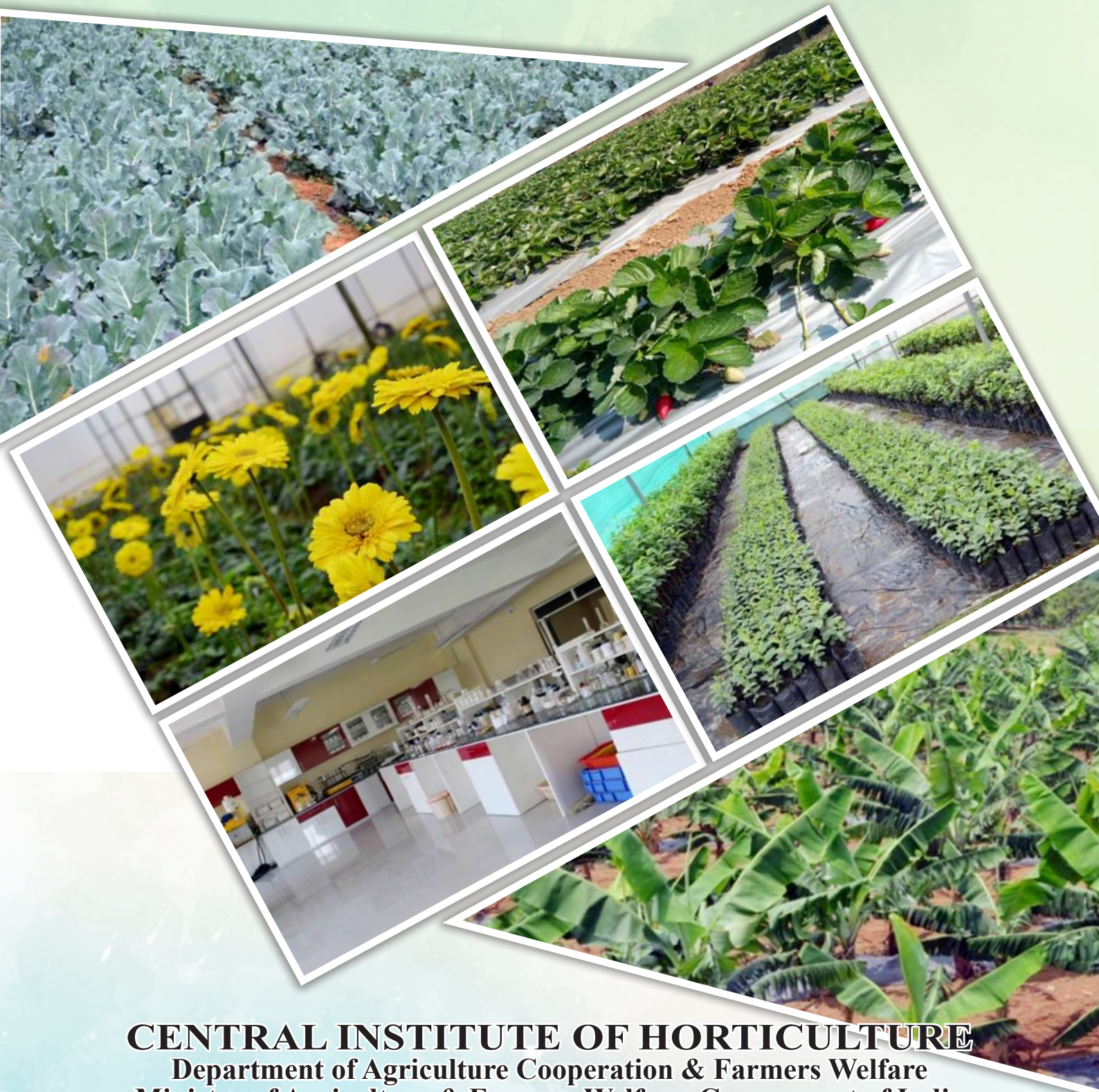




# ANNUAL REPORT (2017-18)



## **CENTRAL INSTITUTE OF HORTICULTURE**

**Department of Agriculture Cooperation & Farmers Welfare  
Ministry of Agriculture & Farmers Welfare, Government of India**

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**DR. S.K. PATTANAYAK**  
**SECRETARY**



भारत साकार  
कृषि एवं किसान कल्याण मंत्रालय  
कृषि, सहकारिता एवं किसान कल्याण विभाग

Government of India  
Ministry of Agriculture & Farmers Welfare  
Department of Agriculture, Cooperation  
& Farmers Welfare



## **FOREWORD**

Horticulture plays a pivotal role in the diversification of Indian Agriculture and in improving the economic condition of farmers and entrepreneurs as well as contributing significantly to the growth of national economy. Horticulture provides a wide range of opportunities to farmers for diversification of traditional agriculture and has immense potential to sustain large number of agro-industries, provide employment opportunities and secure nutritional security for the masses. North Eastern part of the country is a unique vibrant region for varied horticultural crops with diverse agro-climatic condition ranging from tropical to temperate crops.

Since inception, the contribution of Central Institute of Horticulture, Nagaland over the last 12 years has been phenomenal in terms of organizing programmes, exposure trips, skill development, capacity building, production of quality planting materials, technology demonstration, protected cultivation, organic farming, nursery accreditation and certification, agri business promotion, post-harvest management and marketing activities of horticulture crops, it is encouraging to see that the Institutes, organizations and stake holders of horticulture as well as the State Government of North East region in an effort to achieve its objectives.

I am happy that Central Institute of Horticulture is bringing out its Annual Report highlighting achievements made during the year 2017-18. I compliment and commend the Director, Central Institute of Horticulture, Medziphema and his team for their sincere efforts and I wish the Institute a bright future.

Date: August 27, 2018

*S.K. Pattanayak*  
(S.K. Pattanayak)



भारत साकार  
कृषि एवं किसान कल्याण मंत्रालय  
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Government of India  
Ministry of Agriculture and Farmers Welfare  
Department of Agriculture, Cooperation  
and Farmers Welfare  
Krishi Bhawan, New Delhi-110001

## **FOREWORD**



North Eastern region is the vibrant source of varied horticultural crops and is endowed with diverse agro-climatic condition ranging from tropical to temperate crops. As a part of high value agriculture, horticulture provides a wide range of options to farmers for diversification and has potential to sustain large number of agro-industries, provides employment opportunities, nutritional security and health care.

Central Institute of Horticulture (CIH) has been imparting various training programmes, exposure trips, skill development & certificate courses as a part of capacity building, promoting production of quality planting materials, technology demonstration of focus horticulture crops, protected cultivation, organic farming, nursery accreditation and certification, agri business promotion, post harvest management and marketing activities. The Institute has been actively co-ordinating with various reputed Institutes, different organization and stake holders of horticulture in the region and the state government departments of North East Region in an effort to achieve its objectives.

I compliment the Director, Central Institute of Horticulture, Medziphema and his team for putting their sincere efforts to address the challenges and augmenting the production and productivity of horticultural crops. I am happy that CIH is bringing out its annual report highlighting achievements made during the year 2017-18 and wish the institute all success in its future endeavour.

(Dr. B N S Murthy)

Horticulture Commissioner





## EXECUTIVE SUMMARY

The Annual Report (2017-18) of Central Institute of Horticulture, Nagaland provides an overall picture of the activities and the initiatives under taken for development of horticulture in North East Region. Despite limited manpower and other logistic constraints, the Institute has been able to make significant achievements during the year 2017-18.

With the objective to promote and propagate improved production technologies amongst farming community, the Institute established various demonstration plots of about 23 ha area under different fruit crops comprising fruit blocks for mother plants of different scion varieties to be used under different propagation activities, protected cultivation and evaluation of different vegetables and spices. Different mother block of fruits has been established for scion collection to be used in different propagation activities.

During the year under report, about 42,720 rootstocks were raised in Rangpur lime, cashewnut, guava and mango by the Institute. The Institute has propagated 5850 cashew nut cv V-4, VRI-3, H-1608, H-2/16 and BBSR-1 following soft wood grafting. In guava cv L-49, Allahabad Safeda, Sweta and Lalit, 18650 plants were propagated by wedge grafting method, 39500 citrus cv Khasi Mandarin, Mosambi and Acid lime following T-Budding and nucellar method. In terms of technology demonstrations, various on farm activities such as cultivation of organic turmeric and ginger, cultivation of vegetables, plantation of strawberry, fig, pomegranate, pineapple, marigold, gladiolus and oyster mushroom cultivation. Under protected cultivation, cultivation of high value vegetables, plantation of orchids and chrysanthemum were carried out. With regard to off farm demonstrations, the activity implemented were establishing litchi demonstration plot at Wokha district, Nagaland in an area of 1 ha.

In the field of human resource development, the institute has organized 38 farmers training which were attended by 2010 farmers and one training for trainers (25 officials) was conducted in identified areas of horticulture in the region. The Institute has also organized one exposure trip cum training for the officials and farmers of North East Region besides participation in various exhibitions and trade fairs. Extension bulletins and folders with special reference to focus horticultural crops of NER were also published by the institute for technology dissemination.

With the aim to establish a network of quality nurseries across the region for better production, supply and availability of quality planting material, the Institute acts as the nodal agency for providing accreditation and certification of nurseries in the region. The Institute during the reported year has accredited thirteen nurseries with a rating two Star for four nurseries and one Star rating to remaining nine nurseries.

The Institute have also completed five number of skill development course of one month duration on protected cultivation-floriculturist and Gardener. One certificate course of three months duration on post harvest management was also conducted for for the less educated youth of NER so as to provide self employment and entrepreneurship in focused courses.

In Agri-business promotion, the initiatives undertaken during the reported year were participation in five exhibitions/ Expo/ trade fairs in different place such as Delhi and Nagaland. The Institute has also organized two Farmers interface meet and horticulture stakeholders meet respectively at CIH, Nagaland. CIH has taken a lot of initiatives for the benefit of the farmers in post harvest management which include trainings, value addition, organizing in exposure trips, exhibitions, etc., to provide suitable market linkages to the horticulture crop growers of the region and giving an opportunity to the farmers to showcase their produce and earn a premium for their high quality horticulture produce.

These few achievements made by the Institute have been possible by the sincere effort and hard work of entire CIH staff. The Institute also extends its profound gratitude and acknowledgement to the Horticulture Commissioner and officials at DAC & FW, Ministry of Agriculture cooperation & Farmers Welfare, Government of India for their constant support, guidance and cooperation.

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

## 1. ABOUT THE INSTITUTE

Recognizing the huge potential for development in the North-Eastern region and to provide institutional support to tap this potential, Government of India has set up the “Central Institute of Horticulture” at Medziphema, Nagaland in the year 2005-06 under the Central Sector Scheme. This Institute has been set up at Medziphema, Nagaland 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.

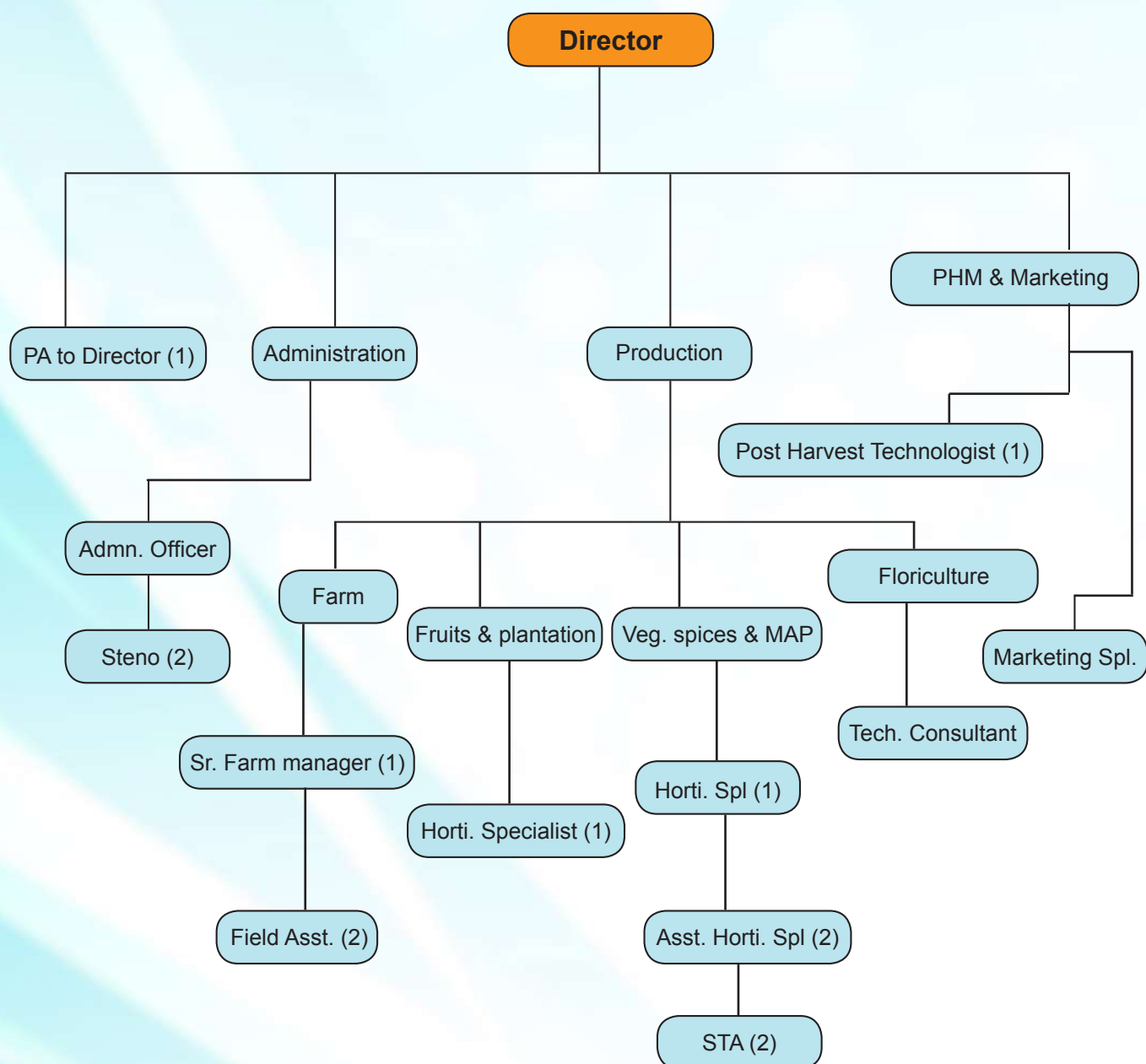
### OBJECTIVES & PROGRAMMES OF THE INSTITUTE

- ❖ 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 gro

## ORGANIZATIONAL SETUP





## 2. HORTICULTURE SCENARIO AND STRATEGIES FOR IMPROVING HORTICULTURE SECTOR IN NE INDIA

Horticulture in north east is known for its vast resources and its varied climate, altitude, edaphic condition, offers immense scope to enrich biodiversity in the region and social diversification. Horticulture in North east is a significant and upcoming sector in India and has proved to be the best diversification option for agriculture land use, because of assured and remunerative returns to the farmers. Horticulture provides higher unit of productivity and offers great scope for value addition and this sector is taking inroads throughout the length and breadth of the region as this region has rich diversity of both indigenous and introduced horticultural crops.

The diverse agro-climatic condition has benefitted this region to grow horticulture crops ranging from tropical to temperate crops. The tropical, sub-tropical and temperate fruits include Mandarin Orange, Pineapple, Banana, Guava, Pear, Plum etc. Vegetables both indigenous and exotic are grown across a wide range of agro-climatic zones. The higher altitude provides a conducive ecosystem to grow traditional vegetables like potato and cole crops. Spices such as black pepper, turmeric, ginger and chillies are grown abundantly. Plantation crops such as tea, cashewnut and arecanut have been performing well and offer a great scope for area expansion. During the last two decades, there has also been a significant sensitization of the global community towards organic cultivation in NER for environmental preservation and assuring of food quality. After almost a century of development, organic agriculture is now being embraced by the mainstream and shows great promise commercially, socially and environmentally even in NER region. In North east region, the production of fruits accounts to 4867 MT, Vegetables 6664.23 MT, Cut flowers 64.74 MT, Loose flowers 51.6 MT, Aromatic crops 2.47 MT, Spices 766.28 MT, Plantation 274.71 MT. Therefore, the North East Region has the great scope for the enhancement of production and productivity under horticulture industry due to conducive climatic condition thus improving the socio economy of the farmers of North East Region of India. Keeping in view the regional demand for horticultural crops, CIH has been working and focussing to tap the potential and fully exploit the focus crops of this region.

Table 1: HORTICULTURE CROPS CATEGORY WISE 2017-18 (1ST Adv. Est.)

Area in '000 ha														
Production in '000 MT														
Sl. No.	States/UTs	Fruits		Vegetables		Plantation		Aromatics & Medicinal		Flowers		Spices		Total
		A	P	A	P	A	P	A	P	A	P	A	P	
										Loose	Cut			
1	Arunachal Pradesh	49.15	125.34	1.77	14.57	0.07	0.10	0.46	0.99	0.02	0.01	0.07	11.50	62.97
2	Assam	163.99	2433.95	320.70	4033.30	95.50	190.64	4.49	0.17	5.17	34.55	57.75	120.59	7044.11
3	Manipur	54.931	523.609	58.208	359.298	0.90	0.32	0.00	0.00	0.24	0.06	0.30	10.52	906.84
4	Meghalaya	35.50	443.02	49.73	522.55	25.52	33.25	0.00	0.00	0.01	0.00	0.35	18.70	1091.99
5	Mizoram	62.89	342.04	36.98	179.86	11.90	7.38	0.77	0.82	0.20	0.46	0.00	24.93	628.40
6	Nagaland	39.32	380.30	47.06	561.57	2.05	9.34	0.10	0.49	0.06	0.02	6.18	15.95	1063.96
7	Sikkim	18.33	24.01	25.54	190.72	0.00	0.00	0.00	0.00	0.24	16.50	0.09	33.22	298.80
8	Tripura	58.18	594.70	46.57	802.37	16.15	33.68	0.00	0.00	0.00	0.00	0.00	5.72	1448.88

Source : DAC & FW, Ministry of Agriculture Cooperation and Farmers welfare, Govt. of India, 2017-18 (1<sup>st</sup> Advance estimate)

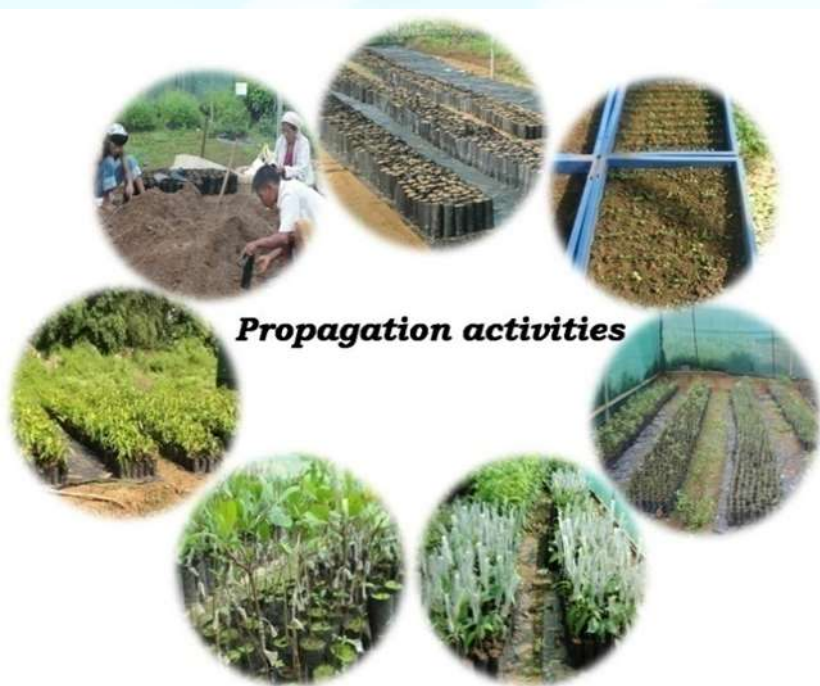
### 3. SALIENT ACHIEVEMENTS

#### 3.1. Production and distribution of quality planting material

##### 3.1.1. Establishment of scion/mother block under field condition

One of the key mandates of CIH is production of quality planting material since availability of good planting material is very important for horticulture development. The Institute has already established mother blocks of Cashew, Citrus, Mango, Pomegranate, Kinnow Mandarin, Assam Lemon, Khasi Mandarin, Guava, Pineapple, Litchi, Aonla, Peach, Bael, Strawberry and Citrus Scion blocks.

During 2017-18, gap filling of existing mother blocks was done in fruit crops such as Guava cv Lucknow-49, Allahabad Safeda and Citrus cv Khasi Mandarin.



##### 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 for further multiplication. The numbers of rootstock raised at the Institute during the year 2017-18 are Rangpur lime (8600), cashewnut (19100), guava (7600) and Mango (7420)

The rootstocks raised by the Institute in the following crops till date is mentioned below:

Sl. No.	Crop	Rootstock raised	Source
1.	Cashew (Local)	19100	Local
2.	Citrus (Rangpur lime)	8600	ICAR-CCRI, Nagpur
3.	Mango (Local)	7420	Local
4.	Guava (Local)	7600	Local
	<b>Total</b>	<b>42720</b>	





Fig 1. Mango rootstock seedling



Fig 2. Guava rootstock seedling



Fig 3. Cashew 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 of horticulture crops and considering the huge demand for quality planting material of improved varieties, the Institute is putting its effort in carrying out propagation activities in crops like citrus, cashew and guava. During the period under report, the Institute has propagated 5850 cashew nut cv V-4, VRI-3, H-1608, H-2/16 and BBSR-1 following soft wood grafting. In guava cv L-49, Allahabad Safeda, Sweta and Lalit, 18650 plants were propagated by wedge grafting method, 39500 citrus cv Khasi Mandarin, Mosambi and Acid lime following T-Budding and nucellar method. The successful propagated plants are used for gap filling, sale to various stakeholders at minimum price and also distribute to the farmers for demonstration programmes at farmers field in NER.

The scion /bud stick were produced from existing scion mother block at the Institute and during the year under report, the Institute has produced 6700 scion stick of Cashewnut (V-4, VRI-3, H-1608, H-2/16, and BBSR-1), 19500 scion stick of Guava (L-49, Allahabad Safeda, Sweta and Lalit), 9500 bud stick of citrus (Khasi Mandarin, and Mosambi).



Sl. No.	Crop	Propagation method	Propagated Plants
1.	Guava (Lucknow-49, Allahabad Safeda, Lalit & Shweta)	Wedge grafting	18650
2.	Citrus (Khasi Mandarin, Mosambi & Acid lime)	T- Budding, nuceller seedling	39500
3.	Mango (Mallika, Langra, Dasehari & Amrapali)	Wedge grafting	6300
4.	Cashew (VRI-3, V-4, BBSR-1, H-2/16, H-1608)	Soft wood grafting	5850
		<b>Total</b>	<b>70300</b>



Fig 5. Grafted Guava



Fig 6. Grafted Cashewnut



Fig 7. Mango Grafted



Fig 8. Citrus budded

The scientific method is followed in the production of quality planting materials. The rootstocks were selected as per the crop and raised in the plastic portray under protected condition at Institute nursery unit. The Institute has propagated cashew nut cvs V-4, VRI-3, H-1608, H-2/16 and BBSR-1 through soft wood grafting, guava cvs. L-49, Allahabad Safeda, Sweta and Lalit, were propagated by wedge grafting method, citrus cvs Khasi Mandarin, Valencia, W. Murcot, Early Gold and Mosambi

were propagated following T-Budding and Wedge grafting method. The citrus was propagated through 'T' budding method, Cashew nut was propagated through Soft wood grafting method and Guava & Mango were propagated through Wedge grafting method. The propagated plants were monitor regularly and scientific cultural practices were followed as and when required as per need for better growth and to check the infestation of insect & pest and diseases in nursery unit. The plants were harden in shade net before distribution /sold to the farmers. The primary data of farmers was recorded and growth performance of the supplied planting materials were collected through survey and data were collected and analyzed from different districts of Nagaland and Assam states in the year 2010 -17.

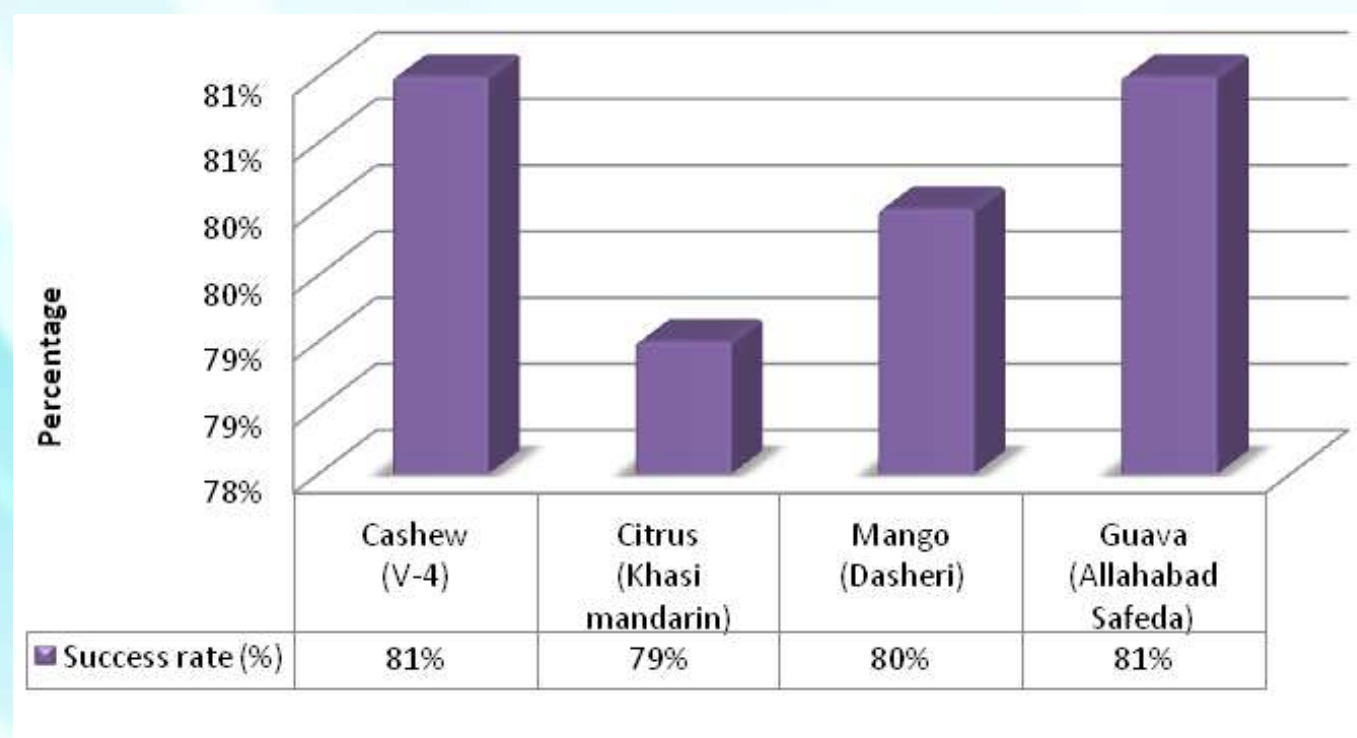


Fig I. Success rate of propagated materials produced in CIH



### 3.2. Technology demonstrations under open field

#### 3.2.1. Spices

##### 3.2.1.1. Ginger

Ginger is a prominent spice in North east region and its cultivation is undertaken as a cash crop mostly in jhum fields spread over the hills and tribal areas of the entire region. Since large scale use of chemical fertilizers has resulted in deterioration of soil health in terms of physical, chemical and biological parameters, there is an emergent need to utilize other source of plant nutrients like-organic manures as they constitute dependable sources of plant nutrients. Therefore, a demonstration was conducted study the effect of organic manures such as FYM + Azotobacter, Pig manure + Azotobacter on growth, yield and quality of ginger cv. Nadia.



Fig 9. Organic ginger cultivation

It is observed that application of Pig manure + Azotobacter recorded the maximum plant height (72.40 cm), Number of tillers /clump (8.87), Number of leaves/plant (23.93), Finger length (8.97 cm), Rhizome yield (18.14t/ ha) and Oleoresin (5.35%) followed by FYM + Azotobacter. Hence, it is suggested that application pig manure is a better source of nutrient input for obtaining higher yield as well as in sustaining soil fertility under the foothill agro-climate conditions.

##### 3.2.1.2. Turmeric

Turmeric being a value added crop may be cultivated by the farmers on commercial basis. During the reported period, demonstration was conducted study the performance on growth, yield and quality of two cultivars Megha Turmeric-1 and Lakadong. The study was undertaken in an area of 0.1 ha during the month of April 2017. In case of recommended practices, field drainage plant protection measures and balanced cultural practices were followed.



Fig 10. Organic turmeric cultivation

The result of demonstration showed that the Plant height (102.52 cm), Number of leaves (7.0), Number of clump (2.0) and Yield (9000 kg/ha) was recorded maximum in Lakadong, whereas, the maximum weight of rhizome/plant (0.35 kg), and Cucurmin content (4.70%) was recorded in Megha Turmeric -1. Hence, it can be suggested that the cultivars Megha Turmeric-1 and Lakadong are suitable for cultivation in the region coupled with suitable technology for enhancing the productivity of turmeric crop.

### 3.2.2. Vegetables

#### 3.2.2.1. Okra

An open field demonstration was carried out at CIH farm, Nagaland during 2017 to study the performance of organic manure on growth and yield of okra var. Arka Anamika in an area of 300 sq m. A total of four treatments viz., FYM, Vermicompost, FYM + Vermicompost and control were replicated three times in a randomized block design. Manures were incorporated at the time of planting. Intercultural operation was adopted at 20-25 and 40-45 days after planting. Irrigation was given according to the needs. Seeds were sown during the month of April and harvested during the month of August.



Fig 11. Field demonstration in okra

Observations were recorded on growth and yield characters. The data recorded indicates that the maximum plant height (91.04 cm) was obtained in treatment vermicompost, Number of fruits per plant (10.8) was highest in treatment FYM + vermicompost and fresh weight of fruit (20 g) and yield per plant (0.300 kg) was found maximum in FYM followed by vermicompost and FYM + Vermicompost. Thus, it may be concludes that application of organic manures 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

A field demonstration has been carried out to study the performance of tomato cv. Durgesh Navodya with four treatment viz., FYM, FYM+ Vermicompost, Vermicompost and Control under open field agro-climatic condition. The seedling was transplanted during the month of April and observations were recorded on growth and yield characters.

From the data recorded, it is observed that application of FYM resulted in higher Number of branches (7.75), Number of fruit per plant (33.40) and Fruit yield (kg)/100 sq m (25.31). Maximum plant height (56.75cm) and fruit of marketable size (20.30 kg) was obtained in treatment FYM + vermicompost. Higher T.S.S (3.75°Brix) was observed in treatment vermicompost and control whereas, maximum content of Vitamin C (30mg/100g) was found Vermicompost.



Fig 12. Field demonstration in tomato

Hence, it is suggested that application organic manure is a better source of nutrient input for obtaining higher yield as well as in sustaining soil fertility under the foothill agro-climate conditions.



### 3.2.2.3. Broccoli

A field demonstration was conducted at Central Institute of Horticulture, Nagaland during the winter crop growing season (November to February) of 2017-18 with an objective to study the response of different organic manures on growth and yield of broccoli (*Brassica oleracea* var. Italica) and also to assess adoption of improved technology and to popularize broccoli variety Green Magic and its varieties among the marginal and small farmers. Two treatments FYM and FYM + Vermicompost were replicated three times and were incorporated at the time of planting.



Fig 13. Field demonstration in broccoli

Among the two organic manure treatments, application of FYM performed better than the other treatment through improved plant characters viz., plant height (50.30 cm), Curd length (11.36 cm), Curd diameter (12.63 cm), Yield per plot (2.83 kg), Yield (90.60 q/ha), though the treatment FYM + Vermicompost showed positive effect through growth and yield characters. The better efficiency of organic manures might be due to the fact that the organic manures especially FYM would have provided the micronutrients such as Zn, Cu, Fe, Mn, and Mg in an optimum level. The results revealed that among the different organic manure treatments, broccoli responded well to the application of FYM.

### 3.2.2.4. Cabbage

During the reported period, a field demonstration to study the response of different organic manures on growth and yield of cabbage was conducted at CIH, Nagaland during 2017-18. The demonstration was conducted in a Randomized Block Design replicated thrice, in the newly initiated organic farming trial. There were three treatments involving different organic manures viz. FYM, FYM + Vermicompost and control. The growth and yield attributing characters were recorded and the mean data were analyzed statistically.



Fig 14. Field demonstration in cabbage

The data recorded indicate that FYM treatment gave the maximum plant height (42.60) 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.

### 3.2.3. Flowers

#### 3.2.3.1. Gladiolus

Gladiolus is one of the most important bulbous ornamental grown for its long lasting spikes with attractive colour. 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 2017-18. 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 a spacing of 20 x 30 cm.



Fig 15. Gladiolus field demonstration

The observation recorded indicates that the maximum growth characters i.e, Plant height (62.69 cm), Number of leaves per plant (4.80), leaf length (34.46 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 (58.41 cm), Number of floret per spike (8.61), Flower diameter (6.68 cm), Flower length (5.47 cm), Diameter of corm (3.40 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.

#### 3.2.3.2. Marigold

A field demonstration was conducted at CIH, Nagaland during 2017-2018 to study the performance of FYM on growth and flower yield of marigold var. Pusa Narangi under open field condition. Seedlings were transplanted during the month of December in the main field after 60 days in an area of 500 sq m. Observations were recorded on plant height (cm), stem diameter, number of primary branches /plant, No. of flowers per plant, and Flower yield/ plant. The treatment farmyard manure @ 6 tonnes/ha and control were replicated three times and was incorporated at the time of planting.



Fig 16. Field demonstration in marigold

The recorded data indicates that application of FYM gave the maximum plant height (36.93 cm), Stem diameter (4.82 cm), Number of primary branches/plant (3.66), Number of flowers per plant (21.00), and Flower yield/ plant (260.50g). Thus, from the demonstration, it can be suggested on that FYM can play a vital role in sustaining the marigold flower production under foothill conditions of Nagaland.



### 3.2.4. Fruits

#### 3.2.4.1. Pineapple

Pineapple cv. Giant Kew was planted on slope area (1.0 ha) double row system with spacing of 30 x 60 x 90 cm. The main objective of plantation is:

- a) To encourage and benefit the farmer's through intensive crop cultivation by demonstrating poly mulch technologies.
- b) High quality production systems for domestic market.
- c) To achieve potential productivity per unit area.
- d) Lead the farmers with technology.
- e) To check the soil erosion on sloppy area.



Fig 17. Pineapple cultivation under mulch on slopes

#### 3.2.4.2. Fig

The edible fig is a member of the mulberry family, Moraceae. The fig fruit is consumed fresh or dried. Leaves have medicinal properties due to their bergaptene and psoralene content. Fig fruits are known to have laxative properties. During the reporting period, the Institute has planted Fig (cv. Poona) in an area of 0.4 ha. Farmyard manure was incorporated at the time of planting and the saplings were transplanted in the field at a distance 5 x 5 m in a pit size of 90 x 90 x 90 cm. The main objective to develop the fig block is to popularize the improved production technology and multiplication of plants for further area expansion in the NER States.



Fig 18. Fig plantation cv. Poona

#### 3.2.5. Oyster mushroom cultivation

The *Pleurotus* spp is generally referred to as Oyster mushroom in India. It is economically viable enterprise because of its low investments. A trial is carried out in small unit area of (5m x 3m x 4m) at the Institute by recording some basic parameters. The income generation from the mushroom enterprise is very fast. For oyster mushroom it takes only 20-30 days to get the first harvest and the entire cropping cycle is completed within 45-60 days. Therefore, a farmer can incorporate mushroom cultivation to get additional income.



Fig 19. Demonstration of oyster mushroom cultivation

**Table 2. Data recorded on parameters of mushroom**

Variety	Weight of sterilized straw+ spawn	Time taken for incubation	Temperature recorded	Time taken for first harvest	Cropping cycle	Total yield/bag
Oyster mushroom ( <i>Pleurotus spp.</i> )	2.5 kg	20-25 days	22-27°C	25-30 days	45-60 days	800g-1000 g

**Table 3. Economic analysis of Oyster mushroom (small unit)**

Variety	Estimated expenditure	Total Expenditure	Production (kg)	Gross return (Rs)	Net return (Rs)	Cost Benefit Ratio
	Materials & inputs					
Oyster mushroom ( <i>Pleurotus spp.</i> )	10,000	10,000	200kg	24000	14000	1.4

### 3.2.6. Organic input production

Organic input production units are established in the Institute. The objective of the unit is to produce inputs at low cost of production which would eventually help the farmer meet the input requirement at the farm. It would also help in generating additional income through sale of inputs.

#### 3.2.6.1. Vermicompost

Vermicomposting is most efficient method of waste management. Vermicomposting is being carried out in the institute for demonstration and for the production of organic inputs. It is prepared in four beds at a dimension of 6 m x 1.2 m x 0.9 m. Organic matter generated in the farm is being utilized as raw materials while the earthworm is procured from the Bio lab, Department of Agriculture, Nagaland. About 800 earthworms are introduced per bed and the annual capacity of the yield is around 4.0t from four harvests. The main objective is to demonstrate to the farmers/ trainees and also to meet the requirement of the organic inputs for the demonstration plot of the institute.



Fig 20. Vermicompost unit at CIH farm

#### 3.2.6.2. NADEP method of composting

Three units of NADEP organic compost was set up. Each unit produces approximately 2.5 tons of compost is prepared within 90-120 days which produces an annual harvest of about 7.0 tonne. Compost making is an efficient way of converting all kinds biomass into high value fertilizer that serves as a good alternative to farmyard manure, especially for crop-growing households without



livestock. Approximate rate of FYM is about Rs. 350/tonne and by adopting this method of composting a farmers can also reduce cash expenses on purchase of manures.



Fig 21. NADEP Unit



Fig 22. NADEP compost bed

### 3.2.6.3. Bio formulation

To create awareness among the farmers for promotion of organic farming, bio-formulation like Panchgavya and Jeevamrita were prepared at institute level. The formulation helps to promote growth and development of soil microbes and improve soil conditions. The methods of preparations were being demonstrated to the farmers and the outputs were used in the organic plot of vegetables and fruit crops of the institute.



Fig 23. Preparation of bio formulation

### 3.2.7. Maintenance of existing plantation of fruit crops

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.

#### 3.2.7.1. 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 13.65 kg/plant.



Fig 24. Peach plantation cv. Shane-E-Punjab

### Recommendation

Shane- E –Punjab of Peach is suitable for low chilling area in Nagaland and North East Region.

#### 3.2.7.2. Mango

The Institute has established mango block of varieties Langra, Bombay green, Pant Sinduri, Dashehari, Mallika. 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. Highest yield (2.45t/ha) was observed in Mallika variety. Dashehari recorded the highest Juice content/ fruit, T.S.S.

### Recommendation

Mallika variety of mango is suitable for cultivation in Nagaland and north east region

#### 3.2.7.3. Strawberry

CIH, Nagaland has established a demonstration plot for strawberry varieties Sabrina, Winter Dawn, Barak, Gili and Hada in an area of 1 acre with an objective to study the performance of different varieties under Nagaland condition. Growth, physical and chemical data was collected from demonstration plots and analyzed. Winter Dawn proved to be the best suited with a yield of 6.25 t/ha followed Sabrina and Hada.

### Recommendation

Winter Dawn variety of strawberry is suitable for cultivation in Nagaland and north east region.

#### 3.2.7.4. HDP guava

Ultra high density plantation of guava variety Lucknow 49, Shweta, Lalit and Allahabad safeda was established in an area of 1 ha at CIH farm. The main objective is meadow orcharding to control tree size and maintain desired architecture for better light interception and ease in operations such as pruning, pest control and harvesting. Growth, physical and chemical data was collected from demonstration plots and cost of cultivation, net income and Benefit: Cost ratio were calculated and analyzed. The highest yield was recorded in Allahabad Safeda (11.27 t/ha).

### Recommendation

Allahabad Safeda variety of guava is suitable for cultivation in Nagaland and north east region.



Fig 25. Mango plantation



Fig 26. Strawberry cultivation



Fig 27. High density planting of Guava

### 3.2.8. Impact of technology demonstrations at farmers' field

The demonstrations in farmer's field were confined under the close supervision of technical staff of the Institute. The demonstrations are conducted in a block of 2- 4 ha land area in order to have better impact of the demonstrated technologies on the farmers field which act as readymade sites for field level extension functionaries as an educational aid, something like learning by doing.

The primary data on the input utilization cost of cultivation and returns were collected from the selected growers and other relevant information was collected through a survey method for selected fruits and vegetables. The critical inputs were applied as per the scientific package of practices recommended by ICAR, Barapani.

The Primary data was collected from different districts of Assam, Nagaland and Manipur states in the year 2010-17. From number of districts 10 farmers were selected and based on land holding below 1 ha, 1ha to 2 ha, 2 ha to 4 ha and above for the marginal, small, medium and large farmers, respectively.

The area, production & income of farmers have increased significantly over the years. The above chart provides a comparison of the status prevailing prior to 2010 and the status in 2017-18. The average area has increased from 1.4 ha to 6.4 ha and the average production of farmers has increased from 124 tons to 625 tons. This has lead to increase in income from Rs. 30785/annum to Rs. 141428/ annum.

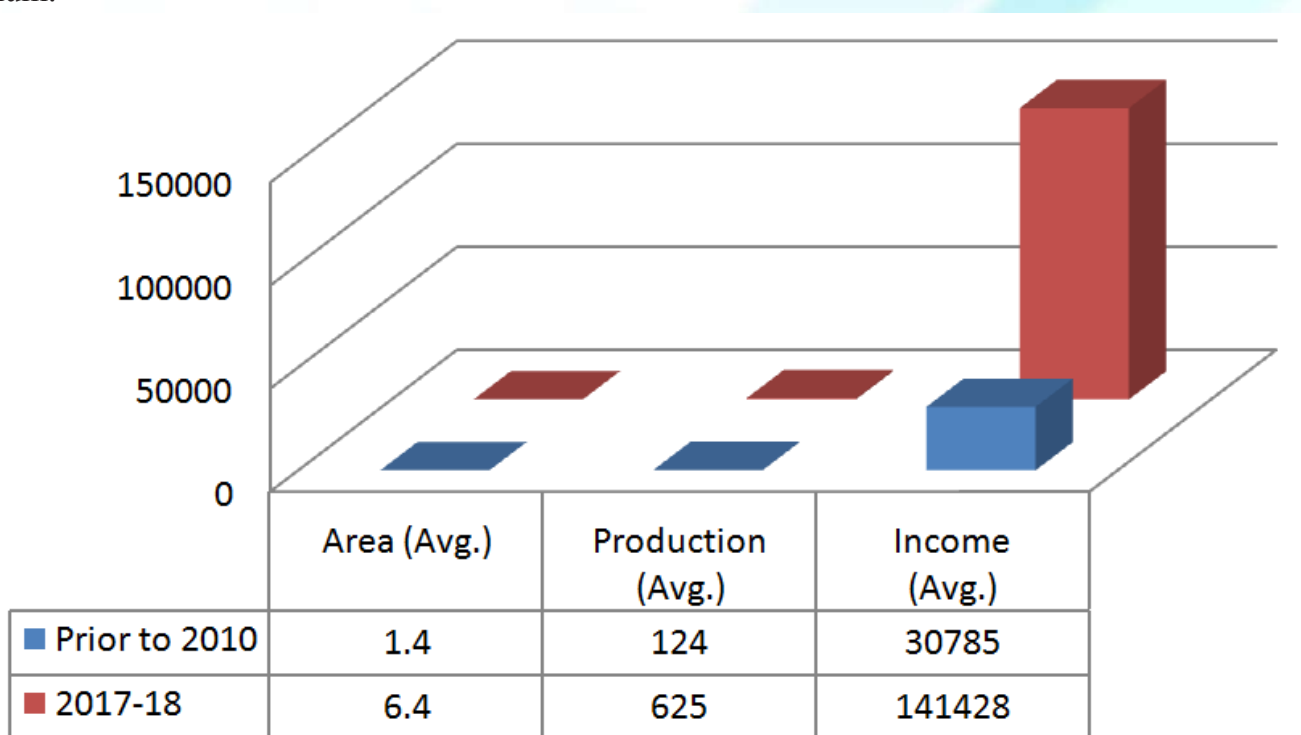


Fig. II. Increase in area, production & income of farmers over the years

A 22% increase in area under horticulture crops is reported by the farmers through technology demonstration which has lead to a 20% increase in production of horticulture crops. The income of farmers has also increased 21% over the years through horticultural activities.



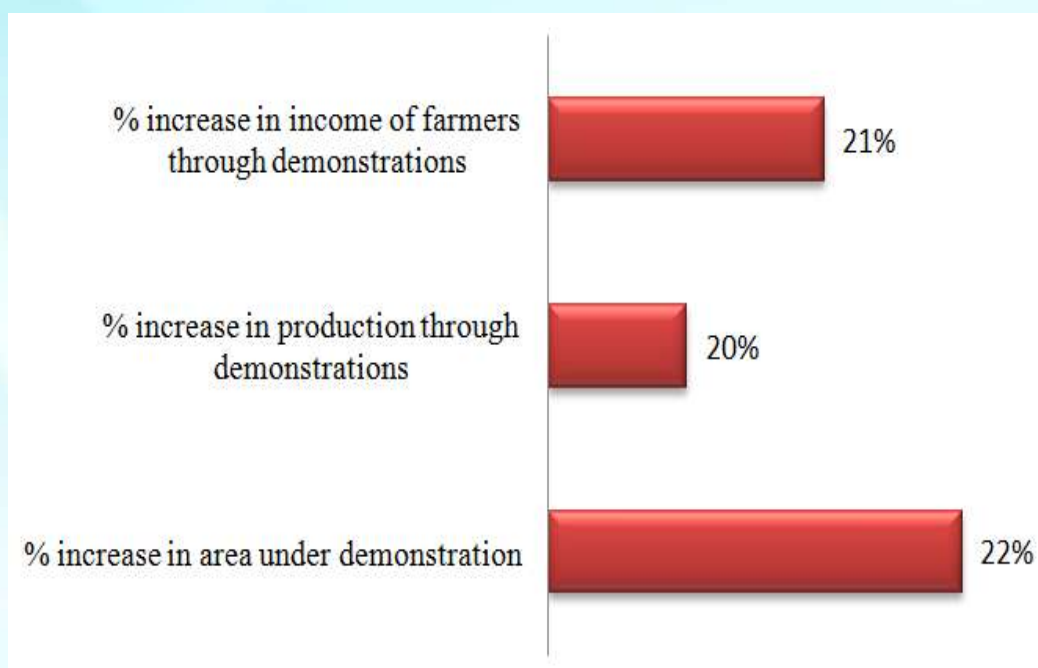


Fig. III. % increase in area, production & income of farmers through technology demonstration

### 3.3. Technology demonstrations under protected cultivation

#### 3.3.1. Orchid

*Dendrobium* is one of the important genera of orchid and grown commercially for cut flowers. 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 among the different varieties evaluated, Sonia recorded maximum plant height (55.42 cm), length of internodes (4.07 cm) and number of pseudo bulbs per plant (8.71), and White Singapore recorded 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 varieties Sonia. The varieties Sonia (187.13 days) and White Singapore (201. 67 days) have taken less number of days for flower bud initiation where as Sonia exhibited minimum time interval from flower bud initiation to first flower opening and first flower opening to harvest (31.43 days and 27.67 days respectively). Out of the two varieties studied, Sonia exhibited free-flowering nature and seasonal flowering compared to White Singapore variety. The number of spikes per plant per year (8.67) was recorded maximum in variety Sonia.

The above mentioned findings indicated that out of the two cultivars studied, the cultivar Sonia purple was found to be the best cultivars showing significantly highest mean values for most of the growth and flower characters including plant height of pseudo bulb, Girth of pseudo bulb, number of pseudo bulb per plants, number of leaves per pseudo bulb, Leaf length, Leaf breadth, number of flowers per plant/year.



Fig 28. Demonstration of *Dendrobium* orchid cv. Sonia & White Singapore under shade net

### 3.3.2. Anthurium

Anthurium is an evergreen; tropical herbaceous plant cultivated for its colour, full spathe and unusually attractive foliage and is also known as ‘Flamingo Flower’. It is native to tropical parts of South America, mainly Columbia. Genus anthurium comprises of about 500-600 species. A typical commercial anthurium plant is a low-growing perennial, herbaceous plant that thrives best under 60 to 80 percent shade at temperatures of 18<sup>o</sup> to 24<sup>o</sup> C and relative humidity of 60-80 percent.

A field demonstration was conducted at CIH farm under protected cultivation with an objective to study the performance and adaptability of different varieties of anthurium viz., Xavia, Tropical, Moment and Pistachi under foot hill condition of Nagaland and also to ensure uniformity performance evaluation as well as vegetative growth and flowers quality in control condition. The observations recorded showed that the 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) and No. of sucker/plant (2.66) was found highest in variety Xavia. Whereas, maximum Spathe length (17.16cm), Spathe breadth (11.03 cm) is recorded in variety Tropical and maximum No. of leaves (11.00) and Vase life (21.33 days) was found in variety. Therefore, from the study, it may be concluded that variety Xavia is suitable for cultivation under Nagaland condition followed by Tropical and Pistachi.





Fig 29. Cultivation of different varieties of Anthurium under shade net

### 3.3.3. Gerbera

An experimental trail was carried out during 2017-18 to study the performance growth and flower production of different varieties of Gerbera under semi protected condition at Central Institute of Horticulture, Medziphema Nagaland. The study was designed with three replication and undertaken with followed by standard cultivation practices to observe leaf production rate at various date after transplanting, days taken for first flower initiation, average stalk length of flowers, diameter of flowers, number of flowers per plant and vase life at 2% sucrose level of Gerbera cv. Lieke, Preinteze, Daikan, Ice Queen, Daphane, Shaina and Jaffana. 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. It was also found that cv. Lieke initiated flower bud visibility (75.82) to produce flower compared to other cultivars under study. In respect of vase life study, cv. Lieke sustained fresh with maximum days (12 days) of vase life at 2% sucrose level followed by Ice Queen (9.0 days) and Daiken (8.2 days).

The above mentioned findings indicated that out of the seven cultivars studied, the cultivar Lieke was found to be the best among all the cultivars showing significantly highest mean values for most of the growth and flower characters including plant height, number of leaves per plant, leaf length, leaf breadth, plant spread, number of suckers per plant, days to flower bud visibility, flower size, flower weight, stalk length, diameter of flower, number of flowers per plant/year, shelf life and vase life. The other promising cultivars suitable for Nagaland condition are Daphane, Shaina and Jaffana which also exhibited acceptable morphological and flowering quality characteristics.



Fig 30. Cultivation of different varieties of Gerbera under polyhouse



### 3.3.4. Tomato

During 2016-17, the Institute has undertaken cultivation of tomato variety Himsona and Rishika F1 under poly house in an area of 900 sq m with the following objectives to demonstrate intensive crop cultivation farm by demonstrating latest technologies, high quality vegetables production systems for domestic market and to achieve potential productivity per unit area. The seedlings were transplanted after 25 days of sowing at a spacing of 60 x 45 cm. Manures were incorporated at the time of transplanting and observations on plant growth and physico-chemical parameters were recorded.



Fig 31. Cultivation of tomato under polyhouse

The result showed that plant growth and physico-chemical parameters such as Fruit weight (36 g), Fruit diameter (33.85 mm), Acidity (0.60%), Fruit firmness (9.06 kg/ cm<sup>2</sup>), Lycopene (1.89 mg/ 100g), Total sugar (3.14 %) was found significant in variety Himsona whereas, T.S.S (7.00 °Brix) was recorded highest in Rishika F1. Hence, the result indicated that the variety Himsona is suitable for growing under protected cultivation as it showed significant impact on growth, yield and other attributes.

### 3.3.4. Capsicum

Sweet pepper [*Capsicum annum* L. var. Grossum (L) Sendt] is one of the important vegetable crops which require mild climate for its growth and development. The



Fig 32. Cultivation of capsicum under polyhouse

fruits are harvested either at green mature stage or at colouring stage and is a very good source of vitamin A and C and other nutrients having great demand in big cities and other urban areas of the country and fetch very high price. Capsicums are grown under shade net houses and green houses to get good quality and better yield round the year.

A field demonstration was conducted at Central Institute of Horticulture, Medziphema during 2017-2018 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. The maximum plant height (81.60 cm), Number of branches plant<sup>-1</sup> (6), Number of leaves plant<sup>-1</sup> (80), fruit length (6.20 cm), fruit diameter (5.39 cm), Number of fruits plant<sup>-1</sup> (10.20) and yield ha<sup>-1</sup> (60.53 t) were recorded in the treatment FYM followed by Vermicompost. The highest value for TSS (8.36 ° Brix) and vitamin –C (115.40 mg 100g<sup>-1</sup>) was recorded in the treatment vermicompost. 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.

### 3.4. Human resource development

Trainings are imparted to the State Government officials and field extension functionaries at village level and district level in all the eight states of the North East Region. In order to promote sustainable horticultural technologies in villages, the Institute after identifying the areas for dissemination, assess the training needs and appropriate course content are designed for different states of NER. The methods adopted for assessing the impact assessment was obtained through feedback and telephonic follow up with the farmers and master trainers to have effective linkage mechanism between the Institute, development agencies and farmers.

#### 3.4.1. Farmers training

During 2017-18, the institute has organized 38 farmers training which were attended by 2010 farmers. The trainings were conducted in different areas of horticulture in different states of the region and as mentioned in brief below.

**Table 4. List of various farmers' training conducted during 2017-18**

Sl/ No	Topic	Date	Venue	No. of participants	Organized/ sponsored
1	Scientific cultivation practices of Apple & its management practices	28th April, 2017	Thinamir village, Kipheri Nagaland	67	Organized by ADC Pungro, Kipheri
2	Importance & scope of Banana & Guava cultivation & its PH management techniques	30th May, 2017	Chetheba, Phek Nagaland	42	In coll. With DHO, Phek
3	Flower arrangement - its principles and floral designs	31st May, 2017	Pfutsero, Phek Nagaland	51	In coll. With DHO
4	Training programme on Horticulture	12th June, 2017	Phek Nagaland	60	In coll. With DHO

5	Training programme on Horticulture	13th June, 2017	Meluri, Nagaland	50	In coll. With DHO
6	Training programme on Horticulture	14th June, 2017	Kanjang , Nagaland	50	In coll. With DHO
7	Importance & economics of Oyster mushroom cultivation for rural livelihood	19th June, 2017	Tura, Meghalaya	50	In coll. With SNAMRIK Club, Meghalaya
8	Naga king chilli cultivation & post harvest techniques for women SHGs	20th June, 2017	Tura, Meghalaya	50	In coll. With SNAMRIK Club
9	Value addition for important crops for better rural income	21st June, 2017	Tura, Meghalaya	50	In coll. With SNAMRIK Club
10	Importance of indigeneous fruit crops 7 spices and its value addition	22nd June, 2017	Tura, Meghalaya	50	In coll. With SNAMRIK Club
11	Sustainable kitchen gardening for self sufficiency for rural areas	23rd June, 2017	Tura, Meghalaya	50	In coll. With SNAMRIK Club
12	Importance & scope of king chilli cultivation in AP	26th June, 2017	Ligu vill, Arunachal Pradesh	50	In coll. With Murmenrijo welfare consumer cooperative society, Arunachal Pradesh
13	Nursery raising techniques for king chilli cultivation	27th June, 2017	Lingko vill., Arunachal Pradesh	50	In coll. With Murmenrijo welfare consumer cooperative society
14	Main field preparation for methods of cultivation for king chille	28th June, 2017	Sigun vill., Arunachal Pradesh	50	In coll. With Murmenrijo welfare consumer cooperative society
15	Pest & disease of king chilli management	29th June, 2017	Liruk vill., Arunachal Pradesh	50	In coll. With Murmenrijo welfare consumer cooperative society



16	Value addition for king chilli and aloe vera	30th June, 2017	Niji vill., Arunachal Pradesh	50	In coll. With Murmenrijo welfare consumer cooperative society
17	Approaches for organic production of horti crops	24th July, 2017	Tengnoupal Dist. Manipur	50	In coll. With RAPA, Manipur
18	Technological intervention for PH loss in hort crops	25th July, 2017	Kakching dist. Manipur	50	In coll. With RAPA
19	Nursery management & propagation of fruit crops	26th July, 2017	Chandal dist., Manipur	50	In coll. With RAPA
20	Production technology of Aloe vera & its value added products	27th July, 2017	Ukhrul, Manipur	50	In coll. With RAPA
21	Fresh flower arrangement & its principle designs	28th July, 2017	Thoubal, Manipur	50	In coll. With RAPA
22	Approaches for organic production of horti crops	31st July, 2017	Helipong vill., Tuensang, Nagaland	61	In coll. With AH Agri. & Allied cooperative society
23	Technological intervention for PH reduction in hort crops	1st Aug. 2017	Ngongpong vill., Tuensang, Nagaland	50	In coll. With AH Agri. & Allied cooperative society
24	Nursery management & propagation techniques of fruit crops	2nd Aug. 2017	Tuensang vill., C Khel, Nagaland	55	In coll. With AH Agri. & Allied cooperative society
25	Cultivation of Oyster Mushroom and value addition of Horticulture crops	16th Sept. 2017	Medziphema Nagaland	50	In coll. With Ao Baptist church, Medziphema
26	Cultivation of Naga King Chilli	17th Oct. 2017	Bhandhari, Wokha, Nagaland	50	In Coll. With Mhankai Okho
27	Value Addition of Horticulture Crops	18th Oct 2017	Bhandhari, Wokha, Nagaland	50	In Coll. With Mhankai Okho
28	Advance Techniques on horticultural production	22nd Oct. 2017	Amlighat village, Assam	50	In Coll. With SITAJAKHALA
29	Advance Techniques on horticultural production	23rd Oct. 2017	Sindisor village, Assam	50	In Coll. With SITAJAKHALA

30	Advance Techniques on horticultural production	24th Oct 2017	Udmari village, Assam	50	In Coll. With SITAJAKHALA
31	Advance Techniques on horticultural production	25th Oct 2017	Gova village, Assam	50	In Coll. With SITAJAKHALA
32	Advance Techniques on horticultural production	26th Oct 2017	Nellei village, Assam	50	In Coll. With SITAJAKHALA
33	Post harvest loss reduction and value addition of potential hortl. Crops for livelihood in Tripura.	15 <sup>th</sup> March 2018	College of Agrl. , Lembucherra	82	In coll. With College of Agrl. , Tripura
34	Technological advancement for HDP and canopy management for enhanced production in hortl. Crops	16 <sup>th</sup> March 2018	College of Agrl. , lembucherra, Tripura	67	In coll. With College of Agrl. , Tripura
35	Advances in production technologies of hortl. Crops, nursery management and propagation of hortl. crops	17 <sup>th</sup> March 2018	College of Agrl., Lembucherra, Tripura	67	In coll. With College of Agrl. , Tripura
36	Organic cultivation of Naga King chilli	26 <sup>th</sup> march 2018	Conference hall, KVK, Tuensang	53	In coll. With KVK, Tuensang
37	Rejuvenation of declining orchard	27 <sup>th</sup> march 2018	Hakchang village, Tuensang	53	In coll. With KVK, Tuensang
38	Rejuvenation of declining orchard	28 <sup>th</sup> march 2018	Momching village, Tuensang	52	In coll. With KVK, Tuensang
	<b>Total</b>			<b>2010</b>	



Fig 33. Farmers training held at Tuensang



Fig 34. Farmers training held at Bhandari, Wokha



Fig 35. Farmers training held at Manipur



Fig 36. Farmers training held at Arunachal

### 3.4.2. Trainers training on “Advances in Protected and Precision Horticulture” at CIH, Medziphema

Three days training programme on “Advances in Protected and Precision Horticulture” was organized by Central Institute of Horticulture (CIH) DAC&FW, Ministry of Agriculture, GOI, Medziphema, Nagaland at Training centre, CIH, Medziphema from 6<sup>th</sup> -8<sup>th</sup> September 2017 for the officials of State Horticulture Department, Nagaland.



Fig 37. Participants from State Horticulture department, Nagaland

The resource persons for the training were Dr. Madhumita Choudhary, Professor and head, department of Horticulture, AAU, Jorhat, Dr. Bijit Kr. Saut, Professor, Department of Horticulture, AAU Jorhat, Dr. Deepa Phookan, Professor, Department of Horticulture, AAU Jorhat and Dr. Abhijit Borah, RE, Department of Agriculture Engineering, AAU, Jorhat.

The training covered on the concept and techniques of precision farming, importance and scope of protected cultivation and with a special focus on package of practices under protected cultivation on crops like Capsicum, Naga King Chilli, Tomato, Cucumber, Orchid, Anthurium, Gerbera etc.



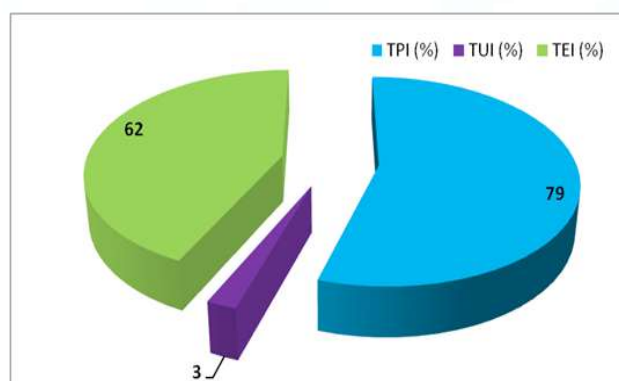
### 3.4.3. Impact Evaluation

Impact evaluation refers to assessing the programme impact on the job performance of the participants. The response of the participants (Farmers/Trainers) were collected in 3-point continuum scale such as Very high utility (I), High utility (II) and Average utility (III) by assigning scores 3, 2 and 1 respectively.

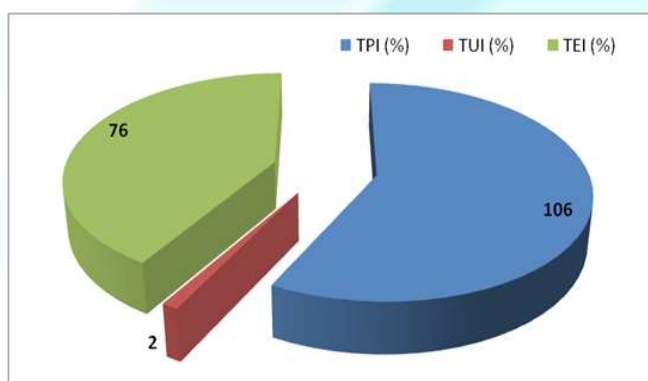
<u>Option (Response Category)</u>	<u>Score</u>
Very high utility (I),	3
High utility (II)	2
Average utility (III)	1

The results were calculated as weighted score for each of the thrust area identified for the training. Weighted score in the range of 3, 2 and 1 were ranked in each topic and the highest score was observed in Very High utility (3) followed by High utility (2) and the least was observed in Average utility (1).

The result of the analysis is presented in the figures given below which shows the impact of different topics of the training in farmers and trainers training in terms of Training participation index (TPI%), Training utility index (TUI%) and training effectiveness index (TEI%).



**Farmers training**



**Trainers Training**

**Fig. IV. Training participation index, training utility index & training effectiveness index**

Where, **TPI**= Training Participation Index, **TUI**= Training Utility Index & **TEI**= Training Effectiveness Index.

### 3.4.3.1. Impact of technologies disseminated to farmers

A number of technologies on production, protection, nutrient management, post harvest management etc. have been provided to the farmers. These technologies have helped the farmers in increasing their production, improvement in quality of produce, utilizing resources judiciously. The figure below gives an impression of the impact of training programmes.

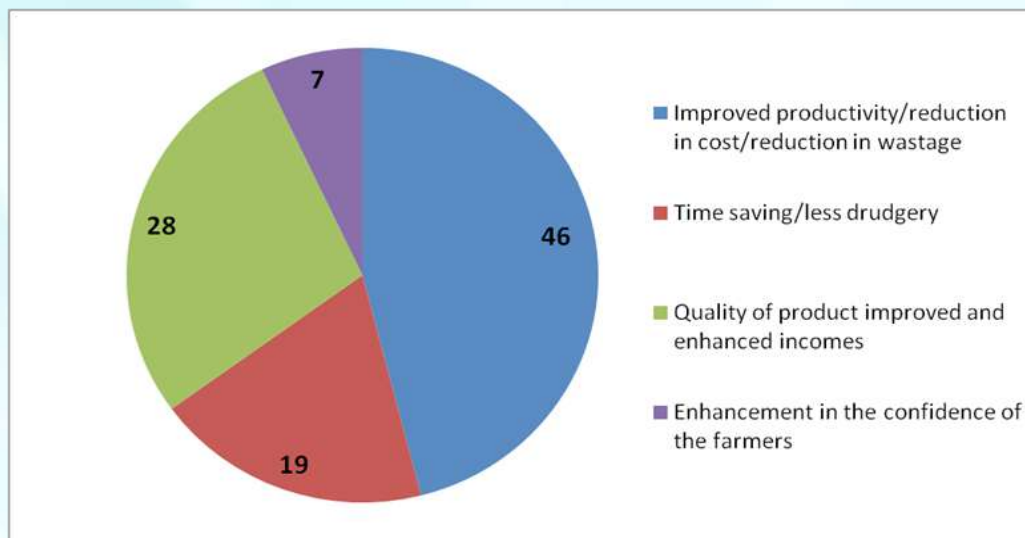


Fig V. Impact of training programmes to farmers

The training programmes provided to the farmers have resulted in increase in area, production & ultimately income of the farmers. Approximately 40-50% increase in income has been reported by the beneficiaries of training programme through adoption of improved package of practices in their fields.

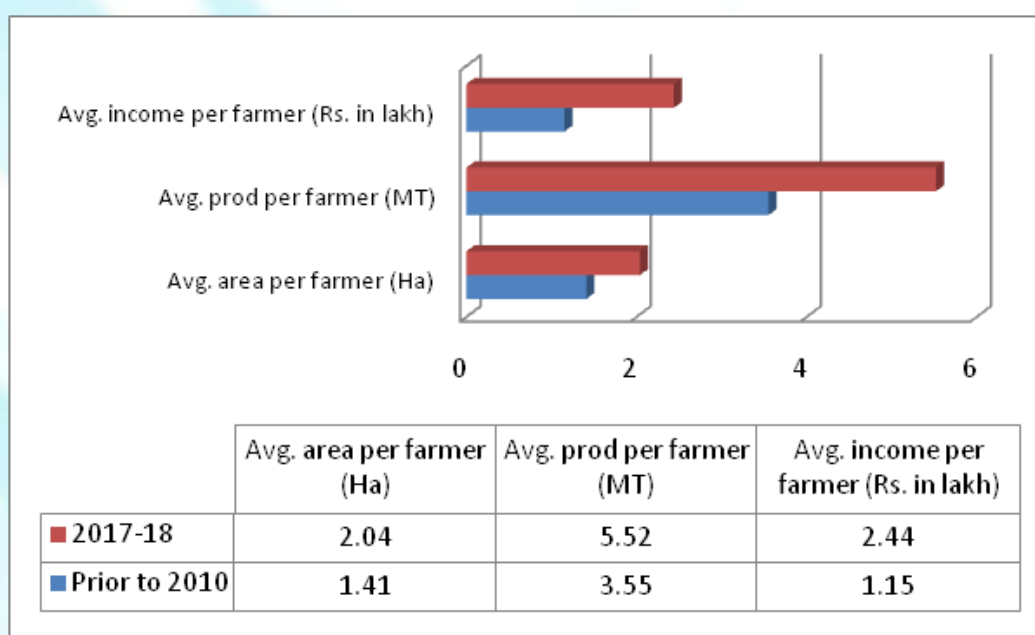


Fig VI. Area, production & income of trainee's pre & post 2010

The trainings provided to the farmers has had a substantial impact on the adoption of technologies, area expansion, production, crop protection measures and post harvest management practices.

1. **Technology adopted:** Most of the farmers have adopted the technologies disseminated during the training and has helped them in higher production and better yield. Adoption of organic cultivation and technical approach in cultivation of horticultural crops such as pineapple, large cardamom, banana, citrus and vegetable crops, have significant positive impact on their cultivation pattern as compared to their previous traditional methods. Mushroom production, vermicomposting and post harvest processing and value addition also aided in substantially increasing their yearly income.
2. **Increase in Area:** There has been significant increase in area compared to past 10 years, expansion in area for horticultural crop ranges from 0.5ha to 2 ha.
3. **Increase in horticultural production:** Adopting new technology through farmers training has also helped farmers in increased production in various horticultural crops. Yearly average yield of organic cultivation of pineapple, banana, citrus, vegetables have significantly increased within the past 10 years.
4. **Crop protection measures:** Farmers have started to incorporate crop protection measures in their cultivation practices, before the farmers had no technical knowledge related to crop protection but after farmers training they are well aware of the problems but some farmers are still following ITK (Indigenous technical knowledge) with regard to crop protections.
5. **Post harvest management:** Farmer groups have also adopted post harvest management in the form of food processing and value addition of horticulture produce; this significantly helped the farmers to prevent post harvest loss during glut period and also preserve the commodity for off season production.

### 3.4.4. Capacity building

#### 3.4.4.1. Trainers Training programme on Skill development at EEI, Gujarat.

Mr. A.K. Singh, Horticulture specialist underwent three days trainers training programme on skill development from 20<sup>th</sup> -22<sup>nd</sup> Dec., 2017 organised by Extension Education Institute, at Anand Agricultural University, Anand, Gujarat.

### 3.4.5. Exposure trip

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 2017-18, the Institute has conducted one exposure trips cum trainings for the farmers of NER in different high tech horticulture programmes.



### 3.4.5.1. Exposure trip cum training of Meghalaya and Arunachal Pradesh farmers to Jaipur, Rajasthan

Central Institute of Horticulture under the Department of Agriculture Cooperation & FW, Ministry of Agriculture and FW, Govt. of India as a part of its vision to promote transfer of technology for better production and productivity organized a subject oriented exposure trip for 20 farmers and entrepreneur from the state of Meghalaya and Arunachal Pradesh to enhance skills for income generation so as to improve livelihood at Manesh Agro Engineering & Technology, Kotpuli, Jaipur, Rajasthan from 25<sup>th</sup> to 27<sup>th</sup> March, 2018 on 'Advances in Production & processing of Aloe Vera with hands on demonstration on preparation of soap making, shampoo, juice and various value added products from Aloe vera and Amla were also shown. Field visit was also conducted, where the trainees had hands-on experience on planting of aloe vera. Exposure tour to Jaipur city was also conducted where various historical sites like Amer fort, Hawa Mahal, Jal Mahal and Albert Hall was visited by the participants.



Fig 38. Exposure trip cum training of Meghalaya and Arunachal Pradesh farmers

## 3.5. Agri-business promotion

### 3.5.1. Exhibitions/Trade Fairs/ Meets

#### 3.5.1.1. Participated in exhibition during Field day cum Farmers Scientists Interaction at ICAR, Nagaland Centre

Central Institute of Horticulture, Nagaland participated in exhibition organized by ICAR Nagaland Centre on 8<sup>th</sup> June 2017 at ICAR Jharnapani. The event was inaugurated by Hon'ble MLA Ghaspani II, Shri. Zhaleo Rio. The activities of the Institute were highlighted during the event. Consultancy on technical matters for cultivation of horticulture crops was provided to the participating farmers.



Fig 39. Hon'ble MLA visiting CIH stall



Fig 40. Director CIH, Dr. Lallan Ram with staffs

### 3.5.1.2. Co-organized Pineapple Fest at NER Agri Expo Site, Dimapur Nagaland.

CIH, Nagaland co-organized Pineapple Fest on 8<sup>th</sup> & 9<sup>th</sup> August 2017 at NER Agri Expo Site, Dimapur Nagaland. The event was organized by Dept. of Horticulture, Govt. of Nagaland in collaboration with SASRD, Nagaland University, ICAR, Nagaland and CIH, Nagaland. The Institute also participated in the exhibition held during the event and highlighted the activities and programmes of the Institute. Shri. P B Acharya, Hon'ble Governor of Nagaland & Arunachal Pradesh inaugurated the fest on 8<sup>th</sup> August 2017. Shri. Kejong Chang, Hon'ble Minister of Horticulture, Govt. of Nagaland was the Guest of Honor of the inaugural programme.



Fig 41. Inaugural programme of Pineapple Fest



Fig 42. Hon'ble Minister of Horticulture, Govt. of Nagaland visiting CIH stall

### 3.5.1.3. Organized exhibition during Farmers Interface Meet at CIH, Nagaland

An exhibition programme was organized by Central Institute of Horticulture, Nagaland on 6<sup>th</sup> October, 2017 during Farmers Interface Meet. Shri. Alan Gonmei (IAS), Secretary (Horticulture), Govt. of Nagaland inaugurated the exhibition and visited all the stalls. A total of 15 exhibitors from different parts of North East participated in the exhibition. The Institute also participated in the exhibition and highlighted the various activities being undertaken at CIH, Nagaland.



Fig 43. Inauguration of exhibition by Chief Guest



Fig 44. Exhibition stalls

### 3.5.1.4. Organized North East Kisan Mela cum Horticulture Stakeholders Meet at CIH, Nagaland.

Central Institute of Horticulture, Nagaland organized North East Kisan Mela cum Horticulture Stakeholders Meet on 22<sup>nd</sup> & 23<sup>rd</sup> January 2018 at its campus in Medziphema, Nagaland. The event was inaugurated by Shri. Jalaj Shrivastava IAS, Additional Secretary (Horticulture), DAC&FW,



Govt. of India. The mela was organized with the objective to promote the horticulture crops growers of the region. A total of 20 exhibitors from different states of North East participated in the mela.



Fig 45. Inauguration of Mela by Chief Guest



Fig 46. Chief Guest delivering lecture during inaugural programme

During the inaugural programme, the Chief Guest and dignitaries released the publications of the Institute and distributed the certificates of skill development course & nursery accreditation. The Chief Guest also inaugurated the soil sterilization unit and laid the foundation stone of culvert in the Institute. An exposure trip was also organized for the exhibitors and the participants on the second day to horticulture farm.



Fig 47. Exhibition stalls



Fig 48. Participants of inaugural programme

### 3.5.1.5. Participation in Krishi Unnati Mela held at IARI, Pusa, New Delhi

CIH, Nagaland participated as an exhibitor in Krishi Unnati Mela held at IARI Pusa, New Delhi from 16<sup>th</sup> – 18<sup>th</sup> March 2018. The event was the biggest agricultural fair in the country and was inaugurated by Hon'ble Prime Minister of India, Shri. Narendra Modi. The activities and programmes of the Institute were highlighted through printed banners and audio video display. Fresh & value added horticultural products prepared in the Institute were displayed in the mela. Publication materials on package of practices of horticultural crops were distributed to the farmers during the mela. Three farmers from Assam, Manipur & Nagaland were also given a platform to exhibit and sell their products in CIH, stall.





Fig 49. Director CIH, Dr. N K Patle interacting with visitors



Fig 50. Jt. Secy. (MIDH), Jt. Secy. (Crops) & Horticulture Commissioner, DAC&FW at CIH stall

### 3.6. Post Harvest Management

North East Region is blessed with diverse agro-climatic condition which varies from temperate to subtropical. Due to vivid climatic condition, it provides ample opportunity to grow the various types of horticulture crops in the region. The production of fruits, vegetables and flowers has increases many folds but lack of post harvest infrastructure causes severe post harvest loss during the market glut. 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 course on post harvest management. The details of the activities are mentioned below.

#### 3.6.1. Pineapple:

The mature green pineapple of cultivar Kew and MD-2 were harvested from the Institute farm and were stored at ambient temperature ( $33 \pm 5^\circ\text{C}$ ) and relative humidity 85%. The storage life of pineapple cv. Kew showed maximum (9 days), whereas the pineapple cv. MD-2 were minimum (7 days).



Fig. 51. Change in peel colour during storage of pineapple fruit of cultivar Kew and MD-2 on 0, 3, 6 and 9 days.

### 3.6.2. Anthurium:

**3.6.2.1. Vase life Extension:** To evaluate the vase life of anthurium flowers, the experiment were conducted in the institute laboratory. The harvested flowers were placed in the conical flask containing tap water under ambient temperature. In the trial 4 cultivars viz., Xavia, Tropical, Moment and Pistachi were taken. From the experiments, Pistachi cultivar showed maximum vase life of 22 days; whereas the lowest vase life 11 days was observed in case of moment cultivar.



Fig 52. Anthurium flowers placed in tap water

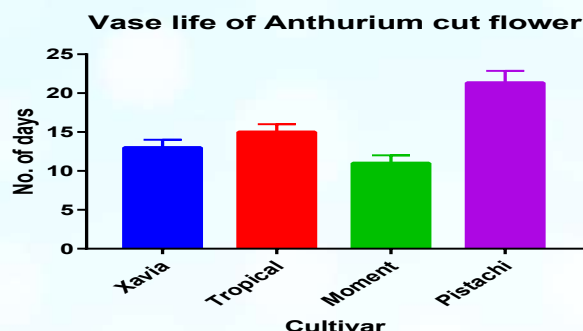


Fig VII. Vase life of anthurium cut flowers

### 3.6.3. Gerbera:

**3.6.3.1. Vase life Extension:** The gerbera flowers were harvested and placed in tap water to study the vase-life. There were nine cultivars namely, Ice queen, White house, Pre intenzz, Rosalin, Diakan, Paradise, Jaffna, Lieke and Zingaro to evaluate the vase life. The study was conducted under ambient temperature and from the experiments it was observed that highest vase life was recorded incase Paradise (13 days) whereas the lowest was in case of Lieke variety (6 days).

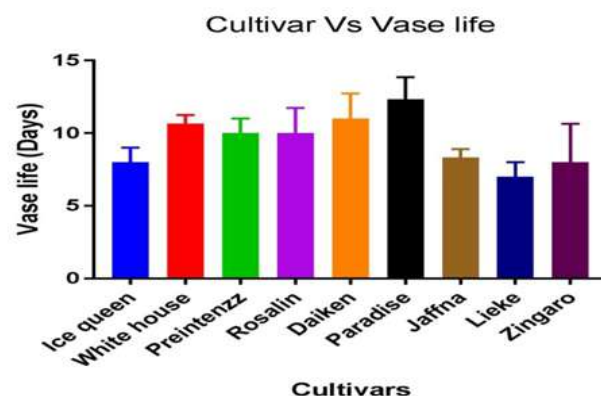


Fig VIII. Vase life of Gerbera cultivars vs vase life

**3.6.3.2. Vase life Extension of imperial cultivar:** The gerbera flowers cv. Imperial was placed in five different vase solution such as T0: Distilled water, T1: 2% Sugar, T2: 2% Sugar+2% Multineem, T3: 2% Sugar+4% Multineem, T4: 2% Sugar+6% Multineem and T5: 2% Sugar+8% Multineem. The highest vase life was observed in T2 and it was 9 days and lowest vase life was noted in T0 and it was 5 days.



Fig 53. Gerbera flowers placed in different vase solution

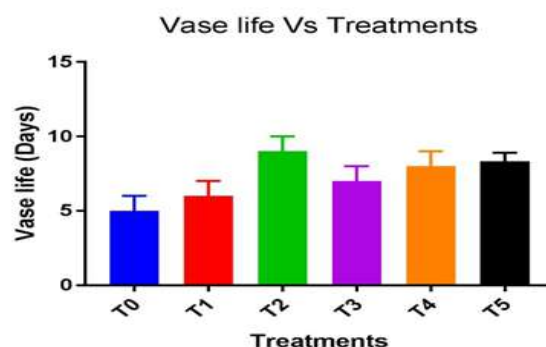


Fig IX. Vase life of Gerbera cv imperial vs treatment



### 3.6.4. Optimization of pineapple juice, Aloe vera gel and Basil leaves extract

The experiments were conducted to evaluate the physico-chemical and sensory parameters of blended pineapple juice, Aloe vera gel and Basil leaves extract. In this experiment, the sample R-10 (80:20:3= Pineapple juice: Aloe vera gel: Basil leaves extract) showed the highest overall acceptability (OAA) and it was 8.65. The physico-chemical properties such as TSS: 13.0 °B, Acidity: 0.38%, pH:4.30 and Vit.C: 8.00 mg/100g was noted in the sample R-10.

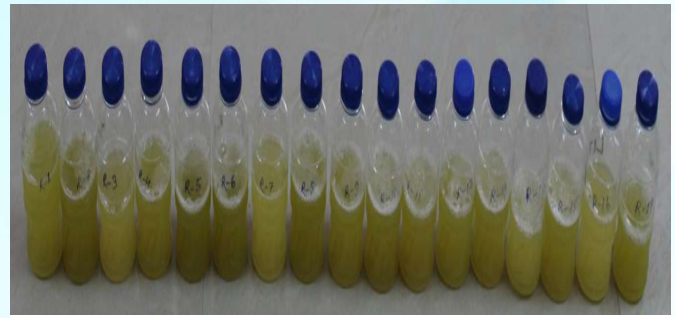


Fig 54. Different blending ratio of pineapple juice, Aloe vera gel and Basil leaves extract

### 3.6.5. Value added products:

#### 3.6.5.1. Squash:

Squashes were prepared from pineapple juice, pumelo, strawberry and star fruits. The fruit were collected from the institute farm and carried to laboratory. The fruit was washed, peeled and chopped in small pieces and juice was extracted. The obtained juice were added in sugar syrup and homogenized and preservative was added. The final products were filled in PET bottle and sealing and labelling was done.



Fig 55. Pineapple Squash



Fig 56. Pummelo squash



Fig 57. Strawberry Squash



Fig 58. Star fruit squash



### 3.6.5.2. Jam:

Pineapple and strawberry jam was prepared to display the product in the institute and Kisan mela. The ripened fruits were harvested and brought to the laboratory for preparation of Jam. Harvested fruits were washed and chopped into small pieces. In case of pineapple the fruit was peeled and core was removed before cutting into small pieces. The chopped pieces of fruit was placed in a stainless steel utensils and boiled for 30 min. thereafter the required amount of sugar and Citric acid was added and cooked till the consistency was achieved upto 63 °B. At this stage gelatin was added as thickening agent in the Jam and cooked to 68 °B. The final products were filled into pre-sterilized glass jar.



Fig 59. Pineapple jam



Fig 60. Strawberry jam

### 3.6.5.3. Dehydrated Slices

Pineapple fruit and cabbage were sliced, treated with preservative and kept for drying under hot air oven at 55 °C. The obtained dehydrated slice were packed in polyethylene standing pouch, sealed and labelled.



Fig 61. Dehydrated Pineapple Slices



Fig 62. Dehydrated Cabbage Slices

### 3.6.5.4. Pickle:

King chilli, brinjal and ginger pickle were prepared in the institute to showcase the preservation of locally available horticultural produce for off season. The produce were washed and chopped into small pieces and salt, spices powder, mustard oil and vinegar were added and mixed properly. The prepared pickles were filled in the pre-sterilized glass jar and cleaned standing pouch.



Fig 63. King chilli pickle



Fig 64. Brinjal Pickle



Fig 65. Ginger Pickle

### 3.6.5.5. Candy

Ginger and chow chow were used to prepare the candy. Ginger and chow chow were washed, peeled and sliced into small pieces. The sliced pieces were boiled in stainless steel utensils and strained the water. The boiled slices were weighed and equal amount of sugar was added in the cooking pan (Slice: Sugar= 1:1) and cooked until the sugar was crystallized in the slices. The final product obtained as candy was packed in clean and sterilized polyethylene standing pouches.



Fig 66. Ginger candy

### 3.6.5.6. Powder

Drum stick leaves were treated with preservatives and dried in hot air oven at 55°C and dried leaves were grinded in the grinder and obtained powder was filled in polyethylene standing pouch.



Fig 67. Chow chow candy



Fig 68. Moringa powder

### 3.6.6. Practical demonstration of certificate course on Post harvest management

The practical on post harvest management was conducted in the CIH laboratory during the training of three months certificate course on post harvest management. The maturity indices of horticultural



Fig 69. Demonstration on “pasteurization of aloe vera juice” and “slicing of cabbage for drying”



crops, harvesting techniques, stage of harvest, pre-cooling and preparation of jam, jelly, pickle, aloe vera juice, squash and drying of horticultural crops were done.



Fig 70. Lecture and “demonstration of maturity indices of orchid flowers”

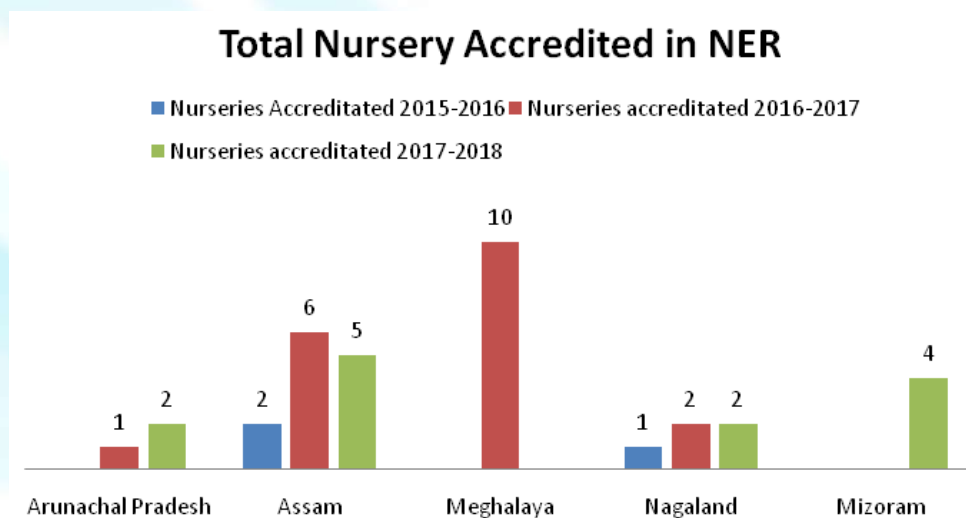
### 3.7. Accreditation and certification of nurseries in NER

Nursery Accreditation and Certification of horticulture nurseries has been one of the major activities of the institute. During the period of 2017-2018, a total of 19 nurseries were assessed/monitored which includes both fresh application and renewal applications, out of which 13 nurseries were accredited and certification were done with a rating **2 Star** to four nurseries and with a **1 Star** rating to remaining 9 nurseries. The details of the nurseries are provided in the table below.

Table 5. Total no. of Horticulture Nurseries Accredited by CIH in NER (2017-2018)

Sl no	State	No. of nurseries visited	No. of nurseries accredited	Star rating
1	Arunachal Pradesh	4	2	2
2	Assam	8	5	3
3	Mizoram	5	4	1
4	Nagaland	2	2	-
	<b>Total</b>	<b>19</b>	<b>13</b>	<b>-</b>

*\*\*Including two numbers of nurseries renewed.*



*\*Including three numbers of nurseries renewed*

Fig X. Total nos. of Horticulture Nurseries accredited by CIH



**Table 6. Details of the horticulture nurseries accredited by CIH in NER (2017-2018)**

Sl. No	Name of the Nursery	Address	Contact	State	Name of the Horticulture Crop	Rating
1.	Government Horticulture Farm	Govt. Hort. Farm, Salari, West Kameng, Arunachal Pradesh	C/o. Deputy Director of Horticulture, Salari, West Kameng, Arunachal Pradesh	Arunachal Pradesh	Grapes	“ 1 Star”
2.	Regional Apple Nursery	Regional Apple Nursery, Dirang, West kameng, Arunachal Pradesh	C/o. Horticulturist, Regional Apple Nursery, Dirang, Dept. of Horticulture, West kameng, Arunachal Pradesh	Arunachal Pradesh	1.Apple 2.Kiwi	“ 2 Star”
3.	North Eastern Agro Services	Nagdirgram,Kabuganj-788121, Cachar, Assam	Jahirul Haque 9435206955	Assam	1. Mandarin 2. Lemon 3. Lime 4. Litchi 5. Guava 6. Mango	“ 1 Star”
4.	Itiben Nursery	Kharia Basti, Khatkhathi-782480, Assam	H.K. Sharma 03675-249112/249113 <a href="mailto:itibenresort16@gmail.com">itibenresort16@gmail.com</a> Ph.9435539003	Assam	Apple Mango	“ 1 Star”
5	J.N Nursery	Uttar Chelabari, P.O. Ambari, P.S. Dhupdhara Goalpara-783123, Assam.	Mr. Naimul Haque <b>Ph No:</b> 9854659212	Assam	Litchi Lemon Guava	“ 1 Star”
6.	Yeansunara Nursery	Uttar Chelabari, P.O. Ambari, P.S. Dhupdhara Goalpara-783123, Assam.	Ibrahim Ali Ph. 8011014574	Assam	Litchi	“ 1 Star”
7.	M.Hussain Nursery	Chapar Balajan, P.O. Moterjhar Dhubri-783334 Assam.	Mr. Mozaffar Hussain <b>Ph No:</b> 9954109290	Assam	1.Litchi 2.Mango 3. Cashewnut	“ 1 Star”
8.	C.L. Nursery	C. Lalduhawma, Bualpui, Lawngtlai, Mizoram	C/o. DHO, Horticulture, Lawngtlai, Mizoram	Mizoram	Mandarin	“ 1 Star”

9.	Horticulture Centre, Sercchip	Horticulture Centre, Sercchip, Mizoram	C/o. DHO, Horticulture, Serchipp Mizoram	Mizoram	Mandarin	“ 2 Star”
					Sweet Orange	
10.	Horticulture Centre, Thingdawl	Horticulture Centre, Thingdawl, Kolasib, Mizoram	C/o. Director, Directorate of Horticulture, Mizoram, Aizawl	Mizoram	Mandarin	“ 2 Star”
					Dragon fruit	
11.	Zopar Exp. Pvt. Ltd	Zopar Exp. Pvt. Ltd, Mamit, Mizoram	Rajesh Prasad, Mamit, Aizawl. Ph. 8794731387 zoparexpo@yahoo.co.in	Mizoram	Strawberry	“ 2 Star”
12.	Dream Dragon Fruit Farm & Tropical Plant Nursery.	Shitovi, Dima-pur-797112	Lucy Ngullie 9436438352 8794486420 lucyngthomas@gmail.com	Nagaland	Dragon Fruit	“1 Star”
13.	Ms/ Evergreen Nursery	Shukhovi, Dima-pur-797112	Honito Sema Ph.9856869646	Nagaland	Cashewnut	“1 Star”



Fig 71. Visit of different nurseries by the committee members



Fig 72. Shri. Jalaj Srivastava, IAS, Addl. Secy, DAC &amp; FW distributing certificates to nurserymen

### 3.8. Skill development & Certificate course

#### 3.8.1. Skill Development

Skill development programmes of the Institute are designed to equip the less educated unemployed youth of the region with the skills to work in the field of horticulture. Most of the farmers follow the traditional practices in horticulture which decreases the production level and increases the cost of production. There is a dearth of skill manpower in horticulture sector in the region which if addressed could have a substantial effect on the horticulture scenario of the North East region. The right techniques and the proper management practices would help them increase their production, productivity and cut down their production costs. Since the youth are the future of tomorrow, providing them the right skills would help them enhance their productivity and more importantly, employability.

Central Institute of Horticulture, Nagaland has been accredited by ASCI to impart skill trainings in North East Region. During the year 2017-18, the Institute organized 5 skill development programmes. The details of courses undertaken are given below;

**Table 7. Skill Trainings**

Sl.No.	Skill Course	Batch start date	Batch end date	Assessment date	Total nos. of trainees registered	Total no. of trainees who qualified the assessment conducted by ASCI
1	Floriculturist-Protected Cultivation	06.06.17	18.07.17	20.07.17	20 nos.	16
2	Gardener	04.08.17	07.10.17	09.10.17	26 nos.	23
3	Floriculturist-Protected Cultivation	25.10.17	06.12.17	08.12.17	30 nos.	25
4	Floriculturist-Protected Cultivation	11.01.18	23.02.18	23.02.18	20 nos.	20
5	Gardener	07.03.18	19.04.18	20.04.18	19 nos.	Result awaited
<b>Total</b>					<b>115</b>	<b>84</b>

#### 3.8.2. IMPACT OF SKILL DEVELOPMENT COURSES

The skill development courses provided by the Institute have significantly benefitted the trainees.

##### Benefits

- ❖ Increase in individual's employability
- ❖ Provided marketable skills
- ❖ Provided advantage in compensation
- ❖ Provided opportunity for better job roles and career growth
- ❖ Increase in productivity level
- ❖ Higher standards of delivery of quality of service
- ❖ Availability of trained personnel



**Table: 8. Details of employment provided to skill development trainees**

Sl. No.	Skill Course	Batch start date	Batch end date	Assessment date	No. of registered trainees	No. of qualified trainees	No. of trainees employed/ self employed	Employed through/ in
1	Floriculturist-Protected Cultivation	16.01.17	16.02.17	16.02.17	20 nos.	18	6	Private project sites in Manipur & Nagaland
2	Gardener	31.03.17	15.05.17	15.05.17	18 nos.	13	7	On daily wage basis
3	Floriculturist-Protected Cultivation	06.06.17	18.07.17	20.07.17	20 nos.	16	11	Meghalaya SFAC
4	Gardener	04.08.17	07.10.17	09.10.17	26 nos.	23	9	Meghalaya SFAC
5	Floriculturist-Protected Cultivation	25.10.17	06.12.17	08.12.17	30 nos.	25	2	Meghalaya SFAC
	<b>Total</b>				<b>114</b>	<b>95</b>	<b>35</b>	

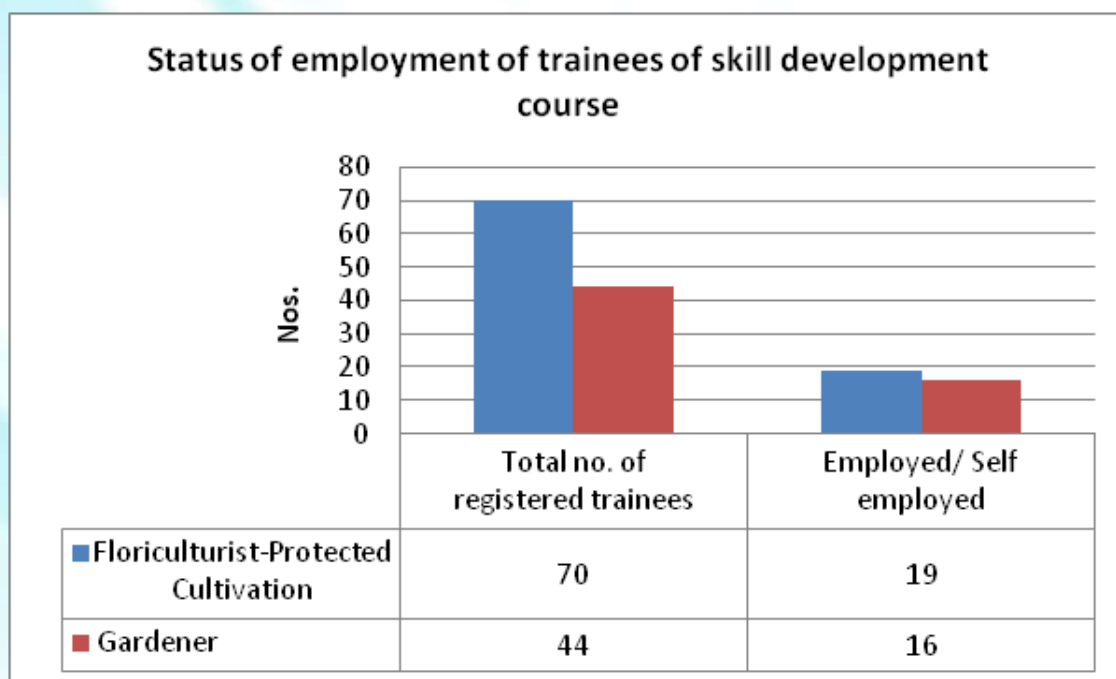


Fig XI: Course wise details of employment provided to trainees of skill development

**Table: 9.** State-wise details of trainees with employment details of Skill Development (ASCI)

S.No.	State	Skill Course	No. of registered trainees	No. of qualified trainees	No. of trainees employed/ self employed	Employed through/ in
1	Manipur & Nagaland	Floriculturist-Protected Cultivation	20 nos.	18	6	Project site at Manipur & Nagaland
2	Nagaland	Gardener	18 nos.	13	7	Horticulture Dept., Nagaland & CIH
3	Meghalaya	Floriculturist-Protected Cultivation	20 nos.	16	11	Meghalaya SFAC
4	Meghalaya	Gardener	26 nos.	23	9	Meghalaya SFAC
5	Meghalaya	Floriculturist-Protected Cultivation	30 nos.	25	2	Meghalaya SFAC
		Total	114	95	35	

### Glimpses of Skill Development Course



Fig 73. Practical classes of skill development course on Floriculturist-Protected Cultivation &amp; Gardener



### 3.8.3. Certificate Courses

Apart from skill trainings, the Institute also imparts Certificate Courses of three (3) months duration on various topics in horticulture. The courses run by the Institute are

- a) Modern nursery management of horticulture crops.
- b) Protected cultivation of horticulture crops.
- c) Post harvest management and value addition of horticulture crops.
- d) Organic farming and certification of horticulture crops.

During the year 2017-18, the Institute organized certificate course Post Harvest Management of Horticulture Crops from 6<sup>th</sup> June 2017 to 6<sup>th</sup> September 2017. The trainees were also provided a 15 days internship at IICPT, Guwahati where they were trained on various aspects of post harvest management, value addition and processing of horticulture crops.



Fig 74. Trainees of certificate course

### 3.9. Infrastructure development

- Construction of soil sterilization unit
- Construction of polyhouse for Nursery Unit
- Construction of garage for farm machineries
- Construction of extension of boundary wall (350 m)
- Construction of boundary wall (50 m) near pump house
- Construction of 2 km CC road
- Conversion of LED based lighting system inside the campus
- Installation of 18 nos. street light





Fig 75. Soil sterilization unit



Fig 76. Construction of Polyhouse for Nursery unit



Fig 77. Garage for farm machineries



Fig 78. Construction of 2 km CC road

## 4. PUBLICATION

### 4.1. Annual Report/ Technical bulletin/ extension folders

- ☞ Lallan Ram and Meribeni Shitiri. 2017. *Annual report (2016-17)*. Central Institute of Horticulture, DAC&FW, Ministry of Agriculture cooperation & FW, Govt. of India, Medziphema, Nagaland.
- ☞ Lallan Ram. 2017. Prospectus of three months Certificate Course & Skill development course. Central Institute of Horticulture, DAC&FW, Ministry of Agriculture cooperation & FW, Govt. of India, Medziphema, Nagaland.
- ☞ Arvind Singh, Meribeni Shitiri and Lallan Ram. 2017. *Production technology of chrysanthemum*. CIH/ Tech./ Pub. No.7 / pp 1-20.
- ☞ Arvind Singh, Meribeni Shitiri and Lallan Ram. 2017. *Production technology of anthurium*. CIH/ Tech./ Pub. No.8 / pp 1-23.
- ☞ Meribeni Shitiri and Lallan Ram. 2017. *Package of practices for Brinjal*. CIH/ Tech. Folder 51/ pp 1-6.
- ☞ Meribeni Shitiri and Lallan Ram. 2017. *Package of practices for Cow pea*. CIH/ Tech. Folder 52/ pp 1-6.
- ☞ Shisarenla Aier, Meribeni Shitiri and Lallan Ram. 2017. *Package of practices for Orchids (Dendrobium sp)*. CIH/ Tech. Folder 53/ pp 1-6.
- ☞ Shisarenla Aier, Meribeni Shitiri and Lallan Ram. 2017. *Lawn and lawn making*. CIH/ Tech. Folder 54/ pp 1-6.
- ☞ A.K.Singh, Meribeni Shitiri and Lallan Ram. 2017. *Package of practices for Assam Lemon*. CIH/ Tech. Folder 55/ pp 1-6.
- ☞ A.K.Singh, Meribeni Shitiri and Lallan Ram. 2017. *Package of practices for Cashewnut*. CIH/ Tech. Folder 56/ pp 1-6.

## 5. SEMINARS, CONFERENCES, WORKSHOPS, MEETINGS

### 5.1. Organized Farmers Interface Meet on 6<sup>th</sup> & 7<sup>th</sup> October 2017 at CIH, Nagaland.

A Farmers Interface Meet was organized by Central Institute of Horticulture, Nagaland on 6<sup>th</sup> & 7<sup>th</sup> October, 2017 at its campus in Medziphema. Shri. Alan Gonmei (IAS), Secretary (Horticulture), Govt. of Nagaland graced the occasion as Chief Guest. Director CIH Dr. Lallan Ram presented the welcome address. The keynote address was delivered by Dr. N K Mohan, Chief Consultant CIH where as brief remarks were delivered by Dr. D J Rajkhowa, Jt. Director, ICAR Nagaland and Dr. N K Patle, Dy. Commissioner (Hort.), DAC&FW, Ministry of Agriculture & FW, New Delhi. The event was marked by sharing of success stories by farmers, entrepreneurs and trainees promote by the Institute. Awards were distributed for the best demonstration plot and best accredited nursery. The certificates of skill development course on floriculture and nursery accreditation were distributed during the inaugural programme. NEZCC Dimapur sponsored two cultural troops and presented two cultural items during the programme. The programme ended with vote of thanks from Mr. Md. Manzar Hossain and the programme was compered by Ms. Imtinaro Jamir.

The Interface Meet was held on 7<sup>th</sup> October 2017 where representatives of farmer groups and govt. depts. from Arunachal Pradesh, Manipur, Mizoram, Meghalaya, Mizoram, Nagaland, Sikkim & Tripura participated. Dr. N K Patle, Dy. Comm. (Hort.), DAC&FW, Director CIH, Dr. Lallan Ram & Dr. N K Mohan, Chief Consultant CIH addressed to the queries and issues raised during the farmers meet.



Fig 79. Inaugural programme of Farmers Interface Meet



Fig 80. Chief Guest addressing the participants of Farmers Interface Meet



## 5.2. Organized Horticulture Stakeholders Meet on 22<sup>nd</sup> January 2018 at CIH Nagaland.

A Horticulture Stakeholders Meet was organized at CIH, Nagaland on 22<sup>nd</sup> January, 2018 during N E Kisan Mela. The stakeholders meet was chaired by Dr. V A Parthasarathy, President, NABS & Ex-Director, ICAR-IISR, Calicut and co-chaired by Dr. N K Mohan, Chief Consultant, CIH, Nagaland & Ex-Chief Scientist, HRS, Kahikuchi. During the meet, Dr. N K Mohan presented on the topic “Horticulture Scenario in North East: Present Status & Challenges”. Dr. V A Parthasarathy delivered a lecture on “North East India-A treasure trove of Heirloom varieties”. The topic on “Post harvest management practices of horticulture crops for increasing the income of farmers” was presented by Prof. S Alam, Dept. of Horticulture, AAU, Jorhat & Dr. S C Panwar, Joint Director, NHB, Guwahati highlighted on “Promoting horticulture development in North East”



Fig 81. Participants and resource persons on Horticulture Stakeholders Meet

## 5.2. Meetings

**5.2.1.** Director, CIH attended 23<sup>rd</sup> Regional Committee Meeting of ICAR at Imphal, Manipur on 30<sup>th</sup> & 31<sup>st</sup> May 2017.

**5.2.2.** Meeting of the High Powered Committee for evaluation of Central Institute of Horticulture, Nagaland was held on 15<sup>th</sup> November 2017 at Krishi Bhawan, New Delhi under the chairmanship of Additional Secretary (Horticulture).

**5.2.3.** Technical Advisory Committee meeting conducted on 23<sup>rd</sup> January 2018 at CIH, Nagaland under the chairmanship of Dr. V.A Parthasarathy, Ex- Director, ICAR-IISR, Calicut with 07 members and 11 invited members.

**5.2.4.** Nursery accreditation committee meeting conducted on 23<sup>rd</sup> January 2018 at CIH, Nagaland.

**5.2.4.** Board of management meeting conducted on 9<sup>th</sup> April 2018 at CIH, Nagaland under the chairmanship of Dr. B.N.S Murthy, Horticulture Commissioner, DAC & FW, Govt. of India, New Delhi.



Fig 82. Technical Advisory Committee meeting



Fig 83. Nursery accreditation Committee meeting



Fig 84. Board of Management meeting



## 6. IMPORTANT EVENTS CELEBRATED

### Independence Day Celebration

Central Institute of Horticulture celebrated 70<sup>th</sup> Indian Independence Day along with the whole country on 15<sup>th</sup> August, 2017. Flag hoisting was done by Director CIH, Dr. Lallan Ram. All the staffs and field workers were part of the programme.



Fig 85. CIH staff & farm workers

### 1.1. Republic Day Celebration

The Institute, with the rest of the country, celebrated the 69<sup>th</sup> Republic Day on 26<sup>th</sup> January 2018. Flag hoisting was done by Director CIH, Dr. Lallan Ram. A brief programme was being organized where all the staffs and field workers participated.



Fig 86. CIH staff & farm workers Director, CIH

### 1.2. Hindi Diwas Celebration

With an aim to create awareness and promotion of Hindi language, Central Institute of Horticulture, Nagaland successfully organized Hindi diwas cum Swachhta Hi Sewa Campaign programme at the campus on 20<sup>th</sup> September 2017. A brief highlight about the Hindi Diwas was delivered by Dr. Lallan Ram Director, CIH, Medziphema. Activities such as song competitions and speeches were organized among the workers of CIH which was followed by taking pledge of Swachhata Hi Sewa by all the staff and field workers of the Institute.



Fig 87. CIH director & staffs taking pledge of Swachhata Hi Sewa



### 1.3. Organized Swachhta Pakhwada at CIH, Nagaland.

Central Institute of Horticulture, Nagaland organized Swachhta Pakhwada from 16<sup>th</sup> – 31<sup>st</sup> May 2017. The event began with taking the Swachhta Pledge by all the staffs and field workers of Central Institute of Horticulture, Nagaland. The office building was cleaned by all the technical staffs. Cleanliness drive was undertaken in various areas of the Institute and all types of wastes were removed from the campus.



Fig 88. CIH staffs taking the Swachhta pledge



Fig 89. Cleaning of paper & plastic wastes



Fig 90. Cleaning of administrative building



Fig 91. Cleaning of guest house

## 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.

### 1.4. PRESENT STAFF POSITION AT CIH

- |     |                            |                                                                                                              |
|-----|----------------------------|--------------------------------------------------------------------------------------------------------------|
| 1.  | Director                   | : Dr. Lallan Ram (Till 31 <sup>st</sup> January, 2018)<br>Dr. Naveen Patle (From 1 <sup>st</sup> Feb., 2018) |
| 2.  | Technical consultant       | : Mr. Arvind Singh                                                                                           |
| 3.  | Horticulture Specialist    | : Mrs. Meribeni Shitiri<br>: Mr. Anjani Kumar Singh                                                          |
| 4.  | Post Harvest Technologist  | : Md. Manzar Hossain                                                                                         |
| 5.  | Marketing Specialist       | : Mr. Prabin Das                                                                                             |
| 6.  | Assistant Horticulturist   | : Mr. Lichamo Yanthan<br>: Dr. Moasosang Longkumer                                                           |
| 7.  | Senior Farm Manager        | : Mr. Diganta Gohain                                                                                         |
| 8.  | Senior Technical Assistant | : Mr. Ngupani P.S<br>: Mr. Tokivi Zhimomi                                                                    |
| 9.  | Administrative officer     | : Mr. Babu Singh                                                                                             |
| 10. | P A to Director            | : Ms. Imtinaro Jamir                                                                                         |
| 11. | Stenographer               | : Mrs. Sharda Devi<br>: Mrs. Achibeni Yanthan                                                                |
| 12. | Field Assistant            | : Mr. Eliyamo Humtsoe<br>: Mr. Anukul Roy                                                                    |

## 8. BUDGET

**FINANCIAL PROGRESS REPORT OF CIH, NAGALAND  
FOR THE YEAR 2017-18**

<b>HEAD OF ACCOUNT</b>	<b>Budget Estimated 2017-18</b>	<b>Revised Estimated 2017-18</b>	<b>Expenditure till date</b>
<b>248-Crop Husbandry</b>			
<b>119-Horti &amp; Veg. crop</b>			
<b>02-Estt. of CIH</b>			
1	2	3	4
510101- Salary	24.60	38.21	29.96
510102- Wages	40.00	60.00	61.09
510106- Medical Treatment	8.00	8.00	7.33
510111- D T Expenses	20.00	7.00	1.85
510113- Office Expenses	50.00	40.00	37.41
510114- Rent rate & taxes	2.00	1.00	0.21
510116- Publication	15.00	10.00	8.10
510120- Other Admni. Expn.	70.00	60.00	36.82
510126- Advt. & publicity	5.00	2.00	0.45
510127- Minor works	60.00	50.00	12.21
510128- Prof. services	10.00	2.00	0.98
510150- Other charges	220.40	200.00	131.67
<b>Total (2401Crop Husbandry)</b>	<b>525.00</b>	<b>478.21</b>	<b>328.08</b>
4401 CO on Crop Husbandry			
119-Horti. & Veg. Crop			
14-Estt. of CIH			
160151-Motor Vehicle	-	-	-
160152-Machinery & Equip.	10.00	-	-
160153- Major Works	390.00	243.24	166.54
<b>Total – Major Head 4401-</b>	<b>400.00</b>	<b>243.24</b>	<b>166.54</b>
<b>Grand total</b>	<b>925.00</b>	<b>721.45</b>	<b>494.62</b>



## 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,<br>Horticulture Commissioner,<br>DAC & FW, Govt. of India, Khrishi Bhawan, New Delhi | - | Chairman |
| 2.  | Secretary/Director (Horticulture),<br>Govt. of Arunachal Pradesh,<br>Itanagar, Arunachal Pradesh        | - | Member   |
| 3.  | Secretary/Director(Agriculture),<br>Govt. of Assam, Guwahati, Assam                                     | - | Member   |
| 4.  | Secretary/Director (Horti. & Soil Cons.),<br>Govt. of Manipur, Imphal, Manipur                          | - | Member   |
| 5.  | Secretary/Director (Horticulture),<br>Govt. of Meghalaya, Shillong, Meghalaya                           | - | Member   |
| 6.  | Secretary/Director (Horticulture),<br>Govt. of Mizoram, Aizwal, Mizoram                                 | - | Member   |
| 7.  | Secretary/Director (Horticulture),<br>Govt. of Nagaland, Kohima, Nagaland                               | - | Member   |
| 8.  | Secretary/Director (Horticulture),<br>Govt. of Sikkim, Gangtok, Sikkim                                  | - | Member   |
| 9.  | Secretary/Director (Horticulture),<br>Govt. of Tripura, Agartala                                        | - | Member   |
| 10. | Vice Chancellor/Director(Research),<br>Assam Agriculture University,<br>Jorhat, Assam                   | - | Member   |
| 11. | Vice Chancellor/Director (Research),<br>Central Agriculture University,<br>Imphal, Manipur              | - | Member   |
| 12. | Prof.D.P.Ray,<br>Ex-Vice Chancellor of OUAT,<br>Bhubaneshwar, Orissa                                    | - | Member   |

- |     |                                                                                                                     |   |                  |
|-----|---------------------------------------------------------------------------------------------------------------------|---|------------------|
| 13. | Dr.Kirti Singh,<br>Former Chairman ASRB and Vice Chancellor                                                         | - | Member           |
| 14. | Joint Secretary/Representative of<br>Ministry of Food Processing Industries<br>(MOFPI), New Delhi                   | - | Member           |
| 15. | Representative of Ministry of DONER,<br>Vigyan Bhavan Annexe, Mulana,<br>Azad Road, New Delhi                       | - | Member           |
| 16. | Secretary/ Representative of North East Council,<br>Nongrim Hills, Shillong, Meghalaya                              | - | Member           |
| 17. | Director ICAR,<br>Umroi Road, Umiam-793103, Meghalaya                                                               | - | Member           |
| 18. | Dr.V.B.Singh,<br>Ex-Prof, Horti. Dept., SASARD-NU,<br>Medziphema, Nagaland                                          | - | Member           |
| 19. | Chairman/Representative, NABARD,<br>Plot Np-c24, G Block,Bandra Kurlar Complex,<br>P.O.Box-8121,Bandra East, Mumbai | - | Member           |
| 20. | Representative of M/s. Zopar Exports Pvt.Ltd.<br>(North East Circle)                                                | - | Member           |
| 21. | Mr. Zion Lalremruata, General Secretary,<br>All Mizoram Farmers Union, progressive farmer of NER                    | - | Member           |
| 22. | Mr. Shiv Anjan Dalmia,<br>Dalmia Greens,<br>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,<br>Ex-Director, IISR, Calicut                                | - Chairman         |
| 2.  | Dr. R.K.Pal,<br>Ex-Director, NRC for Pomegranate, Sholapur                       | - Member           |
| 3.  | Dr.N.K.Mohan,<br>Chief Consultant of CIH, Nagaland                               | - Member           |
| 4.  | Dr.Ramesh Kumar,<br>Ex- Director, DFR, Ex-Director of Research, PAU,<br>Ludhiana | - Member           |
| 5.  | Dr. Ramavadh,<br>Principal Scientist, CISH, Lucknow                              | - Member           |
| 6.  | Dr.M.Tamil Selvan,<br>Ex-Addl.Comm.(Horti.), DAC&FW, New Delhi                   | - Member           |
| 7.  | Dr. D.J.Rajkhowa,<br>Jt.Director, ICAR- Jharnapani, Nagaland                     | - Member           |
| 8.  | Dr. A.K. Srivastav,<br>Principal Scientist, NRC-Citrus, Nagpur                   | - Member           |
| 9.  | Dr. L.C.Bora,<br>Professor, AAU, Jorhat, Assam                                   | - Member           |
| 10. | Mr. R Anand Zambre,<br>Executive Director, NCPAH, New Delhi                      | - Member           |
| 11. | Director, CIH                                                                    | - Member Secretary |

**9.3. Members of Nursery Accreditation Committee****Nagaland & Assam**

1. Dr. V.J Shivankar, Former Director, NRCC, Nagpur (Chairman).
2. Director, CIH/ Representative.
3. Dr. Moa Walling, Dy. Director of Horticulture, Govt. of Nagaland.
4. Shri. Ghanakanta Hazarika, Asst. Director of Horticulture, Govt. of Assam.
5. Dr. Anamika Sharma, Programme Coordinator, KVK, ICAR, Nagaland centre.



**Manipur & Mizoram**

1. Dr. R.K Arora, Former Professor and Head, Dept. of Horticulture, HAU, Hissar (Chairman).
2. Director, CIH/Representative.
3. Shri.Rosanglura Ralte, Deputy Director, Mizoram.
4. Shri L. Upendra Singh, Deputy Director of horticulture, Govt. of Manipur.
5. Dr. M.R. Sahoo, Scientist, ICAR, Manipur centre
- 6.

**Arunachal Pradesh & Meghalaya**

1. Dr. R.k Pathak, Former Director,CISH, Lucknow (Chairman).
2. Director, CIH/ Representative.
3. Shri. D.J.W Ingty, Director, Meghalaya.
4. State Representative (Arunachal Pradesh).
5. Dr. A.K. Jha, Sr. Scientist, ICAR, Umiam, Barapani.
- 6.

**Sikkim & Tripura**

1. Dr. Yog Raj Chanana, Head of Department, Horticulture, PAU, Ludhiana (Chairman).
2. Director, CIH/ Representative.
3. Shri. Anil Debbarma, Dy. Director of Horticulture, Govt. of Tripura.
4. Shri Sonam Gyatsho Bhutia, Joint Director of Horticulture, Govt. of Sikkim.
5. Dr. Biswajit Das, Principal scientist, ICAR, Tripura centre.

## ANNUAL ACTION PLAN 2017-18

Central Institute of Horticulture				
Annual Action Plan 2017-2018				
Sl	Components	Physical Targets	Approx. cost per unit	Approx. Financial Implication
			(Rs. )	(Rs. In lakh)
1	SALARIES			24.60
2	WAGES			40.00
3	MEDICAL			8.00
4	DOMESTIC TRAVEL EXPENSES			20.00
5	OFFICE EXPENSES			
	1) Office furniture		1.00	
	2) Telephone bill		4.00	
	3) Electricity bill		5.00	
	4) Repair of motor vehicle		3.00	
	5) Purchase of rubber stamp		0.10	
	6) Stationary		1.00	
	7) Office equipment		1.00	
	8) Computer		1.00	
	9) Contingent staffs remuneration		1.00	
	10) Stores		5.00	
	11) Printing & binding jobs		0.20	
	12) POL		7.00	
	13) AMC		11.70	
	14) Postage & telegraph		4.00	
	15) Training hall furnishing		5.00	
	Sub total			50.00
6	RATE, RENT & TAXES			2.00
7	PUBLICATION			
	1) Annual Report 2016 – 2017	1No.		
	2) Technical bulletin	2 Nos.		
	3) Folders	6 Nos.		
	4) Reprinting of exhausted Technical folders	10 Nos.		
	5) Reprinting of prospectus of Certificate Course	1No.		
	Sub total			15.00

<b>8</b>	<b>OTHER ADMINISTRATIVE EXPENSES</b>			
	<b>A. Human Resource Development</b>			
	<b>B. Meetings</b>			
	<b>C. PHM &amp; Marketing</b>			
<b>8.A</b>	<b>Human Resource Development</b>			
	1) Farmers Training	40 nos.(50 trainees/batch		20.00
	2) Training of Trainers	08 nos. (40 trainees/batch)		27.68
	3) Exposure trip cum training	03 nos.		8.00
	4) Capacity Building of CIH Staffs & State officials	04 nos.		2.00
	5) Skill Development trainings	03 nos.	4.00	RKVY funding
	<b>Sub total of 8.A</b>			<b>57.68</b>
<b>8.B</b>	<b>Meetings</b>			
	1) Technical Advisory Committee (TAC) meeting	1 no		2.00
	2) Board of Management (BOM) meeting	1 no		2.00
	3) Regional level stake holders meeting & other meetings	1no		1.67
	<b>Sub total of 8.B</b>			<b>5.67</b>
<b>8.C</b>	<b>PHM &amp; Marketing</b>			
	1) Designing and promotion of packages	500 x 3 =1500	90.00/pcs	1.35
	2) Product developments			0.60
	3) Furnishing of processing unit along with electrical works			2.20
	4) Stainless steel Working table		0.50	1.00
	5) Colour Analyzer	1 No.		1.50
	<b>Sub total of 8.C</b>			<b>6.65</b>
<b>9</b>	<b>ADVERTISEMENT &amp; PUBLICITY</b>			<b>5.00</b>
<b>10</b>	<b>MINOR WORKS</b>			
	1) Land development for construction of poly-houses for nursery unit (JCB work)	1000 sqm	2.00	2.00
	2) Construction of polyhouses for nursery unit	1Nos. (500 sqm)	8.00	8.00
	3) Construction of terracing for farm development	1 Ha	35.00	35.00
	4) Construction of low cost poly house (tabular structure)	500sqmt	5.00	5.00
	5) Construction of rain water harvesting structure	20x 30 sq.ft		7.00
	6) Other minor works			3.00
	<b>Sub total</b>			<b>60.00</b>



<b>11</b>	<b>PROFESSIONAL SERVICES</b>			
	a. Consultancy fees as per actual			
	b. Professional fees as per actual			<b>10.00</b>
	c. Invigilator fees as per actual			
	d. Legal services as per actual			
<b>12</b>	<b>OTHER CHARGES</b>			
	A. Demonstration of production technologies at Institute level			
	i. Management of existing demonstrations			
	ii. Demonstrations of Technology in the Institute			
	iii. Demonstration of improved Technologies in NE States			
	B. Quality Planting Material Production			
	C. Accreditation of Horticulture Nurseries in NER			
	D. Certificate Course			
	E. Exhibitions/Trade Fairs/Meets/Mela			
	F. Upgradation of laboratory for basic analysis			
<b>12.A</b>	G. Contractual staff remuneration			
	H. Farm development & beautification			
	I. Contractual staff remuneration			
	<b>Demonstration of production technologies at Institute level</b>			
	<b>i. Management of existing demonstrations</b>			
	1) Maintenance of Organic model farm	1Ha		0.40
	2) Maintenance of Organic NADEP unit	2 units		0.10
	3) Maintenance of Organic Vermicompost	4 units		0.10
	4) Intercropping of Cowpea/Dhaincha in fruit blocks	5.5Ha		0.50
	5) Maintenance of high value flowers in polyhouse i. Anthurium var. Carnaval, Pistachi & Tropical ii. Gerbera Plants var. Shimmer & Preintage	800 nos. 2000nos.		3.00
	6) Repair & re-installation of drip irrigation system in existing fruit blocks including laying of plastic mulching	2 Ha		10.00
	7) Purchase of fertilizers, chemicals & manures for open cultivation	13 Ha		5.00

	8) Purchase of Fertilizers(water soluble),Chemicals & Manures for polyhouse	10nos. of poly-house		2.00
	9) Preparation of sign board and labeling of every mother plants along with Institute name and logo	18 nos big size (4x 3 ft) with post and 7000 nos labeled (1ft x 9inch)		7.00
	<b>Sub total of 12A i</b>			<b>28.10</b>
<b>ii.</b>	<b>Demonstrations of Technology in the Institute</b>			
	1) Establishment of Fig block var.Poona and Dinkar for varietal evaluation under foot hill condition of Nagaland including mulching and Installation of drip irrigation & fertigation system (IIHR Bangalore)	0.40 Ha		2.00
	2) Establishment of pineapple block var. Gaint Kew along the slope area including mulching (AAU, Jorhat)	B 3Block 1.0Ha		3.08
	3) Performance of high value vegetables under protected cultivation (tomato var.Himsona & Avatar,Pusa Cherry-1, sweet pepper var.Bomby(Red) & Shwarna (yellow), Cucumber var.Hilton & Kian, Bittergourd var.Pusa Rasdav) (IARI technology)	1500 sqm		0.50
	4) Varietal evalution of Gladiolus in open field var. Nova Lux,White Prosperity,Eurovision & Pink Frindship) (NBRI, Lucknow)	0.5 Ha		2.00
	5) Demonstration of seed inoculation with biofertilizers of ginger var.Nadia (IISR technology)	0.25 Ha		0.10
	6) Improved production Technology of Marigold var.Pusa Narangi (IARI technology)	0.05 Ha		0.10
	7) Awareness creation on Nutrition through Model vegetable garden(Brinjal var.Pusa Purple Round, Okra var.Arka Anamika, Broccoli var.Pusa Broccoli-1& Cabbage var. Pride of India (IARI technology)			0.50
	8)Demonstration on organic cultivation of turmeric var. Lakadong & Megha (IISR technology)	1000 sq.m		0.20
	9)Demonstration on organic cultivation of underutilized horticulture crops (IARI technology)	4000 sq.m		0.30
	10)Demonstration on organic cultivation of pineapple var.Gaint Kew under plastic mulch (area expansion of excisting plantation) (AAU, Jorhat)	3000 sq.m		0.50
	11)Demonstration on production of organic inputs like bio-enhancers, bio-manures & bio-pesticides (CISH technology)			0.30
	12) Setting up of Mushroom spawn production unit			7.00
	<b>Sub total Sub total of 12A ii</b>			<b>16.58</b>

<b>iii.</b>	<b>Demonstration of improved Technologies in NE States</b>			
	1) Demonstration on plantation of litchi var.China/Shahi in Nagaland (NRC Litchi)	1 Ha		1.00
	2) Demonstration on plantation of Khasi Mandarin in Sikkim (CCRI technology)	1Ha		1.00
	3) Rejuvenation of declining Citrus orchard Nagaland & Manipur (CCRI technology)	1Ha each		1.00
	<b>Sub total of 12A iii</b>			<b>3.00</b>
<b>B.</b>	<b>Quality Planting Material Production</b>			
	1) Mass multiplication of quality planting material			
	Asexually propagated plants (Cashew 18000nos. var.BBSR-1, VRI-3,V-4; citrus 18000nos. var. Khasi mandarin, Assam lemon; mango 5000nos. var.Amrapali, Dashehari & Mallika, guava 15000nos. var.L-49, Allahabad Safeda, Lalit & Sweta; rose 4000nos. Var.Bordeux, Avalanche)	70,000 nos		7.80
	2) Production & supply of vegetable seedlings to farmers (Brinjal, Broccoli, Cabbage)	9000 nos.		0.35
	<b>Sub total 12B</b>			<b>8.15</b>
<b>C.</b>	<b>Accreditation of Horticulture Nurseries in NER</b>	20 nos.	1.25	<b>25.00</b>
<b>D.</b>	<b>Certificate Course</b>	4 courses		<b>35.42</b>
<b>E.</b>	<b>Exhibitions/ Trade Fairs/ Meets/Mela</b>			
	1) National level exhibitions (3 days event to be organized)	1 no		10.00
	2) National/ State level exhibitions (To participate)	2 nos		6.00
	3) NE Kisan Mela ( To organize 2 days event)	1no		8.00
	<b>Sub total</b>			<b>24.00</b>
<b>F.</b>	<b>Upgradation of laboratory for basic analysis</b>			
	1) Muffle furnace	30cmx20cmx20cm		0.70
	2) Microwave oven	30 ltrs		0.20
	3) Centrifuge (vertical)	1 no.		1.00
	4) Autoclave	152 ltrs		1.50



	<b>Sub total</b>			<b>3.40</b>
<b>G.</b>	<b>Chemical &amp; glassware's for laboratory</b>			<b>5.75</b>
<b>H.</b>	<b>Farm development &amp; beautification</b>			<b>5.00</b>
<b>I.</b>	<b>Contractual staff remuneration</b>			<b>66.00</b>
<b>13</b>	<b>MACHINERY &amp; EQUIPMENT</b>			
	1) Farm tools & implements			
	a)Tractor drawn weed cutter	1 No.	2.00	2.00
	b)Tractor drawn pit digger	1 No.	2.00	2.00
	2) Fruit & Vegetable clink &shrink wrapping machine	1 No.		6.00
	<b>Sub total</b>			<b>10.00</b>
	<b>Grand total</b>			<b>535.00</b>

Budget Projection for the year 2017-2018		
Sl	Head of Account	Approved Budget for 2017-18 (Rs. In Lakhs)
<b>A</b>	<b>Major Head -2401</b>	
1	Salary	24.60
2	Wages	40.00
3	Medical Treatment	8.00
4	Domestic Travel Expenses	20.00
5	Office expenses	50.00
6	Rent, Rates & Taxes	2.00
7	Publication	15.00
8	Other Administrative Expenses	70.00
9	Advertisement & Publicity	5.00
10	Minor works	60.00
11	Professional Services	10.00
12	Other Charges	220.40
	<b>Sub Total</b>	<b>525.00</b>
<b>B</b>	<b>Major Head -4552</b>	
1	Major works	
	a. C/o Training hostel (Total cost Rs.650 lakhs) 1st Installment	390.00
2	Machinery & Equipment	10.00
	<b>Sub Total</b>	<b>400.00</b>
	<b>Grand Total</b>	<b>925.00</b>

Extra budget required for undertaking the following major works		
<b>1</b>	C/o Training hostel (2nd Installment)	260.00
<b>2</b>	C/o Admin block R&D i/c bulk services & site development (Ground floor)	1500.00
<b>3</b>	Renovation of existing barbed wire boundary wall with bricks	156.00
	<b>Total</b>	<b>1916.00</b>

## 11. RECOMMENDATION OF TECHNICAL ADVISORY COMMITTEE AND BOARD OF MANAGEMENT COMMITTEE

### 11.1. Recommendation of Technical Advisory Committee

**Minutes of the 10<sup>th</sup> Technical Advisory Committee (TAC) meeting of CIH held on 23<sup>rd</sup> January, 2018 at 11:00 AM at conference hall, CIH, Medziphema, Nagaland**

The following members were present.

#### Members present:

- |     |                                                                  |                    |
|-----|------------------------------------------------------------------|--------------------|
| 1.  | Dr. V.A Parthasarathy, Ex- Director, ICAR-IISR, Calicut          | - Chairman         |
| 2.  | Dr. N K Mohan, Chief Consultant, CIH                             | - Member           |
| 3.  | Dr. M. Tamil Selvan, Rtd. Addl. Comm. (Hort.), DAC & FW          | - Member           |
| 4.  | Dr. R.A.Ram, Principal Scientist, CISH, Lucknow                  | - Member           |
| 5.  | Dr.A.K.Srivastava, Principal Scientist, CCRI-Nagpur              | - Member           |
| 6.  | Dr. Lohit C. Bora, Professor, AAU, Jorhat                        | - Member           |
| 7.  | Dr. Lallan Ram, Director, CIH                                    | - Member Secretary |
| 8.  | Dr.N. K Patle, Dy Comm. (Hort.), DAC & FW                        |                    |
| 9.  | Dr. R.K Arora, Professor, Haryana Agricultural University, Hisar |                    |
| 10. | Dr. Y.R Chanana, Former Head, PAU, Ludhiana                      |                    |
| 11. | Mrs.Meribeni Shitiri, Horticulture Specialist, CIH               |                    |
| 12. | Mr. Anjani Kumar Singh, Horticulture Specialist , CIH            |                    |
| 13. | Mr. Prabin Das, Marketing Specialist, CIH                        |                    |
| 14. | Mr. Arvind Singh, Technical Consultant, CIH                      |                    |
| 15. | Dr. Moasosang Longkumer, Asst. Horticulture Specialist, CIH      |                    |
| 16. | Mr. Manzar Hossain, Post Harvest Technologist, CIH               |                    |
| 17. | Mr.Ngupani, Sr. Technical Asst., CIH                             |                    |
|     | Mr.Tokivi, Sr. Technical Asst., CIH                              |                    |

Dr. V.A Parthasarathy chaired the meeting. The meet deliberated on the agenda laid before the members. After a brief introduction, there was a presentation by Director, CIH on achievements of CIH and confirmation of the 9<sup>th</sup> TAC recommendation.

#### 1. Confirmation of 9<sup>th</sup> TAC meeting held on 14<sup>th</sup> Jan 2017 (Meeting minutes and action taken report)

The action taken report of the minutes of the last Technical Advisory Committee meeting held on 14<sup>th</sup> Jan 2017 was discussed and was approved by the members.



**II. Achievements of CIH 2017-18**

The Achievements of the Institute for the period from April, 2017 to Dec., 2018 was presented by the Director, CIH in a power point presentation.

**III. Annual Action Plan of CIH for the year 2018-2019**

The following recommendations were made:

**1. Focus crops:**

- It was recommended to give focus on crops like Citrus (Assam lemon and Khasi Mandarin), Kiwi, Pineapple, Strawberry, litchi, banana, Large cardamom, ginger, turmeric and black pepper.

**2. Human Resource development:**

- It was advised to cover crops such as ginger, Sikkim Mandarin and large cardamom during farming training programme for the farmers of Sikkim.
- It was suggested to increase the number of trainer's training as well as number of persons to be trained.
- It was also advised that the staff of CIH should go for training on Soil Fertility Management and act as master trainers during training programmes.

**3. Quality Planting Material:**

- It was suggested to have linkage with private accredited nurseries to meet the demand of quality planting material production and scion materials. Technical support to the private nurseries may be provided by CIH.
- It was suggested that the rootstocks used for citrus may be re-verified, disease free and may be bought from reliable source.

**4. Post harvest management:**

- For minimal processing of spices, it was suggested that the Director, IISR may be contacted for collaboration.
- It was suggested to concentrate only on few products for value addition and processing.

**5. Demonstration (open field and protected cultivation):**

- It was suggested to include Chinese garlic instead of onion for demonstration.
- It was also advised to explore new and improved varieties of vegetables from AAU, Jorhat and ICAR, Barapani.
- It was suggested that the technology of AAU, Jorhat and ICAR, Barapani should be adopted as source of technology for various demonstration activities.
- It was suggested to use the term 'Improved production technology' in place of Integrated Nutrient management.
- It was also advised to take appropriate technology developed in NER for flowers and concentrate on farmer's varieties.

**6. Marketing:**

- It was suggested to have linkage with all the Institute activities irrespective of marketing.
- It was advised to form Farmers Producer Organization (FPOs) and Farmers Producer Company for production and marketing of the produce.
- It was suggested to organize brainstorming on all the Government schemes related to the production and marketing of horticultural crops.
- It was also suggested to guide the farmers/ groups in preparation of DPR related to the various horticultural projects.

**7. Skill development course**

- It was also suggested to increase the number of skill development course by collaborating with the KVKs of Nagaland.
- It was also advised to take 7 hour per day class hour in skill development course and further 1 hour practical class to be kept on Saturdays that has to be looked after by the Farm Manager and field Assistants.
- It was also suggested to maintain a separate register for expenditure incurred.

**8. Suggestions by the members:**

- a. It was advised to maintain a separate register for meeting attendance.
- b. It was suggested to take up one integrated farming system in Nagaland.
- c. It was advised to increase the number of quality planting material production and concentrate only on major crops whose varieties are suitable in the North East Region.
- d. It was advised multiply vegetable and papaya seedlings production as per the suitable varieties required by the farmers for demonstration in farmers field and sale to the stakeholders at minimal price.
- e. It was suggested to expand the area for establishing mother blocks in the Institute for horticulture crops such as pomegranate, ber, dragonfruit, jamun, sapota, carambola, custard apple, black pepper and bay leaf. This suggestion may be included in Action Plan 2018-19.
- f. It was suggested to establish an apiculture unit in the Institute which may be included in Action Plan 2018-19.
- g. It was suggested that exposure trips cum training may be organized in collaboration with Government organization.
- h. It was advised to identify some adopted village in all states of NER for establishment of demonstration plots in the farmers' field and monitored properly for its success and impact.
- i. It was recommended to carry out impact analysis study for all the activities of the Institute of previous years.
- j. It was suggested to install drip irrigation facilities in all fruits and vegetable block.

## 11.2. Recommendation of Board of Management

### **Minutes of the 13<sup>th</sup> Board of Management meeting of CIH, Nagaland held on 09<sup>th</sup> April, 2018**

The 13<sup>th</sup> Board of Management meeting was held on 9<sup>th</sup> April 2018 at CIH, Nagaland under the Chairmanship of Dr. B N S Murthy, Horticulture Commissioner, Dept. of Agriculture, Cooperation & Farmers Welfare, Govt. of India with 11 members, 4 invited members & 10 technical staffs of CIH. The meeting was conducted to deliberate on key issues and to consider for approval of Annual Action Plan of CIH, Nagaland for the year 2018-19 which was prepared under the supervision and guidance of Technical Advisory Committee (TAC). The list of members present in the BOM meeting is enclosed in Annexure-I.

1. **Confirmation of the minutes of 12<sup>th</sup> BOM meeting:** The minutes of the 12<sup>th</sup> BOM meeting held on 28<sup>th</sup> February 2017 at Krishi Bhawan, New Delhi was confirmed by the members.
2. **Achievements of CIH 2017-18:** Dr. Naveen Kumar Patle, Dy. Commissioner (Hort), DAC & FW & Director i/c. CIH presented a power point on the achievements of the Institute during the year 2017-18. The Chairman and the members appreciated the efforts of the Director and staffs of the Institute for working towards holistic development of horticulture in the North East states. The suggestion and recommendations given by the Board members are mentioned below:
  - i) To further strengthen production of the planting material in the Institute, the chairman suggested for establishment of tissue culture laboratory in the Institute for mass multiplication of quality planting material.
  - ii) It was advised to carry out demonstration of red cabbage in the Institute to study the performance of the variety in Nagaland condition and also to popularize new technology of cultivation.
  - iii) It was advised that utmost care should be taken while spraying insecticides in the farm for controlling of insects/pests. It was also recommended to minimize the use of insecticides.
  - iv) The members suggested to take up demonstration of early and pickling varieties of mango in the farm.
  - v) It was suggested to develop a vegetable seedling production unit for round the year production of vegetable seedlings which could be utilized for demonstration in the CIH farm as well as in farmers field.
  - vi) For raising vegetable seedlings in pro-trays, it was suggested to apply bio-pesticides in the media.
  - vii) The chairman and members appreciated the staffs for conducting 39 trainings and 5 skill development programmes for the farmers and youth of North East states. It was advised to conduct need-based trainings for the farmers.



- viii) In Post Harvest Management, it was suggested to give priority to primary processing of horticulture crops in the certificate course on PHM & Value Addition so as to minimise pH losses of farmers.
- ix) In nursery accreditation, it was advised to focus on improving the rating of those nurseries who have been rated as O and 1 star. The nurserymen should also be advised to undertake standard practices as it is important to produce healthy, genuine quality planting material for success of commercial horticulture.
- x) To order to disseminate the right kind of knowledge on advance technologies through printed materials, it was suggested to take guidance and support of agricultural universities during preparation of publications, folders etc. Focus should also be given for publishing extension folders in different local dialects for distribution to farmers.
- xi) It was advised to identify beneficiaries for off farm demonstration by collaborating with state departments, KVKs and CAUs.
- xii) The members suggested that the revenue generated from different production systems in the farm should be properly recorded and maintained.

**3. Action Plan of 2018-19:-** Dr. N.K. Patle, Director i/c. CIH presented the Annual Action Plan of 2018-19 and the members deliberated upon the activity and programmes of the Institute. The Annual Action Plan 2018-19 was approved with the following suggestion and recommendations.

- i) Apart from the already allotted courses i.e. Floriculturist Protected Cultivation and Gardener, it was suggested by the members to take up some other courses in horticulture. Director, CIH informed that the Institute is planning to take up a new course on Bee Keeping during the year 2018-19.
- ii) The chairman recommended that the Institute should maintain database of important horticulture crops of North East states.
- iii) It was suggested to increase the number of Capacity Building programmes for the staffs as it would help them in developing their skills, expertise and update themselves with the latest advancements in horticulture sector. The budget may also be increased to Rs. 2.00 lakh.
- iv) The members advised to increase the number of exposure visits in different parts of the country. The number of persons per exposure visit may be reduced. Exposure visit cum training on post harvest management may be given special preference. The member from Horticulture department, Nagaland requested that an exposure trip be arranged for suitable farmers from the state on post harvest management and processing.
- v) The chairman suggested that for market linkage, major horticulture crops which have good potential should be considered. He also suggested that a detailed plan be prepared for implementation of new mandates on market linkage with details of target beneficiaries, support institutions and the calendar of events.

- vi) It was suggested to check the amount proposed for installations of electrical transformer and propose the revised amount as it seems to be on the lower side.
- vii) It was suggested to construct one unit of ground water harvesting near the polyhouse.
- viii) The chairman suggested that demonstration on open cultivation of Gladiolus flower may also be taken up in farmers field so as to make the farmers aware of the additional benefits that they can reap through it.
- ix) It was suggested to drop pomegranate and include Rambutan and Avocado in establishment of new mother block in the Institute.
- x) It was advised to take up demonstration on bird's eye chilli, a popular variety of chilli found in Mizoram with the objective to study the performance of the variety under Nagaland condition.
- xi) It was suggested to demonstrate local variety of cucumber found in Nagaland at the Institute farm under open field condition.
- xii) In order to highlight on the benefit of practicing improved production technologies, the members recommended that all the demonstrations established in the institute should be associated with a field day cum training programme so that the farmers come and learn from the Institute. It was also advised that all the state horticulture departments of NER may bring beneficiaries for field visit in the Institute atleast thrice in a year.
- xiii) The chairman opined that the Institute may plan for a demonstration plot which would highlight on overcoming the bad cultivation practices in horticulture.
- xiv) It was advised to take up demonstration of some few tuber crops like cassava, elephant foot yam, sweet potato and colocasia instead of going for one crop in the new site near the newly constructed boundary wall. The component in the action plan should be mentioned as "plantation of tuber crops (cassava....etc.)".
- xv) The members suggested that instead of going for off farm demonstration/ establishment of mother block of Pomegranate, the Institute should take up off-farm demonstration of Khasi Mandarin in the state of Assam/ Nagaland.
- xvi) It was suggested not to mention the names of chemicals and glasswares for laboratory in the summary of action plan. The list of chemicals/ glasswares for laboratory should be annexed. It was advised to club the items under tools and implements as one unit under machinery and equipment head.
- xvii) In major works, it was suggested that construction of residential quarters in the Institute may be taken up phase wise. Initially, the Institute may propose for construction of type-II & III quarters during the financial year 2018-19.

**4. The Chairman gave time to all the members to share their suggestions and inputs, which are mentioned as follows;**

- i) **Dr. D P Ray:** He mentioned that a number of research meetings are being conducted by ICAR and it would be very beneficial for the Institute to participate in such meetings to which the Chairman assured the participation of the Institute whenever invited to attend such research meetings.
- ii) **Dr. D J Rajkhowa:** He shared that, with regards to planting material production, there should be sharing of information between the organization so that they are aware of what varieties of crops are produced and available in CIH.
- iii) **Shiv Anjan Dalmiya:** He shared that there is a need for mushroom spawn as many farmers can take up mushroom production and acquire additional income through it. The members from Horticulture Dept., Nagaland and ICAR Nagaland informed that they are involved in production of mushroom spawn and interested farmers can procure it from them.

The meeting concluded with the Chairman thanking all the members for their time and valuable inputs in finalizing the Annual Action Plan of CIH, Nagaland for the year 2018-19. He congratulated the Director and staffs for their contribution in implementation of the programmes and encouraged them to continue their hard work and dedication towards the Institute.



## 12. SUCCESS STORIES

### A. Success story of various training programmes organized at different States of NER

Over the years CIH has helped in disseminate technical knowledge and creating awareness through trainings and exposure visit, from which some farmers have use these technical knowledge to started their own venture, while some of them have formed various self help groups (SHG).

A group of women farmers from Vikuho village, Dimapur, Nagaland have been cultivating aloevera but due to lack of technical knowledge they have approached CIH for help, for which three days exposure visit cum training on “Production technology and processing of aloevera” at Jaipur was arranged and conducted. The exposure programme created a huge impact on the farmers and it has given them vital knowledge on technical approaches in production and processing of aloe vera. Now, apart from better production and marketing of fresh organic aloevera, the farmers group have started processing aloe vera and making it into aloe vera product like soaps, detergent power and liquid dish wash.

Mrs. Emola, Ms.Asangla Mrs. Amenla and Narola from Medziphema town, Dimapur, Nagaland, were ordinary housewives but after they attended farmers training on “Value Addition of horticultural crops”, and through demonstration they learned preparation of king chilli pickle with bamboo shoot, cultivation of oyster mushroom and preparation of pineapple jam and squash. These group of women along with several others formed a self help group (AINA) initially they started their work with the help of training kits (mushroom spawn) distributed during the training programme, which proved to be very successful now they have started preparation of bamboo shoot pickle and other products. A Farmer from Dadenggre village, West Garo Hills, Meghalaya name Mr. Nangren A. Sangma has been cultivating only cashewnut in a small area of land before but after attending farmers training on “Sustainable kitchen gardening for self sufficiency in rural areas” and based on the knowledge gained during the training programme he started his own organic kitchen, which he grows various seasonal vegetables throughout the year and has been able to get some additional income by selling the produce which helps to sustains his family.

Another farmer Mr.Mebin ch. Marak from Samingre village, West Garo hills has a meager sized orange orchard and was finding it difficult to make ends meet, but after he attended the farmers training on “Importance and economics of oyster mushroom cultivation for rural livelihood” he was made aware of the technologies for mushroom cultivation, ever since, along with orange cultivation he has also started cultivating mushroom for additional income.

Mr. Athoi Bungte from Aimol village of Manipur, his main occupation was cultivating paddy, for a long time he wanted to cultivate vegetable crop as a secondary source of income but due to lack of

proper technical know how he was reluctant from doing so, but after he attended farmers training as well as 3 months Skill development course, he has taken up vegetable cultivation where he also practices mixed vegetable gardening.

Similarly, a farmer from Ukhongsang village, Thoubal district of Manipur, Mr. Gyanal Singh was intrigued to start horticulture farming after he participated in farmers training because paddy cultivation alone was not sufficient to make ends meet. Now he has started vegetable cultivation in his small plot of land where he grows seasonal vegetables all year round.

## **B. Success story of vegetable cultivation at farmers field**

FPO (Farmer's Producer Organisation) was formed under Bade Area Agri. & Allied Co-operative Society Ltd., Dimapur. Before the intervention of CIH, Nagaland, they were blindly engaged in traditional farming using primitive forms of agricultural practices. These vegetable farmers were first trained at CIH, and after attending awareness and training programme on improved production technology of vegetables organized by CIH, Nagaland; they approached the Director, CIH who in turn motivated them to take up vegetable farming in a scientific manner. The farmer was fully convinced with the technology and remained in touch with the technical staff of CIH then onwards. FPOs are also one of the vegetable cultivators in the state.



Fig 92. Cultivation of French bean



Fig 93. Cultivation of brinjal

They initiated vegetable cultivation under the supervision of technical staff of CIH and as a follow up, the staff of CIH visited their field at regular intervals. They were provided with all the need - based knowledge and skills. The impact of hard working attitudes of farmer and their ability to grasp the technologies at a much faster rate for better adoption the way they deserved to be implemented.

## **Constraints**

- Good production coupled with unstable market price, make the growers not in a position to receive the desired incentive of higher production. Another viable option could be to regulate the crop cycle according to market price of different vegetables since the climate is already so suitable for such ventures.



Fig 94. Cultivation of cabbage

Shelf life of vegetables is very short, which needs to be backed up through proper development of value chain management as per index of Codex Alimentarius of different vegetables.

The impact of promising technology is more than often undone by lack of proper irrigation facilities since vegetable cultivation requires abundant water for irrigation, especially during at initial stage of crop growth.

### **Impact and outcome**

- The beneficiary obtained a yield of 7 tons/ha of Broccoli (F1 hybrid Sakura), 25 tons /ha Cabbage (Golden Acre), 30 tons/ha French bean (Arka Anoop) and 6 tons/ha spinach (Pusa Bharti) generated an income of Rs. 2,00,000, on an ha area which is a staggering income needed.
- After seeing the potential of the new variety of French bean, farmers also look up seed production in the current year. The seeds so generated were supplied to the neighboring farmers. And, soon, this additional income will also add into the net economic benefit.
- The so trained farmers actively guide other farmers in adoption of new technologies and at present they are having 30 ha of land under vegetables. This is how, adopted technology is percolating from one area to another area, once impact of technology is visible in field.
- With CIH intervention, farmers up have started growing different vegetable crops in one season in the village and as a result they are realizing better price in the market to catch up with any eventuality of slackness in market price.
- The farmers were trained at CIH through comprehensive training programmes related to improved production technology organized by CIH. The Institute has also assisted and organized exposure trip to IHT, Noida, and Uttar Pradesh. This is how CIH is dedicated in service of farmers of northeastern India.
- The change scenario of vegetable cultivation has started being realized in the wake of area, production and productivity. With intervention of CIH, the impact of technology adoption in productivity has been observed across entire northeastern states when baseline data of 2008-09 is compared with 2015-16 as a year of impact assessment, with the result, average productivity increased from 9.6 to 5.3 tons/ha in Arunachal Pradesh, 11.7 to 12.2 tons/ha in Assam, 9.6 to 10.1 tons/ha in Manipur, 9.4 to 10.0 tons/ha in Meghalaya, 7.5 to 8.0 tons/ha in Nagaland, 4.6 to 5.2 tons/ha in Sikkim, and 11.5 to 16.7 tons/ha in Tripura. These figures of productivity will become wider as the impact of technology reaches to many more farmers.











