

1. Technology: IPM Module for Fruit Fly management in cucurbits

- **Scientists associated in developing technology:** Ajanta Birah, Shrawan Singh, Subhash Chand, Krishna Kumar and Jai Sunder
- **Technology description:** An IPM module has been developed for the successful management of cucurbit fruit fly under island conditions. The IPM module comprising of installation of cue-lure baited traps @ 50 traps/ha for mass trapping, weekly clipping of infested fruits, foliar spray of aqueous leaf extracts of *Morinda citrifolia* @ 100g/l and foliar spray of spinosad 45SC or imidacloprid 17.8SL @ 0.3ml/l alternately at 15 days interval was found effective with respect to less fruit damage due to fruit fly (9%) and maximum fruit yield (10.75 t/ha) in bitter melon and ridge melon as compared to untreated control (39.3% fruit damage and fruit yield 5.53t/ha).



- **Scope (application of agro-climatic zone):** It can be adopted for fruit fly management during cucurbit cultivation under island conditions.
- **Benefit:** IPM module for cucurbit fruit fly management gives higher cost benefit ratio of 1:3.35 in IPM and 1:2.30 in non-IPM fields of bitter melon. Similarly, IPM module for fruit fly management in ridge melon gives cost benefit ratio of 1:1.99 in IPM compared to 1:1.23 in non-IPM fields.

2. Technology: IPM Module for fruit & shoot borer management in okra

- **Scientists associated in developing technology:** Ajanta Birah, Shrawan Singh, Subhash Chand, Krishna Kumar and Jai Sunder
- **Technology description:** An IPM module has been developed for the successful management of okra pest complex. The IPM module comprising of seed treatment with imidacloprid @ 3-5 g/kg of seed a day before sowing, sowing of maize at the borders as barrier crop for conservation of natural enemies, weekly clipping of infested shoot & fruit, erection of pheromone trap @ 30 traps/ha for mass trapping of fruit & shoot borer, foliar spray of neem seed kernel extract @ 30 ml/lit, spinosad 45SC or imidacloprid 17.8SL @ 0.3ml/lit and aqueous leaf extracts of *Morindacitrifolia* @ 100g/l at 15 days interval was found most effective in reducing fruit damage. In IPM module, less incidence of shoot and fruit borer (5.64%) and more fruit yield (10.55t/ha) was recorded as compared to untreated control (16.85% incidence and fruit yield 5.90t/ha).



- **Scope (application of agro-climatic zone:** It can be adopted for fruit & shoot borer management during okra cultivation under islands conditions.
- **Benefit:** The adoption of IPM technology for okra fruit & shoot borer resulted in higher cost benefit ratio of 1:2.73 in IPM and 1:2.26 in non-IPM fields (Chemical control or farmer's practice)

3. Technology: Production technology of oyster mushroom for tropical Islands

- **Scientists associated in developing technology:** Krishna Kumar, S. Bhagat, and A.Sharma,
- **Technology description:** Production technology of oyster mushroom has been standardized for tropical Islands of Andaman and Nicobar Islands. Paddy straw substrate showed significantly higher biological efficiency of about 77 %. Sterilized chopped paddy straw is used for filling the bags. The polythene bags are perforated by making holes with a punch machine or similar tool at a distance of about 10cm. The spawning is done by layer method as in case of cube making. The requirement of spawn may vary with size of bags and quantity of paddy straw inside the bag. In general one bottle or packet (250 gm) of spawn is sufficient for 2 bags (60x45cm). The spawn run completes within 15 days and white fungal growth can be seen inside the bags. After the spawn run has completed 3-4 cuts are made longitudinally and upper neck of bag is tied with a thread and then hanged or kept on a shelf or rack made of wood, bamboo, iron etc. at a cool place (25-30⁰C), humidity (70-90%). Thereafter, water is sprayed regularly to keep it moist. Within 3-4 days after spawn run small mushrooms are seen which become ready for harvest in another 3-4 days. About 1-1.5 kg of fresh mushroom can be harvested from one bag.
- **Subject Area/ Industry (in which it used):** Oyster mushroom production has ample scope in the islands. Humid climate is very much congenial for round the year mushroom production in the A&NIslands.
- **Earnings (Total) Rs./:** Total investment in 12 months for (20 q paddy straw) is Rs. 59000/-. Gross returns from mushroom cultivation (from 5 crops per year) is about Rs. 85000/-.
- **Benefit:** The technology can be utilized for income generation, business or part of suitable agriculture activity. Here the farming community can be motivated to harness plenty of locally available agriculture waste for making monitory returns. It will also improve the protein deficiency among people of Islands.



4. Technology: Biological Control of coconut Rhinoceros Beetle

- **Scientists associated in developing technology:** Ajanta Birah, Krishna Kumar, P. K. Singh and Someshwar Bhagat
- **Technology description:** The management of Rhinoceros beetle by baculovirus is a landmark success in biological control. The baculovirus infests both the grubs and adults of the beetles. The virus is released in the field by infected beetles. Beetles can be collected in large numbers manually from breeding grounds or by deploying the same Rhinoceros beetle pheromone traps. A diseased grub is macerated in 100 ml clean water containing 5 gm sugar, the suspension is taken in shallow container and the collected beetles are allowed to wade in for about half an hour. The healthy beetles during this period take up the virus inoculum and get infected. The beetles are later confined in saw dust overnight. The next day at dusk the beetles visiting breeding sites pass on the infection to both larvae and adults. The transmission is by contamination with healthy partner.



- **Subject Area/ Industry (in which it used)::** It has been proved that virus alone can bring down the pest population to a very low level. Other methods such as hooking, destruction of breeding sites on palm if integrated with other measures can be effectively used to manage beetle problem. Its effect is self-perpetuating, long lasting, cost effective and overall pesticide independent.
- **Benefit:** It is eco-friendly as it does not have any pesticide or any harmful chemical to the atmosphere. It will improve the coconut production by controlling *Rhinoceros* beetle population. Its effect is self-perpetuating, long lasting and cost effective.

5. Technology: Rodent control in paddy

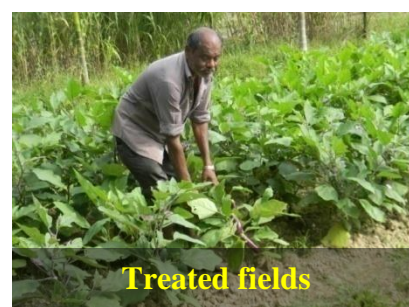
- **Scientists associated in developing technology:** Ajanta Birah and K. Sakthivel
- **Technology description:** Rodents are persistent pests in the island ecosystem. They plunder field crops, rice in particular and also cause severe damage to plantation crops. Following management measures are suggested for controlling rodent menace in the Andaman and Nicobar Islands.
- **Cultural practices:**
 - Deep ploughing should be done at the time of land preparation to destroy hidden burrows. Bunds should be trimmed to avoid new burrow formations. Weed free cultivation can reduce the rodent infestations to certain level. Periodical trapping and killing of rodents in paddy fields using mechanical traps also avoid rodent menace. In case of storage, keeping the storage area very clean, immediate removal of any spilled over grains, periodical mechanical trapping, and usage of modern storage structures or metal bins which is not having direct contact with floor instead of traditional wooden storage bins helps in reduction of rodent infestations.
- **Chemical management of rodents**
 - Locating live burrows in field is the preliminary step before using rodenticides. All the burrows seen in particular field area/storage area have to be closed with soil. Those burrows reopened by rodents will be considered as live burrows. Bromodiolone (0.005%) cake which is commonly available as Rat Kill can be placed directly in live burrows. This method does not involve pre-baiting. In severe infestations zinc phosphide (2%) can be used with safety precautions. It involves two steps viz. pre-baiting and poison baiting.
- **Pre-baiting:**
 - Baiting should be done 2-3 times without any poison to attract rodents and habituate animal towards the bait.
 - One kg of broken rice is mixed uniformly with 20 g of vegetable oil and packed in to small packets in newspaper and kept in live burrows.
 - This step is to be repeated twice or thrice before poison baiting.
- **Poison baiting:**
 - This should be practiced after 2-3 times of pre baiting.
 - Uniform mixing of 20g of zinc phosphide + 20g vegetable oil + 900 g of broken rice is used as poison bait.



- **Scope (application of agro-climatic zone:** It is suitable for rodent management in rice under rainfed lowland ecosystem of A& N Islands.
- **Benefit:** It is high yielding effective for management of rodent in paddy fields.

6. Technology: CIARI-Bioconsortia

- **Scientists associated in developing technology:**
- **Technology description:** It is a talc based bioformulation for effective management of soil borne bacterial wilt disease of solanaceous vegetables like brinjal, tomato and chillies caused by *Ralstoniasolanacearum*. It is also effective against other soil borne, foliar fungal and bacterial pathogens.



Raw materials: Talc powder, Carboxy Methyl Cellulose (CMC), Bacillus spp. Consortia
(Field evaluated)

Protocol: These bio-agents have to be applied right from preparation of field to harvesting stage of crop for better plant disease management and for obtaining higher yield. The four methods of application are as follows.

(i) Soil application:

- One kg of the talc based bio-agents should be mixed thoroughly with 50 kg well rotten farm yard manure (FYM).
- Keep in shaded area for 4-5 days. Thorough mixing can be given once in two days along with little spray of water.
- The bio-enriched FYM can spread to one acre of land uniformly before ploughing and transplanting.
- Soil treatment can be continued in standing crop once in 10 days for better disease resistance.

(ii) Seed treatment:

- Ten gram of talc based formulation can be prepared to suspension by mixing it with enough amount of water.
- Mix one Kilogram of seeds and keep for 30 minutes before sowing.

(iii) Seedling treatment:

- Five hundred gram of talc based formulation can be prepared to suspension by mixing it in five liters of water.

- Treat the seedlings by root dipping for 30 minutes before transplanting to main field from nursery.

(iv) **Foliar application:**

- Ten gram of talc based formulation should be mixed with one litre of water and spraying can be done on leaves, flowers and fruits of standing crop.
- Spray can be done once in 10-15 days to avoid disease incidence.
- **Subject Area/ Industry (in which it used):** It is beneficial for vegetable growers of islands both at farm level and kitchen garden level.
- **Benefit:**
 - Biological control using *Bacillus* bioconsortia is less costlier than any other method of plant disease control
 - The bio-agents give protection throughout the crop period.
 - Highly effective against most of fungal and bacterial plant pathogens.
 - Non toxic to plant, soil, environment and other useful organisms
 - Bio-agents also enhance the plant growth promotion through secretion of various useful compounds and also encourage other beneficial soil micro-flora
 - Bioagents are safer to the handling person unlike chemicals.
 - These can also be applied along with other bio-formulations available in market.

7. Technology: CARI-MIN -Growth promoting micronutrient for pig

- **Scientists associated in developing technology:** M. S. Kundu, S. Jeyakumar, Jai Sunder, A.Kundu, S. K. Verma and A. K. De
- **Technology description:** Alternate least cost fortified feed with micronutrients suitable for pig feeding. Average daily body weight gain was significantly more i.e.365.33 g than control i.e.298.8g
- **Equipments/Raw Materials**
 - Cobalt Chloride 55g,
 - Copper Sulphate 265 g,
 - Ferrous Sulphate 500 g
 - Zinc Sulphate 750 g

- **Subject Area/ Industry (in which it used):** Tropical climatic conditions of Andaman & Nicobar Islands and similar ecosystem available elsewhere.
- **Benefit:** Alternate least cost fortified feed with micronutrients suitable for pig feeding. It can be used for promoting the growth in pigs

8. Technology: Microbial consortia

- **Scientists associated in developing technology:**
- **Technology description:** It comprises of native *Bacillus* and *Pseudomonas* species in a talk based carrier was developed and standardized to improve plant growth, phosphorus mobilization and disease resistance for Island condition.
- **Benefit:** It is disease resistance and suitable for Island condition.

9. Technology: Herbal based ointment for wound healing

- **Scientists associated in developing technology:** Jai Sunder, S. Jeyakumar, M.S. Kundu and A.Kundu
- **Detail description of technology:** A herbal based ointment prepared based on *Vitex trifolia* and *Eupatorium odoratum*. It enhances acute and chronic wound healing in cattle. It should be applied on a chronic hump sore of a cow. Wound will be completely healed in 14 days. The ointment can be applied for healing of fresh cut wound with bleeding on a cow. It should be applied after cleaning the blood with water. Wound starts healing in a week unlike chronic wound, which takes two weeks for healing.



Year of Release: 2015

Agro Climatic Zone: Island and coastal



○ 0 day



3 day



7 day

Plate: Different stages of wound healing

- **Recommendation:** The ointment can be applied on both chronic and fresh wound. It should be applied for 14 to 21 days after cleaning the wound with water.
- **Benefit:** It enhances acute and chronic wound healing in cattle

10. Technology: Azolla as a feed supplement for backyard poultry

- **Scientists associated in developing technology:** T. Sujatha, A.Kundu, S.Jeyakumar, Jai Sunder and Abhay Kumar Singh

- **Technology description:** Azolla is a free floating water fern used as a sustainable feed substitute for livestock and backyard poultry. Azolla can be grown and cultivable under this island ecosystem. Its nutritive value showed the feasibility of its utilization as a feed supplement for livestock and poultry.

- Equipments:
- Silpauline sheets
- Cow dung
- Mineral Mixture
- Azolla seedlings



- **Protocol:**

- An artificial pond made of silpauline sheets of 2.6 m by 1.6 m is used to grow azolla.
- Initially a pit of 2 m long, 1 m width and 20 cm deep is dug under a tree shade.
- The pit is first covered by used plastic sacks in order to prevent the growth of the roots of trees nearby, which may puncture the silpauline sheets. The silpauline sheet is laid over the pit avoiding any folds.
- About 10 to 15 kg of soil is uniformly spread over the sheet.
- One kg of cow dung mixed in 10 litres of water is poured over it.
- Powdered rock phosphate should be added along with the cow dung slurry at a rate of 10 to 20 g per pit.
- Water is poured into the pond to a depth of 10 cm, then 0.5 to 1 kg of Azolla is inoculated in the pond.
- In about 10 to 15 days, azolla will fill up the pond, and daily 0.5 to 1 kg fresh azolla can be harvested thereafter.



- **Earnings (Total) Rs./:** Capital Investment: Nil
- **Benefit:** Simple and low cost technology.

11. Technology: Integrated Farming System model for coastal areas

- **Scientists associated in developing technology:** T.P.Swarnam, A.Velmurugan, T.Subramani, S.Swain, M.Sankaran, Shrawan Singh, M.S.Kundu, R. Kirubasankar, B.K.Nanda and Ajmer Singh
- **Technology description:** A farming system model for agricultural diversification of coastal low lands of Andaman Islands was developed by integrating dairy, fishery poultry, goat rearing, horticulture, agro-forestry and crop components comprising vegetables, rice and pulses for 0.75ha.

Apart from sustainability of income the required nutritional security of coastal people can be achieved through appropriate integrated farming system models. The crop husbandry component contributes more to net returns (70-80%) in hilly and slopping hilly uplands whereas in medium upland valley and low lying valley areas. 1 to 2.5 lakhs /ha can be obtained depending upon the component selection and integration.



- **Date of Transfer: Earnings (Total) Rs./: Net income:** Rs.2.02/- lakhs and generated 302 man days year⁻¹
- **Benefit:** Integrated farming system is a judicious mix of one or more enterprise with cropping in which there is a complementary effect through effective recycling of livestock contributes 49-66% to the net returns.

12. Technology: Seed production of Marine Ornamental Fishes

- **Scientists associated in developing technology:** Grinson George, S. Dam Roy, C.S. Chaturvedi, Kamal Sarma, S. Murugesan and Benny Varghese
- **Technology description:** The reef waters of A & N Islands harbours a variety of exportable and valuable ornamental fishes. Due to high demand of ornamental Fishes, in USA, E.U. & Japan, ornamental fish breeding unit can be a profitable business proposal. The technology can be initiated with initial smaller scale with an area of 0.1 ha. The business can be initiated with an amount of 1.5 lakhs for production of 4000 -5000 seed per year.
- **Equipments/Raw Materials**
 - Hatchery shed (2.5 x 2 x 1) m each
 - Glass aquariums with lids and fittings 10 numbers
 - Rearing area with FRP tanks (3x 1.0 t)
 - Aerators/ blowers (2 nos)
 - Other equipment like hand net, buckets, pipes
- **Protocol**
 - Required species of anemone fishes (both male and female) are collected from the wild.
 - Environmental conditions in the wild are simulated in the lab and the fishes are allowed to form breeding pairs in the cement or FRP cistern.
 - Brooders that have formed pairs are transferred along with an anemone into a glass aquarium for spawning.
 - The eggs hatch out after about 6 days of incubation and the larvae are maintained in the aquarium provided with nutritious diet.
 - After 25-30 days the larvae are suitable for selling.
- **Benefit:** Due to high demand unit can be a profitable business proposal.



13. Technology: Mud Crab Fattening

- **Scientists associated in developing technology:** Rema Madhu and K. Madhu
- **Technology description:** The present technology can be suitable in brackish water areas where water level can be maintained around 75 cm. Grow-out ponds can be constructed in tide fed estuaries, backwaters and creeks. The crab ponds can also be established in traditional fish/ shrimp farms, by converting one portion adjoining the brackish water canal, which would help increase the overall income of traditional fish/ shrimp farmers. A 2 feet high bamboo fencing on the bund is essential to prevent escape of crabs from the pond. A pond of 0.1 ha area can be used for mud crab culture. With 500 nos /ha stocking density of 50-60g size crab for a period of six months, about 780kg/ ha production can be achieved.
- **Equipments/Raw Materials**
 - pH meter
 - Weighing balance
- **Protocol**
 - Mud crab juveniles of 50-60 g are stocked at 500 no. per hectare.
 - In the initial 3 months they are fed at 10% body weight with trash fish/chicken offal in bamboo enclosed ponds.
 - For the following three months they are fed at 5-6% body weight with trash fish/chicken offal.
 - A harvest of 60% of the stock with average body weight of 260g is obtained with a total yield of 780kg/ha.
- **Benefit:**
 - Mud crabs can be cultured in brackish water ponds with suitable modification
 - Culture of Mud crab can also be undertaken in places adjacent to mangrove areas or saline affected soils



14. Technology: Hump Sore ointment

- **Scientists associated in developing technology:** R.B. Rai, S.P.S.Ahlawat, Jai Sunder, S.Jeyakumar, A. Kundu, R.N. Chatterjee, S.P. Yadav
- **Detail description of technology:**

Treatment of hump sore with ointment: Hump sore is a chronic focal skin disease of cattle and buffalo caused by *Stephanofilaria assamensis*. The sore generally occurs at the hump region, hence it is called hump sore. The sore also occurs at base of the ear (ear sore), eye (eye sore), horn (horn sore), legs, perineum, teat, udder, abdomen, sternal region etc. The disease is endemic in these islands and almost 40% of the cattle are affected with this disease. The prevalence rate in male is higher than female. The disease is generally seen more during dry season.

Hump sore should be cleaned with cleaning and disinfections of sores with potassium permanganate and ointment should be applied for 7-10 days. The best month for treating the animals is September or October.

- **Composition of the ointment**

- LevamisoleHcl – 100 gms.
- Zinc Oxide – 10 gms.
- Resorcinol – 1 gm.
- Vaseline base – Up to 100 gms.
- Crystal violet – 2-3 drops.

- **Application:** Wash the affected area with KMnO₄ solution (1% W/V) and apply the ointment twice a day for 14-20 days.



- **Benefit:** The disease is transmitted by house fly (*Muscaconducens*), hence the control is very difficult however, it can be treated with the application of the ointment developed by the Institute.

15. Technology: Herbal eye drop for poultry

- **Scientists associated in developing technology:** T. Sujatha, Jai Sunder and A. Kundu
- **Detail description of technology:** Conjunctivitis, a common eye disorder, is usually caused by bacteria, virus and fungus. It is also a symptom of many other medical problems, including respiratory infections. It is a wide spread problem among rural poultry in A&N Islands where more than 80% of poultry population belong to backyard poultry. Eye diseases have significant economic value since they negatively affect birds' health and performance. The conventional treatment for most forms of conjunctivitis is a topical antibiotic or antifungal application that usually involves high cost. Further, it may lead to allergies due to resistance to antibiotics or over usage. Aloevera is readily and naturally available in all over the island. This natural remedy has proven antibacterial, antifungal and antiviral properties in human medicine. With treatment using this eye drops, birds completely recover from swelling of eyes.
- **Recommendation:** For treating acute conjunctivitis in poultry
- **Application:**
 - Clean the eye with clean water
 - Apply daily for 14 -21days
- **Benefit:** This natural remedy has proven antibacterial, antifungal and antiviral properties in human medicine. With treatment using this eye drops, birds completely recover from swelling of eyes.



16. Technology: Satellite Fish Nursery Technique - A New Tool for Livelihood Improvement for ANI

Scientists associated in developing technology

P. Krishnan, S.K. Zamir Ahmed, R. Kiruba Sankar, Shailesh Kumar, Nagesh Ram, Siba Mahato, R. Jayakumara Varadan and S. Dam Roy



- **Technology description**

Availability of sufficient fish nurseries remains a major issue in the freshwater aquaculture sector of the islands. The fish ponds existing in the farmers' fields are basically irrigation ponds meant for water storing purposes. The demand for freshwater fishes is enormous in island conditions and hence fish culture could be a remunerative option for island farmers. Despite the wide popularization of induced breeding programmes, the availability of well managed nursery ponds with required specifications and sufficient numbers to stock the spawns remains a challenge to address. To overcome the issues, the fish farmers in were sensitized on the breeding, seed production and the need for satellite nurseries. Common satellite nurseries were constructed and the spawns reared from the breeding programmes from different farmers field would be stocked in satellite nurseries. This concept was popularized by ICAR-CIARI in collaboration with Department of Fisheries, Andaman and Nicobar Administration well received among the farmers of North Andaman. Farmers who do not have nurseries can stock the spawns in satellite nurseries and could earn considerable revenue with their limitations.

- **Subject Area/Industry (in which it used)**

Andaman Islands

- **Benefit**

Sajib Kumar, progressive farmer started selling his first installment of fish seeds at the price ranging from Rs.1-8 of various sizes. He earned an additional income of Rs.70,000. On knowing about the availability of the quality fish seeds by the peer group from Kalipur to Keralapuram, 20-25 farmers placed their demand of fish seeds i.e., around 40,000 seeds which he sold at the rate of Rs. 5.00 per seed. Finally, an additional income of Rs. 2,00,000 was earned by him. Within a span of 6 months, he earned Rs. 2,70,000 as additional income by adopting satellite nursery technique for production of fresh water fishes. Many youth have come forward to adopt the technology.

17. Technology: CIARI Brinjal 5 (*Solanum macrocarpa*) - a bacterial wilt resistant genotype

Scientists associated in developing technology

V. Baskaran, K. Abirami, K. Sakthivel, N. Bommayasamy R. K. Gautam and S. Dam Roy



- **Technology Description**

Brinjal is widely grown vegetable crop in the Andaman and Nicobar Islands. It is used in various culinary preparations. The area under brinjal cultivation is more but the yields are poor due to biotic stresses. Bacterial wilt caused by *Ralstonia solanacearum* is one of the most important diseases of brinjal in most parts of the country including the Andaman and Nicobar Islands. The disease is devastating in hot and humid climate and can cause 100% yield losses in few cases. While screening the germplasm of local collections, CIARI brinjal 5 (*Solanum macrocarpa*) is the genotype identified by selection as a bacterial wilt resistant genotype. The plant is tall with semi spreading habit and smooth stem. The leaves are dark green in colour with purple veins. CIARI brinjal 5 showed complete resistance to *Ralstonia solanacearum*. The nutritional analysis of the fruits revealed that the new CIARI brinjal 5 is highly rich in iron, calcium and ascorbic acid content. This new genotype can be used as a donor for wilt resistance breeding in brinjal and for nutritional security.

- **Subject area/Industry in which it is used**

This is a potential genotype in brinjal breeding programme for gene pyramiding and as rootstock for solanaceous vegetable crops.

- **Benefits**

Bacterial wilt is the major constraint for production of solanaceous vegetable crops like tomato and brinjal. The wilt resistant genotype identified can be utilized as the source material for resistant genes and as a rootstock.

18. Technology: Pekin Duck under backyard

Scientists associated in developing technology

S.K. Zamir Ahmed, A. Kundu, Siba Mahato, R. Jayakumara Varadan and S. Dam Roy



- **Technology description**

- Pekin duck was introduced in the year 2011 to provide livelihood as well as nutritional security to the rural households in the remote areas of North & Middle Andaman district. By 2015, the enterprise has spread across 15 villages wherein 81 farmers were rearing 3-5 ducks in their backyard, totaling 466.

- **Subject Area/Industry (in which it used)**

North & Middle Andaman district in the Union Territory of Andaman & Nicobar Islands.

- **Benefit**

A farmer could earn Rs.16 per egg, Rs.400-450 per live adult and Rs.50-55 per duckling of Pekin Duck when compared to Rs.5-7, Rs.200 and Rs.10 respectively from desi duck. Pekin Duck can gain an average weight of 2.637 Kg with low level of mortality when compared to 1.975 kg weight of desi duck with high mortality rate. Thus, Pekin Duck under backyard with a unit size of 3 birds could earn a net return of Rs.4, 350 against Rs.1,140 from desi ducks giving an additional income of Rs. 3, 210.

19. Technology: Seed Village Concept for augmenting quality rice seed production in Andaman & Nicobar Islands

Scientists associated in developing technology

S.K. Zamir Ahmed, R.K. Gautham, P.K. Singh, Siba Mahato R. Jayakumara Varadan and S. Dam Roy



• Technology description

Rice is the principal cereal crop of Andaman and Nicobar Islands cultivated in 6,100 ha producing 21,000 tonnes with an underwhelming productivity of 3.4 t/ha. Farmers' preference towards low yielding but abiotic stress-tolerant traditional varieties, admixtures in locally saved seed, improper crop management practices are the major constraints in improving the rice productivity in the Islands. Hence, CIARI introduced "Seed Village Concept" in 2011 to produce Truthfully Labelled Seeds (TFL) of improved rice varieties in participatory mode involving breeders, farmers and social scientists. Under this concept, selective progressive farmers of cluster villages in North & Middle Andaman and South Andaman districts are given hands-on training in quality seed production and TFL seeds of CIARI rice varieties viz. CARI Dhan 3, CARI Dhan 4, CARI Dhan 5, CARI Dhan 6, CARI Dhan 7, CARI Dhan 8 and CARI Dhan 9; and other improved varieties viz. Ranjeet, Gayatri, CSR 23 and CSR 36 are distributed for cultivation in their farms. Regular field visits are undertaken throughout the season for technical guidance and to ensure seed purity and quality. The TFL seeds thus produced are purchased from farmers, cleaned, packed and re-distributed/sold to other farmers.

• Subject Area/Industry (in which it used)

- North & Middle Andaman district and South Andaman districts in the Union Territory of Andaman & Nicobar Islands.

• Benefit

During 2012-17, 170.32 Q TFL seed of 11 rice varieties viz. CARI Dhan 3, CARI Dhan 4, CARI Dhan 5, CARI Dhan 6, CARI Dhan 7, CARI Dhan 8, CARI Dhan 9, Ranjeet, CSR 36, CSR 23 and Gayatri have been produced from 64 cluster villages of Andaman Islands. The initiative has augmented the availability of quality seed of HYV of rice to the Island farmers. Further, traditional and low yielding rice varieties viz. C14-8, Jaya, Lal Sanno, Pagla Jaya, Ranchi Dhan and Silver Jaya have been replaced, resulting in the reduction of farm-saved seed and significant increase in seed replacement rate (SRR) from 1.5% to 10.2% in the Islands.

20. Technology: Production technology of dragon fruit in Bay Islands

Scientists associated in developing technology

K. Abirami and V. Baskaran



- **Technology description**

Concrete support structures are highly suitable for successful dragon fruit cultivation in Andaman and Nicobar Islands. One year old rooted cuttings about 12 inches in length are selected for planting in structures like unused tyres or concrete square structures which may help to prevent erosion of soil, conserve moisture also internal drainage in the media composition. A spacing of 3 x 3 is highly suitable in open condition. Once the planted cuttings start growing, the stems are tied with these columns. Usually four cuttings are planted per pillar. The branching of the main stem is allowed after it reaches a height of 90 cm in the pillar. It is recommended to have round/circular metal frame or concrete square structure at the top of the pillar to maintain the balanced dragon shrub in drooping form. Organic matter plays key role in dragon fruit cultivation. Each plant should be applied with 10 to 15 kg of organic compost/organic fertilizers. Thereafter, increase the organic fertilizer amount by 2 kg per year. Dragon fruit require less water as it belongs to the cacti family. However at the time of planting, flowering, fruit development stage and hot dry climatic conditions, frequent irrigations are required. Drip irrigations can be used for effective water usage. The flowering will initiate in the second year after planting. Flowering initiates in the month of March in the Island and fruiting continues upto November. Pollination is by honey bees and bats. Yield will be stabilized from third year after planting. Once the crop is established in trellis system, the longevity of the crop is upto twenty years. On an average 4 to 5 Kg of fruits can be harvested from a single pole. Fruits are harvested 25 to 30 days after fruit set and the suitable stage of harvesting is when colour changes completely from green to pink/ red colour.

- **Subject area/ Industry in which it is used**

It is suitable for open upland area. This crop for high potential for industrial exploitation as it is a high value fruit crops that generate more income per unit area

- **Benefits**

Highly nutritious crop rich in phytochemicals and micro-nutrients. The crop is easy to cultivate with less managemental care. Only initial establishment cost for the support structure is the major investment in this crop. The crop can also be established in a small area and hence is a boon to landless farmers for their sustainable livelihood.

21. Technology: Leaf petiole propagation in *Jasminum sambac* and *Ixora macrothyrsa*

Scientists associated in developing technology

V. Baskaran and K. Abirami



Jasminum sambac



Ixora macrothyrsa

- **Technology Description**

Jasminum sambac and *Ixora macrothyrsa* are the two ornamental plants which are usually propagated by stem cuttings. For large scale planting material production, the stem cuttings taken from the mother plant are very limited. The process is also time consuming with poor rooting ability in the field. The success percentage of stem cuttings depends on the season and high relative humidity favours maximum rooting. An alternative and easy propagation technique with limited use of resources will help in meeting the demand for planting material requirement in the Island. One such innovative technology is the propagation by leaf petiole as a propagule. The technology is standardized to select best mother leaf and suitable propagation media for maximum success percentage. Recently matured leaves in the mid of the stem with soil, vermicompost and coir dust in 1:1:1 ratio in root trainers showed best results. The rooting was initiated in 27 to 35 days from leaf petiole. After three months the young plants may be planted in mainfield. This technology is highly suitable for large scale planting material production.

- **Subject area/Industry in which it is used**

This technology is highly utilized in nursery industry where there is a need to produce large quantity of planting material with limited mother plants. It is a simple and easy way to propagate rather than the tissue culture which require more technical input and input cost.

- **Benefits**

This technology can be utilized for planting material production throughout the year independent of the seasons. It is a cost effective technology for large scale production of planting material. The technology is easy and can be practiced by any farmer/nursery men.

22. Technology: Year round flowering of *Arachnis* orchid in open

Scientists associated in developing technology

V. Baskaran and K. Abirami



- **Technology Description**

Arachnis (*Arachnis flosaeris*) is an epiphytic, monopodial orchids commonly called as spider orchid or scorpion orchid. It is an outstanding cut flower with pretty long flower spikes and usually grown under protected condition. To make the production of spider orchid economically, a technology was developed to cultivate the orchid in pandal system in open. The low cost pandal type of support system was established with bamboo from forest and plastic wire. By this new method of cultivation, flowering was observed throughout the year with luxurious growth of the plant, whereas in conventional method of growing spider orchid under protected condition, flowering was observed once in a year during November to January. Flowers are produced once in 13-15 days interval from an axillary bud of a plant. The system of cultivation with bamboo poles will help in harvesting of the flowers for maximum four years due to the less durability of the bamboo standard. However, if the same system of open cultivation is established using thin concrete square pillars as support structures, the constant yield may be reaped for infinite years. Once in three years, 50 to 60 cm terminal cuttings of the stems can be done and once rooted the same may be planted near the mother plant in the same pole. When the new planted cuttings start bearing the old plants may be removed based on the vigour. By this way the *Arachnis* orchid system can be maintained permanently for round the year harvest of cut flowers.

- **Subject area/Industry in which it is used**

Orchid is one of the major cut flower with lot of floral utilities. Many of the orchids in the Island are not commercial and highly seasonal. This potential *Arachnis* orchid can be harvested throughout the year by this technology and hence gives enormous economic benefit. When grown in large scale, this orchid may find a major export market

- **Benefits**

This technology can be utilized even by farmers with small holdings since spacing adopted between the poles is 30 cm x 45 cm. This crop is highly suitable for homestead gardening performs well with minimum organic input in open. The flowers have high aesthetic value with their characteristic long spike, unique colours and long shelf life.

23. Technology: Red Ginger CIARI 1

Scientists associated in developing technology

V. Baskaran and K. Abirami



- **Technology Description**

A local genotype of Red Ginger "*Alpinia purpurata*" Red Ginger CIARI 1, is identified which is very unique in its floral characteristics. Usually in red ginger, only vegetative aerial offshoots are produced in the inflorescence. In this identified genotype, CIARI Red Ginger 1, multiple floral spikelets were observed in the inflorescence instead of vegetative aerial offshoots. The number of floral spikelets ranged from 3-6 in each inflorescence of red ginger CIARI 1. This unique type of multiple floral spikelets, result in additional flowers per plant with multiple spikes in an inflorescence. This may be utilized for aesthetic purpose in flower arrangements and in floral bouquets making and is a potential genotype which may be utilized as effective parent in ornamental breeding programme to produce novel genotypes.

- **Subject area/Industry in which it is used**

This unique genotype is highly suitable for growing it as intercrop in coconut plantation. The beauty of the cut flower is enhanced in this multiple floret genotype which increases the aesthetic value of vase arrangements.

- **Benefits**

Round the year flowering is observed in this genotype and it has more economic value as cut flower. The interspace in plantation crops can be effectively utilized for growing this genotype, which gives additional income

24. Technology: Modified planting system for increased yield in marigold

Scientists associated in developing technology

V. Baskaran and K. Abirami



- **Technology Description**

A new method of planting system developed which is the modified ridges and furrows system with reconstituted media. In this method, the furrow was dug at a depth of 70-75 cm, width 70 cm and 8.5 m length. The width of ridges was 45 cm. The ridges and furrows were lined with weed mulch and the reconstituted media with only top soil and Farm Yard Manure were filled in the furrows. The seedlings of the marigold variety Siracole were planted in the media filled in furrows. The ridges were used as the walking space and for doing intercultural operations. Early flowering was noticed in this modified system (45.12 days) when compared to the normal system of planting (57.2 days). The flower yield of marigold was almost doubled (360.50 g per plant) in the modified system of planting in comparison with the normal system of planting (138.30 g/ plant). Once the modified system is initially established, the additional expenditure involved for intercultural operations like weeding, manuring, earthing up are highly reduced. Furthermore, this modified system helps in moisture

conservation. Once the system is laid out, planting of different crops could be done for a period of five to seven years by enriching the media with organic manure. This system is highly useful in places of problematic soil. The system supports the luxurious growth of the annual crop like marigold because of the enriched and reconstituted organic media.

- **Subject area/Industry in which it is used**

The land area is limited in the Island and hence more flower production per unit area should be aimed for the prosperity of the farmers. Under this condition, this system is highly useful for more economic returns

- **Benefits**

This technology can be utilized even by farmers with small holdings since intensive cultivation of marigold can be done because of the advantages like soil moisture and nutrient conservation and weed control. Yield is doubled by this modified planting system.