

Chapter 5- Horticulture

Technology no.1

- 1. Name of technology:** Mulching in Tube rose
- 2. Source of technology:** Department of Horticulture, AAU, Jorhat
- 3. Year of release:** 2012
- 4. Agro-climatic zone:** UBVZ & LBVZ of Assam
- 5. Detail description of technology:** Black polyethylene mulch of 50 micron
Method of application of mulch: The polyethylene should be laid on well prepared beds of 1.2/1.8 m breadth and of convenient length. Holes are made at a spacing of 30 cm x 20 cm and proper sized bulbs of tube rose are planted.

Management practices:

Variety: Suvasini

Characteristics: It is a summer commercial cut flower. Flowers are white having aroma

Duration: One to three years.

Planting time: February—March/ March--April

Harvesting time: 60--65 days after planting

Seed rate: (bulbs/ha) 1,42,500 no. of bulbs

Spacing: 30 cm x 20 cm

Seed Treatment: Bulbs should be treated with captaf or bavistin @ 1.5 g/l water for 30 min.

Land preparation: The land is thoroughly ploughed, harrowed and leveled. Beds are raised by 25--30 cm.

Manuring: Well rotten cowdung @ 5 kg/m²

Fertilizer: NPK@ 40: 20: 20g/m² (88 g urea, 125g SSP and 66 g MOP/m²)

- 6. Critical inputs required:** Black polyethylene mulch of 50 micron
- 7. Observations to be recorded:** Temperature, Rainfall, Date of sowing , Date of germination, Date of planting, date of weeding, Days to 50 % flowering, Plant height, Number of flower/ m², Florate per spike, Pest infestation, Disease infestation, Farmers reaction, Soil test data (initial & final), B: C ratio.

Technology no. 2

- 1. Name of technology:** Gerbera cultivars identified for Assam
- 2. Source of technology:** Department of Horticulture, Assam Agricultural University, Jorhat.
- 3. Year of release:** 2013
- 4. Agro-climatic zone:** UBVZ & LBVZ of Assam
- 5. Detail description of technology:** Gerbera is a perennial crop which flowers during winter. The crop duration is 8 months. Varieties are: RedGem, Orange Gleam, Pink Melody, Classic Beauty, Pride of Sikkim, Pride of India and Indukumari. Flower Character: Red Gem- Red colour flowers with both ray and trans florets of red colour. The stalk colour is brick red, involucre colour is dark green.

Pink Melody: The colour of flowers is light pink with both ray and trans florets having light pink colour but the disc florets are black or brown in colour.. The colour of the stalk and involucre is dark green.

Classic Beauty: Light orange colour flowers with ray florets of light orange and trans floret are of yellow colour. Disc florets are light yellow or green in colour. The colour of the stalk is light green and involucre colour is dark green.

Pride of Sikkim: White colour flowers with both ray and Trans florets of white colour. Disc florets are white or green in colour. The colour of the stalk and involucre is dark green.

Pride of India: The colour of flowers is light orange with both ray and trans florets having light orange colour but the disc florets are light green or yellow in colour.. The colour of the stalk and involucre is dark green.

Indukumari: The colour of flowers is mezena with both ray and trans florets having mezena colour but the disc florets are light yellow in colour. The ray florets are bilipped. The colour of the stalk is dark green and involucre colour is green.

Planting time: September--October

Harvesting time: Starting from 2 months after planting for a period of 6 months

Requirement of suckers/ha: 85,000 nos.

Spacing: 30 cm x 30 cm

Management practices:

Sucker Treatment: Healthy, disease free suckers having at least one growing point are selected. The roots and leaves should be trimmed leaving 5-6 cm and treated with captaf or

bavistin @ 1.5 g/l water for 30 min

Land preparation: Thoroughly ploughed, harrowed and levelled. Beds are raised by 25--30 cm.

Manuring: Well rotten cow dung @ 5 kg/m²

Fertilizer: NPK@ 30: 10: 20g/m² (66 g urea, 62 g SSP and 33 g MOP)

Pest management: Malathion 50 E.C. @ 1 per cent is sprayed at 15 days interval to control the insects attack. Endosulfan is also applied @ 2 ml/l to control the caterpillars at the later stages.

Disease management: Bavistin @ 5 per cent is sprayed on the foliage to control the bacterial blight in the initial stage of the crop. Later on, this mixture is sprayed as a prophylactic measure against bacterial blight at an interval of one month.

6. **Critical inputs required:** Varieties-Red Gem, Orange Gleam, Pink Melody, Classic Beauty, Pride of Sikkim, Pride of India and Indukumari.
7. **Observations to be recorded:** Temperature, Rainfall, Date of sowing, Date of germination, Date of planting, date of weeding, Days to 50 % flowering, Plant height, Number of flower/ m², Pest infestation, Disease infestation, Yield/ m², Farmers reaction, B: C ratio.

Technology no.3

1. **Name of technology:** Cut flower production of Gerbera using organic sources of nutrient

2. **Source of technology:** Department of Horticulture, Assam Agricultural University, Jorhat

3. **Year of release:** 2013

4. **Agro-climatic zone:** UBVZ & LBVZ of Assam

5. **Detail description of technology:**

Microbes: Biofertilizer (Azospirillum and PSB)

Manure: Well rotten cow dung @ 5 kg/m²

Dose of bio – fertilizer: Enrich compost @10t/ha + Biofertilizer (Azospirillum and PSB) @3.5 g/ha.

Method of application: Enrich compost as soil application one day before planting and biofertilizer as root treatment on the same day of planting.

Management practices:

Crop: Gerbera Cv .Red Gem

Sucker Treatment: Biofertilizer as root treatment on the same day of planting

Land preparation: The land is thoroughly ploughed, harrowed and levelled. Beds are raised by 25--30 cm.

Manuring: Well rotten cow dung @ 5 kg/m²

6. **Critical inputs required:** Biofertilizer (Azospirillum and PSB), enriched compost
7. **Observations to be recorded:** Temperature, Rainfall, Date of planting of sucker, Date of weeding, Days to 50 % flowering, Plant height, Number of flower/ m², Pest infestation, Disease infestation, Flower yield/m², Farmers reaction, Soil test data (initial & final), B: C ratio.

Technology no.4

1. **Name of technology:** NPK requirement for yield and cut flower production of chrysanthemum
2. **Source of technology:** Department of Horticulture, Assam Agricultural University, Jorhat
3. **Year of release:** 2013
4. **Agro-climatic zone:** UBVZ & LBVZ of Assam
5. **Detail description of technology:**

Fertilizer dose: NPK@ 30: 20: 20 g/m² (66 g urea, 125 g SSP and 33 g MOP/ m²)

Manure: Well rotten cow dung @ 5 kg/m²

Method of application: Half dose of urea and full dose of SSP and MOP are applied as basal dose. After one month of planting the rest of the fertilizers are applied in two equal doses at 15 days interval in ring method.

Management practices:

Varieties: Chrysanthemum, Cv.Carnival Pride

Planting materials Treatment: 5-7 cm long Terminal cutting are taken dipped in 1.5 g/lit captaf or Dithane M-45 solution for 20 min and then planted in nursery bed or pot after applying growth hormone (Rootex 1). The bed is also treated with the same fungicide up to a depth of 15-20 cm.

Land preparation: The land is thoroughly ploughed, harrowed and leveled. Beds are raised by 25--30 cm. Planted spacing - 30 cm x 30 cm

Pest management: Malathion 50 EC is sprayed @ 2% in every 30 days interval for the entire crop season to keep the crop pest free

Disease management: To control leaf spot disease after flowering i.e. stock plant maintenance application of Bavistin @ 1.5 gm/lit or Caftaf @ 1.5 gm / lit in one month interval.

Farming situation: High land

6. **Critical inputs required:** N, P, K, organic manure
7. **Observations to be recorded:** Temperature, Rainfall, Date of planting, Days to 50 % flowering, Plant height, Number of flower/ m², Pest infestation, Disease infestation, Yield / m², Farmers reaction, Soil test data (initial & final), B: C ratio.

Technology no. 5

1. **Name of technology:** Growth regulators for flowering & planting material production of gladiolus
2. **Source of technology:** Department of Horticulture, Assam Agricultural University, Jorhat.
3. **Year of release:** 2013
4. **Agro-climatic zone:** UBVZ of Assam
5. **Detail description of technology:** Application of GA3 100 ppm and Ethrel 250 ppm
Method of application: The corms of gladiolus were soaked overnight in the different solutions of growth regulators before planting

Management practices:

Crop: Gladiolus, Cv. Red Candiman

Manure: Well rotten cow dung @ 5 kg/m²

Planting materials Treatment: Healthy, disease free corms having a diameter more than 2.5 cm. Dry scales should be removed, treated with 2% Bavistin or Captaf for 30 min and then dried in shade

Land preparation: The land is thoroughly ploughed, harrowed and levelled. Beds are raised by 30 cm.

Manuring: Well rotten cow dung @ 5 kg/m²

Fertilizer: 25 g urea, 140 g SSP and 50 g MOP/ m²

6. **Critical inputs required:** GA3 and Ethrel
7. **Observations to be recorded:** Temperature, Rainfall, Date of sowing, Date of germination, Date of weeding, Days to 50 % flowering, Plant height, Number of flower/ m², Florae per spike, Pest infestation, Disease infestation, Farmers reaction, Soil test data (initial & final), B: C ratio: 4.5.

Technology no. 6

1. **Name of technology:** Summer Marigold technology
2. **Source of technology:** Department of Horticulture, Assam Agricultural University, Jorhat.
3. **Year of release:** 2017
4. **Detail description of technology:**

Variety: Seracole

Characteristics: It is a day neutral plant.

Duration: 4 months

Flower Character: Orange in colour and flower petals are compact in nature

Planting time: Every month from February to September cuttings are prepared and rooted cuttings planted in each months in raised beds for getting flower continuously through out the summer months.

Harvesting time: 75 days after planting of rooted cuttings

Requirement of cutting/ha: 47500 nos.

Spacing: 45 cm x 45 cm

Management practices:

Planting material Treatment: Healthy,disease free. 5-7 cm long terminal cuttings are taken, treated with Dithane M-45 or captaf @ 1.5 g/lit for 20 min and then planted in nursery bed or pot after applying growth hormone. The bed is also treated with the same fungicide up to a depth of 15-20 cm.

Land preparation: The land is thoroughly ploughed, harrowed and levelled. Beds are raised by 30 cm.

Manuring: Well rotten cow dung @ 5 kg/m²

Fertilizer: NPK@10: 10: 10 g/m² (21 g urea, 62 g SSP and 16.5 g MOP/ m²)

Pest management: For mite infestation, Omite @ 1.5 per cent is sprayed at 7 days interval.
Endosulfan @ 2 ml/l to control the caterpillars at the later stages

Disease management: For leaf spot infestation, Bavistin or Diethane M-45 @ 1.5 per cent is sprayed at 7 days interval.

5. **Critical inputs required:** Variety 'Seracole', fungicide, growth hormone, organic manure, N, P, K, insecticides.
6. **Observations to be recorded:** Temperature, Rainfall, Date of planting of rooted cuttings, Date of weeding, Days to 50 % flowering, Plant height, Number of flower, Pest infestation, Disease infestation, Flower yield/ m², Farmers reaction, B: C ratio.

Technology no.7

1. **Name of technology:** Cultivation of Okra by using organic sources of nutrient
2. **Source of technology:** Deptt. of Horticulture, AAU, Jorhat
3. **Year of release:** 2015
4. **Agro-climatic zone:** All zones of Assam
5. **Detail description of technology:**

Treatment of seeds with biofertilizers AZB and PSB @ 7.5g each per 100 g of seeds and application of Rock Phosphate @ 313 kg/ha, FYM @ 5 t/ha and Vermicompost @ 1 t/ha during final land preparation has been recommended.

Microbes: *Azotobacter* and *Phosphorus Solubilizing Bacteria*

Dose of biofertilizer: *Azotobacter* and *Phosphorus Solubilizing Bacteria* @ 7.5g each per 100g of seeds.

Manuring: Farm Yard Manure @ 5t/ha+ Vermi Compost @1t/ha along with Rock.Phosphate 313 kg/ha

Method of application: Manure application is to be done at the time of final land preparation.

Management practices:

Crop: Okra

Spacing: 50 cm X 45 cm

Seed rate: 10 kg/ha

Seed treatment: Seed treatment with biofertilizer slurry for at least 1 hour before sowing of seeds

Land preparation: Minimum tillage operation is done.

Pest management:

- Installation of pheromone traps for monitoring *Earias vitella*.
- Yellow sticky traps should be set up for monitoring whitefly, thrips etc. @ 10 traps/ha. Locally available empty tins can be painted yellow colour, coated with vaseline/ castor oil on outer surface may also be used as yellow sticky traps.
- Five releases of *Trichogramma chilonis* @ 1 lakh/ha starting from 35 DAS at weekly interval.
- Neem based insecticides @ 20 ml/10 lt to be applied for conservation of natural enemies at an interval of 15 days whenever necessary.
- Three sprays of 5% NSKE for hopper, white fly and mites starting at 28 DAS
- Erection of bird perches for facilitating predation of borer larvae.

Disease management: Sowing of Yellow Vein Mosaic resistant variety. Destruction of crop residues after harvest and phyto sanitation measures is to be adopted.

Any other: Use of black mulch (50 micron) between the rows control weeds and also conserves soil moisture.

6. Critical inputs required: *Azotobacter*, *Phosphorus Solubilizing Bacteria*, FYM, vermicompost, Rock phosphate.

7. Observations to be recorded: Rainfall, Date of sowing, Date of germination, Date of planting, Date of weeding, Days to 50% flowering, Plant height, Number of fruits/ m², Fruit character, Pest infestation, Disease infestation, Yield, Soil test data (initial & final), Benefit Cost Ratio : 3.45.

Technology no. 8

- 1. Name of technology:** Cultivation of Cabbage by using organic sources of nutrient
- 2. Source of technology:** Deptt. of Horticulture, AAU, Jorhat
- 3. Year of release:** 2012
- 4. Agro-climatic zone:** All zones of Assam
- 5. Detail description of technology:**

Microbes: *Azotobacter* and *Phosphorus Solubilizing Bacteria*

Dose of biofertilizer: *Azotobacter* and *Phosphorus Solubilizing Bacteria* @ 7.5g each per 100g of seeds

Manuring: Vermicompost @5 t/ha + Rock Phosphate@375kg/ha Rock phosphate 375kg/ha (as per SSP dose)

Method of application: Manure application is to be done at the time of final land preparation.

Management practices:

Crop: Cabbage

Spacing: 45 cm X 45 cm

Seed rate: 800g/ha for early; 10 g of seed should be sown/m²

Seed treatment: Seed treatment with biofertilizer slurry for at least 1 hour before sowing of seeds

Land preparation: Minimum tillage operation.

Pest management: i) 1% Lemon juice as a foliar spray for controlling Diamond

Black Moth is found effective.

ii) Erect bird perches @ 50 nos./ha helps to come and eat the insect larvae.

iii) Use of trap crop: Bold seeded mustard is more suited for using as trap crop in cabbage cultivation. Mustard is sown twice; first is at 15 days prior to cabbage transplanting, while the second one is at 25 days after transplanting. However, there may be some incidence at later stages. For this apply 5% NSKE.

iv) Release of *T. chilonis* @ 50,000/ha 4-5 times with interval of 5-7 days helps in controlling DBM and other *lepidopteran* pests.

Disease management:

- i) Soak the seeds in 122-degree water for about 25 minutes to kill any lingering bacteria.
- ii) Avoid cruciferous crops in the in the infected location.
- iii) Use clean cultivation
- iv) Use copper fungicide

Any other: Use of black mulch (50 micron) between the rows control weeds and also conserves soil moisture. Earthing up can be done at about 30 days after planting.

6. **Critical inputs required:** *Azotobacter*, *Phosphorus Solubilizing Bacteria*, vermicompost, rock phosphate
7. **Observations to be recorded:** Temperature, Rainfall, Date of sowing, Date of germination, Date of planting, Date of weeding, Pest infestation, Disease infestation, Yield, Soil test data (initial & final), B: C ratio

Technology no.9

1. **Name of technology:** Cultivation of Carrot by using organic sources of nutrient
2. **Source of technology:** Deptt. of Horticulture, AAU, Jorhat
3. **Year of release:** 2012
4. **Agro-climatic zone:** All zones of Assam
5. **Detail description of technology:**

Microbes:	<i>Azotobacter</i> and <i>PSB</i>
Manure:	Enriched compost @5 t/ha or Cowdung @ 10t/ha
Dose of biofertilizer:	<i>Azotobacter</i> and <i>PSB</i> @ 7.5g each per 100g of seeds
Manuring:	Enriched compost @5 t/ha or Cowdung @ 10t/ha+Rock Phosphate188kg/ha
Rock phosphate:	188kg/ha (as per SSP dose)
Method of application:	Manure application is to be done at the time of final land preparation.
Management practices:	
Crop:	Carrot

Spacing: Seeds should be sown at a depth of 1.5 cm in lines spaced at 30 cm on flat bed and seedlings are to be thinned out to 10 cm within rows at 10-15 days after emergence.

Seed rate: 7.0 kg/ha

Seed treatment: Seed treatment with biofertilizer slurry for at least 1 hour.

Land preparation: Land is prepared to fine tilth

Pest management/Disease management:

i) Destruction of crop residues after harvest and phytosanitation measures is to be adopted.

ii) Use of repellent: 4% garlic juice is sprayed whenever required.

iii) Neem based insecticides @ 2ml/lit is applied against any leaf cutting insects whenever required.

iv) Neem cake enriched with *Pseudomonas fluorescens* applied at 10g/m² increases the root colonization and significant increase in the yield of carrot.

Any other: Earthing up is done at about one month after sowing.

6. Critical inputs required: *Azotobacter* and *PSB*, enriched compost/cowdung, Rock Phosphate

7. Observations to be recorded: Rainfall, Date of sowing, Date of germination, Date of planting, Date of weeding, Days to 50% flowering, Yield Soil test data (initial & final), B: C ratio: 6.12

Technology no.10

1. Name of technology: Stage wise requirement of N and K in banana

2. Source of technology: Department of Horticulture, Assam Agricultural University, Jorhat.

3. Year of release: 2017

4. Agro-climatic zone: All zones of Assam

5. Detail description of technology:

Manures and fertilizers: Pits of 45cmx45cmx45cm size are dug and each pits filled with the top soil mixed with 200g lime and 12kg FYM one month before planting. Nitrogenous and potassic fertilisers @ 110g N and 330g K₂O per plant in the form of Urea and Murriate of Potash respectively are applied in splits in different stages as

Nitrogenous fertilizer :

- 60% of N at planting to five month stage
 - 20% of N at shooting
 - 20% of N at last hand opening to one month before harvest
- Potassium fertilizer:
- 40% of K at shooting to last hand opening
 - 60% of K at last hand opening to one month before harvest stage

Phosphatic fertilizer: The phosphate fertilizers @ 33g P₂O₅ per plant are applied in third month after planting.

Management practices:

Variety: Barjahaji

Characteristics: It is high yielder, has no persistent male bract, fingers are long and green, even at ripening, flesh is soft and smooth.

Duration: 13-16 months

Planting materials: 4-6 months old sword suckers

Requirement of suckers: 3086 nos

Planting time: March to May

Planting material treatment: Healthy uniform sword suckers weighing about 2kg of uniform age are selected. Before planting, the top portion of selected suckers is removed at 30cm from the corm. The weighed suckers are pared and pralinaged by dipping them in a clay slurry with carbofuran 3G @ 20g per sucker.

Land preparation: Thoroughly ploughed, harrowed and levelled

Spacing: 1.8mx1.8m

Harvesting time: June/July

Farming situation: High land

6. Critical inputs required: N & K

7. Observations to be recorded: Bunch weight, Yield, Hands per bunch, Fingers per hand, Weight of finger, Farmers' reaction, B: C ratio.

Technology no.11

- 1. Name of technology:** Off season cultivation of cucumber under polyhouse
- 2. Source of technology:** Department of Horticulture, AAU, Jorhat-13
- 3. Year of release:** 2017
- 4. Agro-climatic zone:** All zones of Assam

Detail description of technology:

Variety:	Alisha F-1
Sowing time:	Mid of Oct to Jan
Spacing:	30cm (Plant to plant) X 60 cm (Row to row)
Seed rate:	20 g/ 100 m ²
Land Preparation:	The width per bed is 75 cm and distance between bed is 40 cm.
Manure & fertilizers:	90: 270: 120 kg NPK/ha + FYM @ 15 t /ha
Seed treatment:	Potassium nitrate @ 0.2%
Plant population:	506 plants/ 100m ²
Plant protection:	techniques Powdery mildew: Sulfex @ 0.2%
Downy mildew :	Indofil M-45 @ 0.2%

Interculture: Irrigation and weeding are done as and when required.

Special cultural practices: Four bamboo poles are put at two ends of each bed and Coconut ropes are tied horizontally in the poles at a distance of 1.5 feet. Upto 1.5 feet from ground level no fruits are allowed to develop. Only one stem is allowed to trail and after 2m of height tip is removed and allowed the plant to trail downwards as umbrella system.

Crop duration:	Three and half months
Harvesting time:	Harvesting starts about one and half months after sowing
Yield:	8-12q /100m ²
Farming situation:	High land, under protected condition

- 5. Critical inputs required:** Variety 'Alisha F-1', Potassium nitrate, polyhouse
- 6. Observations to be recorded:** (including cost benefit ration)

Days to first female and male flower, Nod no at which first female and male flower appear, Fruits/ plant, Weight, Girth, Volume, length per fruit, Yield/ plant (kg), Vine length (m), B: C Ratio.

Technology no.12

- 1. Name of technology:** Integrated Nutrient Management in Colocasia
- 2. Source of technology:** Department of Horticulture, Assam Agricultural University, Jorhat.
- 3. Year of release:** 2017
- 4. Agro-climatic zone:** All zones of Assam
- 5. Detail description of technology:**

Treatment : Vermicompost 1t/ha + FYM 10t/ha + 75% RD(80: 60: 80kg/ha) of NPK. The entire quantity of vermicompost, FYM, P_2O_5 , K_2O and half quantity of the N is applied as basal. Remaining quantity of N splitted in to two parts, one applied at first earthing up (one month after planting) and 2nd is applied at the time of second earthing up (two months after planting).

Management Practices:

Variety: Jorhat *Ahina*

Characteristics: It is a high yielder, easily palatable and consumer preference

Duration: 8 months

Planting materials: Cormel (25 g)

Requirement of Cormel: 60-80 q/ha

Planting time: April-May

Planting material treatment: The cormels are treated with 2% Bevistin and shade dried for one day before planting

Land preparation: One time deep ploughing and two times harrowing followed by levelling

Spacing: 60cm x 45cm

Harvesting time: At 6-7 months (September-October)

Farming situation: Upland

- 6. Critical inputs required:** Vermicompost, FYM, N, P, K
- 7. Observations to be recorded:** Yield, No. of corms, No. of cormels, Farmers' reaction, B: Cratio, soil status.

Tehnology no. 13

- 1. Name of technology:** Use of organic and biofertilizers for cut flower production of gerbera cv. Red Gem
- 2. Source of technology:** Department of Horticulture, Assam Agricultural University, Jorhat.
- 3. Year of release:** 2013
- 4. Agro-climatic zone:** All zones of Assam
- 5. Detail description of technology:**

Organic and Biofertilizer: Enrich compost @10t/ha + Biofertilizer (Azospirillum and PSB) @3.5 g/ha.

Method of application: Enrich compost as soil application one day before planting and biofertilizer as root treatment on the same day of planting.

Management Practices:

Variety: Red Gem

Characteristics: Gerbera is a perennial crop which flowers during winter. Enrich compost is an organic fertilizer which is fortified with rock phosphate.

Duration: 8 months

Planting materials: Healthy, disease free suckers having at least one growing point.

Requirement of suckers/ha: 85,000

Planting time: September--October

Planting material treatment: The roots and leaves should be trimmed leaving 5-6 cm and treated with captaf or bavistin @ 1.5 g/l water for 30 min.

Land preparation: The land is thoroughly ploughed, harrowed and levelled. Beds are raised by 25--30 cm.

Spacing: 30 cm x 30 cm

Manures and fertilizers: Well rotten cow dung @ 5 kg/m², NPK@ 30: 10: 20 (66 g urea, 62 g SSP and 33 g MOP/ m²)

Crop duration: Perennial

Harvesting time: Starting from 2 months after planting for a period of 6 months.

Farming situation: High land

6. **Critical inputs required:** Enrich compost, Azospirillum, PSB
7. **Observations to be recorded:** Plant height, No. of leaves/ plant, No. of flowers/ plant, Flower size, No. of suckers/ plant, B: C ratio.

Technology no. 14

1. **Name of technology:** NPK requirement for yield and cut flower production of chrysanthemum
2. **Source of technology:** Department of Horticulture, Assam Agricultural University, Jorhat.
3. **Year of release:** 2013
4. **Agro-climatic zone:** All zones of Assam
5. **Detail description of technology:**

Manures and fertilizers: Well rotten cow dung @ 5 kg/m², NPK@ 30: 20: 20 (66 g urea, 125 g SSP and 33 g MOP/ m²)

Method of application of fertilizer: Half dose of urea and full dose of SSP and MOP are applied as basal dose. After one month of planting the rest of the fertilizers are applied in two equal doses at 15 days interval in ring method.

Management Practices:

Variety: Carnival Pride

Characteristics: It is a short day crop

Duration: 5 months

Planting materials: Healthy, disease free 5-7 cm long cuttings having four leaves.

Requirement of cuttings/ha: 85,000

Cutting time: July to September

Planting time: August - September

Planting material treatment: 5-7 cm long tips are taken, dipped in 1.5 g/lit captaf or Dithane M- 45 for 20 min and then planted in nursery bed or pot after applying growth hormone (Rootex 1). The bed is also treated with the same fungicide up to a depth of 15-20 cm.

Land preparation: The land is thoroughly ploughed, harrowed and levelled. Beds are raised by 25--30 cm.

Spacing: 30 cm x 30 cm

Crop duration: One year

Harvesting time: 3-3 1/2 months after planting.

Farming situation: High land

6. **Critical inputs required:** Cow dung, N, P, K
7. **Observations to be recorded:** Plant height, No. of leaves/ plant, No. of flowers/ plant, Flower size, No. Of suckers/ plant, Flower duration, Vase life, B: C ratio.

Technology no.15

1. **Name of technology:** Growth regulators for flowering & planting material production of gladiolus.
2. **Source of technology:** Department of Horticulture, Assam Agricultural University, Jorhat.
3. **Year of release:** 2013
4. **Agro-climatic zone:** All zones of Assam
5. **Detail description of technology:**

Growth Regulator: Application of GA3 100 ppm and Ethrel 250 ppm

Method of application of growth regulators: The corms of gladiolus were soaked overnight in the different Solutions of growth regulators before planting.

Management Practices:

Variety: Red Candiman

Characteristics: Winter crop

Duration: 6 months

Planting materials: Healthy, disease free corms having a diameter more than 2.5 cm.

Requirement of corms/ha: 85,000 corms

Planting time: Mid October- mid November

Planting material treatment: Dry scales should be removed, treated with 2% Bavistin or Captaf for 30 min and then dried in shade.

Land preparation: Thoroughly ploughed, harrowed and levelled. Beds are raised by 30 cm.

Spacing: 30 cm x 30 cm

Manures and fertilizers: Well rotten cow dung @ 5 kg/m², 25 g urea, 140 g SSP and 50gMOP/m²

Crop duration: Six months

Harvesting time: Three months after planting

Farming situation: High land

6. **Critical inputs required:** Growth regulators (GA3, Ethrel)
7. **Observations to be recorded:** Plant height, Days to corm sprouting, Spike length, No. of florets/ spike, Flower duration, Vase life, Corm weight, Corm diameter, No. Of cormel/ corm, B: C ratio.

Technology no.16

1. **Name of technology:** Integrated weed management in Tuberose
2. **Source of technology:** Assam Agricultural University
3. **Year of release:** 2015
4. **Agro-climatic zone:** All Zones of Assam
5. **Detail description of technology:** Application of Metribuzin @ 500 g/ha or Oxadiargyl@ 150 g/ha as pre-emergence followed by garden hoeing 3 times at 60, 90 and 120 days after planting.
6. **Critical inputs required:** Herbicide, garden hoe
7. **Observations to be recorded:** Rainfall (mm), weed population, weed growth, yield attributes, yield (q/ha), B: C Ratio, Farmers' reaction.

Technology no.17

1. **Name of technology:** Integrated weed management in Brinjal
2. **Source of technology:** Assam Agricultural University
3. **Year of release:** 2015
4. **Agro-climatic zone:** All Zones of Assam
5. **Detail description of technology:** Application of pre-emergence herbicide (0-3 days after planting) Pendimethalin @ 1.5 kg/ha followed by hand weeding at 35 days after planting.
6. **Critical inputs required:** Herbicide

- 7. Observations to be recorded:** Rainfall (mm), weed population, weed growth, yield attributes, yield (q/ha), B: C Ratio, Farmers' reaction.

Technology no. 18

- 1. Name of technology:** Integrated weed management in Marigold
- 2. Source of technology:** Assam Agricultural University
- 3. Year of release:** 2015
- 4. Agro-climatic zone:** All Zones
- 5. Detail description of technology:** Pre-emergence application of herbicide (0-3 days after planting) Butachlor @ 1.0 kg/ha followed by grubber at 35 days after planting and alternatively, garden hoeing at 20 and 40 days after planting.
- 6. Critical inputs required:** Herbicide, grubber/garden hoe
- 7. Observations to be recorded:** Rainfall (mm), weed population, weed growth, yield attributes, yield (q/ha), B: C Ratio, Farmers' reaction.

Technology no.19

- 1. Name of technology:** Irrigation management in coriander, chilli and tomato
- 2. Source of technology:** Assam Agricultural University
- 3. Year of release:** 2015
- 4. Agro-climatic zone:** All Zones of Assam
- 5. Detail description of technology:** Application of 4 cm irrigation at 18-20 days interval by surface flooding.
- 6. Critical inputs required:** Irrigation water (4 cm)
- 7. Observations to be recorded:** Rainfall (mm), moisture status in soil, yield attributes, yield (q/ha), B: C Ratio, Farmers' reaction.

Technology no.20

1. **Name of technology:** Irrigation management in Brinjal
2. **Source of technology:** Assam Agricultural University
3. **Year of release:** 2015
4. **Agro-climatic zone:** All Zones of Assam
5. **Detail description of technology:** Application of 4 cm irrigation at 15-18 days interval by surface flooding.
6. **Critical inputs required:** Irrigation water (4 cm)
7. **Observations to be recorded:** Rainfall (mm), moisture status in soil, yield attributes, yield (q/ha), B: C Ratio, Farmers' reaction.

Technology no.21

1. **Name of technology:** Irrigation management in Gladiolus
2. **Source of technology:** Assam Agricultural University
3. **Year of release:** 2015
4. **Agro-climatic zone:** All zones of Assam
5. **Detail description of technology:** Three irrigations of 4 cm depth at plant emergence, 4 leaves and spike initiation stage in gladiolus
6. **Critical inputs required:** Irrigation water
7. **Observations to be recorded:** Rainfall (mm), soil moisture status, yield attributes, yield (q/ha), B: C Ratio, Farmers' reaction.

Technology no.22

1. **Name of technology:** Gerbera varieties for green house cultivation
2. **Source of technology:** Assam Agricultural University
3. **Year of release:** 2015
4. **Agro-climatic zone:** All zones of Assam
5. **Detail description of technology:** Black centered gerbera varieties like Antibes (red), Batavia (orange), Shimmer (white with pink trans floret), Faith (yellow), Prianha (purplish

pink), Winter Queen (white), Cross Road (yellow with red trans floret) and Dream (pink).

- 6. Critical inputs required:** Planting materials
- 7. Observations to be recorded:** Rainfall (mm), flower yield, B: C Ratio, Farmers' reaction, soil nutrient status.

Technology no.23

- 1. Name of technology:** Fertility management in Tuberose
- 2. Source of technology:** Assam Agricultural University
- 3. Year of release:** 2015
- 4. Agro-climatic zone:** All zones of Assam
- 5. Detail description of technology:** Application of NPK @ 30: 20: 20 g/m² with half of N and full doses of P₂O₅ and K₂O to be applied at the time of land preparation and the remaining N to be top-dressed in 2 split doses at 35 and 55 days after planting of cutting.
- 6. Critical inputs required:** N, P, K
- 7. Observations to be recorded:** Rainfall (mm), flower yield, B: C Ratio, Farmers' reaction, soil nutrient status.

Technology no.24

- 1. Name of technology:** Chemical treatment for increased vase life of the spathe of Anthurium
- 2. Source of technology:** Assam Agricultural University
- 3. Year of release:** 2015
- 4. Agro-climatic zone:** All zones
- 5. Detail description of technology:** Application of 50 ppm Sodium hypochlorite + 5% sucrose or 300 ppm of Aluminium Sulphate + 5% sucrose as holding solution for increased vase life of the spathe of Anthurium.
- 6. Critical inputs required:** Sodium hypochlorite or Aluminium Sulphate, Sucrose
- 7. Observations to be recorded:** Rainfall (mm), vase life of the spathe of Anthurium , B: C Ratio, Farmers' reaction, soil nutrient status.

Technology no.25

- 1. Name of Technology:** Drying Technology of Orchids
- 2. Source of Technology:** ICAR-NRCO (Value addition in orchids)
- 3. Year Release:** 2015-16
- 4. Ago climatic Zones:** Any states especially for city dwellers
- 5. Brief Description Of Product/Technology**

Sl.No.	Species / varieties of orchids	Recommendations
1.	<i>Vanda teres</i> , <i>Dendrobiummoschatum</i> , <i>Arundinagramminifolia</i> , Den. 'Madam Pink', Den. 'Lervia', Den. 'Abraham', Phal. 'Casa Blanca', Phal. 'Detroit' and <i>Oncidium</i> 'Sweet Sugar'	Embedded drying with borax at 50°C in oven
2.	<i>Epidendrum</i> spp., <i>Cattleyabowringiana</i> and <i>Cattleya</i> hybrids, Phal. 'Ox Plum Rose x Black Jack' and Den. 'Big White', <i>Vanda coerulea</i>	Embedded drying with borax at 60°C in oven
3.	<i>Coelogyneflaccida</i> , <i>Coelogyne cristata</i> , <i>Dendrobiumnobile</i> , <i>Dendrobiumwilliamsonii</i> , <i>Dendrobiumaphyllum</i> , Den. 'Erika', Den. 'Big White 4N', Den. 'Bangkok Blue', Phal.'Nagasaki' and Cym. 'Sungold'.	Embedded drying with borax and silica gel at 55°C in oven
4.	<i>Dendrobium</i> , <i>Phalaenopsis</i> , <i>Cattleya</i> , <i>Cymbidium</i> , <i>Aranda</i> , <i>Mokara</i> hybrids	Perlite, Perlite + borax and Perlite + Silica gel under room condition (24-25°C and 75-79%RH)
5.	<i>Cattleya</i> 'Guanmian City', <i>Dendrobium</i> 'Lervia', <i>Phalaenopsis</i> 'Vienna', <i>Vanda tessellata</i> , <i>Oncidium</i> 'Taka Yellow', <i>Phalaenopsis</i> 'TaidaS.Red'	Embedded drying with sand at 50°C in oven

Photographs





Dry orchids in batches

6. **Critical inputs:** Fresh flowers, hot woven, sand, borax, silica gel, perlite
7. **Observations to be recorded:** Name of species, stage of harvest (bud, half opened bud/ full bloom, single flower/spray, thickness of petal (thick, medium, thin), colour (as per RHS colour chart), duration, brittleness
8. **Address of the institute:** ICAR-NRC for Orchids, Pakyong, Sikkim, Email address: nrcorchids@rediffmail.com

Technology no. 26

1. **Name of Technology:** DUS Test Guidelines of Commercial Orchids
2. **Source of Technology:** Preparation for Plant Varieties Protection and DUS Testing through ICAR-SAU System
3. **Year of release:**

Sl.No.	Genera	Publication in Plant Variety Journal of India	Gazette Notification No.
	<i>Cymbidium</i>	Vol. 05, No. 10, October 03, 2011	S.O. 617 (E), 27/03/2012
	<i>Dendrobium</i>	Vol. 05, No. 10, October 03, 2011	S.O. 617(E) 27/03/2012
	<i>Vanda</i>	Vol. 05, No. 10, October 03, 2011	S.O. 617(E) 27/03/2012
	<i>Phalaenopsis</i>	Vol. 06, No. 11, November 01, 2012	S.O. 1093(E), 15/04/2014
	<i>Cattleya</i>	Vol. 06, No. 11, November 01, 2012	S.O. 1093(E), 15/04/2014
	<i>Oncidium</i>	Vol. 08, No. 04, April 01, 2014	S.O. 2664 (E), 16/10/2014
	<i>Paphiopedilum</i>	Vol. 09, No. 08, August 03, 2015	19/4/2016

4. Agro-climatic Zones: Western Himalaya, NEH Region, Deccan Plateau

5. Details description about the Technology

Sl.No.	Genera	No. of hybrids	Total No. of morphological descriptors	Grouping characteristics
1.	<i>Cymbidium</i>	41	66	Pseudobulb shape & size , Inflorescence length, number of flowers/ inflorescence, Flower width, Flower duration, Flower predominant color, Lip ornamentation , Blooming time
2.	<i>Dendrobium</i>	14	60	Plant height, Internode length, Inflorescence length, Flower width, Lip colour, Lip ornamentation, Flowering time
3.	<i>Vanda</i>	11	66	Plant type , Internode length , Leaf type, Spike length, Flower number, Inflorescence colour, Sepal & petal ornamentation, Lip: shape, colour, ornamentation, Spur length , Flowering time
4.	<i>Cattleya</i>	9	53	Plant: height, Leaf: number/ pseudobulb, Flower width in front view, Petal: predominant colour, Lip predominant colour , Lip colour pattern
5.	<i>Phalaenopsis</i>	50	58	Plant size , Flower width in front view, Petal predominant colour, Petal colour pattern, Lip predominant colour, Lip Predominant colour of apical lobe, Lip colour pattern of apical lobe
6	<i>Oncidium</i>	40	60	Plant type, Number of basal leaves/ pseudobulb, Flower width in front view, Petal main colour, Petal colour pattern, Lip main colour, Lip colour pattern
7	<i>Paphiopedilum</i>	10	77	Floral bract shape, Flower width in front view, Dorsal sepal colour pattern, Synsepal width, Synsepal main colour, Petal orientation, Lip colour pattern, Column staminode size

Photographs

Fig 1. Nature of stem in *Dendrobium*

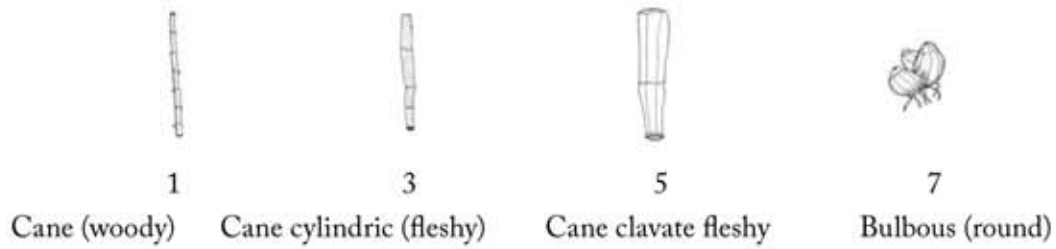


Fig 2. Nature of pseudobulb in *Cattleya*

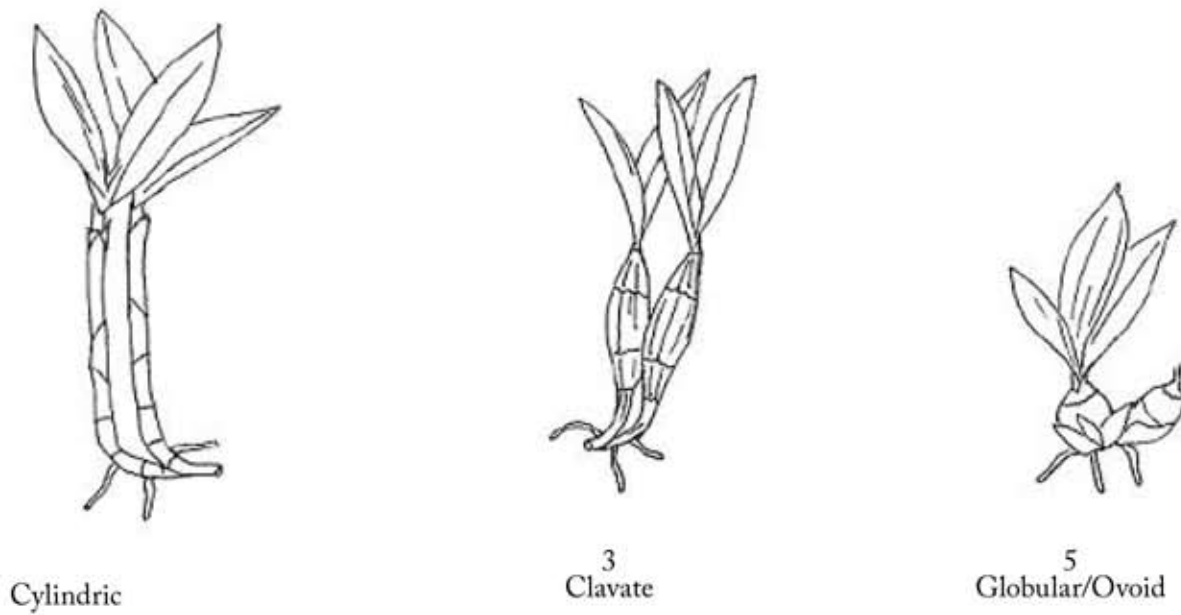


Fig 3. Inflorescence type in *Phalaenopsis*

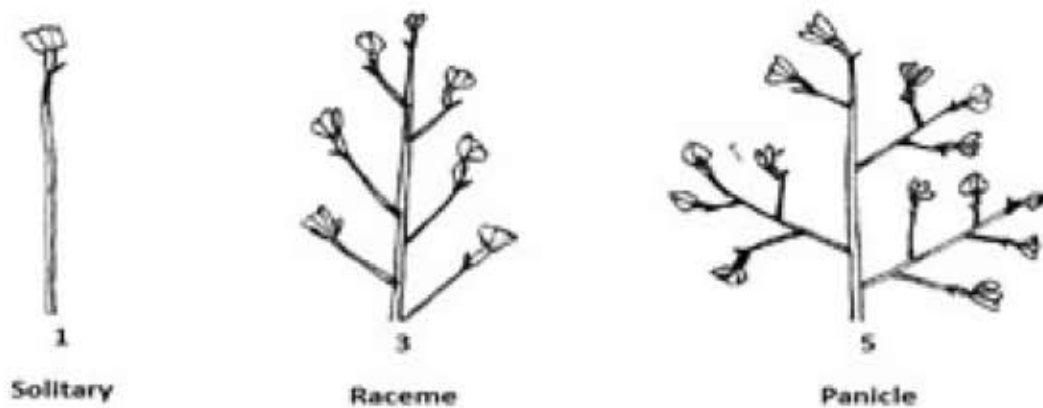
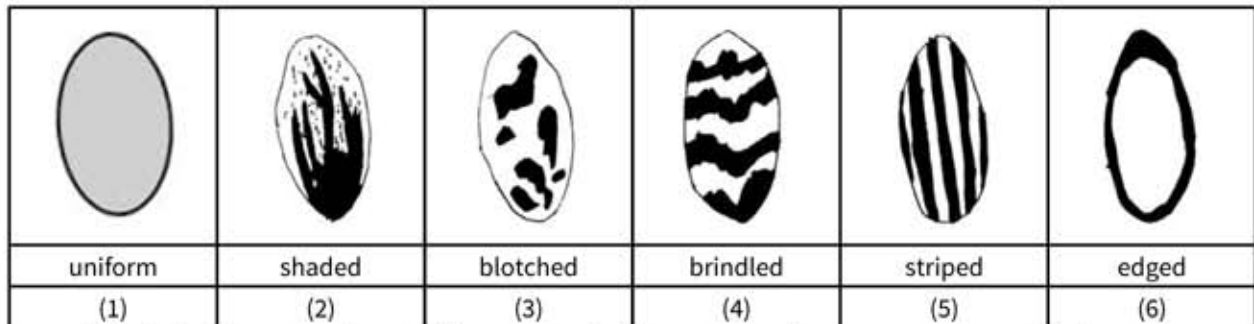


Fig 4. Lip colour pattern in *Oncidium*



6. Critical inputs requires: Fully grown plants, protected structures, pots, potting mixtures, Thermohygrometer, RHS colour chart.

7. Observations to be recorded:

- a. Observations shall be made on the longest leaf of flowering plant.
- b. Observations on the inflorescence shall be made at the time when 50% of the flowers on the inflorescence have opened. Observations on the flowers should be made on the most recently fully opened flower before the color starts to fade.
- c. Observations on the length and width of the flower and parts of the flower shall be made on the spread out positions.
- d. Observations on the color of the sepal, the petal and the lip shall be made on inner side at apex, mid and base portion.
- e. Observations on the colour of column shall be made on inner side at apex, mid and basal region.

8. Contact address: ICAR-NRC for Orchids, Pakyong, Sikkim, Email address: nrcorchids@rediffmail.com

Technology no.27

1. **Name of Technology :** Post-harvest Technology of Cymbidium orchids
2. **Source of Technology:** Post-harvest technology of Orchids
3. **Year of Release:** 2013-14
4. **Agroclimatic Zones:** Western and North Eastern Himalayan region

5. BRIEF DESCRIPTION OF TECHNOLOGY

Sl.No.	Particulars	Recommendations
	Evaluation of elite hybrids for vase life	Bob Marlin Lucky (57 days), Fire Storm Blaze (53 days), Hazel Fay Tangerine (50 days), Everett Stockstill Bullai (48 days), Caripepper Peachy Keen (43 days), Hana Akari (41 days), Fire Storm Ruby (36 days)
2.	Spike length and vase life of different classes of Cymbidium	Miniature (30-60cm): 30-34 days Intermediate (60-75cm): 35-37 days Standard (> 75cm): 55-59 days
3.	Optimal stages of harvest of Cymbidium 'PCMV' for maximum vase life	Two buds opened stage (66.8 days)
4.	Best impregnation treatment of Cymbidium 'PCMV' for maximum vase life	CoCl ₂ (1000ppm) for 15 minutes (46 days)
5.	Best pulsing treatment of Cymbidium for maximum vase life	5% sucrose for 8 hours (56 days)
6.	Best pre-harvest spray of Cymbidium for maximum growth and vase life	GA ₃ (50 ppm) + BA (200 ppm)
7.	Best chemical treatment for opening of tight buds of Cymbidium cutflowers	Sucrose 4% + Salicylic acid 200 ppm with 75% opening and vase life of 45 days
8.	Best holding solution for improved vase life of Cymbidium	2% sucrose + 200 ppm 8-HQS with vase life of 76.6 days
9.	Best packaging material of Cymbidium spikes and florets for improved vase life	Cellophane (56 days)

10.	Best harvesting stage of Cymbidium florets for improved vase life	Fully opened florets with vase life of 48 days.
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1. Photographs



Cymbidium hybrids for cut flowers



Chemicals for opening of tight buds of Cymbidium cutflowers

- Critical inputs requires:** Cut flowers of Cymbidium, chemicals, packaging materials, glasswares
- Observations to be recorded:** Days to first floret opening, longevity of first floret (days), , diameter of first floret (cm), , water uptake (ml), changes in fresh weight (g), per cent of half opened buds, per cent of fully opened buds, vase life (days)
- Address of the institute:** ICAR-NRC for Orchids, Pakyong, Sikkim, Email address: nrcorchids@rediffmail.com

Technology no. 28

1. **Name of Technology:** Potting Mixtures of Commercial orchids
2. **Source of Technology:** ICAR-NRCO (Production Management of Tropical and Subtropical Orchids)
3. **Year of release:** 2013-2014
4. **Agro climatic Zones:** NEH Region and Deccan Plateau
5. **Brief Description Of Technology**

Sl. No.	Commercial orchids	Recommended varieties/hybrids	Potting mixtures
1.	<i>Cymbidium</i>	Cym. Red Beauty Evening Star, Cym. Bob Marlin Lucky, Cym. Fire Storm Ruby, Rocky Greek Pebbles, Cym. Hazel Fay Tangerine, Cym. Fire Storm Blaze, Cym. Sunny Moon, Cym. 'Samurai HeeSagun', Cym. 'Winter Beach See Green', Cym. 'PCMV', Cym. 'Ensikhan', Cym. Everett Stockstill Bullai, Cym. Valley Legend Steff, Cym. Caripepper Peachy Keen, Cym. Soul Hunt	Cocochips + Cocopeat + Brick pieces + Slow release fertilizer (Osmocot) (1: 1: 1: 5g)/dry leaf fern
2.	<i>Dendrobium</i>	Big White 4N, Bangkok Blue, Dang Saard, Big White Jumbo, Erika, Madam Pompadour, Ear Sakul, Thongchai Gold, Madam Pink, Triple Pink, Emma White, Julie, Kating Dang	Coco peat / cocochips + brick pieces + tree bark (1: 1: 1)
3.	<i>Vanda</i>	Prao Sky Blue, Pures Wax, RBSD Black, Pat Delight, Sansai Blue, Roberts Delight Blue, Motes Indigo Blue, V. Sirilak x Thongchai Gold, Pakchong Blue, RBSD Pink, RBV-10 x Fusch's Delight, RBSD Blue, RBV-10 x Dr. Anek, Ratch Blue Stars	Cocochips + brick pieces + leaf fern (1: 1: 1)
4.	<i>Phalaenopsis</i>	Taida S.Red, Kaleidoscope, Strawberry, Maki Watanabe, Hsin-Ying Fortune, Shu Shu Long First Love, Memoria Francis Hunter, Ox Prince Thunder, Chian Xen Magpie, Ox Plum Rose x Ox Black Jack, Detroit, Vienna, Manchester	Cocochips + brick pieces + leaf moulds + green moss (1: 1: 1: 1)

5.	<i>Cattleya</i>	Blc. Guanmiao City, Blc. Chinese Beauty Orchid Queen, Lc. Purple Cascade 'Fragrant Beauty', C. Queen Sirikhit, Blc. Hsin ying Catherine, Lc. Ahmad Shiekhi, Blc. Mem Ann Balmores 'Conves', Blc 'Chia Lin New City', Blc. Ablaze Medal 'U Emperor'	Cocochips + brick piece + leaf mould/ leaf fern (1: 1: 1)
6.	<i>Oncidium</i>	Colm. Wildcat Bobcat, Colm. Wildcat Carmera, Colm. Pixie Ruth, Sweet Sugar, Gower Ramsay, Sharry Baby Sweet Fragrance, Taka Yellow, Popki Red, Jairak Rainbow Pink Spot, J.R. Orange Red, J.R. Yellow Brown, J.R. Orange Spot	Cocochips + brick pieces + leaf moulds (1: 1: 1)

6. Critical inputs requires: Protected structures, pots, cocochips, cocopeat, leaf moulds, brick pieces, green moss, leaf fern, tree bark, slow release fertilizers.

7. Observations to be recorded:

Sl.No.	Genera	Main observations
1.	<i>Cymbidium</i>	Pseudobulb shape & size , Inflorescence length, number of flowers/ inflorescence, Flower width, Flower duration, Flower predominant color, Lip ornamentation , Blooming time
2.	<i>Dendrobium</i>	Plant height, Internode length, Inflorescence length, Flower width, Lip colour, Lip ornamentation, Flowering time
3.	<i>Vanda</i>	Plant type , Internode length , Leaf type, Spike length, Flower number, Inflorescence colour, Sepal & petal ornamentation, Lip: shape, colour, ornamentation, Spur length , Flowering time
4.	<i>Cattleya</i>	Plant: height, Leaf: number/ pseudobulb, Flower width in front view, Petal: predominant colour, Lip predominant colour , Lip colour pattern
5.	<i>Phalaenopsis</i>	Plant size , Flower width in front view, Petal predominant colour, Petal colour pattern, Lip predominant colour, Lip Predominant colour of apical lobe, Lip colour pattern of apical lobe
6	<i>Oncidium</i>	Plant type, Number of basal leaves/pseudobulb, Flower width in front view, Petal main colour, Petal colour pattern, Lip main colour, Lip colour pattern

8. Address of the institute: ICAR-NRC for Orchids, Pakyong, Sikkim, Email address: nrcorchids@rediffmail.com

Technology no.29

- 1. Name of the Technology:** Low Cost Plastic Shelters for High Value Organic Vegetable Production in North Eastern Hill Regions
- 2. Source of the Technology:** ICAR-National Organic Farming Research Institute, Tadong-737102, Gangtok, Sikkim
- 3. Year of Release:** 2016
- 4. Agro Climatic Zone:** High Rainfall Mid Hills of North Eastern Hill Regions
- 5. Detail Description of the Technology:** Production of vegetables under low cost shelters provides the best way to get better return per unit area especially during rainy season. At ICAR-National Organic Farming Research Institute (Formerly ICAR RC for NEH Region, Sikkim Centre), Tadong, Gangtok we have tried determinate and indeterminate tomato varieties, capsicum, cherry pepper, bitter gourd, bottle gourd, sponge gourd, ridge gourd, cucumber etc. under low cost plastic shelters during summer and rainy season. It was observed that all the vegetables can be grown successfully under low cost plastic shelters and have shown significant increase in earliness with higher production and productivity. Low cost plastic shelters provide crop diversification opportunities and supports production of high quality and clean organic produce. It gives protection against wind, rain and hail storm during rainy season and maintains optimum temperature for plant growth, and protects crop from frost during winter season.

Low cost plastic rain shelters are very simple structures, covering plants along the row. These are about 7 ft. high at one end and 6 ft. high at other end to give slanting roof. Crossed bamboo sticks are placed on the roof for supporting the plastic sheets. The width of these shelters can be 6-8 ft. The plastic rain shelters are erected with bamboo or wooden poles of about 1-2 inch diameter. A transparent UV stabilized plastic sheet of 35 or 45 GSM is placed on the bamboo structure to cover the roof. The plastic films are properly tied on bamboo structures with wire. The plastic sheet simply protects the plants from adverse climatic conditions for e.g., high rainfall, hail storm and frost during winter.

Preliminary Requirements

- ❖ Potential stresses caused by heavy wind, hail or heavy rains and orientation of structure must be considered while constructing the low cost plastic shelters.
- ❖ Prior to start high value organic vegetable farming in low cost plastic shelters, the farmer must have practical knowledge about vegetable farming.
- ❖ Soil and water quality should be tested before starting the farming.

- ❖ Recommended seed should be used.
- ❖ Farmer must have the updated market information to earn high profit.

6. Critical Inputs Required

Space Requirement

Minimum area should be 100 m²; however, length of plastic shelters can be made as per the availability of land. Slopy land should not be used for the construction of plastic shelters.

Plan Set up Cost

Construction cost of plastic shelter per 100 m² area is approximately Rs.9,550.00.

Raw Materials Required

UV stabilized plastic sheets (35 or 45 GSM) or Non UV stabilized plastic sheets (120 GSM), bamboo, binding wire etc.

Photographs of the Technology



Low Cost Plastic Shelters for High Value Organic Vegetable Production

7. Observations to be Recorded

- ❖ Comparative vegetable crops yield between open conditions and under low cost plastic shelters.
- ❖ Comparative vegetable crops duration between open conditions and under low cost plastic shelters.

- ❖ B: C Ratio should be calculated as per the region and crop season.
- ❖ Cropping sequences can be modified and adopted as per the location specific requirement.

Benefits of the Technology

- ❖ Vegetables can be produced year round regardless of the season.
- ❖ It gives better return per unit area especially during rainy season.
- ❖ Provides crop diversification opportunities and supports production of high quality and clean products.
- ❖ Maintains optimum micro climate for good plant growth.
- ❖ Protection against wind, rain, hails, frost and to some extent disease and pests.

8. Contact Address for Relevant Information

The Joint Director,

ICAR-National Organic Farming Research Institute, Tadong, Gangtok, Sikkim.

E-mail: jdsikkim.icar@gmail.com

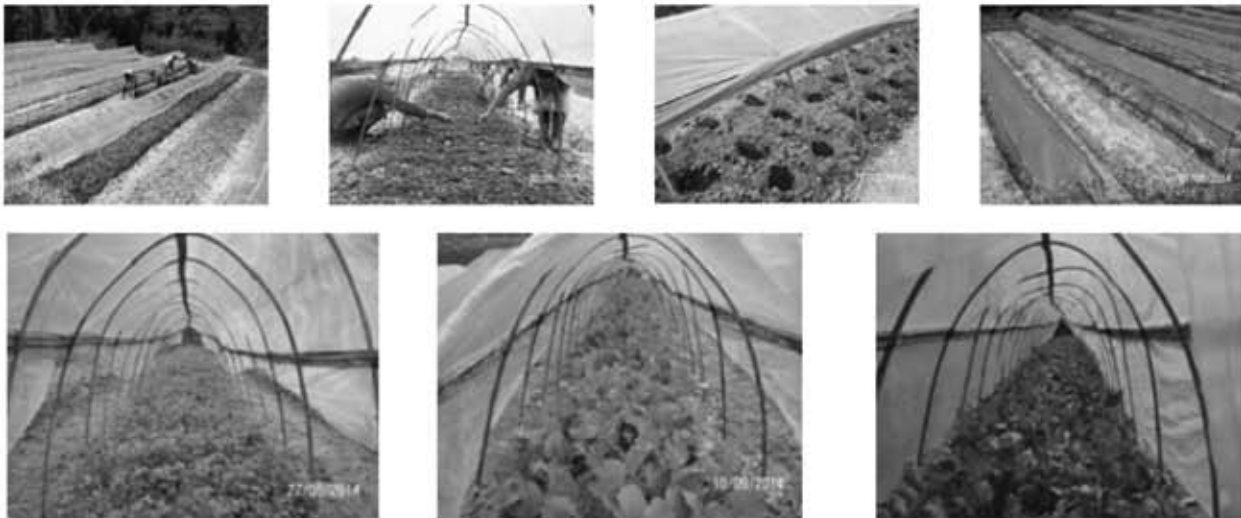
Technology no.30

- 1. Name of the Technology:** Low Cost Plastic Tunnels for Year Round Organic Vegetable Production in North Eastern Hill Regions
- 2. Source of the Technology:** ICAR-National Organic Farming Research Institute, Tadong-737102, Gangtok, Sikkim
- 3. Year of Release:** 2016
- 4. Agro Climatic Zone:** High Rainfall Mid Hills of North Eastern Hill Regions
- 5. Detail Description of the Technology:** Production of vegetables under low cost tunnels provides the best way to increase the productivity and quality of vegetables, especially during rainy season and severe winter season. At ICAR-National Organic Farming Research Institute (Formerly ICAR RC for NEH Region, Sikkim Centre), Tadong, Gangtok we have tried several high value vegetables viz. cabbage, cauliflower, broccoli, coriander, fenugreek, spinach, rayo sag, lettuce, pakchoi, garlic, beetroot, carrot, pea and radish under low cost plastic tunnels and observed that all the vegetables can be grown successfully under low cost plastic tunnels and have shown significant increase in earliness with higher production

and productivity.

Low cost plastic tunnels or open tunnels are greenhouse-like structures, covering the plants along the row. These tunnels are about 1.0 m high and 1.5 m wide at the base and are erected with bamboo sticks or wooden poles of about 1 inch diameter. A UV stabilized transparent plastic sheet (35 or 45 GSM) is placed on the bamboo structure to allow sunlight during the day passes through the plastic sheet, and is absorbed by the soil. This raises the temperature to desired levels. The plastic sheet serves two purposes: first it traps heat and reduces water loss and second it protects plants from adverse climatic conditions. Transparent plastic films are stretched over low (about 0.5 m or so) as a flexible wall on both sides of tunnels. The plastic films are properly tied up on bamboo structures with wire.

Photographs of the Technology



Preliminary Requirements

- ❖ Potential stresses caused by heavy wind, hail or heavy rains and orientation of structure must be considered while constructing the low cost plastic tunnels.
- ❖ Prior to start off-season vegetable farming in low cost plastic tunnels, the farmer must have practical knowledge about vegetable farming.
- ❖ Soil and water quality should be tested before starting the farming.
- ❖ Self-pollinated plant should be grown.
- ❖ Recommended seed should be used.
- ❖ Farmer must have the updated market information to earn high profit.

6. Critical Inputs Required

Space Requirement

Minimum area should be 100 m²; however, length of plastic tunnels can be made as per the availability of land. Slopy land should not be used for the construction of plastic tunnels.

Plan Set up Cost

Construction cost of plastic tunnels of size 15 x 1.5 x 1.0 m (Length x Width x Height) = Appx. Rs. 2015.00 and Per 100 m² area is approximately Rs.8,950.00.

Raw Materials Required

UV stabilized plastic sheets (35 or 45 GSM) or Non UV stabilized plastic sheets (120 GSM), bamboo, binding wire *etc.*

7. Observations to be Recorded

- ❖ Comparative vegetable crops yield between open conditions and under low cost plastic tunnels.
- ❖ Comparative vegetable crops duration between open conditions and under low cost plastic tunnels.
- ❖ B: C Ratio should be calculated as per the region and crop season.
- ❖ Cropping sequences can be modified and adopted as per the location specific requirement.

Benefits of the Technology

- ❖ Vegetables can be produced year round regardless of the season to get better return.
- ❖ Provides crop diversification opportunities and supports production of high quality and clean products.
- ❖ Used for raising healthy and early nursery.
- ❖ Maintains optimum micro climate for good plant growth.
- ❖ Protection against wind, rain, frost, and snow at higher hills.
- ❖ Makes cultivation of vegetables possible in areas where it can't grow in open conditions viz. high altitudes.

8. Contact Address for Relevant Information

The Joint Director,

ICAR-National Organic Farming Research Institute, Tadong, Gangtok, Sikkim.

E-mail: jdsikkim.icar@gmail.com

The Director, ICAR Research Complex for NEH Region, Umroi Road, Umiam, Meghalaya.

Technology no.31

- 1. Name of the Technology:** Farmer Friendly Low Cost Structure for Organic Kiwifruit Multiplication through Cuttings
- 2. Source of the Technology:** ICAR-National Organic Farming Research Institute, Tadong-737102, Gangtok, Sikkim
- 3. Year of Release:** 2015
- 4. Agro Climatic Zone:** Mid Hills Regions of India
- 5. Detail Description of the Technology:** The kiwifruit can be multiplied through seed and vegetative means of propagation. Propagation by softwood cuttings is the commercial method to produce rapid and quality plants. Sterilized growing medium, free from pathogenic organism should be selected. Organic kiwifruit plant multiplication by semi-hardwood cuttings under low cost farmer friendly structure has been standardized at ICAR-National Organic Farming Research Institute (Formerly ICAR Research Complex for N.E.H. Region, Sikkim Centre), Tadong, Gangtok. Sterilized growing medium composed of perlite, vermiculite, cocopeat and vermicompost (1: 1: 1: 1 ratio) is being used for propagation through semi-hardwood cuttings under jute bag made low cost tunnels. Cuttings were taken from semi-mature growth of the current season. Base of cuttings wounded and dipped in 400 ppm IAA for 24 hr and then planted in growing media and in moist soil under greenhouse. Relative Humidity (70-80%) was maintained by regular spraying of water on jute bags after shoot emergence to prevent desiccation. Cuttings of 0.5-1.0 cm thickness with relatively short internodes and about 15-20 cm in length were most ideal and showed 70% rooting under low cost structure. Jute bags should be removed after 90 days planting of cuttings.



6. **Critical Inputs Required:** Jute bags, bamboo, nails, binding wire *etc.*
7. **Observations to be Recorded:** Comparative kiwifruit cutting rooting percentage under low cost farmer friendly structure and open conditions.

8. **Contact Address for Relevant Information**

The Joint Director,

ICAR-National Organic Farming Research Institute, Tadong, Gangtok, Sikkim.

E-mail: jdsikkim.icar@gmail.com

The Director,

ICAR Research Complex for NEH Region, Umroi Road, Umiam, Meghalaya.

Technology no. 32

1. **Name of the Technology:** Partial Protection of Kiwifruit for Organic Production in North Eastern Hill Regions
2. **Source of the Technology:** ICAR-National Organic Farming Research Institute, Tadong-737102, Gangtok, Sikkim
3. **Year of Release:** 2016
4. **Agro Climatic Zone:** High Rainfall Mid Hills of North Eastern Hill Regions
5. **Detail Description of the Technology:**

Prolonged wet seasons with high rainfall intensities along with frequent hails in North Eastern Hill Regions causes several biotic and abiotic stress conditions under open cultivation and have a serious negative effect on kiwifruit yield and quality. Kiwifruit flowers are extremely susceptible to damage by heavy rainfall and hail storm. Provision of adequate shelter is essential to protect kiwifruit flowers from heavy rainfall and hails and for the successful production of kiwifruit in Sikkim. Heavy rainfall and hails coincides with the time of kiwifruit flowering, which causes major physical damage to both flowers and new vegetative growth, however, adoption of 50% agro-shade net protects the kiwifruit from adverse weather conditions. At ICAR NOFRI, we mount agro-shade net on kiwifruit vines at the end of March for about sixty days and remove the shade net at the end of May, which results in better fruit set (80-90%) and initial fruit growth. Final fruit size and yield depends upon the hand pollination and initial fruit set percentage. The adoption of partial protection and hand

pollination techniques resulted in 70-80% production of 'A' grade kiwifruit (*i.e.*>100 g/fruit).

Photographs of the Technology:



Partial Protection of Kiwifruit for Organic Production

- ❖ Provide a suitable microclimate for vegetative growth, flowers, initial fruit set and fruit development. Compared with plants grown under unsheltered conditions, kiwifruit vines that are provided with adequate shelter grow more rapidly, have better fruit set, and produce larger fruit, also their fruit reach maturity earlier. Pollination is improved under shelter, because bees work better in sheltered conditions.
- ❖ Reduce physical damage to vines and fruit. The new shoots of kiwifruit plants, and especially the young growing tips, are very soft and tender and are easily damaged by high rainfall and hails. Flowering shoots are easily broken, reducing the current season's crop. However, more serious damage can be caused by breakage of the replacement shoots which will carry the following season's crop. These shoots usually grow almost vertically, and are subject to breakage at the junction of the shoot and the main permanent leader of the vine. This result in the loss not only of the shoot itself but also of the basal axillary buds which normally provide the shoots of future years.
- ❖ Any leaf damage implies a reduced photosynthetic area, which would lead to reduced flowering in the following season. Young plants are particularly prone to this type of damage, at a stage when the canopy can provide only limited self – shelter. Additional benefits of providing shelter include the improved efficiency of orchard spraying, and more pleasant working conditions.

6. Critical Inputs Required:

Agro-shade net (50%) or hail net, bamboo, nails, binding wire *etc.*

7. Observations to be Recorded:

- ❖ Comparative kiwifruit fruit set percentage, fruit growth and yield between open conditions and under partial shade conditions.
- ❖ B: C Ratio should be calculated as per the region.

8. Contact Address for Relevant Information:

The Joint Director,

ICAR-National Organic Farming Research Institute, Tadong, Gangtok, Sikkim.

E-mail: jdsikkim.icar@gmail.com

The Director,

ICAR Research Complex for NEH Region, Umroi Road, Umiam, Meghalaya.

The Director, ICAR Research Complex for NEH Region, Umroi Road, Umiam, Meghalaya.

Technology 33

1. Name of the Technology:

TRC BADAMA (ELEPHANT FOOT YAM).

2. Source of the Technology:

ICAR Research Complex for NEH Region, Tripura Centre, Lembucherra – 799210, West Tripura

3. Year of Release: 2014

4. Agro Climatic Zone:

Tripura. Also suitable for entire North eastern region

5. Details description about the Technology:

- Tripura Yam Batema received very good farmers acceptance, particularly among tribal farmers due to very high yield and low disease incidences.
- Yellowish white flesh is preferred taste wise over the other popular varieties with white



flesh.

- Produces more number of corms, which are suitable for easier multiplication.
 - Yield: 45-55 t/ha.
- 6. Critical inputs requires:** Planted in pits of 60cm x 60cm x 45 cm at a spacing of 90 cm x 90 cm or 75 cm x 75 cm. Fill each pit with 4-5 kg FYM and a basal dose of 40: 60: 50 (NPK /ha). Ideal planting time is March-April. 750-1000 g size corm pieces are required in each pit for good harvest.
- 7. B: C ratio:** 2.5-2.7
- 8. Observation to be recorded:** Yield, maturity, reaction to different stresses such as drought, diseases, insect pests etc, farmers and consumers preference.
- 9. Contact Address for relevant information:** The Joint Director, ICAR Research Complex for NEH Region, Tripura Centre, Lembucherra – 799210, West Tripura



Tripura Yam Bate



Tripura Yam Batema



Tripura Yam Batema

Technology 34

- 1. Name of the Technology:** BRINJAL- TRC BHOLANATH
- 2. Source of the Technology:** ICAR Research Complex for NEH Region, Tripura Centre, Lembucherra – 799210, West Tripura
- 3. Year of Release:** 2012
- 4. Agro Climatic Zone:** Tripura. Also promising in other North eastern states
- 5. Details description about the Technology:**
 - Resistant to bacterial wilt
 - Plant height 95-100 cm, fruit length 16.5-18 cm, fruit breadth 19.5-21 cm and fruit weight 160-190g.
 - Requires 92 days for flowering and 130 days for first harvest in Tripura condition.
 - It has wide adaptability in all brinjal growing areas due to its resistance to bacterial wilt disease which is major problem for brinjal Most preferred brinjal variety for fry purpose

in Tripura

- Yield: 400 -450 q/ha
6. **Critical inputs requires:** Seed rate 300-400g/ha. Nursery to be raised in March and planting by April – May or nursery in July-August for September Planting. Fertilizer @ 120: 60: 60 (NPK) for good growth. Regular irrigation for good growth.
 7. **B: C ratio:** 3.2-3.5
 8. **Observation to be recorded:** Yield, maturity, reaction to different stresses such as drought, diseases, insect pests etc, farmers and consumers preference.
 9. **Contact Address for relevant information:**
 - The Joint Director, ICAR Research Complex for NEH Region, Tripura Centre, Lembucherra – 799210, West Tripura



TRC BHOLANATH

Technology 35

- 1. Name of the Technology:** TRC GREATER YAM
- 2. Source of the Technology:** ICAR Research Complex for NEH Region, Tripura Centre, Lembucherra – 799210, West Tripura
- 3. Year of Release:** 2014
- 4. Agro Climatic Zone:** Tripura. Also suitable for entire North eastern region
- 5. Details description about the Technology:**
 - High yielding disease resistant variety of greater yam.
 - Highly vigorous creeper with dark green foliage and indeterminate climbing nature.
 - Produces more number of corms (10-11), which is helpful in faster multiplication.
 - Flesh colour is yellowish white, preferred over the white flesh.
 - Yield: 45-50 t/ha.
- 6. Critical inputs requires:**

Planted in pits of 60cm x 60cm x 45 cm at a spacing of 90 cm x 90 cm or 75 cm x 75 cm. Fill each pit with 4-5 kg FYM and a basal dose of 40: 60: 50 (NPK /ha). Ideal planting time is March-April. 750-1000 g size corm pieces are required in each pit for good harvest.
- 7. B: C ratio:** 2.4-2.6
- 8. Observation to be recorded:** Yield, maturity, reaction to different stresses such as drought, diseases, insect pests etc, farmers and consumers preference.
- 9. Contact Address for relevant information:**
 - The Joint Director, ICAR Research Complex for NEH Region, Tripura Centre, Lembucherra – 799210, West Tripura



Tripura Tha



Tripura Tha

Technology 36

- 1. Name of the Technology:** BRINJAL-TRC SINGHNATH
- 2. Source of the Technology** ICAR Research Complex for NEH Region, Tripura Centre, Lembucherra – 799210, West Tripura
- 3. Year of Release:** 2012
- 4. Agro Climatic Zone:** Tripura. Also performed very well in all North eastern states
- 5. Details description about the Technology:**
 - Resistant to bacterial wilt.
 - Plant height 125-130 cm, fruit length 23-27 cm and fruit breadth 10-13 cm and fruit weight 85-100g.
 - It has wide adaptability in all brinjal growing areas of the state due to its resistance to bacterial wilt disease which is major problem for brinjal .
 - Requires 94 days for flowering and 128 days for first harvest. Fruiting throughout the year and suitable for multi year ratooning.
 - Yield: 400 -450 q/ha.
- 6. Critical inputs requires:**

Seed rate 300-400g/ha. Nursery to be raised in March and planting by April – May or nursery in July-August for September Planting. Fertilizer @ 120: 60: 60 (NPK) for good growth. Regular irrigation for good growth.
- 7. B: C ratio** 3.2-3.6
- 8. Observation to be recorded:** Yield, maturity, reaction to different stresses such as drought, diseases, insect pests etc, farmers and consumers preference.
- 9. Contact Address for relevant information:**

The Joint Director, ICAR Research Complex for NEH Region, Tripura Centre, Lembucherra – 799210, West Tripura



TRC Singnath



TRC Singnath

Technology 37

- 1. Name of the Technology:** TRIPURA PAPITA
- 2. Source of the Technology:** ICAR Research Complex for NEH Region, Tripura Centre, Lembucherra – 799210, West Tripura
- 3. Year of Release:** 2014
- 4. Agro Climatic Zone:** Tripura. Also suitable for entire North eastern region
- 5. Details description about the Technology:**
 - RCTP1 produced much higher average fruit yield per plant (63.25 kg/ plant) in comparison to 2nd highest yielder – Pusa Delicious (52.65 kg/plant).
 - It has remarkably higher fruiting zone of 214.68 cm on an average. Average fruit size is 2.05 kg.
 - Tolerant to Papaya Ring Spot Virus
 - Average Yield: 63.25 kg/plant

Critical inputs requires:

B: C ratio 3.1-3.2

Observation to be recorded: Yield, maturity, reaction to different stresses such as drought, diseases, insect pests etc, farmers and consumers preference.

Contact Address for relevant information:

- The Joint Director, ICAR Research Complex for NEH Region, Tripura Centre, Lembucherra – 799210, West Tripura



Tripura Papita



Tripura Papita

Technology no. 38

- 1. Name of the Technology:** Megha Turmeric-1
- 2. Source of the Technology:** Horticulture Division, ICAR Research Complex for NEH Region, Umiam
- 3. Year of Release:** 2006
- 4. Agro Climatic Zone:** Suitable for plain as well as hilly region of North eastern states
- 5. Details description about the Technology:** Maturity: 300-315 days, Average yield: 27-30 t/ha, Tolerant to leaf blotch and leaf spot. Suitable for processing into dried rhizome, powder as well as extraction of oleoresin. Recommended as stable variety for high yield and curcumin content.
- 6. Critical inputs requires:** Seed rate: 18-20 q/ ha, FYM: 20 q/ ha, NPK @ 120: 90: 90 kg/ ha
- 7. Observation to be recorded:** Maturity, Average yield/ plant, Average yield/ ha, % powder recover
- 8. Contact Address for relevant information:** Horticulture Division, ICAR Research Complex for NEH Region, Umiam

Technology no. 39

- 1. Name of the Technology:** Megha Tomato-3
- 2. Source of the Technology:** Horticulture Division, ICAR Research Complex for NEH Region, Umiam
- 3. Year of Release:** 2010
- 4. Agro Climatic Zone:** Suitable for rainfed as well as irrigated conditions
- 5. Details description about the Technology:** Developed by hybridization and selection of Pusa Sheetal x Lima. Fruit is medium sized, round, smooth attractive at maturity; tolerant to low temperature and bacterial wilt. Suitable for rainfed as well as irrigated conditions. Indeterminate in growth habit, good for protected cultivation; Locules 4, TSS 5.9%, fleshy, good in colour development; Cultivar is uniform in ripening and suitable for processing; with high ascorbic acid content (19.20 mg/100g) and high lycopene (36.59 mg/100 g) with good shelf life. Yield potential : 500-550 q/ha.
- 6. Critical inputs requires:** Spacing: 60x 45 cm, FYM: 25t/ ha, NPK @120: 80: 60 kg/ ha
Observation to be recorded: yield, shelf life
- 7. Contact Address for relevant information:** Horticulture Division, ICAR Research Complex for NEH Region, Umiam

Technology no. 40

- 1. Name of the Technology:** Megha Guava - 1 (RCGH-1)
- 2. Source of the Technology:** Horticulture Division, ICAR Research Complex for NEH Region, Umiam
- 3. Year of Release:** 2015
- 4. Agro Climatic Zone:** mid hill condition
- 5. Details description about the Technology:** It is a progeny of cross Sour Type x Red Fleshed. Plant growth was upright, erect with dark green broad leaves. Yield potential was 17-19 t/ha under mid hill condition. Fruits were medium size, fruit shape was globose, greenish yellow in colour with red dots at ripening. Pulp was creamy white, soft seeded, rich in vitamin C (230.66-246 mg/100g), pectin (1.26-1.37%) and dietary fibres (3.41-3.52%). Fruits matured 8-12 days earlier than other varieties under mid hill conditions and is suitable for table and processing purpose.
- 6. Critical inputs requires:** Spacing: 5x 5 m, FYM: 25 kg/ bearing plant, NPK @ 1.4, 1.25 and 0.5kg Urea, SSP and MOP / bearing plant
Observation to be recorded: plant, growth, yield, fruit size, shelf life
- 7. Contact Address for relevant information:** Horticulture Division, ICAR Research Complex for NEH Region, Umiam

Technology no. 41

- 1. Name of the Technology:** Megha Saw Priam (RCGH-4)-
- 2. Source of the Technology:** Horticulture Division, ICAR Research Complex for NEH Region, Umiam
- 3. Year of Release:** 2015
- 4. Agro Climatic Zone:** mid hill condition
- 5. Details description about the Technology:**

It is a progeny of cross Red Fleshed X Allahabad Safeda, was bred to develop coloured high yielding guava variety. It has semi-spreading growth habit with yield potential of 11-14 t/ha under mid hill condition. Fruits are medium to big in size; fruit shape is elliptical to ovate with greenish yellow colour at maturity. Pulp is red coloured and products viz., jam, jelly, juice; RTS can be prepared.
- 6. Critical inputs requires:** Spacing: 5x 5 m, FYM: 25 kg/ bearing plant, NPK @ 1.4, 1.25 and 0.5kg Urea, SSP and MOP / bearing plant
Observation to be recorded: fruit size, fruit shape, yield
- 7. Contact Address for relevant information:** Horticulture Division, ICAR Research Complex for NEH Region, Umiam

Technology no. 42

- 1. Name of the Technology:** Megha Khongpheram Paudiik (RCGH-7)
- 2. Source of the Technology:** Horticulture Division, ICAR Research Complex for NEH Region, Umiam
- 3. Year of Release:** 2015
- 4. Agro Climatic Zone:** suitable for high density planting with yield potential of 12-15 t/ha under mid hills
- 5. Details description about the Technology:** It is a progeny of cross Lucknow-49 X Pear Shaped guava. Variety has drooping growth habit suitable for high density planting with yield potential of 12-15 t/ha under mid hills. Fruits are medium size, light green in colour at maturity. Pulp is creamy white with less and soft seeded (107-119 seeds/100g fruit weight), high in sugar (7.96-8.39%), pectin (1.29-1.40%) and phenol content (358.14 - 369 mg GAE/100g) suitable for table and processing purpose.
- 6. Critical inputs requires:** Spacing: 5x 5 m, FYM: 25 kg/ bearing plant, NPK @ 1.4, 1.25 and 0.5kg Urea, SSP and MOP / bearing plant
Observation to be recorded: maturity, size
- 7. Contact Address for relevant information:** Horticulture Division, ICAR Research Complex for NEH Region, Umiam

Technology no. 43

- 1. Name of the Technology:** Megha Priam Thiang (RCG-11)
- 2. Source of the Technology:** Horticulture Division, ICAR Research Complex for NEH Region, Umiam
- 3. Year of Release:** 2015
- 4. Agro Climatic Zone:** mid hills
- 5. Details description about the Technology:** It a seedling progeny selection from Meghalaya, selected for low seed content. Plant growth is semi spreading type with yield potential of 11-13 t/ha under mid hills. Fruits are sweet (TSS: 11.88-12.50 OB) with low seed content (42-55 seeds/100 g fruit wt), rich in pectin (1.28-1.32%), phenol content (330.65-340.11 mg GAE/100 g) and vitamin C (207-215.33 mg/100g) suitable for table and processing.
- 6. Critical inputs requires:** Spacing: 5x 5 m, FYM: 25 kg/ bearing plant, NPK @ 1.4, 1.25 and 0.5kg Urea, SSP and MOP / bearing plant/ year
Observation to be recorded: fruit size, fruit shape, yield
- 7. Contact Address for relevant information:** Horticulture Division, ICAR Research Complex for NEH Region, Umiam

Technology no. 44

- 1. Name of the Technology:** Rejuvenation of old/senile peach trees
- 2. Source of the Technology:** Horticulture Division,, ICAR Research Complex for NEH Region, Umiam
- 3. Year of Release:** 2011
- 4. Agro Climatic Zone:** Mid hills
- 5. Details description about the Technology**

Following steps have been standardized for rejuvenation of old/senile peach trees

 - Select old/senile peach trees of more than 20 years old.
 - Heading back of primary branches leaving 50 cm on main trunk during November-December.
 - Pasting of cut portion with copper oxychloride and main trunk with Bordeaux paste, mixing 25 kg FYM and fertilizer, mulching of basin area with black polythene
 - The 10-15 new shoots will emerge 30-45 days after heading back
 - The 2-3 new shoot/branch should be selected and remaining will be removed during March-April.
 - Terminal pruning of selected shoot up to 50% of its length should be done.
 - Retention of desirable fruiting shoots.
 - Reproductive pruning of the shoots in October-November.
- 6. Critical inputs require:** FYM: 15-20 kg/ plant, Urea, SSP and MOP @ 100, 300 and 100 g/ bearing plant/year
Observation to be recorded: Fruit yield and quality
- 7. Contact Address for relevant information:** Horticulture Division, ICAR Research Complex for NEH Region, Umiam



Rejuvenated peach plants

Technology no. 45

- 1. Name of the Technology:** Thinning time and fruit spacing for early maturity and quality fruit production in peach cv. Flordasun:
- 2. Source of the Technology:** Horticulture Division ICAR Research Complex for NEH Region, Umiam
- 3. Year of Release:** 2010
- 4. Agro Climatic Zone:** Mid hills
- 5. Details description about the Technology:** Among the low chilling peaches cv. Partap and Flordasun are recommended for mid hills of NE India. But profuse bearing of peach cv. Flordasun, resulted in to excessive crop load of undersized fruits with impaired fruit quality and limb breakage. Further ripening of this cultivar coincides with rains in late April hampering fruit quality and marketability. To get rid of these problem fruit/ fruitlets of cv. Flordasun should be thinned on 20 days after full bloom (DAFB) with spacing of fruits at 10 to 15 cm on shoot on whole tree canopy. This advanced the fruit maturity by 12-14 days with an average fruit yield of 28.10 kg/tree.
- 6. Critical inputs require:** FYM: 15-20 kg/ plant, Urea, SSP and MOP @ 100, 300 and 100 g/ bearing plant/year
Observation to be recorded: Fruit yield and quality
- 7. Contact Address for relevant information:** Horticulture Division ICAR Research Complex for NEH Region, Umiam



Fruits thinned at 20 DAFB and spaced at 10 to 15 cm on shoot

Technology no. 46

- 1. Name of the Technology:** Technology to increase the production of grafted/budded plants of *Khasi* Mandarin:
- 2. Source of the Technology:** Horticulture Division, ICAR Research Complex for NEH Region, Umiam
- 3. Year of Release:** 2008
- 4. Agro Climatic Zone:** Mid hills
- 5. Details description about the Technology:** Looking towards the advantage of rootstocks in citrus production system, T-budding is suggested in *Khasi* mandarin during February in which practically less than one month is available for actual budding operation. Further, around 50-60% budding success is recorded in *Khasi* Mandarin. To increase the production of budded/grafted plants, Division of Horticulture ICAR, Umiam, Meghalaya has standardized the wedge grafting technique, which is done in July-August on 6 to 7 month old rootstock for the production of grafted plants with more than 80-85% plant survival. Thus it is suggested to do wedge grafting during July-August on 6-7 months old rootstock. Rootstock left after

grafting can be utilized for T-budding during February to extend the grafting/budding period up to 3 months with the use of available resources.

- 6. Critical inputs require:** FYM: 15-20 kg/ plant, Urea, SSP and MOP @ 350, 600 and 300 g/ bearing plant/year

Observation to be recorded: Plant canopy, Fruit yield

- 7. Contact Address for relevant information:** Horticulture Division, ICAR Research Complex for NEH Region, Umiam

Technology no. 47

- 1. Name of the Technology:** : Off-season production of Strawberry under low tunnels
- 2. Source of the Technology:** Horticulture Division ICAR Research Complex for NEH Region, Umiam
- 3. Year of Release:** 2009
- 4. Agro Climatic Zone:** Mid hills
- 5. Details description about the Technology:** Strawberry was planted at monthly intervals from July to November under low tunnels of plastic and shade net (Fig 8). The size of tunnels was 4.0m x 0.90m x 0.75cm. Maximum plant growth in terms of survival, plant height and number of leaves/plant was recorded in low tunnels of shade net 50 % in the month of August and September whereas in the month of November it was highest in low tunnels of UVS polythene. It was observed that strawberry can be produced 30-35 days earlier than normal period, when planted in low tunnels of 50% shade net in the month of July or August and the period of fruit availability may be extended to 47 days from normal when planted in the month of November under UVS polythene tunnels. Normal fruiting period under open condition was 2nd fortnight of January to 2nd fortnight of March.



Off-season production of strawberry

- 6. Critical inputs requires:** FYM: 15-20 kg/ plant, Urea, SSP and MOP @ 100, 300 and 100 g/ bearing plant/year
- 7. Observation to be recorded:**
- 8. Contact Address for relevant information:** Horticulture Division ICAR Research Complex for NEH Region, Umiam

Technology no. 48

- 1. Name of the Technology:** Instant ginger candy
- 2. Source of the Technology:** Horticulture Division ICAR Research Complex for NEH Region, Umiam
- 3. Year of Release:** 2010
- 4. Agro Climatic Zone:** Entire Northeast India
- 5. Details description about the Technology:** Low cost technology suitable for ginger growing areas. It is very simple process which does not require much technical skills. Rhizomes were washed and air dried at room temperature (22 ± 2 °C; $70\pm 5\%$ RH) for 2–3 h for removal of surface moisture. Dried rhizomes were peeled manually and slices were made with the help of stainless steel knife. The rhizome were sliced (slice thickness: 5.0–25.0 mm) and blanched (BT, 10–30 min). Blanched slices were dipped in 40°brix and 75°brix sugar solutions containing 2.0% citric acid for 1 and 2 h at 95 °C, respectively. As soon as the retention time reached the predetermined level, the materials were taken out from the syrup and kept in laboratory tray drier at 60 °C for 1 h. Dried materials were cooled at room temperature before being packed in air tight containers.
- 6. Critical inputs requires:** Sugar and citric acid
- 7. Observation to be recorded:** Candy recovery/ kg ginger, Quality, B: C ratio
- 8. Contact Address for relevant information:** Horticulture Division ICAR Research Complex for NEH Region, Umiam

Technology no. 49

- 1. Name of the Technology:** Guava leather, nectar, spread and cheese
- 2. Source of the Technology:** Horticulture Division, ICAR Research Complex for NEH Region, Umiam
- 3. Year of Release:** 2014
- 4. Agro Climatic Zone:** Entire Northeast India
- 5. Details description about the Technology:** Value added products such as nectar, spread and cheese are prepared from guava fruits. In guava nectar, 20% guava fruit pulp is adjusted to 15 °B. In case of guava spread preparation, firm ripe fruits pulp was adjusted to 70° B and



Guava Nectar



Guava Cheese



Guava leather

cooked to smooth and creamy consistency. For guava cheese preparation, every kilogram of mature fruits was cooked to a thick paste with sugar (1.25-1.5 kg), acid (3 g) and butter (56 g). Hot cheese is spread on tray to set overnight and cut in to desired shapes and sizes.

6. Critical inputs requires:

Sugar, Citric acid, packaging materials

Observation to be recorded: Recovery % of finished products, quality, B: C ratio

7. Contact Address for relevant information: Horticulture Division ICAR Research Complex for NEH Region, Umiam

Technology no. 50

1. Name of the Technology: Sohiong RTS, jam and nectar

2. Source of the Technology: Horticulture Division, ICAR Research Complex for NEH Region, Umiam

3. Year of Release: 2010

4. Agro Climatic Zone: Entire hill zones

5. Details description about the Technology: Various pulp percentage and syrup strength was considered for developing optimum products. Total protocols have been developed for RTS, nectar and jam were prepared from freshly harvested ripen Sohiong. The Sohiong fruits of 225 days of maturity are selected for preparation of RTS beverage. The total soluble sugar and acidity of 10% juice are adjusted to 15°brix and 0.5% acidity respectively. The ingredients mentioned in the Table 5 are mixed in calculated quantity of water. The RTS is filled in sterilized bottle immediately. It was then pasteurized at 80°C for 20 minutes.

Table. Different ingredient and amounts for preparation of RTS Sohiong beverage



Sohiong jam

Sohiong RTS beverage

Ingredients	Amount
Sohiong	1 L
Sugar	1.4 kg
Citric acid	17 g
Water	7.6 L

6. Critical inputs
Sugar,

inputs
citric

requires:
acid

Observation to be recorded:
Recovery % of products, quality and B: C ratio

7. **Contact Address for relevant information:** Horticulture Division ICAR Research Complex for NEH Region, Umiam

Technology no. 51

1. **Name of the Technology:** Ready-to-cook green jackfruits (Minimally processed)
2. **Source of the Technology:** Horticulture Division ICAR Research Complex for NEH Region, Umiam
3. **Year of Release:** 2010
4. **Agro Climatic Zone:**
5. **Details description about the Technology:** Mature fruits (45-60 days after fruit set) were harvested and peeled. Slicing into pieces are done which was followed by blanching for 10 minutes. The pieces are filled in sterilized bottles and brine solution (8% salt + 0.2% KMS) is poured into it. The bottle is sealed and kept in cool dry place.



Ready-to-cook green jackfruits



6. **Critical inputs requires:**

Raw materials, salt, chemicals etc

Observation to be recorded:

% recovery of finished product, Quality and B: C ratio

7. **Contact Address for relevant information:** Horticulture Division, ICAR Research Complex for NEH Region, Umiam

Technology no. 52

1. Name of the Technology Chow chow tooty fruity and shreads

2. Source of the Technology: Horticulture Division ICAR Research Complex for NEH Region, Umiam

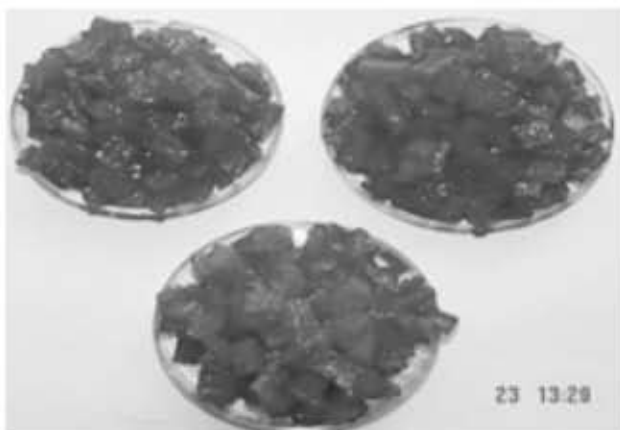
3. Year of Release: 2010 and 2014

4. Agro Climatic Zone: Entire Northeast India

5. Details description about the Technology:

A process for producing a natural cho-cho (*Sechium edule*) tooty fruity was prepared from matured chow-chow vegetable. In this method, peeled vegetables were sliced into pieces of (10-15) x (10-12) x 5 mm followed by blanching in boiling water for 5-10 minutes. Blanched vegetables were dipped in sugar syrup of 30-40% for 1-2 hours and 72-75% for another 2-3 hours with slow heating. Syrup was mixed with 15-20% Sohiong juice and 10-15% fresh ginger juice as a natural colouring, acidulant and flavouring agent. Drained slices were dried in tray drier for 15-30 minutes at 60°C. The chow-chow tuity fruity thus prepared had 70 -73% total soluble solid (TSS) and the product is ready for packing in packaging materials. This product could be used as a confectionery, bakery and pan masala purposes. Mature chow-chow fruits are collected for making dehydrated shreds. The fruits are peeled manually, core removed and cut into slices. The slice thickness and length are kept at 0.5 cm and 6 cm, respectively. The slices are dehydrated on trays in cabinet drier oven at 55±5° C.

6. Critical inputs requires:



Tooty fruity



Dehydrated shreds

Sugar and other ingrediants

Observation to be recorded:

% recovery of finished products, Quality, B: C ratio

7. Contact Address for relevant information: Horticulture Division ICAR Research Complex for NEH Region, Umiam

