathy, Chairman, TAC and the following members were present.

Members:

1. Dr. V.A Parthasarathy, Ex- Director, ICAR-IISR, Calicut - Chairman
2. Dr. M. Tamil Selvan, Rtd. Addl. Comm. (Hort.), DAC & FW - Member
3. Dr.R.K.Pal, Ex-Director, ICAR - NRC for Pomegranate. - Member
4. Dr.Ramesh Kumar, Ex-Director, ICAR -DFR - Member
5. Dr.A.K.Srivastava, Principal Scientist, ICAR- CCRI-Nagpur - Member
6. Dr. R.A.Ram, Principal Scientist, ICAR-CISH, Lucknow - Member
7. Dr. Lohit C. Bora, Professor, AAU, Jorhat - Member
8. Dr.Anand Zambre, Executive Director, NCPAH - Member
9. Dr.D.J.Rajkhowa, Jt.Director, ICAR Complex -Jharnapani - Member
10. Dr.N. K Patle, Dy. Comm. (Hort.) & Director I/c, CIH - Member Secretary

Invited members:

1. Mr. Anjani Kumar Singh, Horticulture Specialist , CIH
2. Mrs.Meribeni Shitiri, Horticulture Specialist, CIH
3. Mr. Prabin Das, Marketing Specialist, CIH
4. Mr. Arvind Singh, Technical Consultant, CIH
5. Ms. Vinika, Post Harvest Technologist, CIH
6. Dr. Moasosang Longkumer, Asst. Horticulture Specialist, CIH
7. Ms.Marina, Sr. Technical Asst., CIH
8. Ms.Imtinaro,PA to Director, CIH

The meeting started on the afternoon of 18th with a field visit and lab visit.

The meeting started with the introduction of all the members of TAC and thereafter, deliberated on the proposed agenda. Director Incharge, CIH presented the action taken report in lieu of the proceedings of 10th TAC and achievements of CIH 2018-19. The members unanimously confirmed the proceedings of the 10th TAC meeting. Decided to drop the point for cultivation of Chinese garlic based on the experience shared by Jt. Director, ICAR RCNEH-Nagaland centre regarding the poor performance of Chinese Garlic under Nagaland condition. Members went through the previous recommendations made by earlier TAC. It was found that most of the recommendations were repetitive. **The members made two strong suggestions to the Commissioner for consideration:**

i. The meeting must be held twice a year as indicated in the ToR.

ii. Efforts should be made to appoint a full time Director for effective functioning of the institute.

The following recommendations were made through long discussion on different programs of CIH:

1. The Institute should carry out an impact analysis on the various technologies for which demonstration as well as trainings were conducted by CIH with respect to ascertain the level of adoption by the farmers. Institutes like ICAR-NIAP, New Delhi or any other professional institutes may be involved in such impact evaluation study.

2. Continuous demonstration on cultivation of high value vegetable crops should be carried out under polyhouse and the structural design of the polyhouse needs to be looked after as per suggestion by members. ROI form protected cultivation should be calculated for better adoption of technologies**.**

3. The Institute should focus on starting incubation centre for small scale processing of horticulture produce and take assistance for technologies from Institutions like CIPHET, NIFTEM, IARI, CISH, AAU, ICAR-Regional Center for NEH, NERAMAC and TERI etc.

4. As the KVKs under ATARI are mandated for quality planting material production, the Institute should approach Director, ATARI and request for submission of proposal for accreditation of KVK nurseries in NER.

5. In order to enhance the rating of the accredited nurseries in NER, the Institute should organize a workshop for the nurserymen for advancement of existing methods of propagation, so that nurseries find ways and means for their improvements**.**

6. The Director, CIH may revisit the details of the recommendation of 9th TAC meeting held on 14th January, 2017 and take up the recommended demonstration programmes. The redrafted technical Action Plan 2019-20 with special reference to demonstrations should be submitted within a week time to the TAC members by email**.**

7. As per the recommendation of 9th TAC meeting held on 14th January, 2017, the planting material production may be worked out considering the demand particularly for perennial crops and accordingly, the revised estimate of production of quality planting material may be submitted within a week.

8. The Institute should focus on establishment of model on-farm organic inputs production unit for quality composts, bio-enhancers, bio-pesticides with locally available materials and their use in different demonstrations laid out on flowers, fruits and vegetables in the institute as well as farmers' fields**.**

9. It was suggested for demonstration of tree spices such as cinnamon, bay leaf, nutmeg and star anise besides king chilli (under polyhouse). It was advised to collect the package of practices of King chilli from AAU, Jorhat/ ICAR-NEH, Barapani. The PoP of tree spices may be obtained from ICAR-IISR.

10. The Institute should focus on establishment of model on-farm organic inputs production unit for preparation of compost, bio enhancers and bio pesticide.

11. In hills, soil and water conservations measures are very important. The CIH may take the help of ICAR Complex for NEH Region to develop a strong water shed management demonstration.

12. The Institute should compile a database of scientific personnel/experts working in various National/International Institutes along with contacts to be used as resource persons. The institute publications warrant expert intervention as the members felt that there are a lot of discrepancies.

13. The revenue generation from protected cultivation of flowers and vegetables was observed unexpectedly low, it needs to be ascertained whether it was due to management failure, technological failure or due to failure to maintain the required growing conditions within the protected structures.

14. Technical Advisory Committee meeting should be convened once in every 6- months to review the progress of the recommendations and timely technical guidance.

Suggestions for Annual Action Plan 2019-2020

1. Procurement of sweet potato vines from ICAR-RC NEH Barapani.

2. Selection of major focus crops of NER for technology demonstrations.

3. Enrichment of FYM with bio-fertilizer and other bio agents before application in the demonstration plot.

4. Selection of new improved varieties for any demonstration at CIH.

5. Collaboration with ICAR-CISH RC Malda /NHBM/NBB for processing of honey should be explored.

6. New variety of drumstick which is suitable for NER region need to be explored.

7. Vegetable seedlings should be raised on demand basis only.

8. It was suggested to consult experts of TAC members and scientist of NE region for validation/ proof reading / editing of CIH publications. It was also advised for further improvement of extension folders, particularly on ornamental crops, with respect to planting time, plant spacing, fertilizer dose and time of its application.

9. New fruit crops (humid tropical crops) such as loquat, logan, litchi instead of rambutan need to be introduced at CIH for evaluation of their performance at CIH The planting material may be procured from NRC litchi, Muzaffarpur.

10. It was suggested to organize demonstration on pineapple varieties Queen and Mauritius.
11. Focus should be given on Khasi Mandarin and Assam lemon for production of planting materials. For citrus rootstock, Volkamariana may be used for multiplication. Planting material of cashewnut may be multiplied as per requirement only.
12. Multiplication of gladiolus corms, anthurium and carnation plant should be continued.
13. It was advised to prepare detail list of seasonal flowering plants, hedge plants and ornamental beauty plants.
14. Must Keep record of EC and pH of soil/ media of all the crops under protected cultivation and open field condition along with data on temperature and R.H.
15. Demonstration of high value vegetables such as cucumber, coloured capsicum and cherry tomato etc under protected cultivation should be taken up.
16. It was advised to depute technical persons to undergo training on hydroponics and preparation of water soluble fertilizer at CISH, Lucknow.
17. It was advised to remove the sentence "IPM/INM on citrus at Tuensang, Nagaland" and instead use the sentence "Improve production technology for citrus decline" for Off-farm demonstration.
18. It was advised to remove the topic "INM/IPM of vegetable crops" and include a topic on "Organic farming" for farmers training.
19. It was suggested that the Institute should focus on processing of important crops of the region like Pineapple, Ginger, Turmeric, Khasi Mandarin and Passion fruit with value chain approach on total utilization of produce need to be adopted. Technology can be adopted from IARI, New Delhi for utilization of processing wastes for development of high value products from pineapple and citrus.
20. Processing of underutilized crops should be done only after ascertaining of the availability of the material in large quantity in the market as well as the demand for the particular product in the market.
21. It was advised to procure vertical Autoclave and SS tables for processing unit at CIH.

The TAC members visited the Institute farm on 18th & 19th March, 2019 and gave the following suggestions for demonstration (polyhouse, farm, mushroom unit and bee keeping unit)

1. The Institute should demonstrate the complete package of practices for a particular crop developed and published by ICAR for demonstration purpose.
2. There should be systematic planning of blocks as per the classification of crops and proper signboards should be installed.

3. Geo-membrane lining was suggested in the existing pond 'or' Soil filling of the pond. If possible, pond can be deepened further few meters.
4. Proper training and pruning practices should be adopted in all the fruit blocks with proper fertilizer scheduling under the guidance of expert. Proper record should also be maintained.
5. The growth and performance of Anthurium, Gerbera and Roses under polyhouse should be improved as per the advice given by members, especially with respect to composition of growing medium.
6. The deficiency of phosphorous was observed in the Anthurium. pH of the growing medium should be checked . It was suggested to add activated charcoal or dolomite in Anthurium beds in order to raise pH and organic matter having most stable carbon source.
7. It was suggested to regulate the pH of mushroom unit, concrete flooring of the unit and also trial of milky mushroom/ button mushroom may be carried out.
8. A mechanical compost making (cubes) should be purchased for preparation of the substrate for mushroom. It was further suggested to undertake a suitable training at DMR, Solan by identifying a suitable person.
9. It was suggested to undertake control measures for the leaf miner in acid lime, fruit flies in guava and peach by placing pheromone traps along with agro-chemicals or neem oil (3%).
10. It was suggested for second half pinching in carnation.
11. The use of bio-fertilizer (Jeevamrita) + vermin-wash was suggested in 2-3 beds of carnation and application of commercial fertilizers in 3-4 beds of carnation the comparative evaluation.
12. Application of 50 g borax + 5 kg of FYM as basal dose and 0.10% spray of borax in bael. It was also advised to prune the plants in the month of May after fruit harvest.
13. Procurement of soft seeded yellow fleshed guava variety from IIHR, Bangalore and guava varieties released by ICAR, Barapani. Likewise, procurement of vegetable jackfruit plants was suggested from CISH, Lucknow or IIHR, Bangalore.
14. Guava bending technology developed by BCKV, Nadia was suggested to be tried.
15. As a control measures for leaf gall disease in litchi it was suggested for spraying 5% neem oil.
16. Spray of wettable sulphur @ 2g/l of water was suggested in mango for control of powdery mildew.
17. Shifting of as many 10 nos of bee colonies was suggested to be transferred to litchi block as it is the pollinator for litchi.
18. Proper pruning of guava and litchi plants for proper canopy development was suggested.

19. Processing of oyster mushroom powder and mushroom pickles was suggested.

20. Coordination with Dr. Ruth Assumi (Scientist-ICAR) should be sought for value chain development in pineapple.

21. For promotion of scientific bee keeping and post harvest processing of honey and other horticulture produce resources developed under RKVY at ICAR-CISH-RRC, Malda using the Advance Centre on Post Harvest Processing and Value Chain Management for Bee keeping should be utilized.

22. Evaluation of various organic inputs produced in the farm should be undertaken in different demonstration of vegetables and fruits.

The meeting ended at 3.30 pm on 19th with a vote of thanks by the Director i/c, CIH.

11.2. Minutes of the 14th Board of Management meeting of CIH, Nagaland held on 2nd May, 2019 at Room No.243, Krishi Bhawan, New Delhi.

The Chairman welcomed all the members and started the meeting as per the Agenda note. The decisions emanated from the deliberations are mentioned below. The list of members present is Annexed.

1. **Confirmation of the minutes of 13th BOM meeting**: The minutes of the 13th BOM meeting held on 9th April, 2018 at CIH, Medziphema was confirmed by the members along with some advice as mentioned below:
   a. To procure the seeds of Red Cabbage from IARI, Delhi and IIHR, Bangalore and demonstrate in CIH farm.
   b. To continue with the production of vegetable seedlings and support farmers and some women self help groups by distributing it to them.
   c. It was advised to continue with the demonstration on performance of Bird Eye chili at the Institute.
2. **Achievements of CIH during 2018-19**: Dr.N.K.Patle, Director Incharge CIH presented a power point on the Achievements of the Institute. All the members expressed happiness on the commendable work done by the Institute inspite of the shortage of manpower at the Institute.
3. **Approval of Annual Action Plan 2019-20**: Director Incharge CIH presented a power point on the Annual Action Plan 2019-20 which was prepared as per the recommendation of the Technical Advisory Committee members. The following were discussed and suggested.
   a. It was suggested to increase the number of Training of Trainers as per the response of the State Horticulture Department in keeping with the available funds.
   b. Director, Sikkim informed that, a batch a trainees will be send to CIH for undergoing Skill Development Training.
   c. It was decided to drop "setting up of incubation centre" under Post Harvest Management as such centre was available at SASRD-Nagaland University.
   d. It was informed that, experts on cultivation of Shitake Mushroom were available at ICAR centers of Manipur and Barapani and that the Institute can take their assistance for Shitake mushroom cultivation.
4. **Reconstitution of Technical Advisory Committee**: The Board recommended the Institute to submit proposal to the Competent Authority for reconstitution of TAC members even though their tenure would be completed only in March 2020, so that the Institute can have area wise experts who could dedicate their time for visiting the Institute at regular intervals and provide guidance in all the Technical programmes of the Institute.
5. **Enhancement of honorarium of Board of Management members (non-officials) and Technical Advisory Committee members**: The Board unanimously decided to follow the rules of ICAR/DAC&FW for payment of honorarium of Board of Management members (non-officials) and Technical Advisory Committee members.
6. **Enhancement of remuneration of Contractual Staffs of CIH**: The Board recommended that as per the earlier practice of yearly enhancement of remuneration, the Institute should submit proposal to IFD once again for enhancement of remuneration as payment of satisfactory remuneration to the staffs was very important.
7. **MOU with NIAM, Jaipur**: The Board unanimously decided that MOU should be signed with NIAM Jaipur as marketing was an important component and should be promoted by the Institute.
8. **The following suggestions was discussed in the meeting with the permission of the Chair**:
   a. It was suggested that, the Institute should identify those horticulture crops which have potential for commercial production with the assistance of the State Horticulture Departments and promote them by taking up demonstration.
   b. It was also suggested that, the Institute should promote cultivation of Bird of Paradise, Red ginger flower etc which were mostly grown in coastal areas like Kerala, Orissa etc.
   c. It was advised that the Institute should prepare a training calendar and circulate to all the State Horticulture Departments.
   d. It was suggested that, the Institute should explore the possibility of setting up an integrated pack house at CIH for demonstration purpose.
   e. It was advised that the Institute should explore the possibility of taking up demonstration on cultivation of Durian.
   f. It was also suggested that, the activities of CIH should be updated to the BOM members from time to time so that they are aware of the progress of the Institute.

The meeting ended with a vote of thanks from the Chairman.

CENTRAL INSTITUTE OF HORTICULTURE

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