Package of Practices for Organic Vegetable production in A & N Islands

Tomato

(*Solanum lycopersicum*
Syn. *Lycopersicon esculentum*)

Season	In Andaman and Nicobar Islands, tomato cultivation in open condition is done during Dry season (Dec. – April) while its protected cultivation during rainy season (May-December) is also coming up in some pockets of islands.
Variety	Arka Vikas, Ayush, Arka Samrat, Arka Saurabh, Pusa Sadabahar, Arka Shrestha, Arka Rakshak, BT-1, BT-10, Laxmi
Climate and soil	Tomato is a warm season crop and can be grown between 10-30°C but ideal temperature is 21-24°C. Its fruit set is affected by temperature, light intensity, humidity and nutrient status of the soil. The ideal night temperature for fruit set in tomato is 15-20°C though some varieties are available which can set fruits at slightly higher temperature also. Thus, polyhouse growers should maintain the inside temperature below 28-30°C along with proper air movement during peak hours (9-11 hours of day) at flowering and fruiting stage. Further, temperature above 30°C also affects lycopene synthesis and proper colour development which ultimately affect market quality. For tomato, well drained and fairly fertile soils which have enough organic matter with fair water holding capacity are ideal. The suitable soils for early harvesting of crop are sandy to sandy loam soils while high yield can be obtained from tomatoes grown in heavy soils rich in organically matter. Tomato performs well in soil having pH 6.0-7.0 while show moderate tolerance to acidic soils but bacterial wilt became a serious challenge in such soils. Therefore, organically accepted soil amendments like coconut husk, green manure, vermicompost, poultry manures and lime should be given improve the soil pH to the level of 6.0-7.0.
Sowing time	For open cultivation in Dry season, the seedlings for early crop should be raised in October month with rain protection measures; for main season crop November – December is ideal time while for late season crop seedlings can be raised in January month. The seedlings can be raised as and when required for protected cultivation of tomato. Preferably, it should be done in April – May for early crop; in June for Main crop and July-August in Late crop of rainy season.

Seed rate	300 - 350 g /ha for open pollinated varieties and 150 g for hybrids; 10 -15 beds of 7-10 m length and 1 m width for one hectare area.
Nursery management	Select well drained open space having good soil health. Make the soil to fine tilth and mix FYM @ 5 kg and vermicompost @ 1 kg/ sq. m. Prepare 3-10 meter long 20 -30 cm raised beds of 1 m width. Keep 50 cm wide furrow for drainage facility. Sow seeds in line at 5 cm apart and 1 -2 cm deep. Cover lines with fine FYM and also beds with dry grass till germination. Provide regular watering and protect nursery from heavy rains using rainshelters. Before one of transplanting, seedlings should be hardened by giving irrigation on alternate day. The seedlings are ready in 21-25 days for transplanting. Seedlings production in Pro-trays technique is more advantageous. In this, coconut husk and vermicompost in 1:1 ratio is filled and sow one seed per hole. Keep the trays in shade for 2 days than in partial shade for 5-7 days and then remove the shade cover and allow proper light. Protect seedlings from any kind of disease or pest attack by applying Pseudomonas and Trichoderma @ 2g/10 ml and use of insect proof nets on sides.
Spacing	Single row: 50 -60 cm X 40-50 cm Double row bed system: 80 -100 cm (60 cm x 40 cm) + 50 cm (between beds) The islands conditions more prone to incidental rains in dry season particularly in February –March months when the crop is in flowering or fruiting stage and water stagnation even for few hours cause huge loss to crop and farmers. Thus, better to adopt the double row raised bed technique which avoid such losses and also require less irrigation water and minimize weed infestation.
Transplanting	Give light irrigation One or two days before transplanting, a light irrigation should be given to bring field in favourable condition. For transplanting, prepare raised beds and make small pits with *Khurpi* at prescribed spacing. If required give a light irrigation to 'planting pits' to bring field in favourable condition.

	Apply FYM, Vermicompost, Trichoderma, Pseudomonas and PGPR mix in single or combinations in the pits. Transplant 21-25 days old seedlings and provide sufficient water immediately. It is better to practice transplanting operation in evening hours to minimize transplanting shock.
Irrigation and water management	Frequent irrigation needed in initial days of transplanting. Later on, it can be done on alternate days and then at 2-3 days interval. Furrow or drip irrigation is better. Avoid excess irrigation and also do allow soil to dry otherwise it will contribute in breaking of roots which ultimately allow bacteria into the plant system and cause disease like bacterial wilt. It is essential to provide facility for immediate and proper drainage of excess water during incidental rains. Mulching with plastic, dry grass, rice straw etc is suggested to conserve soil moisture, reduce effect of soil heat on fruits and minimize weed infestation. It also increase fruit yield and improve the quality fruits.
Intercultural operations	Pre-planting irrigation and ploughing practice reduce weed population drastically. In tomato, regular weeding and hoeing at 7-10 days interval is necessary. During weeding and earthing-up operations, avoid any damage to the plant stem or leaves otherwise it will open the way for entry of pathogens in the plant system. Avoid damage to plant stem or roots while field practices. Pruning and training is practiced in indeterminate (in simple - tall growing or polyhouse tomatoes) varieties to increase plant vigour and add one or two more stems. Training with wires, strings, rope or stems is necessary for indeterminate varieties.
Manuring and nutrient management	Tomato is and require 25 -30 t/ha as basal dose. Also apply vermicompost @1-tonnes/ha during transplanting. Mix Trichoderma and PGPR mix (each @ 2.5 kg /ha) and keep for 15 days in shade and apply during FYM application. Dip the roots in 2% Pseudomonas or PGPR mix before transplanting. Tomato is medium duration crop but fast feeder of nutrients so top dressing of vermicompost @ 1.5-2 t/ha around the root zone or in furrows in equal doses at 45, 60 and 90 days after transplanting.

	The yield and quality of tomato improve with regular application (7-10 days interval) of soil application of fresh cow dung slurry @ 1 kg/10 litres (50 kg/ha) or biogas slurry @ 1 kg/10 litres (50 kg/ha) or cow's urine 500 litres/ha (8 times dilution) or vermiwash-500 litres/ha (8 times dilution) or groundnut cake1 kg/10 litres (50 kg/ha). Foliar spray can be given with cow dung slurry/ vermiwash/ cow's urine
Pest and disease management	The major pests of tomato in islands are Fruit borer, Serpentine leaf miner and sucking pests. For Fruit Borer, it is advised to (i) collect and destroy the infested fruits and grown up larvae; (ii) grow less susceptible genotypes Rupali, Roma, Pusa red plum; (iii) grow available level of resistant cultivars like BT-1, Punjab Kesri, Punjab Chhuhara, Pant Bahar, Pusa Hybrid-4; (iv) grow simultaneously 40 days old African tall marigold and 25 days old tomato seedling at 1:10 rows to attract *Helicoverpa* adults for egg laying and later on, collect and destroy the marigold plants; (v) Set up pheromone trap with Helilure @ 15 traps/ha to collect adults and kill them and change the lure once in 15 days; (vi) Spray Azadirachtin 1.0% 1.0-1.5 L with 500 L water/ha, NPV of *H. armigera* 0.43% AS 400-600 or NPV of *H. armigera* 2% AS 500; (vi) Spray Dipel (Bt formulation) - 1 g per litre of water and grow maize as barrier crop for the pest; and (vii) Apply Pongamia or neem cake 250 kg/ ha at planting and repeat 2 or 3 times at 30 to 45 days interval. To manage Serpentine leaf miner, collect and destroy mined leaves and spray Neem Seed kernel extract (NSKE) 5% or Neem oil 2 ml per litre which acts as a good repellent. The NSKE extract is prepared using 3-5 kg (for one ha) of neem seed kernel (without outer seed coat. The kernels are pound gently and tied loosely in cotton cloth. This is soaked overnight in a vessel with 10 litre of water and then filtered through cloth. The filtrate is diluted with 9 - 9.5 litre of water and extract is emulsified with soap @ 10 ml per litre and sprayed. The sucking pests including white fly can be managed by use of *Sida spinosa* 3% extract, NSKE 5% extract or Garlic, Chilli, Ginger extracts and their preparation is same as given for brinjal crop. The bacterial wilt is serious problem in islands and it can be managed by growing resistant varieties like Arka Rakshak, Arka Samrat, Ayush, Arka Vikash, BT-10 an BT-1. Besides, modified growing media (coconut pith + vermicompost +lime) and grafting technique (using CARI Brinjal-1 or wild brinjal as rootstock) are effective way to manage it. Use of Pseudomonas and Trichoderma (@10g/litre) through seedling treatment, soil drenching and even foliar spray is also suggested.

	The leaf curl is another serious problem and it is spread by white fly. Thus, it can be managed by controlling the white fly population by the use of *Sida spinosa* 3% extract, NSKE 5% extract or Garlic, Chilli, Ginger extracts. The damping-off is serious problem in ill-managed nurseries and this can be controlled using the measures given for brinjal. Besides, fusarium wilt and late blight occurs in tomato crop in islands which can be managed to some extent by use of Trichoderma (10 g/litre) as seedling treatment, soil drenching and foliar spray.
Harvesting	The tomato fruits can be harvested 70-100 days after transplanting of indeterminate varieties like (Arka Vikash, Ayush etc.) and in determinates it starts at 70-80 days after transplanting. Harvesting is done at 4-5 days interval and continues to 6-10 times or even more depending upon the type of cultivars. Harvest red to pink stage fruits for local markets. It can be harvested at turning pink or half ripe stage also. Harvesting should be done with twisting motion of hand to separate fruit from stem. Never harvest the tomatoes by pulling method as will it certainly damage the plant.
Yield	From open pollinated varieties o tomato, the fruit yield of 150 – 250 q/ha can be obtained from organic cultivation while it may slightly higher or lower for hybrids depending upon the nutrient status in soil during crop period.

Brinjal (*Solanum melongena*)

Season	Main crop: Dry season (December – May) Off-season: Rainy season (May-December)
Variety	Round/oval fruits: Arka Navneeth, Akra Neelkanth, Pusa Bindu, Pusa Uttam, Pusa Ankur, Pusa Hybrid-9, Kashi Sandesh Long fruit: Arka Nidhi, Arka Anand, Arka Keshav, Punjab Sadabahar, Pusa Purple Long, Pusa Purple Cluster, Pant Samrat, Pusa Kranti, Kashi Komal Green coloured: Arka Shirish, CARI Brinjal-1, Ram Nagar Giant White colour: SM-6, CARI Selections
Soil	Well drained deep, friable and rich in organic matter soils with fair water holding capacity are ideal. It fruits early in light soils while heavy soils are known for high yield and longer harvest period. The pH of soil should not be more than 5.5 to 6.0 for its better growth and development.
Sowing time	For dry season crop, nursery should be raised in October-November while for rainy season crop where irrigation facility is available the sowing can be done in April month otherwise in May month is suitable for rainfed crop. Besides, the brinjal seedlings can be raised as and when required because it can easily germinate and cultivated round the year in island conditions.
Seed rate	250 - 300 g /ha; 10-15 beds of 7 m length x 1 m width for one hectare area.
Nursery management	Select well drained open space. Make the soil fine tilth and mix 10 kg FYM or 5 kg vermicompost per sq meter. Prepare raise beds of 1 m width and 5-7 m length with drainage facility. Seedlings can be produced in Pro-trays technique. Sowing should be done in 5 cm apart lines at a depth of 1 -2 cm and spread FYM. Cover beds with dry grass till germination. Provide shelter to avoid damage from heavy rains. Restrict irrigation one week before transplanting and irrigate heavily on the previous day of transplanting.

Spacing	Single row: 75 cm X 50-60 cm Double row bed system: 100 cm (80 cm x 60 cm) + 80 cm (between beds)
Transplanting	Islands have high weed infestation so irrigate the field one week before transplanting to promote germination of the weeds and plough them back into the soil. It will favour the crop in its initial days of establishment. Also give a light irrigation to 'planting pits' to bring field in favourable condition otherwise, hot soil may damage the seedling roots. It should be ensured that the seedlings are hardy and healthy and of 5-6 weeks age. Uprooting of seedlings from beds should be done very carefully to avoid or minimize damage to roots. For transplanting, make a small pit with *khurpi* and apply vermicompost or FYM and fill it by half and do transplanting in pit in evening hours. Proper watering should be done immediate after planting to avoid any heat stroke.
Irrigation	Give pre-transplanting irrigation, if the soil is not moist enough. Frequent irrigation needed in initial days, later on it can be done at 5-7 days interval. Furrow or drip irrigation is better. Mulching with plastic sheet, dry grass and rice straw is suggested for good quality fruits and high yield.
Intercultural operations	In organic farming, regular weeding is essential to maintain nutrient pool only for crop plant. Hence, 7-10 days interval weeding and dumping of the weeds in a vermicomposting pit should be done. Regular hoeing at 15 -20 days interval is necessary to keep proper aeration in the root zone. Remove wilted plants or diseases and pest affected parts or fruits as and when noticed in field. Training and pruning is good for brinjal yield and fruit quality.
Manuring and nutrient management	Apply lime @ 500 kg/ha and well decomposed FYM or compost @ 25-30 t/ha as basal dose. Mix Trichoderma and PGPR mix (each @ 2.5 kg /ha) and keep for 15 days in shade and apply during FYM application. Dip the roots in 2% Pseudomonas or PGPR mix before transplanting. Brinjal is longer duration crop so top dressing of vermicompost @ 1.5-2 t/ha

	around the root zone or furrows in equal dose at 60 and 90 days after transplanting. The yield and quality of brinjal improve with regular application (7-10 days interval) of soil application of fresh cowdung slurry @ 1 kg/10 litres (50 kg/ha) or biogas slurry @ 1 kg/10 litres (50 kg/ha) or cow's urine 500 litres/ha (8 times dilution) or vermiwash-500 litres/ha (8 times dilution) or groundnut cake1 kg/10 litres (50 kg/ha). Foliar spray can be given with cowdung slurry/ vermiwash/ cow's urine.
Pest and Disease management	The major pests of brinjal are Shoot and fruit borer while it is also attacked by epilachna beetle and sucking pests. Shoot and fruit borer management practices: (i) Grow available level of resistance varieties like Annamalai, Arka Kusumakar, Doli – 5, Chaklasi Doli, Pusa purple Long, Pusa Purple Round, SM 67, SM 68 and Pant Samrat, (ii) Keep proper watch for the pest occurrence and as and when observed collect and destroy the insects, damaged tender shoots, fallen fruits and fruits with bore holes to prevent population buildup(iii) Use light traps @ 1/ha to attract and kill the moths or Place pheromone traps (Luci Lure) @ 6-10/acres, (v) Spray Bt formulations of *B. thuringiensis* var. *kurstaki* such as Dipel @ 1.5 to 2 ml /L of water or Delphin, Halt, Bioasp, Biolep (0.7-10 ml/litre), (vi) Spray neem-garlic emulsion (2%), (vii) Use S-NPV (250 LE/ha) and spray leaf extract of cashew (10%), (viii) Uproot and burn old plants before planting new plants since they harbour pest and carry over infestation; (ix) grow maize as intercrop in regular or interval fashion with brinjal lines or use net house and (x) avoid continuous cropping of brinjal and even its ratooning, For Hadda / spotted beetle, it is advised to (i) Collect and destroy adult beetles, grubs and pupae; (ii) Shake plants to dislodge grubs, pupae and adults in a bucket of kerosenated water in early morning and collect beetles mechanically and destroy; (iii) Spray Azadirachtin 0.03% 2.5-5.0 L in 500 - 750 L of water; (iv) Emulsify 1 litre of Neem oil with 60 g of soap dissolved in ½ litre of water, diluted by adding 20 litre water and mix 400 g well crushed garlic and spray; and (v) Spray soap-garlic-castor oil emulsion (2%) or *Clerodendron* plant extract 4-8% or custard apple seed extract 2-5%. The pest management option for leafhoppers, mealy bugs and whiteflies includes (i) regular field monitoring and removal pests, egg mass and infected plant parts as and where applicable, (ii) spray *Sida spinosa* 3% extract, NSKE 5% extract, *Clerodendron* extract 4-8% or Custard apple seed extract 2-5%.

	Garlic (18 g) + Chilli (9 g) + Ginger (9 g) extract prepared by crushing separately mixing them in 1 litre of water. Mix 500 ml filtered extract in 9.5 litre of water and add 100 ml of soap solution to emulsify the contents and spray it. Spray neem-garlic emulsion (2%) or Nimbecidin or Econeem or Uneem (2ml/litre). Spraying of lemongrass/ginger extract (10%) is also effective. At nursery stage, avoid damping-off by adding a mixture of Trichoderma + 100kg FYM + 10 kg neem cake kept over for 15 days under shade. Also add 1 kg of PGPR mix (for 1 ha nursery) at the time of bed preparation. Apply *Pseudomonas fluorescens* @ 20g/litre frequently and add diluted (25g/litre) cow dung slurry or cow urine (diluted 8 times) to increase seedling vigour. Bacterial wilt is serious problem in brinjal but it can be managed by integrating (i) resistant varieties (CARI Brinjal-1, Arka Nidhi, Pusa Purple Cluster, Hisar Syamal, SM-6), (ii) crop rotation with crucifers or non-host crops including paddy, (iii) apply lime @ 300-500 kg/ha as basal dose along with FMY, (iv) uproot the diseases plants (v) use *Pseudomonas fluorescens* and Trichoderma or PGPR mix as root dipping @ 10g/litre and (vi) apply in root zone @10-20g/litre at the time of transplanting again at 20-30 days interval.
Harvesting	The harvesting starts at 65-75 days after transplanting and continues till 120-150 days at an interval of 5-7 days. Harvest fruits of good size and bright glossy colour. Test fruit maturity by pressing front of fruits, it is immature if it springe back to original shape. Timely harvesting of tender fruits increase the total growing period and number of picking and yield.
Yield	200 – 300 q/ha

Chilli (*Capsicum annum*)

Season	Main crop: Dry season (December – May) Off-season: Rainy season (May-December)
Variety	KA-2, LCA-334, Pusa Sadabahar, Bhagyalakshmi, Arka Lohit, Arka harita, Arka Meghna, Arka Sweta, Pusa Jwala, Anugraha, Ujwala, Local Genotypes
Soil	Well drained, fertile, loam, deep and good water holding capacity soils are good. Light soils are good for early crop and better quality fruits while clay loam or silty soils are for high yield. Soil pH should be 5.5 to 6.0
Sowing time	Dry season crop – October-November and for Rainy season crop: April (with irrigation facility) – May (Rain fed crop)
Seed rate	500 g to 1 kg/ha; 12-15 beds of 3 m length x 1 m width for one hectare area (40-50 sq. meter area)
Nursery management	The nursery beds should be made in a well drained open space. Mix 10 kg FYM or 5 kg vermicompost per sq meter and prepare 15-20 cm raise beds of 1 m width and 3 -7 m length with drainage facility. Sowing should be done in 5 cm apart lines at a depth of 1 - 2 cm. Cover the line with powdered FYM. The seedlings can be produced in 'Pro-tray technique' in which the holes/plugs are filled with vemicompost and cocopith (1:1) mixture. The nursery should be provided with 45 mesh nylon net on all sides and even on top to avoid pest attack. Always keep ready to protect 'plastic shelter' or 'rainshelters' to avoid seedling damage from heavy rains. Clipping of seedlings 7-10 days prior to planting help in better establishment and profuse branching. Seedlings are ready for transplanting in 35-42 days from beds and 25-30 days in trays.
Spacing	For single row planting: 50 cm X 30-40 cm and for double row bed system: 60 cm (40 cm x 20 cm) + 40 cm (between beds). In island conditions, the raised bed with double row system is more suitable. In this system, the beds are made of 75-100 cm width and 15-20 cm height. The furrow between two bed should be 50-60 cm.

Transplanting	Transplant 6-7 weeks old seedlings on raised beds (one seedling/hill). Field should be ploughed well and mix FYM during first ploughing. For this, make a small pit using *Khurpi* and add a handful of mixture of vermicompost + Trichoderma or Pseudomonas. If soil is not having sufficient moisture, than provide small quantity of water in each 'planting pit'. Though field preparations can be done in morning hours but planting should be done in evening hours. For this, only healthy seedlings should be taken carefully and give root with Trichoderma or Pseudomonas or PGPR mix @ 10g/lt. Irrigation should be given immediate after transplanting to ensure proper field establishment of seedlings.
Irrigation	Frequent irrigation is needed in initial days while interval can be extended to 3-5 days after crop establishment. Furrow or drip irrigation is better. The mulching with plastic sheet, dry grass and rice straw is suggested for moisture conservation, weed control and higher fruit yield. Provide proper drainage facility during incidental heavy rains.
Intercultural operations	Gap filling should be done from 'pro-tray raised seedlings' just after observing the gaps. Weeding and hoeing should be done at 10 days interval during rainy season while 15-20 days during dry season. Remove wilted plants and virus infected portion of parts which help in reducing the further spread of diseases. Pinch the apical buds (if not done in nursery) at 40 to 45 days after transplanting for profuse branching and higher yield.
Manuring and nutrient management	Chilli is also susceptible to bacterial wilt which occurs more in slightly acidic of Andaman Islands. Therefore, during first ploughing for land preparation of chilli, it is advised to apply lime @ 500 kg/ha and well decomposed FYM or compost @ 25-30 t/ha as basal dose. Mix Trichoderma and PGPR mix (each @ 2.5 kg /ha) and keep for 15 days in shade and apply during transplanting in 'planting pits'. Root dipping in 2% Pseudomonas or PGPR mix before transplanting improves plant growth. Chilli is slow growing crop but have loger harvest period, therefore, vermicompost @ 1.5-2 t/ha should be given around the root zone or furrows in equal dose at 45 and 90 days after transplanting. Chilli yield and quality improve with regular application (7-10 days interval) of soil application of fresh cowdung slurry @ 1 kg/10 litres (50 kg/ha) or biogas slurry @ 1 kg/10 litres (50 kg/ha) or cow's urine 500 litres/ha (8 times dilution) or vermiwash-500 litres/ha (8 times dilution) or groundnut cake1 kg/10 litres (50 kg/ha). Foliar spray can be given with cowdung slurry/ vermiwash/ cow's urine. Noni extracts showed good performance in chilli for growth and yield.

Pest and Disease Management	In chilli, the major pests are thrips, aphids and mites. For their management, (i) Inter crop with *Sesbania grandiflora* to provide shade which regulate the thrips population; (ii) keep field clean and remove weeds particularly which are attacked by thrips and mites otherwise they will become the breeding ground for the pest; (iii) spray *Sida spinosa* 3% extract, NSKE 5% extract or Garlic, Chilli, Ginger extract can be used against major sucking pests (the extract can be prepared as per the details given for brinjal); and (iv) Spray *Bacillus thuringiensis* var *kurstaki*, the commercial preparation @ 500 g per ha against lepidopteran pests. The leaf curl, bacterial wilt and anthracnose are the major problems in the chilli in islands. For leaf curl it is advised to follow the strict pest monitoring and appropriate control measure as given above. Do not wait for pest to cause symptom but start the pest control measures along with crop growth stages. Some of the varieties which show field resistance to leaf curl are Bhagyalakshmi, Pusa Sadabahar, Arka Harita, Arka Meghana and Arka Sweta. The white fly population can be managed by the spray of *Sida spinosa* 3% extract, NSKE 5% extract or Garlic, Chilli, Ginger extracts. The bacterial wilt also affects chilli severely in islands. For this, use resistant varieties like Anugarah; (ii) apply lime @ 500 kg/ha to soil during first ploughing to adjust soil pH (iii) seedling treatment with Trichoderma or Pseudomonas @ 10 g/litre water (iv) use of modified growing media (coconut pith+vermicompost+lime) and grafting on local chilli (for small scale or polyhouse cultivation).
Harvesting	The harvesting starts from 70-80 days after transplanting. The onset of harvesting starts and ends early in light soils while slightly delayed onset and end of the harvesting is seen in chilli crop grown in heavy soils. Therefore, farmers should consider this factor for catching the market at right stage. The well grown green fruits should be harvested at 7-10 days interval which stimulates further flush of flowering and fruit set.
Yield	The green fruit of chilli is ranges from 65 to 70 quintals/ha depending upon soil health, variety and crop management practices.

Sweet pepper

(*Capsicum annuum*)

Season	It grows well in rainy season (May-December) and early dry season (November - March) in polyhouse. It does not grow well in open cultivation.
Variety	California Wonder, Indra and Arka Gaurav
Soil	Well drained, fertile, loam, deep and good water holding capacity soils are good. Clay loam or silty soils are good for high yield. If soils is not good than use the cocopith+FYM+vermicompost media in bed system or pot or polybag system. Capsicum grows well in polyhouses in islands but need adequate measures to manage the inside climatic parameters in favour of crop particularly temperature, light and air movement. The optimum temperature for capsicum is For this, use of UV stabilized Insect proof nylon net (45 mesh) all sides and on gutter area, providing 50 % agro-shadenet on roof top with mechanical rolling system and possible 2-3 high speed stand fans to ensure proper wind movement. During dry months, if the crop plan is prepared in such a manner where the flowering and fruiting stage of capsicum crop coincide with hot months of March- April than it is better to grow in shade-nets because extreme heat inside the polyhouses causes sunscald of fruits and also affect flowering and fruit setting. It should be noted that capsicum requires night temperature in the range of 21-24°C and day temperature upto 30°C. It is insensitive to photoperiod and humidity.
Sowing time	For rainy season crop the seedlings should be raised in April-May months and for Early dry season crop the October month is ideal. Though, it grow well in polyhouses in islands but it is required to manage the inside climate in favour of the crop particularly during flowering and fruiting stage.
Seed rate	450 - 500 g /ha or 15 g for 300 square meter polyhosue; 12-15 beds of 3 -5 m length x 1 m width for one hectare area (40-50 sq meter area) or around 350 pro-trays (96 plugs size).
Nursery management	The capsicum nursery should be made in portrays for higher recovery of healthy plants, better crop establishment and early production of seedlings. For this, the pro-trays should be filled with a mixture of cocopith and vermicompost in 1:1 ratio. One seeds should be placed in each plug. Keep the tray in a partial shade and rain protected condition during initial 2-3 days for early germination. Later, place the tray in a partial shade condition

	and provide regular watering. Apply vermiwash solution after 15 days of sowing. Provide Insect Proof Net to protect from pest and rainshelter from heavy rains. Capsicum also needs hardening for better field stand which can be done easily by regulating irrigation.
Spacing	Single row: 60 cm X 50 cm Double row bed system: 80 cm (60 cm x 40 cm) + 40 cm (between beds)
Transplanting	Transplant the 5-6 weeks old seedlings on raised beds (one seedling/hill). The 'Protray seedlings' are ready for transplanting at the age of 25-30 days. For this, the field should be well ploughed and mix full of prescribed FYM and lime. Prepare 15-20 cm raised beds of 80 cm width by keeping furrow width of 40-50 cm. Apply basal dose of vermicompost and other prescribed nutrient sources and microbial formulation (prescribed for protection and growth promotion) and mix well in the moist bed soil. Apply plastic mulch by keeping black colour downside otherwise it will increase the root zone temperature which is not good for plant. Fix the plastic mulch by covering sides with soil or plastic pegs. Mark the points on mulched beds at prescribed spacing levels keeping 10 cm on each side of bed. Make small holes using *Khurpi* and plant one seedling per hole. For this properly place the root ball in centre of the hole and close it with adding small quantity of vermicompost or FYM because it acts as mulching material against evaporation but favour aeration. Transplanting should be done in the evening hours to avoid transplanting shock. Watering should be done near the plants and also in furrows to maintain high humidity in plant microclimate for their better field establishment.
Irrigation	Frequent irrigation near the plants and in the furrow is needed in initial days. Later on the irrigation can be done in furrows at 2-3 days interval. However, the best option for irrigation is to provide water through drip irrigation method regularly which helps in better growth, yield of quality fruits and also save water and labour. The mulching with plastic mulch (silver/white colour on upper side), dry grass and rice straw is suggested for moisture conservation, weed control and higher fruit yield. Avoid excess moisture near the stem and do not allow leaves to touch water.
Intercultural operations	Regular weeding (7-10 days interval) should be done by hands near the plants grown with mulching. Hand or mechanical weeding is good for capsicum grown in beds without mulching. The diseased or pest infested leaves or other parts should be removed immediately to restrict their further spread. It is required to provide training and support to the plants for development of proper frame. For this, pinching of apical bud (if only one stem present) and allow 2-3 stems. Provide support of wood/bamboo

	sticks or rope to keep plant in upright position, Pruning of initial 3-4 flowers is essential to maximize yield and improve quality of fruits.
Manuring and nutrient management	Capsicum is heavy feeder of nutrients particularly during fruiting stage. It is advised to apply lime @ 500 kg/ha and well decomposed FYM or compost @ 25-30 t/ha as basal dose t the time of first ploughing. Mix Trichoderma and PGPR mix (each @ 2.5 kg /ha) and keep for 15 days in shade and apply during transplanting in 'planting pits'. Root dipping in 10 g/litre solution of Pseudomonas or PGPR mix before transplanting to improve plant growth. To maintain consistent yield from the plants for a longer period, it is required to apply vermicompost @ 2-3 t/ha around the root zone or dripper points or irrigation furrows in equal parts at 45, 90 and 120 days after transplanting. Though no such studies are done in capsicum but like chilli crop, the yield and quality of capsicum also improves with regular soil application (7-10 days interval) of fresh cowdung slurry @ 1 kg/10 litres (50 kg/ha) or biogas slurry @ 1 kg/10 litres (50 kg/ha) or cow's urine 500 litres/ha (8 times dilution) or vermiwash-500 litres/ha (8 times dilution) or groundnut cake1 kg/10 litres (50 kg/ha). Foliar spray can be given with cowdung slurry/ vermiwash/ cow's urine. Some of the plant extracts like Noni extracts showed good performance in chilli which can be used in capsicum to improve the growth and yield.
Pest and Disease Management	Similar to chilli, capsicum is also a favourable host of thrips and mites even inside the naturally ventilated polyhouses and shadenet houses. For their management, (i) keep the surroundings of the polyhouse clean and weed free (iii) regularly spray *Sida spinosa* 3% extract, NSKE 5% extract or Garlic, Chilli, Ginger extracts (the extract can be prepared as per the details given for brinjal); and (iv) Spray *Bacillus thuringiensis* var *kurstaki*, the commercial preparation @ 500 g per ha against lepidopteran pests.. Bacterial wilt, mites and thrips are major problem in capsicum in islands. The wilt can be controlled by use of moderate resistant variety (Arka Gaurav), grafting on wilt resistant stock (local round chilli, CARI Brinjal-1 or wild brinjal), grow crop in pots or polybags with growing media (cocopith+ + soil + vermicompost+ lime in 1:1:1:0.01 ratio). Apply Trichoderma and Pseudomonas and PGPR mix (@10 ml/litre) as seed treatment, seedling treatment and fortnightly soil drenching.
Harvesting	The fruits are ready for harvesting at 90-100 days of transplanting. Harvest fully grown mature (green for green colour varieties; yellow for yellow coloured and red for red coloured capsicum).
Yield	200 – 250 q/ha

Okra *(Abelmoschus esculentus)*

Season	Round the year cultivation and only 90- 110 days duration crop. May-September (early crop), August- December (main rainy season), December – April (dry season)
Variety	Arka Anamika, Arka Abhay, Pusa A-4, HOK-152, Varsha Uphar, Prabhani Kranti, Sakti, Co-1, Kashi Mangali, Kashi Mohini, Kashi Bhairav
Soil	Okra crop grows well in lighter soils having proper drainage facility and rich in organic matter with fair water holding capacity. A pH of 6.0-6.8 is ideal for okra though it can be grown in saline soils having salinity upto 6 m mhos/cm EC.
Sowing time	Okra can be grown round the year in staggered planting approach. But for early crop in rainy season it is better to perform sowing in May-June months; for main rainy season crop in August- September months; and December –January months is ideal for main dry season crop in islands.
Seed rate	7.0- 8.0 kg/ha; seed soaking in water for 2 hours or seed treatment with Pseudomonas @ 8g/kg improve germination and vigour of seed and seedlings. Early vigour favour crop for rapid growth and ground cover which help in reducing weed infestation.
Nursery management	Usually not practiced in okra but it is good to follow seedling transplant method for gap filling or adjustment of crop period factored by market demand or previous crop in the field. The 'Pro-trays' technique is highly suitable for such situations. Powdered coconut husk and vermicompost in 1:1 ratio can be taken as media for filling the pro-trays.
Spacing	For open pollinated varietie keep spacing of 60 x 40 cm for rainy season and 60 x 30 cm for dry season crop. Though, Hybrids varieties are not much appreciated in organic farming in initial years but they can bew grown with additional use of manures and vermicompost. For hybrids, sowing should be done at 70-80 x 50- 60 cm in both seasons depending upon the season and soil health.

Land preparation	Apply the FYM and mix by first ploughing 15 days prior to sowing. After 10 days perform next ploughing and last ploughing should be done 2-3 days prior to sowing. The half dose of N and full dose of P and K should be mixed in the soil at the time of last ploughing.
Sowing and Transplanting	Give pre-sowing/transplanting irrigation, if the soil is not moist enough. The line sowing at prescribed spacing level should be done. For contingency crop or gap filling, the seedlings with root ball from Portrays should be transplanted in the gaps. This transplanting technique is also suitable for rainy season when seed germination in field is difficult due to excess soil moisture or water logging.
Irrigation	In rainy season, irrigation is not required as islands receive plenty of rains every month from May to November. But during dry season, irrigate the crop at 3 to 4 days at vegetative stage while 2 to 3 days interval at flowering and fruiting stage. Delay in irrigation hampers fruit yield and quality drastically. Irrigation can be done in furrow lines if sufficient water is available other-wise alternate furrow irrigation method can be adopted. In this, one furrow is irrigated and next to this, is not irrigation than again furrow is irrigated. This will help to save crop particularly when water become a limiting factor but rains are predicated in coming days. Moisture conservation using dry grass mulch helps in conservation of soil moisture and reduces weed infestation. Now-a-days, drip irrigation is also promoted in vegetables including okra for which raised beds and double row system is ideal.
Intercultural operations	Weeding and hoeing at 10 -15 days interval is necessary. Hoeing at 30 and 45 days helps in improving soil aeration and plant growth. Remove and destroy the yellow vein mosaic infected plants from field and pest infested shoots and fruits or leaves immediately if noticed.
Manuring and nutrient management	Apply well decomposed FYM or compost @ 25 t/ha as basal dose. Prepare a Trichoderma and PGPR mix (each @ 2.5 kg /ha) in 50 kg FYM and keep it for 10-15 days in shade and apply with Pseudomonas @ 2 kg/ha as basal dose. It advisable to apply lime @500 kg/ha based on the acidity of soil 15 days before sowing to bring the pH level in favour of crop. Top dressing can be done at 10-15 days interval with any one of the following nutrient source like soil application of fresh cowdung slurry

	@ 1 kg/10 litres (50 kg/ha) or biogas slurry @ 1 kg/10 litres (50 kg/ha); cow's urine (500 litres/ha, 8 times dilution); vermiwash (500 litres/ha, 8 times dilution); vermicompost (1 t /ha) groundnut or karnja cake @ 1 kg/10 litres (50 kg/ha). The foliar spray can be given with supernatant solution of cowdung slurry/ vermiwash/cow's urine upto flowering stage.
Pest and Disease Management	The important pests are jassids, fruit and shoot borer bhindi leaf webber and root knot nematode. For jassids, use neem oil-garlic mixture (2%) or nimbicidine (2ml/litre) or econeem(2ml/litre) or uneem (2ml/litre). The use of Lemongrass suspension (10%) was found effective for controlling this pest. Remove and destroy affected shoots and fruits. Fruit and Shoot borer can be controlled by spraying neem kernel suspension (5%) or ginger suspension (10%) or neem leaf extract (4%). Use of *Trichogramma chilonis* and *Trichogramma japonicum* @1 card each/5 cents followed by *Bacillus thuringiensis* spray (Delphin/Bioasp/ Halt-0.7ml/litre) also minimize the pest incidence. Application of *Beauveria bassiana* 10% WP. The leaf webber can be managed by collecting and destroying the leaf rolls and application of *Beauveria bassiana* 10% WP. The incidence of Root knot nematode in okra is minor in uplands only and for this, if any farmer observe nodules or knot in poorly grown stunted plants than it is advisable to apply neem cake/castor cake/karanj cake @ 1 t/ha or growing of marigold (trapcrop) in between okra plants. Seed treatment with *Bacillus macerans* @ 3% w/w (2.5 kg/ha) and drenching with same bacterial formulation @ 3% solution 30 days after sowing help in nematode management. Yellow vein mosaic with the characteristic of vein clearing and vein chlorosis of leaves is a serious problem in okra. It is transmitted by whitefly and leaf hopper, so their control is essential to protect the crop from YVMV. For this, spray neemoil-garlic mixture (2%) or nimbicidine or econeem or uneem (2ml/litre). Use of disease resistant varieties (Arka Anamika, Arka Abhay, HOK-152, Shakti).
Harvesting	Start harvesting after 45 days of sowing when fruits are tender. A total number of 10-15 harvests can be made.
Yield	80-100 quintals/ha

Cauliflower

(*Brassica oleracea* var. *botrytis*)

Season	Open cultivation in Dry season (Dec. – April) and Rain shelter cultivation in rainy season (May-Nov.)
Variety	White Marble, White Shot, Best Early, Early Kunwari, Pusa Meghna
Soil	Well drained organically rich sandy loam soils, light soils hasten maturity
Sowing time	Staggered sowing at monthly interval is advisable. Dry season crop: November to January months Rainy season crop: May to September months
Seed rate	400 - 450 g /ha; 10 beds of 7 m length x 1 m width for one hectare area
Nursery management	Select well drained open space. Make the soil fine tilth and mix 10 kg FYM or 5 kg vermicompost per square meter. Raise beds (1 m width and 5-7 m length) to 20 -30 cm with proper drainage facility. Seedlings can be produced in Pro-trays. Ensure seed treatment with Pseudomonas or Trichoderma @10g/kg of seed. The solution can be used to drench the nursery bed. Sowing should be done in 5 cm apart lines and at a depth of 1 - 2 cm. The lines should be closed with fine FYM. After sowing the seed, cover beds with dry grass or rice straw till germination for rapid and good germination. Regular watering, drainage and disease - pest management should be done. Keep the nursery protection shelter in 'ready to use mode' to avoid damage from heavy rains. Irrigate nursery on alternate day during last week for hardening of seedlings. The seedlings from the 'Pro-tray' techniques give higher recovery of healthy plants, show better field establishment and early production of seedlings. For this, the pro-trays should be filled with a mixture of cocopith and vermicompost in 1:1 ratio. One seeds should be placed in each plug. Keep the tray in a partial shade and rain protected condition during initial 2-3 days for early germination. Later, place the tray in a partial shade condition and provide regular watering. Apply vermiwash solution after 15 days of sowing. Provide Insect Proof Net to protect from pest and rainshelter from heavy rains. The nursery hardening can be done by regulating water supply during last week of the nursery.

Spacing	Single row: 50 cm X 30-40 cm; Double row bed system: 60 cm (40 cm x 30 cm) + 50 cm (between beds)
Transplanting	Transplant the seedlings of the age of 4-5 weeks old on raised beds. For this, prepare the raised bed of 80 cm width and 15-20 cm height. The length of the bed can be kept as per the convenience of field slope and irrigation facility. After making beds, make small pit using *Khurpi* at prescribed distance and apply small quantity of FYM + vermicompost mixture for better field establishment of seedlings. Provide small quantity of water in the pits if field appear to be dry before transplanting. It prevents rood damage by the soil heat. The seedlings should be planted in the pit in evening hours. Ensure proper watering after planting.
Irrigation	Cauliflower is a shallow-rooted and high water requirement crop. The critical stage of cauliflower for irrigation is throughout the whole vegetation period. It is affected by micronutrient imbalance in soil or factors like moisture availability which affect their absorption. Avoid excess or less irrigation which is not good for curd development and its quality. Therefore, frequent irrigation needed in initial days, later on it can be done at 2-3 days interval. Furrow or drip irrigation is better. Curd initiation and crud development stages are important when plant should be given adequate irrigation. Mulching with plastic, dry grass, rice straw is suggested for moisture conservation and to reduce weed infestation along with better crop growth and yield.
Intercultural operations	Cauliflower is ground covering crop but need proper and frequent weeding during initial days. For this weeding and hoeing should be done at 10-15 days interval. Avoid damage to leaves during field activities. Foliar spray of panchagavyam or vermiwash at fortnightly intervals increases the growth and crop yield. During late dry season crop, it is seen that tying of the leaves around the curds favour curd quality and protect it from yellowing.
Manuring and nutrient management	Apply 30 tonnes FYM/ha and lime @ 300-500 kg/ha during first ploughing. Also apply 2-3 t/ha vermicompost in basin after 30 days of sowing. In addition, also apply any of the following combination as supplement: FYM / Cowdung @ 2 t/ha + Rock phosphate 100 kg/ha or Compost @ 4 t/ha + Rock phosphate 70 kg/ha or Vermicompost @ 2 t/ha + Rock phosphate 110 kg/ha or Greenleaf @ 3.5 t/ha + Rock phosphate 100 kg/ha or Poultry manure @ 1.5 t/ha + Rock phosphate 50 kg/ha. Otherwise, ensure soil application (7-10 days interval) of fresh cowdung slurry @ 1 kg/10 litres (50 kg/ha) or

	biogas slurry @ 1 kg/10 litres (50 kg/ha) or cow's urine 500 litres/ha (8 times dilution) or vermiwash-500 litres/ha (8 times dilution) or groundnut cake1 kg/10 litres (50 kg/ha). It should be kept in mind that the curd appearance is important market parameter for cauliflower, so all the foliar spray from cowdung or urine should be done before appearance of the curd otherwise it will affect the curd colour and ultimately its price.
Pest and Disease management	The major pests of cole crops (cauliflower, cabbage, knolkhol and brussels sprout) are leaf feeders, head borer and other sucking pests. Their incidence appears more in February-April harvesting crops than January harvesting crop. This appears due to increase in pest population processes in initial crop period. It become difficult to manage the pest once attacks the crop. The suggested management practices includes (i) Use of net house made up of UV stabilized nylon net (45 mesh) to protect crop at nursery stage; (ii) Keep the field and surroundings free from weeds which are source of pest and disease inoculum; (iii) Regular monitoring of the field destruction of insects-pests and their egg-masses by hand picking of caterpillars; (iv) Use light trap to attract and kill adults; (v) Adopt proper crop combinations like maize + cauliflower/cabbage/knolkhol but provide adequate spacing and nutrient source as both crop are heavy feeders. Mustard can be grown as trap crop for the pests and it must be destroyed completely along with pests before pest population start its movement towards main crop i.e. cauliflower, cabbage, knolkhol (vi) Apply *Bacillus thuringiensis* formulation @1 g/L or NSKE 4% spray. Alternate Bt. sero types *kurstaki* (B.t.k.) and *aizawal* (B.t.a.) (vii) Azadirachtin 0.03% 2.5-5.0 L/ha is effective against leaf eating caterpillars. For sucking pests, Neem oil 2.0 L/ha or Azadirachtin 0.03% 2.5-5.0 L/ha is effective.
Rain sheltered technology	Heavy rains are major constrain in cauliflower, cabbage and knolkhol cultivation in islands. For this, the rainshelter technology is very effective. It protects curds/heads/tubers of the crop from heavy rains and also from major pests. It is constructed using agro-shadenet on all sides and top as well. The roof top is provided with micron thickness polysheet with mechanical rolling system. The polysheet is used to cover the structure only during the rains otherwise it will increase the temperature manifold which is not suitable for these crops.
Harvesting	Curds are ready for harvest after 80 to 90 days of transplanting
Yield (q /ha)	140 – 180 depending on variety and crop season

Cabbage

(*Brassica oleracea* var. *capitata*)

Season	Open cultivation in Dry season (Dec. – April)
Variety	NS-43, Green Express, Rear Ball, Pusa Ageti
Soil	Well drained organically rich sandy loam soils, light soils hasten maturity
Sowing time	Staggered sowing at monthly interval is advisable during November to January months
Seed rate	400 - 450 g /ha; 10 beds of 7 m length x 1 m width for one hectare area
Nursery management	Select well drained open space. Make the soil fine tilth and mix 10 kg FYM or 2 kg vermicompost per square meter. Raise beds (1 m width and 5-7 m length) to 20 -30 cm with proper drainage facility. Seedlings can be produced in Pro-trays. Ensure seed treatment with Pseudomonas or Trichoderma @10g/kg of seed. Sowing should be done in 5 cm apart lines and at a depth of 1 -2 cm. The lines should be closed with fine FYM. After sowing the seed, cover beds with dry grass or rice straw till germination for rapid and good germination. Regular watering, drainage and disease - pest management should be done. Keep the nursery protection shelter in 'ready to use mode' to avoid damage from heavy rains. Irrigate nursery on alternate day during last week for hardening of seedlings.
Spacing	Single row: 40 cm X 30 cm; Double row bed system: 60 cm (40 cm x 30 cm) + 40 cm (between beds) The cabbage can be grown in roof tops, stairs, kitchen gardens in Peri-urban areas and area with problem soils.For this, use plastic bags or pots with suitable growing media (Cocopith + Vermicompost+soil), variety (Ns-43, Green Express) and conventional or pitcher or drip irrigation system.

Transplanting	Cabbage is low spread crop and fit well in the Raised bed with double row system. The width of the beds may be 70-80 cm but height should be 20 cm. Like cauliflower, the cabbage seedlings should be transplanted at the age of 4-5 weeks old. For this, make small pits using *Khurpi* at specified distance on the bed. Apply small quantity of FYM + vermicompost mixture in each pit for better field establishment of the seedlings. Provide small quantity of water in the pits if field appear to be dry before transplanting to avoid rood damage by the emitting soil heat. The seedlings should be planted in the pit in evening hours and immediately give proper water using rose cane or similar locally made arrangement.
Irrigation	The cabbage is also a shallow rooted vegetable (30-60 cm depth) and classified as high water requirement crop. The head formation and enlargement are two critical stages when adequate soil moisture is essential. It is suggested to give adequate and frequent irrigation during initial days while it can be given 2-3 days interval. However, cabbage itself act as barrier against loss of soil moisture due to its ground covering capacity but mulching with dry grass or rice straw during initial days is advisable. Furrow or drip irrigation is better.
Intercultural operations	Weeding and hoeing at 10-15 days interval are necessary. Avoid damage to leaves while field practices. Rest of the practices as suggested in cauliflower should be practiced for better growth and yield.
Manuring and nutrient management	The manure and nutrient requirement of the cabbage are approximately similar to cauliflower; therefore, the same can be adopted for cabbage cultivation. Here, the foliar spray of cowdung extract or cow urine etc can be done even after head formation but remove the upper coating of 1-2 leaves before sending to market.
Pest and Disease management	The pests are similar to the cauliflower so follow the same management practices.
Harvesting	Heads are ready for harvest after 80 to 90 days of transplanting
Yield	110 – 160 q/ha; depending on variety and crop season

Knolkhol

(*Brassica oleracea* var. *gongylodes*)

Season	Open cultivation in Dry season (Dec. – March)
Variety	Super Star, White Vienna, Early White Vienna
Soil	Well drained organically rich sandy loam soils, light soils hasten maturity
Sowing time	Staggered sowing at 10-15 days interval is advisable during November to January months
Seed rate	600 - 800 g /ha; 15 beds of 7 m length x 1 m width for one hectare area
Nursery management	Select well drained open space. Make the soil fine tilth and mix 10 kg FYM or 5 kg vermicompost per square meter. Raise beds (1 m width and 5-7 m length) to 20 -30 cm with proper drainage facility. Seedlings can be produced in Pro-trays. Ensure seed and nursery treatment with Pseudomonas and Trichoderma @ 10 g/kg of seed and 5-10 g/litre of water, respectively. Sowing should be done in 5 cm apart lines and at a depth of 1 -2 cm. The lines should be closed with fine FYM. After sowing the seed, cover beds with dry grass or rice straw till germination for rapid and good germination. Regular watering, drainage and disease - pest management should be done. Keep the nursery protection shelter in 'ready to use mode' to avoid damage from heavy rains. Irrigate nursery on alternate day during last week for proper hardening of seedlings.
Spacing	Single row: 30 -40 cm X 20-25 cm Double row bed system: 60 cm (40 cm x 25 cm) + 40 cm (between beds) Using the Potted knolkhol technology, it can be grown in roof tops, stairs, kitchen gardens and area with problem soils. It provides bags with suitable growing media (Cocopith + Vermicompost+soil), variety (Super Star) and pitcher or drip irrigation system.

Transplanting	Transplant 4-5 weeks old seedlings on raised beds. Make 8-10 cm pit at prescribed distance and apply mixture of FYM and Vermicompost in the pits. Seedlings should be planted in pit in evening hours. Give water immediate after planting for better field establishment. Always clean the furrows from weeds.
Irrigation	Frequent irrigation needed in initial days, later on it can be done at 3 days interval. Avoid excess or less irrigation situation. During tuber formation stage is important when change is soil moisture regime affect the tubers and ultimately crop yield. Furrow or drip irrigation is better for efficient use of water and labour. Mulching with plastic, dry grass, rice straw is suggested for good quality knobs.
Intercultural operations	Weeding at 10-15 days interval is necessary. Avoid damage to leaves and roots while field practices.
Manuring	The soil should have adequate quantity of the organic matter for proper tuber formation. It suggested to apply 30 tonnes FYM/ha and lime @ 300-500 kg/ha and mix in the soil at the time of first ploughing. In addition, also apply any of the following combination as supplement: FYM / Cowdung @ 2 t/ha + Rock phosphate 100 kg/ha or Compost @ 4 t/ha + Rock phosphate 70 kg/ha or Vermicompost @ 2 t/ha + Rock phosphate 110 kg/ha or Greenleaf @ 3.5 t/ha + Rock phosphate 100 kg/ha or Poultry manure @ 1.5 t/ha + Rock phosphate 50 kg/ha. Otherwise, ensure soil application (7-10 days interval) of fresh cowdung slurry @ 1 kg/10 litres (50 kg/ha) or biogas slurry @ 1 kg/10 litres (50 kg/ha) or cow's urine 500 litres/ha (8 times dilution) or vermiwash-500 litres/ha (8 times dilution) or groundnut cake1 kg/10 litres (50 kg/ha).
Disease and its control	The pests are similar to the cauliflower so follow the same management practices. The tuber splitting is common in unregulated irrigation condition, therefore, follow the raised bed technique and give adequate irrigation only particularly during tuber development stage.
Harvesting	Knobs or tubers are ready for harvest after 50 to 60 days of transplanting when they attain 6-8 cm size.
Yield	100 – 130 q/ha; depending on variety and crop season

Cucurbits: Bitter gourd, cucumber, ridge & sponge gourd, bottle gourd, pumpkin, Ash gourd watermelon, Muskmelon, kakrol, pointed gourd,

Season	Suitable for round the year cultivation Main crop Season: December – April (dry season crop)			
Variety	Bottle gourd : Pusa Naveen, Arka Bahar, Pusa Sandesh Bitter gourd : Pusa Do Mausami, Arka Harit, Pusa Vishesh, CO-1, Sponge gourd: Pusa Supriya, Pusa Chikni, Hybrids Ridge gourd : Pusa Nasdar, CO-1, CO-2, Arka Sumeet, Arka Sujat Cucumber : Japanese Green Long, Priya, Pusa Sanyog Snake gourd : Coimbatore Long CO-1, CO-3, CO-4 Ash gourd : CO-1, CO-2, Local Pumpkin : Arka Suryamukhi, Arka Chandan, CO-1, CO-2, Pusa Vikas Watermelon : Arka Jyoti, Pusa Bedana, Arka Manik Muskmelon : Pusa Rasraj, Hara Madhu, Arka Rajhans, Arka Jeet Kakrol : CARI- Kakrol, Local types Parwal : Local types			
Soil	Well drained deep and rich to medium in nutrient soils are ideal.			
Sowing time	May- June for rainy season crop), December –January (Main dry season crop)			
Seed rate and Spacing	Crop	Seed (kg/ha)	Row to Row(m)	Pit to pit (m)
	Bitter gourd	7.5- 8.0	1.5-2.5	0.60-1.0
	Bottle gourd	4.0	2.0-3.0	1.0-1.2
	Cucumber	3.0	1.5-2.0	0.60-1.0
	Sponge gourd	4.0	1.5-2.5	0.6-1.0
	Ridge gourd	4.0	1.5-2.5	0.6-1.0
	Snake gourd	4.0	2.5-3.0	0.6-1.0
	Wax gourd	7.50	2.5-3.0	0.6-1.2
	Muskmelon	2.5-3.0	1.5-2.5	0.6-1.0
	Watermelon	3.5-5.0	2.5-3.0	0.9-1.2

Planting system	Dioceous cucurbits like kakrol and parwal are planted in 9:1 system. Here, after nine (9) rows of female plants one (1) row of male plant was planted as pollen source. The artificial pollination should be done for fruit setting. This can be done by pollen brush, spray or flower touch method.
Sowing	Grown as direct seeded crop. Sow the seeds at recommended spacing by making small hill or basins on raised beds. Three to four seeds should be at one basin or hill. After sowing the basin or hill should be covered with banana or arecanut or coconut or dry grass for better germination of the seeds. This helps in conserving moisture and protection of germinating seeds from extreme heat strokes. The cucurbits can be grown in problematic soils by making small basins or raised hills of 30 x 30 x 30 cm size. It should be encircled and provided mulch with coconut husk which keep moisture in favour of crop and also keep the hill intact even in heavy rains. Provide proper drainage to all the basin or hills otherwise water logging or water stagnation during heavy rains damage vines or plants.
Nursery and Transplanting	It is suggested to grow cucurbits by seedling method during contingency situations. For this the 'Pro-trays' technique is ideal. The seedlings with root ball should be planted at prescribed spacing level on raised hills or basins.
Irrigation	During dry season, irrigate the crop at 4 to 5 days at vegetative stage while 3 to 4 days interval at flowering and fruiting stage.
Training and pruning	Support system of bamboo-sticks or *pandal* system should be provided for high yield and fruit quality. It protects vines from losses due to water stagnation. Bed-wise *pandal* is easy to prepare and manage the crop. For bittergourd, snakegourd, littlegourd and ridgegourd, erect pandals when the plants start vining while for cucumber, watermelon, bottlegourd, pumpkin and ashgourd, spread dried twigs on the ground for trailing.
Intercultural operations	Weeding and hoeing at 10 -15 days interval is necessary. Remove diseased/pest infected leaves from field. Earthing up is to be done during rainy season. Provide mulch in the field throughout the crop growth period with materials like green leaves, plant residues, decomposed coir pith, coconut husk, straw etc.
Manuring and nutrient management	Well rotten FYM or other organic manure (12 t/ha) is mixed with topsoil in the pit and seeds are sown at the rate of 4-5 per pit. For Littlegourd plant stem cuttings with 3-4 nodes from female plants @ 2-3 cuttings/pit. Unhealthy plants are removed after two weeks and only 3 plants are retained per pit.. The FYM should be provided in the hills or basins for efficient use of the nutrients. Manures are applied in 2 equal splits at winding and flowering

	stage. Apply fresh cow dung slurry @ 1 kg/litre of water at fortnightly intervals starting from flowering. Foliar spray can be given with cowdung slurry/ vermiwash/ cow's urine as suggested for other vegetables.
Disease and Pest Management	**For Fruit fly *(Bactrocera cucurbitae*) the suggested measures are:** 1. Cover the fruits with paper bags or plastic bags at very small stage. 2. Remove and destroy infested fruits. 3. Apply neem cake 250 kg / ha (100g / pit) at planting and one month later. 4. Use any of the following fruit fly traps • Fish meal trap – Place 5 g dry fish in coconut shell, moisten and add 0.5 g Furadan. Put coconut shell inside a polythene cover. Make holes on the cover above shell and hang the cover from 'pandal' (trellis). • Fruit fly trap can also be made by taking 20 g banana pulp in a coconut shell and beer 3 ml and 3 drops of palm oil. • Trap adult fruit flies using cue lure plywood blocks containing 6:4:1 mixture of ethyl alcohol : cue lure : Malathion. Re set traps at four months interval. Hang plywood blocks with pheromone (Clue Lure) @10 nos./ha • Trap adult fruit flies using food baits. Make a pulp of 20 g banana,10 g jaggery and 5 g furadan in 100 ml water + jaggery heated to 80°C at 2.5m spacing. Change traps after 3 weeks. Red banana, Robusta, Njalipoovan and Palayankodan fruits can be used. • Set yellow painted coconut shell traps containing carbofuran smeared banana pieces (Palayankodan) at 2 m spacing at the start of flowering till final harvest. The traps are to be replenished once in seven days. 4. Apply *Beauveria bassiana* 10% WP and *Paecilomyces lilacinus* 5% WP 5. Spraying of leaf extract of *Ailanthus* 10 % and cashew 10% in combination is effective against fruit fly in bitter gourd. **Red pumpkin beetle** It is a serious problem in cucurbits like bottle gourd. The larvae and adults were most active at temperature between 27 to 32°C which is prevalent in island condition. Use of cow dung and fly ash followed by red chilli powder (50 %) is effective. Use of neem seed kernel extract and neem oil were also equally good.

Aphids, Green Jassid, White fly and Mites

1. Spray 2% neem oil + garlic emulsion spray.
2. Dissolve 60g soap in 150 ml warm water, add soap solution to neem oil and castor oil slowly and mix well. Dilute with 6 litres of water. Add 120 g garlic paste. Take the extract and spray. 3. Apply 1.5% fish oil soap.
4. For preventing mites, plant hoppers and jassids, apply 10% magnesium sulphate on leaves, which will provide strength for plants

Epilachna beetle

1. Remove and destroy egg masses, grubs and adults occurring on leaves.
2. Use predator (*Chrysocaries johnsoni*) on larvae and pupae.
3. Apply *Beauveria bassiana* 10% WP and *Paecilomyces lilacinus* 5% WP
4. Spray leaf extract of *Ailanthus* and cashew (10%).
5. Neem oil + garlic emulsion spray (2%).

Mosaic: Uprooting and destruction of affected plants and collateral hosts should be done.Spray neem based insecticide (2%) to control the vectors.

Powdery mildew, downy mildew, anthracnose and fusarium wilt:

Regular spray of Pseudomonas @ 10g/litre and Tricoderma @ 10 g/litre from 30 days old crop to protect the crop from fungal bacterial disease.

Yield

Crop	Day to harvest after sowing	Potential Yield	Avg. Productivity (t/ha)
Bitter gourd	55-100	12-15 t/ha	3.3
Bottle gourd	60-100	15-20 t/ha	8.8
Cucumber	60-70	15-20 t/ha	5.0
Sponge gourd	60-90	8-12 t/ha	6.0
Ridge gourd	55-80	8-12 t/ha	4.5
Snake gourd	60-70	8-10 t/ha	6.0
Wax gourd	60-80	10-15 t/ha	8.0
Muskmelon	100-110	12-25 t/ha	4.0
Watermelon	110-120	30-40 t/ha	7.2

Cowpea

(***Vigna unguiculata*** **subsp.** ***Sesquipedalis***)

Season	Suitable for round the year cultivation but main crop season in islands is May- August for rainy season crop and December – April (dry season crop).
Variety	**Bush type:** Pusa Phalguni, Pusa Do Fasali, Pusa Barsati, Pusa Komal, Arka Suman, Kashi Shyamal, Kashi Kanchan, Kashi Unnati **Pole type** -Arka Sumangal, Arka Garima, Yard long bean (Local)
Soil	It can be grown in all types of soil. It does not thrive well in highly acidic or alkaline soil. Favourable range of soil pH is between6.0-7.5.
Sowing time	Dry season: December – March; one month interval for regular supply Rainy season: May- June or rain-free weeks during September month
Seed rate	Bush type – 20 – 25 kg/ha Pole type – 10 - 12kg/ha
Soil preparation	The soil is prepared by ploughing 2 to 3 times and then levelling by planking. Raised beds and double row system should be practiced for higher yield and less labour requirement. In island conditions, the raised bed with double row system is more suitable. In this system, the beds are made of 60-70 cm (for bush type) to 75-100 cm (pole type) width and 15-20 cm height. The furrow between two bed should be 50-60 cm.
Sowing and seed treatment	Cowpea seeds should be inoculated with Rhizobium . The content of each packet of Rhizobium inoculum is sufficient for seeds to be sown in the area indicated in the packet (250 to 375 g/ ha). Use the inoculant only for the specific leguminous crop mentioned on packet before the expiry date. Do not expose the Rhizobium culture to direct sunlight or heat. Mix the inoculant uniformly with the seeds by using minimum quantity of either 2.5% starch solution or '*kanjivellam* in order to ensure better stickiness of the inoculant with the seed. Take care to avoid damage to the seed coat. Dry the inoculated seed under shade over a clean paper or gunny bag and sow immediately. The Rhizobium culture or the inoculated seeds should not be mixed with chemical fertilizers. Vermicompost can also be used for coating seeds.

Spacing	Bush type - 10 – 15 cm distance on the ridges at 50 – 60 cm apart. Pole type –Prepare 80 – 90 cm beds at 50 cm apart. Sowing should be done in row in rows at 60 cm apart and seed to seed distance should be 20 – 25 cm. Raised bed with double rows is better option for islands. Pole type varieties can be sown in pits (@ 3-4 plants / pit) at 1.0 m x 50-75 cm apart for training plants on cross pattern of bamboo sticks.
Irrigation	During rainy season no irrigation is required, whereas during summer season irrigations at 5 – 7 days interval is must. Irrigation must be given only in furrows only.
Intercultural operations	Remove weeds by hands and if necessary use *Kudali* for tilling the soil on the beds for better aeration and crop growth. Provide bamboo or thread support to pole type for better growth and pod yield.
Manuring and nutrient management	Apply 20 – 25 tonnes FYM/ha during first ploughing. Also apply 2 t/ha vermicompost in basin after 30 days of sowing. Also apply lime @ 250 kg/ha at the time of the first ploughing. In addition, also apply any of the following combination as supplement: FYM / Cowdung @ 2 t/ha + Rock phosphate 100 kg/ha or Compost @ 4 t/ha + Rock phosphate 70 kg/ha or Vermicompost @ 2 t/ha + Rock phosphate 110 kg/ha or Greenleaf @ 3.5 t/ha + Rock phosphate 100 kg/ha or Poultry manure @ 1.5 t/ha + Rock phosphate 50 kg/ha. It is observed the quantity of Rock phosphate can be reduced to 50% by priming it with the manures and the entire quantity of rock phosphate should be applied as basal dose). The additional organic manures should be applied in splits at fortnightly interval. Foliar spray of panchagavyam or vermiwash at 15 days intervals increases yield.
Pest and Disease Management	The Pea aphid (*Aphis craccivora*) affects cowpea and it can be controlled by spraying Neemazal T/S 1% @ 2 ml / litre at fortnightly intervals. The fungus *Fusarium pallidoroseum* can also be used for controlling pea aphid. Bran based fungus can be applied @ 3 kg per 400 ml immediately after infestation is observed. Only one application is necessary. *Hyptis suaveolens* extract (1 litre) + 60 g soap (in ½ litre water), dilute the mixture 10 times and spray. Besides, spray leaf extract of *Strychnos nuxvomica* + soap. Dilute with water and spray is also effective. It is advised to spray neem seed kernel extract 5% for management of jassids anmd white flies. The serpentine leaf miner also affect cowpea and it can be controlled by adopting measures like destruction of the weeds around the crop, use of need based application of neem oil, marotti oil or illupai oil @2.5 %.

	For pod borers, it is suggested to spray diluted cow's urine + asafoetida + bird chilli extract; apply neem cake @ 250 kg/ha at flowering and neem seed kernel extract 5% at 10-15 days regular interval. Red spider mite can be controlled with application of neem oil 5% / neem oil -garlic emulsion 2% or garlic emulsion 2% or fish oil soap @ 2.5%. Soil borne diseases and nematodes: Follow soil solarisation using black colour polythene sheets. Cover the soil with these sheets in sunny summer days after slightly moistening the soil during March to April months or even September – October months. The soil temperature will reach as high as 52°C. Continue the polymulch for 1 week during which the soil temperature will rise and kill the soil borne fungi, bacteria, nematodes and weeds near the soil surface and thereby reduce the soil inoculum load. Soil drenching with 1% Bordeaux mixture or 2% Pseudomonas protects the crop form fungal diseases. To protect the crop from losses by fusarium wilt (*Fusarium oxysporum*) it is advised to burn trashes in the pit before sowing. Remove and burn the affected plants along with the root system. Seed treatment with *Trichoderma viride* @2 g/ kg seed + soil application of 2.5 kg/ha at 30 DAS coupled with soil application of neem cake @150 kg/ ha at the time of land preparation reduce the incidence of *Fusarium* wilt.Drenching with 2 % *Pseudomonas*. Collar rot and web blight (*Rhizoctonia solani)* may also occur in some areas for which suggested to use neem cake @ 250 kg/ha and organic manure enriched with *Trichoderma viride* and drench with 2% *Pseudomonas*. Further, also maintain field clean and reduce soil moisture. Dry root rot is a problem in cowpea and to treat it is advised to follow the seed treatment with *Trichoderma viridae*@ 4g/kg, *Pseudomonas fluorescens* @10g/kg or soil application of neem cake @ 250kg/ ha. Soil drenching with 2 % (20 g litre) *Pseudomonas*. Besides, Spray 1% Bordeaux mixture to protect the crop form fungal diseases and also avoid the entry of white flies which transmit the various viral diseases.
Harvesting	Harvesting should be done at 3 – 4 days interval for getting good quality tender green pods. Bushy cultivars gives 4 – 5 pickings while from the climbing type cultivars 8 – 9 pickings can be harvested.
Yield	Bush type – 50 – 60 q/ha; Pole type – 80 – 100 q/ha

Dolichos bean

(Dolichos lablab)

Season	Suitable for round the year cultivation Main crop Season: December – April (dry season crop)
Variety	Bush type: Arka Jay, Arka Vijay, Arka Amogh, Arka Sambhram, Arka Soumya, Kashi Harittima Pole type: Pusa Early Prolific, Swarna Utkrisht, Hima,
Soil	Light sandy loam to clay soils
Sowing time	Rainy season- July – September Dry season – December - January
Seed rate	Bush type 50-60 kg /ha Pole type- 20-25 kg/ha Seeds should be inoculated with Rhizobium and pelleted with lime as described for cowpea. Application of AMF/Phosphorus solubilising micro-organisms @1g per plant at the time of sowing increases the P availability.
Soil preparation	The soil is prepared by ploughing 2 to 3 times and then levelling by planking. Raised beds and double row system should be practiced for higher yield and less labour requirement. The raised bed with double row system is more suitable in islands. The beds are made of width of 60-70 cm (for bush type) to 1 meter (pole type) and 15-20 cm height. The furrow between two beds should be 50-60 cm for bush type and 1-1.5 meter for pole type.
Spacing and sowing	Bush type: 15-20 cm distance on the ridges at 50 – 60 cm apart. Pole type: 1 –1.5 meter apart rows and plant to plant distance around 50-75 cm.

Irrigation	During rainy season no irrigation is required, whereas during summer season irrigations at 5 – 7 days interval is must. Irrigation must be given only in furrows only.
Intercultural operations	Remove weeds by hands and if necessary use *Kudali* for tilling the soil for better aeration and crop growth. Provide bamboo or thread support to pole type dolishos bean for better growth and high yield of good quality green pods. After top dressing of suggested nutrient sources in root zone, it is better to scrap the soil from the furrow and use it for earthling up on the beds. It will give support to the plants as well increase the height of the bed to protect from water logging. Foliar application of growth promoters like panchagavyam or vermiwash at fortnightly intervals increases marketable yield. Pruning excessive vegetative growth is advantageous for increased flowering and fruiting.
Manuring and nutrient management	20-25 tones FYM/ha should be applied at the time of first ploughing. In some reason, the Island soils are acidic in reaction therefore, lime should be applied @ 500 kg/ha along with FYM. Besides, also apply any one of the following combinations as supplement like FYM / Cowdung @ 4 t / ha + Ash125 kg / ha + Rock phosphate 300 kg / ha; Compost 8 t / ha + Ash 100 kg / ha +Rock phosphate 200 kg / ha; Vermicompost 4 t / ha + Ash 100 kg / ha + Rock phosphate 300 kg / ha; Greenleaf 7 t / ha + Ash 100 kg / ha + Rock phosphate 300 kg / ha; Poultry manure 3 t / ha + Ash 200 kg / ha + Rock phosphate 150 kg / ha (Note: The additional organic manures may be applied in several splits at 10-14 days interval. Quantity of Rock phosphate can be reduced to 50% by priming it with the manures).
Pest and Disease management	Powdery mildew, phytophthora and rust are common diseases of dolichos bean. The control measures recommended for cowpea are effective in this crop also.
Harvesting	Crop is ready after 75 days of sowing in bush type and 3 months in pole type. Harvesting should be done at 3 – 4 days interval for getting good quality tender fully grown green pods. Bushy cultivars give 4 – 5 pickings while pole type cultivars give 8 – 10 pickings.
Yield	Bush type – 50 – 60 q/ha Pole type – 70 – 90 q/ha

Cluster bean

(*Cyamopsis tetragonoloba* L)

Importance	The cluster bean or *guar* is a very hardy vegetable crop. Its green pods are used as vegetable for cultivation under adverse soil and climatic conditions. The pods are rich source of protein, vitamin A, iron, vitamin B, and also contain vitamin C. The green tender pods are dehydrated for use in off-season or sometime preparation of traditional food items. Though, the island conditions are very favourable for its cultivation and fetch very high price in vegetable market but still it is very little known and cultivated vegetables in islands.
Season	The cluster bean is suitable for round the year cultivation but the main crop season is December – April for dry season crop and May to September for rainy season crop.
Variety	Pusa Mausami, Pusa Sadabahar, Pusa Navbahar, Sharad Bahara, Pradeshi, Local
Soil	Cluster bean can be grown in all Light sandy loam to clay soils but thrive best in well drained sandy loam soils having a pH range of 6.5-7.0. Though it can tolerate saline and moderately alkaline soils upto the pH level of 8.0 but activity of nodule forming bacteria is affected both by salinity and heavy soils. Cluster bean i a typical Climate is typical tropical vegetable crop and prefer warm climate. It can be grown in area where temperature reach upto 30-40°C, thus, it ideal crop for use as crop rotation inside the polyhosue. It prefers long-day conditions for growth and short-day conditions for flowering.
Sowing time	Rainy season- May to June Dry season – December - January

Seed rate	The seed rate for cluster bean is ranges from 10-12 kg /ha, depending upon soil health, season and variety. Seeds should be inoculated with Rhizobium and pelleted with lime as described for cowpea. Application of AMF/Phosphorus solubilising micro-organisms @1g per plant at the time of sowing increases the P availability.
Soil preparation	The soil is thoroughly prepared by 2-3 time ploughing and then levelling by planking. Raised beds and double row system should be practiced for higher yield and less labour requirement. For this, 70-80 cm width beds or 15-30 cm height are mode of convenient length. Both sides (l0 cm away from furrow) of the beds are used for sowing.
Spacing and sowing	The raised bed with double row system is more suitable in islands. The beds are made of width of 60-70 cm and 15-20 cm height. The furrow between two beds should be 50-60 cm. In single row system, 45 – 60cm x 20- 30 cm spacing is suggested for cluster bean cultivation.
Irrigation	During rainy season no irrigation is required, whereas during summer season irrigations at 5 – 7 days interval is must. Flowering and pod formation are critical stages of crop growth when proper irrigation should be given otherwise it will factor for significant yield loss. Irrigation must be given only in furrows only.
Intercultural operations	Island conditions are very much favourable for weed growth , therefore, proper and regular weeding should be done. It can be done by hand or mechanical tools, like *Kudali*, hand hoe or grass cutter etc. Hoeing at 30 and 60 days after sowing will help in proper soil aeration and crop growth. Foliar application of growth promoters like panchagavyam or vermiwash at fortnightly intervals increases marketable yield. Pruning of apical bud allow profuse branching for increased flowering and fruiting.

Manuring and nutrient management	20-25 tones FYM/ha should be applied at the time of first ploughing. In some reason, the Island soils are acidic in reaction therefore, lime should be applied @ 500 kg/ha along with FYM. Besides, also apply any one of the following combinations as supplement like FYM / Cowdung @ 4 t / ha + Ash125 kg / ha + Rock phosphate 300 kg / ha; Compost 8 t / ha + Ash 100 kg / ha +Rock phosphate 200 kg / ha; Vermicompost 4 t / ha + Ash 100 kg / ha + Rock phosphate 300 kg / ha; Greenleaf 7 t / ha + Ash 100 kg / ha + Rock phosphate 300 kg / ha; Poultry manure 3 t / ha + Ash 200 kg / ha + Rock phosphate 150 kg / ha. Use of **biofertilizer like** AMF / Phosphorus solubilising micro-organisms @1g per plant at the time of sowing increases the P availability.
Pest and Disease management	The common disease of cluster bean is wilt, bacterial blight, powdery mildew, and anthracxnose. Bacterial blight can be checked by hot water seed treatment for 10 min at 56°C. Further, spray Pseudomonas @ 5-10 g/litre at 30-40 days old crop and then at 15 days interval. This will also protect crop from fungus and other bacterial infections. The pest attack is similar to other legume vegetables like cowpea and dolichos bean so their management practices can be followed for cluster bean also.
Harvesting	The pods become ready for picking after 40-45 days of crop sowing. Regular picking can be done at 5-7 days interval. The toal duration of the crop is about 120-130 days. While harvesting do not jerk the stem by pulling pods but keep use both hands one for holding stem and other for harvesting pod.
Yield	The yield varies from 50-60 tonnes/ha of tender pods.

French bean

(Phaselous vulgaris)

Season	Suitable for round the year cultivation but heavy rains damage the bush type varieties particularly during flowering and fruiting stage. For this, rainshelters or polyhouse technology can be used as it is high value vegetables and always fetch higher price in market. The main season for the French bean cultivation is December – March months when it is grown with assured irrigation facility.
Variety	**Bush type:** Arka Komal, Arka Suvidha, Arka Anoop, Contender, Pusa Parvati, Arka Sharath, Arka Suman, Arka Bold, Kashi Param, Ooty 1, Premier, Ooty 2 **Pole type:** Kentucky wonder, Pusa Himlata, VL-Bean-12, Akoya 427
Climate and Soil	This crop requires plenty of sunshine during its early growth stages. It is a heat loving crop but high temperature is not good for its flowering and fruiting. The favourable temperature for crop growth, flowering and fruiting is 18-23°C. It grows well inside the polyhouse during heavy rainy season. Light sandy loam to clay soils, and pH ranges between 6.0 to 7.5 and acid damp soils with water logging situation are completely unsuitable for its cultivation. Therefore, lime application @ 500 kg/ ha is suggested to reduce the ill effect in upland soils.
Sowing time	Rainy season– July – September Dry season – December - January
Seed rate	Bush Varieties- 65 Kg/ha Pole varieties- 25-30 Kg/ha
Soil preparation	The soil is prepared by ploughing 2 to 3 times and then levelling by planking. Raised beds and double row system should be practiced for higher yield and less labour requirement.

Spacing	For Bush type varieties, it is recommended that the row to row spacing should be 45-60 cm and plant to plant should be 10-15 cm. The pole type varieties are often sown in hills about 90 x 30 m apart. In island conditions, the raised bed with double row system is more suitable. In this system, the beds are made of 60-70 cm (for bush type) to 75-100 cm (pole type) width and 15-20 cm height. The furrow between two bed should be 50-60 cm.
Irrigation	In dry season, frequent irrigation at 3-4 days interval is required particularly during fruiting stage. Avoid excess moisture during seed germination other-wise germination will seriously hamper. During first hoeing, the soil from the furrow should be scraped and use it for earthling up on the beds. It will give support to the plants as well increase the height of the bed to protect from water logging.
Intercultural operations	Remove weeds by hands and if necessary use Kudali for tilling the soil for better aeration and crop growth. Remove weeds by hands or mechanically.
Manuring and nutrient management	During first ploughing, apply 25-30 tones FYM/ha and lime @ 500 kg/ha. For higher yield and quality pods, it is advised to apply any one of the following combinations as supplement like FYM / Cowdung @ 4 t / ha + Ash125 kg / ha + Rock phosphate 300 kg / ha; Compost 8 t / ha + Ash 100 kg / ha +Rock phosphate 200 kg / ha; Vermicompost 4 t / ha + Ash 100 kg / ha + Rock phosphate 300 kg / ha; Greenleaf 7 t / ha + Ash 100 kg / ha + Rock phosphate 300 kg / ha; Poultry manure 3 t / ha + Ash 200 kg / ha + Rock phosphate 150 kg / ha. These organic supplements may be applied in several splits at 10-15 days interval.
Pest and Disease Management	The diseases and pest are common as given for cowpea and dolichos bean therefore, their suggested control measures will be effective in French bean.
Harvesting	First harvest will be obtained after 45 -50 days in bushy cultivars and 60 days in pole type. Three pickings in bush type and five pickings in pole type. Right time harvesting is crucial in frenchbean harvesting.
Yield	Bush Varieties- 50-60q /ha and Pole varieties-80-100q /ha

Palak *(Beta vulgaris* var. *bengalensis)*

Season	Main crop: Dry season (December – April) Protected cultivation: Rainy season (May-December)
Variety	All green, Pusa Jyoti, Pusa Bharti, Pusa Harit and Jobner Green
Soil	Though it can be grown on any kind of soil that is free from bad drainage yet sandy loam and alluvial soil are best suited for them. Acidic soil is not good for growth and yield. The pH should be in between 6.0 to 7.0. It is extremely susceptible to water logging and bad drainage.
Sowing time	Dry season: January to March any time Rainy season: Round the year
Seed rate	30 -40 kg seed per hectare
Soil preparation	The soil is prepared by ploughing 2 to 3 times and then levelling by planking. The beds and furrow are made before sowing in the field.
Spacing	Prepare beds of 30 cm wide in furrow irrigated areas or 50-80 cm wide in drip irrigated plots. Sowing should be done in lines at 20 cm apart and 5 cm distance can be maintained in multi-harvesting plots. Line sowing is more appropriate while broadcasting is most practiced in islands.
Sowing	It is advised to perform overnight soaking of seeds in water which improve the seed germination. Sowing of seeds should be done in 1-2 cm deep lines and cover the lines with vermicompost or well powdered cow dung or FYM. Maintain proper moisture in the beds for better germination.
Irrigation	Dry season crop needs frequent irrigation at 2 -3 days interval or sometimes light irrigations on alternate day for better and early harvest. Avoid water content with leaves otherwise quality will affect and disease may occur. Protected cultivation of palak performs well with drip irrigation method.
Intercultural operations	Regularly remove weeds by hands and if necessary use Khurpi, *Kudali* for tilling the soil for better aeration and crop growth. Hoeing between two rows with *Khurpi* or spade to open the soil for proper aeration. Also remove weed plants from harvested bunch of plants.

Intercropping in coconut plantations	Technology is developed for palak cultivation in coconut and arecanut plantations during dry season. Rs. 21000 per acre in two months period to the farm income or around Rs. 1 to 1.5 lakh per ha per season
Manuring and nutrient management	25-30 tonnes well decomposed FYM or compost at the time of first ploughing. Also give 3-5 tonnes of vermicompost in split doses after each cutting of polyhouse grown palak. It improves the yield and quality of leaves. Prepare a mix of Trichoderma and PGPR mix (each @ 2.5 kg /ha) in FYM and keep it for 10-15 days in shade and apply as basal dose at time of last ploughing. Poi is fast growing crop therefore, it is suggested to apply vermicompost @ 2-3 tonnes /ha along with seed sowing. It can be applied through broadcasting method (only on beds) or used to cover the palak seeds in the lines. (iii) It is suggested to apply any of available option among the (i) fresh cow dung slurry @ 1 kg/10 litres (50 kg/ha) or (ii) biogas slurry @ 1 kg/10 litres (50 kg/ha) through top dressing after 10 days of sowing when soil surface properly visible and plant did not covered it. In Multi-cut crops, it is required to apply nutrient source through foliar spray of cow's urine @ 500 litres/ha (8 times dilution) and application of vermiwash-500 litres/ha (8 times dilution). Foliar spray can be given with cowdung slurry/ vermiwash/ cow's urine after each Harvest.
Pest and Disease management	Leaf webber, leaf roller and leaf miner sometimes affect the palak crop. They can be controlled mechanically by collecting and destroying them. Dipel or Halt (0.7 ml/litre) can be sprayed for controlling leaf webber. Application of 4% leaf extract of neem, *Thevetia* or *Clerodendron* with soap water is also prescribed for pest management. Among diseases, the damping-off and leaf spot affect the yield and quality of leaves. Follow line sowing practice, avoid excess moisture and remove affected leaves immediately. Seed treatment with *Pseudomonas* @ 8 g/kg seeds and apply *Trichoderma* enriched cowdung- neem cake manure in soil.
Harvesting	Palak becomes ready for first cutting after 35 – 40 days of sowing. Only well grown succulent and tender leaves should be harvested. Palak crop give 4 -6 cuttings. Two to three days before harvesting, sprinkle good quality water to the crops which wash away the soil and residuals of nutrient sources and make leaves attractive. After harvesting, leaves are tied in bundles and sent for marketing. Uprooting method should be used only in contingency situation.
Yield	18-28 tonnes per ha with multi-cutting and 8- 10 tonnes per ha with single harvest.

Poi or India Spinach

(*Basella alba* or *B. Rubra*)

Season	Poi grows well in hot and humid climates. So its round the year cultivation is possible in islands.
Variety	CARI Poi Selection, CARI Poi Red, Local types
Soil	It can grown in wide range of soils with sandy loam to clay soils but well drained, rich in organic matter with pH range of 6.0-7.0 are ideal for poi cultivation.
Sowing time	In island conditions, it can be cultivated during round the year but December-January and May-June are preferred months for planting of dry season and rainy season crops for multi-harvesting. However, it can be sown in any time for single harvest crop but require adequate irrigation water also proper drainage.
Seed rate	Direct sowing in broadcasting method is 12-15 kg/ha and Line sowing the seed requirement is 8-10 kg/ha. For transplanting method the seed requirement is around 3-4 kg seeds for one hectare.
Nursery preparation	Fresh healthy seeds should be sown in well prepared and 15-20 cm raised beds. Line sowing is better than broadcasting. Seed depth should be around 2 cm. Cover the nursery with dry grass till germination. The pro-tray technique is found effective for raising the seedlings. For this, fill the pro-tray with cocopith + vermicompost (1:1 ratio) and place one seed per plug. Spray vermiwash for getting healthy seedlings. Seedlings are ready for planting at 3 weeks age. It practiced when the preparation of main plot is taking time or in a situation of shortage of water, labour etc.
Soil preparation	The field should be well prepared by 2-3 ploughing and mixing 10-15 tonnes of farm yard manure (FYM) 15-20 days before transplanting or sowing.
Spacing	For single harvest crop (30 x 10 cm) and for multi-harvest crop (60 x 30 cm) is suggested. The raised bed (15-20 cm) of 60 cm width and with furrow of 40 cm is prepared and two lines of poi are grown on each bed.
Transplanting	Three weeks old seedlings or mature vine cutting (with 2-3 internodes) should be transplanted in well prepared bed in the evening hours.

Training/ Stalking	The bamboo sticks, wire nets, or wood sticks are provided to train the plants at 1 month after sowing. This helps in production of superior quality, succulent and attractive leaves which are also free from soil particles. It is most suited method for poi cultivation in rainshelters for non-traditional consumers.
Irrigation	It should be given at regular intervals of 2-3 days. Sprinkling or furrow irrigation is common for poi cultivation in islands. Drip irrigation with bed system is also suggested for water saving and higher yield of quality leaves.
Intercultural operations	Regular weeding should be done from 10-15 days after sowing. Also remove weed plants from harvested bunch of plants. Hoeing between two rows with *Khurpi* or spade to open the soil for proper aeration.
Manuring and nutrient management	Apply basal dose of FYM @ 20-25 tonnes/ha during first ploughing. Prepare a mix of Trichoderma and PGPR mix (each @ 2.5 kg /ha) in FYM and keep it for 10-15 days in shade and apply as basal dose at time of last ploughing. Poi is fast growing crop therefore, it is suggested to apply vermicompost @ 2-3 tonnes /ha along with seed sowing. It can be applied through broadcasting method (only on beds) or used to cover the poi seeds in the lines. (iii) It is suggested to apply any of available option among the (i) fresh cow dung slurry @ 1 kg/10 litres (50 kg/ha) or (ii) biogas slurry @ 1 kg/10 litres (50 kg/ha) through top dressing after 10 days of sowing when soil surface properly visible and plant did not covered it. In Multi-cut crops, it is required to apply nutrient source through foliar spray of cow's urine @ 500 litre/ha (8 times dilution) and application of vermiwash-500 litres/ha (8 times dilution). Foliar spray can be given with cowdung slurry/ vermiwash/ cow's urine after each Harvest.
Pest and Disease Management	Leaf miners, cutworms and root-knot nematode damage poi crop. The damage can be minimized by the use of nylon net (32-45 mesh), removal of infested leaves, hand-picking of cut-worms, use of neem cake, soil solarization with black plastic mulch during March-April months.
Harvesting	Two to three days before harvesting sprinkle good quality water to the crops which wash away the soil and residuals of nutrient sources and make leaves attractive. First harvest is done after 35-40 days of transplanting by cutting the shoots from 15-20 cm height. In double row system, the first harvesting should be done after 45-50 days of sowing by cutting shoots at 10 -15 cm above ground and leaving 2-4 leaves.
Yield	150-200 quintals/ha for single harvest and 54-60 t/ha with multi-harvesting

Amaranthus

(*Amranthus spp.*)

Season	It is a warm season crop adapted to the conditions of hot, humid tropics. Amaranthus can be grown round the year in different growing conditions but grow well in rainy season.
Variety	CARI AMA-Green, CARI- AMA-Red, Arka Suguna, Pusa Kiran, Pusa Kirti, Pusa Lal Chauai, CO 1, CO 2, CO 3.
Soil	Well drained organically rich and fertile loamy soil.
Sowing time	It can be grown round the year in staggered planting. But avoid the heavy rains or excess dry days. Direct sowing is common practice.
Seed rate	1.5- 2.0 Kg/ha for direct sowing.
Soil preparation	The soil is prepared by ploughing 2 to 3 times and then levelling by planking. Raised beds are suggested for rainy season cultivation of amaranths.
Spacing	Broadcast method is common for single harvesting. Line sowing by seed drilling in lines at 15-20 cm distance. Maintain 5 cm distance between two plants by thinning operation. For sowing, it is better to sand or powdered FYM to maintain proper spacing by regulating the slippage of small and smooth seeds. Line sowing is ideal for weeding and intercultural operations for multi-harvesting.
Irrigation	If required give pre-sowing irrigation, if the soil is not moist enough. In rainy season, no need of irrigation while during dry season it should be essentially done at regular intervals of 1-2 days. Delayed or improper irrigation leads to drastic reduction in leaf quality and yield. Sprinkling or furrow irrigation is common for amaranthus cultivation in islands.
Intercultural	Hand weeding is a common practice. Weeding should be done 7-10 days

operations	after sowing and again before harvesting to avoid weeds in harvested bunch of plants.
Intercropping with other crops	It grows well as intercrop in any of the plantations like coconut, arecanut, fruit crops and maize, brinjal, chilli and cucurbits and on bunds of ponds as a component of integrated farming system.
Manuring and nutrient management	In organic farming, nutrients should be applied as (i) basal dose of FYM @ 20-25 tonnes/ha (ii) prepare Trichoderma and PGPR mix (each @ 2.5 kg /ha) in FYM and keep it for 10-15 days in shade and apply as basal dose. If available also apply vermicompost @ 1 t /ha along with seed sowing practice (iii) It is suggested to practice top dressing of fresh cow dung slurry @ 1 kg/10 litres (50 kg/ha) or biogas slurry @ 1 kg/10 litres (50 kg/ha soil application. (iv) Foliar spray of cow's urine @ 500 litres/ha (8 times dilution) and application of vermiwash-500 litres/ha (8 times dilution). Foliar spray can be given with cowdung slurry/ vermiwash/ cow's urine after each Harvest.
Pest and Disease Management	Amaranthus is very short duration crop and rarely face severe infestation of pests and diseases. However, leaf webber and leaf roller occurrence can be controlled mechanically by collecting and destroying them. Dipel or Halt (0.7 ml/litre) can be sprayed for controlling leaf webber. Application of 4% leaf extract of neem, Thevetia or Clerodendron with soap water is also prescribed for pest management. Leaf spot is common disease and it can be controlled to a certain extent through an integrated approach like growing leafspot resistant varieties like Co-1; seed treatment with *Pseudomonas* @ 8 g/kg of seed; soil application of *Trichoderma* enriched cowdung- neem cake manure; removing diseases leaves as and when appears to reduce the inoculum load; and spray a clear filtrate from one kg of fresh cowdung in 10 litres of water at regular intervals.
Harvesting	First cutting can be obtained in 3-4 weeks after sowing, and subsequent cuttings are made at weekly intervals.
Yield	65-90 q/ha with single harvest to 140-150 q/ha with 3-4 harvests.

Radish

(*Raphanus sativus*)

Season	It is a cool season crop and roots develop best flavour, texture and size at cooler temperature range of 10-15^{0}C.
Variety	Pusa Chetki, Japanese white, Punjab Safed, CO 1, Arka Nishant, Chinese Pink Pusa Desi, Pusa Reshmi
Soil	Light friable loam soil is found to be the best.
Sowing time	December onward to February
Seed rate	9-12 Kg/ha
Soil preparation	The soil is prepared by ploughing 2 to 3 times and then levelling by planking
Spacing	Spacing of 30 - 45 cm from row to row and 6-8 cm between plants. It grows well as intercrop in any of the plantations like coconut, arecanut, fruit crops and maize, brinjal, chilli and cucurbits. Therefore, suitable crop combinations can be planned for increasing the land productivity.
Irrigation	Keep soil moist till in initial crop days for better germination and crop establishment. After that regular irrigation at 2-3 days interval during December to January grown crop and alternate day in February to March grown crop. Appropriate moisture is required during root development.
Intercultural operations	The plants should be thinned to require spacing as soon as the seedlings established. Initially weed free condition favour fast crop growth while and weeding at later stage help in better quality of leaf and root harvest.

Intercropping with other crops	It grows well as intercrop in any of the plantations like coconut, arecanut, fruit crops and maize, brinjal, chilli and cucurbits and on bunds of ponds as a component of integrated farming system.
Manuring and nutrient management	About 25-30 tonnes of well rotten FYM should be mixed with soil during field preparation at least 15 days before sowing. Apply vermicompost @3-4 t/ha as basal dose during last ploughing of the field or beds.
Pest and Disease Management	Radish is attacked by leaf webber and leaf roller which can be controlled mechanically by collecting and destroying them. Use of Dipel or Halt (0.7 ml/litre) by spraying at regular interval control them. Application of 4% leaf extract of Neem, *Thevetia* or *Clerodendron* with soap water is also prescribed for pest management. Damping off caused by fungus *Rhizoctonia solani* is a soil borne soil disease. Therefore, soil solarisation using black plastic mulch should be done. Use of *Pseudomonas* @ 8 g/kg for seed treatment or application of *Trichoderma* (5-10 g/kg) enriched cowdung- neem cake manure and removal of diseases leaves reduce the incidence. Spray a clear filtrate from one kg of fresh cowdung in 10 litres of water at regular intervals is effective against leaf spot diseases.
Harvesting	Ready for harvesting in 25-35 days depending upon the variety. Late harvesting cause pithyness and bitterness in the roots so ensure timely harvesting of the roots. Two to three days before harvesting, it is advised to sprinkle good quality water for 3-4 times to remove soil and nutrient sources and make the leaves attractive. After harvesting, keep the roots in shade condition and wash with water properly. It should be mind that appearance of the vegetables decides the market price to big extent even in organic vegetables. After harvesting and washing, the bundle of 500g and 1 kg can be made for easy marketing at farm get or nearly markets. While proper arrangement in baskets using dry grass or radish leaves as cushioning material is good for keeping roots in good shape.
Yield	80-120 quintals/ha

Coriander

(*Coriandrum sativum*)

Season	Round the year in protected structures and December to March in open
Variety	Pant Harithma, Karna, Sadhna, CO 1, CO 2, CO 3, Private sector varieties
Soil	Deep and fertile loamy soils are best suited for coriander cultivation
Sowing time	Dry season crop; November – February Rainy season crop: May – October (in rainshelters only)
Seed rate	10-15 Kg/ha; Seeds are to be treated with *Azospirillum* @ 3 packets/ha. Seed treatment with *Trichoderma viride* @ 4 g/kg of seed has to be done to control wilt disease. The seeds should be soaked in plain water overnight and spit them in two halves in morning before sowing for better germination. The seeds will germinate in about 8-15 days.
Soil preparation	The field is ploughed 2-3 times and convert to a fine tilth. Add FYM before last ploughing and form raised beds (10-15 cm height and 30 -45 cm width) and channels (30 cm wide). Show the split seeds at a spacing of 20 x 15 cm.
Spacing	The 2 cm deep lines are made at a spacing of 10 - 15 cm is made and sowing is done in these lines and thinning is done to maintain the spacing of 3-5 cm between plants for better growth and minimize the diseases in crown region.
Intercropping	It grows well as intercrop in any of the plantations like coconut, arecanut, fruit crops and maize, brinjal, chilli, cucurbits.

Irrigation	Apply first irrigation immediate after sowing and then every day give light irrigation till germination of seeds. After germination, irrigation field alternate day initial 15-20 days and then at 2- 3 days interval for better growth.
Intercultural operations	Care is taken to maintain the field free of weeds, hoeing is done in about 30 days of sowing and after every harvest. During first harvesting thinning is done and maintain spacing of 3-5 cm between plants. Remove diseased leaves or plants.
Manuring and nutrient management	Apply 25-30 tonnes of FYM per hectare during first ploughing. Broadcast vermicompost @2-3 t/ha as basal dose during last ploughing of the field or beds. Nitrogen should be sufficient during regeneration of the crop after first cutting so apply vermicompost @ 1-2 tonnes/ha and fresh cow dung slurry @ 1 kg/10 litres (50 kg/ha) or biogas slurry @ 1 kg/10 litres (50 kg/ha soil application. (iv) Foliar spray of cow's urine @ 500 litres/ha (8 times dilution) and application of vermiwash-500 litres/ha (8 times dilution). Foliar spray can be given with cowdung slurry/ vermiwash/ cow's urine after each Harvest.
Pest and Disease Management	Powdery mildew can be controlled by seed treatment with *Pseudomonas fluorescens* (Pf 1) @ 10 g /kg and foliar spray of *Pseudomonas fluorescens* g/lit at the time of initial appearance of the disease and 2nd spray at 10 days interval. Neem seed kernel extracts 5 % spray thrice (1st spray immediately after the appearance of disease, 2nd and 3rd spray at 10 days interval). Similarly, the Wilt can also be controlled by seed treatment with *Pseudomonas fluorescens* @10g /kg followed by soil application of Pseudomonas @ 5 kg /ha.
Harvesting	Fresh and fully grown healthy leaves of coriander are harvested after 35-40 days of sowing. Two to three days before harvesting, it is advised to sprinkle good quality water for 3-4 times to remove soil and nutrient sources and make the leaves attractive. It is commonly harvested by pull out the plants but multi-harvesting is suggested for increase in yield and returns from the crop. Harvested coriander leaves should be tied in bundles and kept in baskets with adequate cushioning materials.
Yield	15 - 20 quintals/ha leaves. It is suggested to harvest the leaves for local market and make small bundles for easy transportation.

Broad Dhaniya

(*Eryngium foetidum* L.)

Season	Round the year cultivation but common in rainy season
Variety	CARI Broad Dhaniya, Local materials
Soil	Deep and fertile loamy soils are best suited
Sowing time	Sown during June onwards till November
Seed rate	200-300 g/ha (seedling method)
Soil preparation	The field is ploughed 2-3 times and convert to a fine tilth. Add FYM before last ploughing and form raised beds (10-15 cm height and 45-60 cm width) and channels (30 cm wide).
Spacing	Spacing of 20-25 cm between rows and 10-15 cm between plants.
Nursery production	The seeds are sown in pots or nursery beds having very fine and organically rich soils. Sowing should be done in 1 cm deep lines which are covered with fine FYM. Proper moisture and partial shade are always required for proper germination of the seeds. The germination takes 20-30 days and plants become ready for transplanting at 3- 4 leaf stage.
Transplanting	Normally, farmers establish a broad dhaniya block in coconut, arecanut or banana plantations. Once it establish, the broad dhaniya produce enough seeds which spread and grow naturally. But, for initial establishment, the seedlings of 3- 4 leaves or 40-45 days old should be transplanted in evening hours in well prepared field at prescribed spacing level. Immediate irrigation is required for proper establishment of crop.
Irrigation	Give first irrigation immediate after transplanting and then light irrigation should be given every day during initial days for better crop establishment. After proper establishment, irrigation can be given 2-3

	days interval in furrows only.
Intercultural operations	The gaps should be filled immediately for maintaining desired plant population. Even in naturally grown block, it is necessary to maintain proper beds to drain excess water in rainy season and give irrigation during dry season. For this, clean the furrow or drainage lines regularly. Care should be taken to maintain the field free of weeds. Hoeing should be done regularly using *kudali* or locally made forked implement.
Manuring and nutrient management	It grows well in organic system and requires 25-30 tonnes of FYM per hectare. It is advised to broadcast vermicompost @2-3 t/ha as basal dose during last ploughing of the field or beds. After first cutting, apply vermicompost @ 1-2 tonnes/ha and fresh cow dung slurry @ 1 kg/10 litres (50 kg/ha) or biogas slurry @ 1 kg/10 litres (50 kg/ha soil application. (iv) Foliar spray of cow's urine @ 500 litres/ha (8 times dilution) and application of vermiwash-500 litres/ha (8 times dilution). Foliar spray can be given with cowdung slurry/ vermiwash/ cow's urine after each Harvest.
Pest and Disease management	No major diseases or pest observed in broad dhaniya. However, tip burn, crown rot and 'white powdery leaves' may appear sometimes. For crown rot control ensure proper drainage and apply Pseudomonas @ 5 kg /ha. Tip burn is rare problem which appears due to micronutrient imbalance so proper manuring reduce this problem. 'White powdery leaves' observed in protected structures and for its management it is suggested to sprinkle water regularly. Root knot nematode is observed in broad dhaniya which can be controlled by practicing single harvest crop or use of neem or karanja cake. Bolting is major problem during December onwards which needs to be removed for extending the harvesting season.
Harvesting	First harvesting can be obtained after80-90 days of transplanting and subsequent harvesting is possible at every 30-40 days interval. Two to three days before harvesting, it is advised to sprinkle good quality water for 3-4 times to remove soil and nutrient sources and make the leaves attractive.
Yield	60-80 quintals/ha

Nalibhaji

(*Ipomea aquatic* Forssk.)

Season	It is a rainy season crop and grows well in May to December months or Initial months of dry season.
Variety	CARI NB-1, CARI NB -2, Local
Soil	Organically rich and fertile loamy soil, it also grows well in swampy lands.
Sowing time	May to June
Seed rate	Vine cutting or seeds
Soil preparation	The soil is prepared by ploughing 1 to 2 times and making raised beds of 1 meter width. Furrows of 40-50 cm are made between two rows. FYM and nutrients are applied during first and second ploughing.
Spacing	The vines are planted in rows at 20-25 cm and 10 cm distance
Irrigation	This grown in rainy season so no irrigation is required but during dry season, it should be given at regular intervals of 2-3 days. Sprinkling or furrow irrigation is better.
Intercultural operations	It covers land completely and hand weeding is only possible. The weeding should be done at 10-15 days interval.
Intercropping with other crops	It also grows well as intercrop in any of the plantations like coconut, arecanut, fruit crops or furrows in other brinjal, chilli and cucurbits.

Manuring and nutrient management	Application of 20-25 tonnes/ha of Farm yard manure. Apply vermicompost @ 1-1.5 tonnes ha at 30 days after sowing or transplanting than 1 tonnes / ha after each cutting. Foliar spray of cow's urine @ 500 litres/ha (8 times dilution) and application of vermiwash-500 litres/ha (8 times dilution). Foliar spray can be given with cowdung slurry/ vermiwash/ cow's urine after each Harvest.
Pest and Disease management	It is local crop and disease and pest are rare. Leaf spot, leaf minor and leaf hopper are observed sometimes which can be controlled by removing of such plants. If pest attack increases than Dipel or Halt (0.7 ml/litre) can sprayed at 10-15 days interval.
Harvesting	First cutting can be obtained in 3 – 4 weeks after planting, and subsequent cuttings are made at fortnight intervals. The harvesting should be done by cutting 15-20 cm shoot/vines with leaves and prepare bundles of 500g or 1 kg size. But, before harvesting, it is advised to sprinkle good quality water for 3-4 times to remove soil and nutrient sources and make the leaves attractive.
Yield	60-80 quintals/ha at single harvest to 150 quintal/ha with 3 - 4 harvests.

Madrashibhaji

(Alternanthera spp.)

Season	It is a rainy season crop and grows well in May to December months or Initial months of dry season.
Variety	Local materials
Soil	Well drained organically rich and fertile loamy soil
Sowing time	It grows well in round the year but main season of growing is rainy season while it can be grown in dry season with assured irrigation.
Seed rate	Vegetative propagation by shoots or seeds
Soil preparation	The soil is prepared by ploughing 2 to 3 times and then levelling by planking. Prepare raised beds for its cultivation in rainy season. For planting, the 2-3 cm deep lines are made and shoots are kept in one side of the line and buried with well decomposed FYM. The dibbling with shoots is also suggested on beds.
Spacing	Between lines 20-30 cm apart and 5 cm plant to plant. The shoots grow very rapidly and cover the whole bed in short time.
Irrigation	It is grown in rainy season so, no irrigation is required but frequent watering should be given at regular intervals of 2-3 days for dry season crop. Sprinkle irrigation is better for growth and yield.

Intercultural operations	It covers the beds completely and hand weeding and frequent cleaning of furrows should be done at 10-15 days interval.
Intercropping with other crops	It also grows well as intercrop in any of the plantations like coconut, arecanut, fruit crops or furrows in other brinjal, chilli and cucurbits.
Manuring and nutrient management	Application of 20-25 tonnes/ha of Farm yard manure. This grown well in farm bunds but its commercial cultivation need proper application of FYM and other organic sources regularly for getting higher yield and quality leaves. Apply vermicompost @ 1-1.5 tonnes ha at 30 days after sowing or transplanting than 1 tonnes / ha after each cutting. Foliar spray of cow's urine @ 500 litres/ha (8 times dilution) and application of vermiwash-500 litres/ha (8 times dilution). Foliar spray can be given with cowdung slurry/ vermiwash/ cow's urine after each Harvest.
Pest and Disease management	It is local crop and disease and pest are rare. Leaf spot, leaf minor and leaf hopper are observed sometimes which can be controlled by removing of such plants. If pest attack increases than Dipel or Halt (0.7 ml/litre) can sprayed at 10-15 days interval.
Harvesting	After 3- 4 weeks of planting the shoots attain optimum size for first harvesting. It should be done by cutting 15-20 cm shoots and leaving 5 cm stubbles for regeneration of next crop. Prepare bundles of 500g or 1 kg size for market.
Yield	50-60 q/ha at single harvest to 150 quintal/ha with 4 - 5 harvests.

Khattabhaji or Roselle

(Hibiscus sabdariffa L.)

Season	It is a rainy season crop and grows well in May to December months or Initial months of dry season.
Variety	CARI KB-1, Local materials
Soil	Well drained organically rich and fertile wide ranges of sandy to loamy soil are suitable for khattabhaji.
Sowing time	Tropical climate of the islands is suitable for round the year cultivation of khattabhaji. But it is grown in rainy season and also in initial dry months with assured irrigation.
Seed rate	8 – 12 kg/ha
Soil preparation	Two to three ploughing are done and then levelling by planking. Apply whole of FYM at the time of first ploughing.
Spacing	Row to row : 20-30 cm and plant to plant 5 cm Raised bed of 40-60 cm width with 2 -3 rows is also suggested.
Irrigation	No irrigation in required in rainy season while regular irrigation at 2-3 days interval for dry season crop. Sprinkle irrigation or furrow irrigation is better for growth and yield.

Intercultural operations	Initially frequent weeding is required but later on it covers the beds completely, thus, frequent weeding needed at 10-15 days interval.
Intercropping	It also grows well as intercrop in any of the plantations like coconut, arecanut, fruit crops or furrows in other brinjal, chilli and cucurbits.
Manuring	Application of 20-25 tonnes/ha of Farm yard manure. Apply vermicompost @ 1-1.5 tonnes ha at 30 days after sowing or transplanting than 1 tonnes / ha after each cutting. Foliar spray of cow's urine @ 500 litres/ha (8 times dilution) and application of vermiwash-500 litres/ha (8 times dilution). Foliar spray can be given with cowdung slurry/ vermiwash/ cow's urine after each Harvest.
Disease and its control	It is local crop and disease and pest are rare. Leaf hopper can be controlled by spraying neem formulations or Dipel or Halt (0.7 ml/litre) spray at 10-15 days interval.
Harvesting	First harvesting at 4 - 5 weeks of planting and second harvesting after 15-20 days. Uprooting is also common method. At every harvest keep 5 cm shoots for regeneration. Prepare bundles of 500g or 1 kg size.
Yield	60-80 q/ha at single harvest to 110 quintal/ha with 2 - 3 harvests.

Other leafy vegetables

	**Dalbhaji (*Portulaca oleracea* L.)** Used as vegetable, adding taste and viscosity in *daals* It grow naturally but its cultivation can be done Plough soil 2-3 times after adding 10-15 t/ha of FYM. Raised beds (1 m width) or pot system is better. Sow seeds in line by mixing with fine sand of FYM. Remove weeds timey. No watering is done during rains. Harvest shoots 40-50 days after sowing by leaving 5 cm. Make bundles for marketing.
	Brahmi (***Bacopa monnieri* (L.) Pennell**): Used as chutney or mix agent in other tuber or fish items It grows naturally during rains but can be cultivated also. Plough soil 2- 3 times after adding FYM 15-20 t/ha. Raise beds for large scale or pot system for homegardens Planting with vines/shoots is done in line of dibbling. After planting, spread small quantity of fine FYM. Sprinkle water regularly for better crop establishment. Remove weeds and drain out excess water. Regular harvest of shoots can be done 30 days onwards. Make bundles for marketing.

Aam Bhaji (*Limnophila chinensis*)

It is rainy season leafy vegetable and used for chutney, mix or flavouring agent.

It grows well naturally during rainy season.

Plough the soil 2- 3 times after adding FYM 20 t/ha.

Raise beds or prepare pots for cultivation.

Partial shade is better for its cultivation.

Planting with seeds or shoots is done in line.

After planting, spread small quantity of fine FYM.

Sprinkle water regularly for better crop growth. Remove weeds and drain out excess water.

Regular harvest of shoots 30 days onwards.

Medak bhaji (*Centella asiatica* (L.) Urban)

It is locally known as medak bhaji. Centella is propagated by vine cutting or seeds. It is well adapted to island conditions and grows well in rainy season and shaded locations in dry season.

For its cultivation, apply FYM @ 25-30 tonnes during first mixing of the soil. Prepare beds of 75 cm to 1 m wide at 50 -60 cm apart.

Then mark 3 lines at 20-30 cm distance parallel to the beds. Make small holes at 5 cm apart in the marked lines using *Khurpi*. Broadcast small quantity (1-2 kg/bed of 10 sq meter size) in holes and plant the vine cuttings. Fill the holes with FYM and sprinkle water to establish the cuttings.

After 30 days the crop becomes ready for first harvest. For this, only fully grown leaves should be harvested with due care so that the plant will not disturbed. Use of sharp blade or knife can be used to harvest the leaves.

Make small bundles of 50 g, 100g and 250 g for marketing purpose. Remove unhealthy and damaged leaves to get good market.

No major diseases and pest are reported in this crop so far in islands. Sometimes cutting pest and leaf webber may attack for which Dipel can be used.

Methi/Fenugreek (*Trigonella foenumgraecum* L.)

Green leaves are used as vegetable and flavour agent in food items. It has medicinal uses also. Varieties are Pusa Early Bunching, Kasuri Methi, CO-1.

It is cool season crop but can be grown in islands with partial shade condition during December – February months. Best soil are loamy to sandy loam. About 20-25 kg seeds are required for one ha.

Before showing apply 25 tonnes of FYM and prepare soils to fine tilth. Also aplly vermicompost @ 2-3 tonnes/ha for good quality leaves. Top dreshing after first cutting with vermicompost/vermiwash/cow dung slurry is good for regeneration of the crop. The first harvesting can be done after 30-35 days of sowing. Over mature leaves are bitter.

Yield is around 50-70 q/ha

Lettuce (*Lactuca sativa* L.)

Lettuce is used as a *salad* particularly in hotels as high profile parties. In islands it is gaining popularity particularly along with tourism sector. Varieties are Great lakes, Slobolt, Dark Green. It is a cool season crop and require low temperature (<20°C) for better growth and taste of leaves. Higher temperature cause bitter taste in the leaves.

Soil should be organically rich, light and well drained. It is sensitive to acidity and optimum pH is 5.8-6.6.

The seed rate is @ 400-500/ha and spacing should be 30-45 cm between row to row and 20-25 cm between plants. Apply FYM @ 20-25 tonnes/ha and vermicompost @ 3-5 tonnes/ha.

Provide adequate irrigation regularly, do not allow water to touch the leaves, ensure regular weeding and shallow cultivation for proper aeration. The crop is ready to harvest within the period of 50-60 days of sowing when leaves are tender, immature, but larger enough with acceptable taste.

Aphids, tip burn, downy mildew affect it but preferably to use cultural and mechanical measures to control diseases and pests.

Drumstick
(*Moringa oleifera* L.)

Season	The optimum temperature for better growth is 20-25^0 C. it is highly susceptible to frost and high temperature exceeding 40^0 C causes flower shedding.
Variety	Common in islands: Local, PKM 1 (other type : Jaffna, Moolanoormurangai, Chavakacherimurungai, Chemmurangai, Palmurangai, Kodikalmurangai, Kattumurangai, Palamedumurangai)
Soil	It grows well in almost all types of soil except stiff clays, however sandy loam soils containing lime is best suited for its cultivation.
Sowing time	Round the year with avoiding the heavy rains and excess dry days.
Propagation	Perennial type and are propagated by limb cuttings. Limb cuttings of 90-100 cm length and 5-8 cm diameter are used for planting. Annual types are propagated by seeds and 625 g seeds are sufficient for one hectare. The seedlings should be raised in polythene bags and transplanted in May- June or November – December months.
Planting	The seeds can be either sown in situ in the prepared pits of 45 cm^3 or can be transplanted after raising the seedlings in the polybags. The seedlings are ready for transplant in 40 – 45 days after sowing. Gap filling is necessary for efficient use of land resources. High density planting, planting on farm border or homegardens or road avenues or planting in community land is suggested for increasing drumstick production.
Soil preparation	Two to three ploughing of field should be done. Prepare pits of 45 x 45 x 45 cm at prescribed distance and fill the pits with 10 kg of FYM.

Spacing	Seedlings or limb cuttings are planted in well prepared pits of 45 cm^3 at a spacing of 2 X 2.5 m for annuals and 6.0 x 6.0 m for perennials.
Irrigation	It should be given at regular intervals of 2-3 days, later on irrigation is done once in 10-15 days.
Intercultural operations	Hand weeding is a common practice. When the seedlings reach 75 cm height, the shoot tips are to be nipped off to encourage side branches. The annual plants should be cut back two meter height from ground level for ratooning before onset of monsoon. The ratooned plants develop new shoots and bears flower and fruits after four to five month. Apply10-15 kg of FYM in basin of 1 meter periphery and irrigate it.
Manuring and nutrient management	Apply of Farm yard manure 10-20 kg/plant and 2 kg/ plant vermicompost equally in two doses during June-July and November - December months. Besides, apply Neem cake 1.5 to 2 kg/ pit, Rock phosphate 0.50kg/ pit and Wood ash 1.0kg/ pit
Disease and pest management	No major disease or pest is observed in islands but attack of Green caterpillar and hairy caterpillar are the pests which can be controlled by neem based insecticides (2ml/litre) and tobacco decoction. It can be managed by Bt formulations such as Dipel /Delphin / Halt (0.7%). Among the diseases, for the control of *Fusarium* wilt, soil application of *Trichoderma* (2.5kg/ha) and drenching with 2% *Pseudomonas* are effective. Sometimes, cutting show initial establishment in the field but die after some time. To avoid it, a plastic bag should be used to cover the top end of the cutting to protect from rain water. Further, select the right time for raising of the cuttings particularly month of January –February or plant show slow growth or vegetative inactive when the rains are absent. These cuttings show good field establishment.
Harvesting	The fruits are ready for harvest 60 days after flowering, the period extends 2-3 months.
Yield	100-150 fruits/tree/year in annual types, in perennial types, the yield will be generally low (80-90 fruits/tree/year) in the first two years. Then it increases to about 300-400 fruits/tree/year depending upon the genotype and management practices.

Curry Leaf

(*Murraya koenigii* Linn. Sprengal)

Season	The Curry leaf is tropical to sub-tropical plant. It is a perennial tree spice and leafy vegetable. The climatic conditions of the islands are suitable for planting during May-June and December – January months. Curry leaf cultivation is a crop which needs less input and but provide stable and good amount of round the year profit to farmers.
Description	The leaves of curry leaf tree are used as spice for adding flavour in vegetables and no-vegetarian preparations. The tree is an aromatic deciduous one, five meter in height, 15-40 cm in diameter. It is cultivated mainly in homesteads but to a certain extent on a plantation scale. The fruit is edible, but the seed is poisonous and must be removed prior to use.
Variety	Curry leaf is found almost throughout India as well all across the islands. It is much favoured by each and every community in the islands including Nicobari tribes. Curry leaf is common in Islands but there is no specified variety. Some are promising materials like Neil Collection and CIARI Collection. Other commercial released varieties in mainland India are are Sen Kaampa, Dharwad-1 and Dharwad-2.
Soil	Curry leaf can be cultivated in a wide range of soils. Sandy loam to loam soils which are in organic matter and having good drainage and fair water holding capacity are ideal for better leaf yield. The optimum temperature requirement is 26° to 37°C. Thus, island conditions are well suitable for curry leaf cultivation.

Sowing time	One year old seedlings are suitable for planting at the onset of monsoon or during dry season months. If transplanting of fully grown seedlings is done in rainy season, then it is necessary to maintain proper drainage facility.
Propagation	The main season of availability of curry leaf fruits is August-September. Collect the ripe fruits and extract the seeds within 3 to 4 days of collection. The 2-3 seeds should be sown in each poly bag containing soil, vermicompost and FYM in 1:1:1 ratio. It is better to cover the polybags with dry grass or paddy straw and sprinkle water for proper germination. Seeds germinate in 3 weeks. One-year-old seedlings are planted in the main field. The common method of multiplication of Curry leaf in islands is root suckers. There are a number of root suckers near its plants. They are separated from the main plant during rainy season and planted immediately in the main field.Though, it is better collected the suckers along with roots without disturbing the soil ball. After removal, put in a polybag and keep in the shade to avoid uprooting stress. After proper establishment in the bags, the plant should be transplanted in the field. If planting is done in rainy season, then provide adequate drainage facility to planting basin. If necessary, provide thatching material to protect the plant from extreme heat stress during February-April months. Cuttings are also used for propagation. For this, take a piece of 5-6 inch long mature stem cuttings and remove the leaves from 1 inch of the bottom and plant into rooting media comprising of soil, vermicompost and FYM in 1:1:1 ratio. It will root in about 3-4 weeks.
Spacing	The curry leaf is a perennial plant and planted as a spacing of 4 m x 4m. However, dense planting at 1.2 to 1.5 m in square system.
Planting	For this, the pits of the size of 30 x30x30 cm are prepared at specified distance at least one month before planting. Fill the pits with Soil: FYM: Vermicompost in the ratio of 1:1:0.1 immediately and keep it for further natural mixing and decomposition of the filing mixture. At the time of planting, prepare a hole in the centre of the pit and insert the plant

	along with soil ball and add additional FYM @ 2 kg/pit and press it slightly for properly establishment of the saplings. Raise the basin height during rainy season so that excess water can drain out easily. While during December month, it is advised to keep basin slightly depressed so that watering can be done easily.
Irrigation	No irrigation is required during rainy season. If no rains occurs during initial days of planting, than give regular irrigation to facilitate proper field establishment. During December – January planting, it is also suggested that immediately after planting the pits should be irrigated and then on the third day for 4-5 months. After that, irrigation need to given at 4-5 days interval in first and 10-15 days interval in second year onwards. Drip irrigation is ideal for higher yield and good quality leaves. However, basin irrigation is common method in islands.
Intercultural operations	The field should be kept weed free. For this, hand weeding in the basin in initial days and them using hand hoe or *Khurpi* or *Kudali*. Provide mulching of dry grass during dry season to conserve moisture and prevent excess weed growth around the plant otherwise they will deplete major share from the irrigation water and applied manures. It is observed that tropical climate of islands favours round the year germination of the weed flora and FYM is rich in weed seeds. Therefore, after every time of application of FYM, it is suggest to frequently cleaning of the basins and surroundings to remove weeds. The Curry leaf responds very well to the training and pruning practice because the leaves are major economic part and their yield in decided by the productive base. Therefore, it is advised to train and prune the plant to maintain a height of 1m. Their terminal buds are removed to encourage lateral branching. A minimum of 3-6 branches are kept per plant depending upon the space factor. The spacing between Curry leaf lines can be used for cultivation of legumes like mung, urad and cowpea or leafy vegetables like amaranthus, poi, radish, broad Dhaniya, bhattabhaji, Centella etc. For this, leave the basin region and provide adequate organic sources and irrigation to the intercrop so that in should not disturb the nutrient profile of the Curry leaf crop.

Manuring and nutrient management	Apply of Farm yard manure 20 kg/plant and 2 kg/ plant vermicompost equally in two doses during May-June and November - December months. Besides, apply Neem cake 1.5 to 2 kg/ pit and Rock phosphate 0.50kg/ pit and Wood ash 1.0kg/ pit. The nitrogen is essential nutrient for leaf quality therefore, additional doses of vermicompost or vermiwash should be given at 3 month interval or after each harvest. For this, 4-5 kg FYM and 2-3 kg vermicompost can be given around the basins and mixed well followed by irrigation.
Disease and pest management	No major disease or pest is observed on Curry leaf in islands.
Harvesting	Harvest the well grown leaves using sickle leaving small portion of the leaves on the plant for photosynthetic activities. Harvesting can be done at regular interval of 3-4 months.
Yield	At the end of first year 1-2 quintals of leaves/ha can be harvested which can grow to 30-40 quintals /ha/year in 2nd year, 50-60 quintals kg/ha in 3rd year, 70-80 quintals/ha/year in 4th year and on 5th year onwards, the leaf yield may grow upto 100 quintals /ha/year depending upon the crop management and harvesting operations.


Baby Corn

(*Zea mays*)

Season	The baby corn is a new crop in Andaman and Nicobar Islands and gaining momentum along with tourism sector particularly due to regular demand by hotel industry. It is used as raw or ingredient in mix vegetable, soup, salad, kheer, deep-fried with meat or rice, pickles and corn pakoras. The climatic conditions in islands are favourable for its round the year, but main crop season coincides with the tourist season i.e. December-February months which increase the potential of this new crop. It is a high value crop and suitable for diversification of farming system.
Description	Baby corn refers to the young flowering corn ear harvested between two days before and three days after silking, depending upon the development of the plant and size of the ear shoot (baby corn). It is delicious, decorative and nutritious vegetable. Nutritionally, it is comparable with common vegetables like tomato, brinjal, cauliflower, cabbage, frenchbean, copwa and okra. Its low calorie value, high in fibre content and without chlolesterol attracts health conscious consumers.
Variety	COBC 1, VL-45, MTH-14, RCM 1-1, RCM 1-3 and MLY
Soil	Well drained, deep, medium and loamy types soils are suitable for baby corn cultivation. It does not come up well in alkaline and waterlogged soils. The optimum pH range is 6.5 to 7.5. It is appropriate to apply the lime based on soil test for raising soil pH. It should be around 400-500 kg/ha and mixed at the time of first ploughing.
Sowing time	The ideal time for sowing of the baby corn is onset of the monsoon i.e. May – June and start of the dry season i.e. December – January in areas having assured irrigation facility. Using staggered planting, 3-4 crops can be raised annually in island condition.

Seed requirement	20-25 kg/ha of seeds as sole crop. If it is grown as intercrop in vegetables or pulses than 10-12 kg/ha is sufficient depending upon the row pattern/ratio of main crop (vegetable/pulse) and intercrop (baby corn).
Soil preparation and planting	Baby corn need smooth leveled and fine tilth for proper germination of the seeds. The islands observe heavy rains and water stagnation in plat plots even in upland situation. Thus, prepare ridges for sowing of the seeds during rainy season crop. The sowing points should be marked in the line using rope. The baby corn seed is costly and excess plant population affect the yield and quality of the baby corn. Therefore, use line sowing using dibbling method for maintaining proper plant population. The dibbling of seeds at 2 to 3 cm depth on southern side of ridges at 1/3rd at position from top, which facilitates good drainage and provides sufficient moisture for seeds. In dry season, if no rains predicated for one or two weeks than farmers can go for sowing in flat bed at specified lines.
Spacing	The spacing of 45-60 cm between row to row and 20-25 cm from plant to plant is ideal for baby corn.
Irrigation	Pre-sowing heavy irrigation is required in dry season crop. After that first irrigation is given seed germination and then regularly at 3-5 days interval. The frequency of irrigation is reduced to 2-3 days during hot months and in light soils. Furrow irrigation and drip irrigation are suitable method for baby corn. In furrow irrigation method, the water should be given upto 2/3rd height of the ridges and it should not overflow on the ridges. Young seedlings, knee high stage, silking and picking are the most sensitive stages for water stress for crops thus, irrigation should be ensured at these stages. Use of mulching help in moisture conservation, weed suppression and ultimately yield of the crop, therefore, apply dry grass of rice straw for mulching at 20-30 days old stage of the crop.
Intercultural operations	The weeds are major competitor to baby corn for nutrients, water and CO_2 in tropical ecology. Weed competition will delay maturity and reduce yield. Therefore, it is essential to keep the field weed free or in

	suppressed situation particularly until the corn reaches a height of 50-60 cm. It can be done by regular weeding at 10-15 days interval using cultural and mechanical practices. Two to three hoeings are recommended at 15 -20 days interval for proper aeration and uprooting of the weeds. Detasseling is an essential operation in the cultivation of baby corn. Remove the tassle of the plant as soon as it emerges from the flag leaf and before it start shedding pollen grains. While detasseling, leaf should not be removed otherwise it will affect net photosynthesis and ultimately reduce average baby corn yield. This operation prevents fertilization. The detasselling can be generally done after 45 days of planting, depending on the variety and continues for 8-10 days. The removed tassel can be used as fed to the cattle.
Intercropping	Baby corn is very remunerative, if it is cultivated with intercrop like French bean palak, cabbage, cauliflower, methi, coriander, knol-khol, poi, radish and gladiolus. It adds income to the farm because harvesting of baby corn takes time and therefore, farmers can utilize its lean period by growing intercrop to get additional income through intercropping. It does not cause adverse effect on intercrops on baby corn and vice-versa provided the needs for nutrients and water are met adequately. If water requirement of the intercrop is more frequent than it can be done as per its requirement otherwise it should be given as per the need of baby corn. For this, soil ball test can be done in which a handful of field soil is taken and form a ball, it is not yielding a compact ball than irrigate the field. Therefore, recommended dose of nutrients of intercrops should be applied in addition to the recommended dose of nutrients of baby corn. Even sometimes, the baby corn acts as barrier for certain pests like in tomato, cauliflower and chilli. Commonly their short duration varieties are preferred for intercropping with baby corn.
Manuring and nutrient management	Apply 30 tonnes well decomposed FYM or compost at the time of first ploughing. Also mix of Trichoderma and PGPR (each @ 2.5 kg /ha). Also apply vermicompost @ 4-5 tonnes/ha in equal parts as top dressing during 30 and 60 days after sowing and mix in soils during hoeing practice. Soil application of fresh cow dung slurry @ 1 kg/10 litres (50 kg/ha) or biogas slurry @ 1 kg/10 litres (50 kg/ha) or cow's urine 500

	litres/ha (8 times dilution) or vermiwash-500 litres/ha (8 times dilution) and foliar spray of their extracts is suggested for better growth and yield of baby corn. Use of vermicompost (3.2 t/ha) or FYM (16 t/h) + Biospirillum (10ml/kg of seed) + Biophos (10ml/kg of seed) +biopotash (10ml/kg of seed) was found to be effective in improving the yield and quality of baby corn.
Disease and pest management	Baby corn is relatively pest - free, since plants are harvested before damage normally associated with maize production. If disease or insect problems occur in the islands, than they can be treated after proper identification using biopesticides, Bt formulations and botanical like plant extracts.
Harvesting	Depending on the place, time and variety the baby corn become ready for harvesting after 60 - 65 days of germination. The silk emerges and the shoots are ready for harvest. It must be harvested no more than one to two days after silks emerge. The Ideal cob size is 2 to 4.5 inches (4.5 - 10 cm) in length and 0.2 to 0.6 inch (7-17 mm) in width at the base end. If harvesting is delayed, the baby corn becomes tough and unpalatable. The picking should be done daily or on alternate days without failure. It should preferably be done in morning or evening, when the moisture in baby corn is highest and ambient temperature. A single planting may require between 6 - 12 hand harvests because generally it lasts from two to four weeks. The corn should be marketed in same day alongwith husk to avoid loss in moisture and quality.
Yield	In a good crop, on an average 40-90 q/ha husked baby corn (Fig. 24) or 8-15 q/ha dehusked baby corn can be harvested. Green fodder yield is about 90-120 q/ha that gives additional income to the growers.

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