

FARM INNOVATIONS AND ITKs IN ANDAMAN AND NICOBAR ISLANDS



Central Agricultural Research Institute
Port Blair, Andaman & Nicobar Islands



Farm Innovations and ITKs
In
Andaman and Nicobar Islands

2012



Central Agricultural Research Institute
Port Blair, Andaman and Nicobar Islands



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Layout and Design : Mr. Krishna Gopal Nath
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The wisdom of the farm innovators, who have contributed their innovations and ITKs to this publication is appreciated and duly acknowledged.

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आनन्द प्रकाश
Anand Prakash
मुख्य सचिव
Chief Secretary



फोन/Ph. No. 03192-233110/234087
फैक्स सं./Fax No. 03192-232656
ई-मेल/E-mail: cs-andaman@nic.in

अण्डमान तथा निकोबार प्रशासन
ANDAMAN AND NICOBAR ADMINISTRATION
सचिवालय / SECRETARIAT

Port Blair, dated the 14th June, 2012

MESSAGE

The Andaman and Nicobar Islands are very beautiful place in the Bay of Bengal having 86% area under forests and only 6% under agriculture. The island agriculture is facing serious challenges from the climate change, invasive species, shrinking land resources and declining trend in youth involvement. Agricultural Scientists in the Islands are striving towards developing appropriate technologies to suit the island conditions at the farm level. Concerted efforts are being made to involve farmers as effective partners in evolving technologies and inculcating the scientific temper among them for innovating technologies for their farm. The keen interest of farmers in scientific efforts in the agriculture resulted in farm innovations which need to be documented and disseminated to other farmers for the larger benefit of island agriculture. These innovations may work as base for new research and development programme in agriculture sector in Islands. The CARI is dedicated to the cause of island farmers and its present effort to visualize the farm innovators by compiling in a document is well appreciable. I am happy that Director CARI has taken right step towards strengthening the linkage between researchers and farmers of the benefit of island agriculture.


(Anand Prakash)



डा. एच. पी. सिंह
उप महानिदेशक (बागवानी)

Dr. H. P. Singh

DEPUTY DIRECTOR GENERAL (Horticulture)



भारतीय कृषि अनुसंधान परिषद
कृषि अनुसंधान भवन-II,
पूसा, नई दिल्ली 110 012

INDIAN COUNCIL OF AGRICULTURAL RESEARCH
KRISHI ANUSANDHAN BHAVAN-II,
PUSA, NEW DELHI 110 012

MESSAGE

In island ecosystem, horticulture based farming system including livestock and fisheries provide ample opportunity for livelihood. The efforts of researchers and farm innovators for developing appropriate practices for augmenting productivity, sustainability and profitability is well appreciable. Farming community have developed a number of valuable innovations, and have proved potential through the applications of these innovations. However, these knowledge and innovations need scientific validation for its application in the interest of island, which shall contribute in developing appropriate policies for resilience in production. Efforts of Central Agricultural Research Institute, Port Blair in documenting traditional knowledge and innovations of island farmers is appreciable. I am sure this document shall be of great use to all the stakeholders.

H.P. Singh 14/6
(H.P. Singh)



Dr. D. R. Singh
Director (Acting)



CENTRAL AGRICULTURAL RESEARCH INSTITUTE
(Indian Council of Agricultural Research)
Post Box No. 181, Port Blair- 744 101
ANDAMAN & NICOBAR ISLANDS, INDIA

Dated 12.06.2012

Foreword

The island agriculture has very short but a flourishing history of around 150 years where people from different parts of the country are involved in farming. The tropical climate favoured a number of crops in islands but prolonged heavy rains restricted the choice of crops in open conditions. In pre-independence era, the island farmers practiced the agriculture in limited land with their traditions or experiences. The traditional knowledge and experience got enriched over the years and now many of the farmers are developing technologies by their own to solve the immediate problems of their farm. The establishment of the CARI, the only research institute in islands that cares for agricultural research in islands agro-ecosystem, has transformed the situation from subsistence to commercial agriculture. The institute has developed a number of technologies for agriculture and allied sectors which benefited island population. Over the years, the farmers own innovations were also observed which need to be documented systematically. The matter was well conceived by the Scientists and subject matter specialist of CARI and collected and compiled the promising farm innovations from the islands. I am sure that the information generated and compiled by the authors in this book will facilitate the wide dissemination of promising farm innovative practices and also provide base for research and development agencies engaged in island agriculture. I appreciate the efforts of my fellow colleagues and congratulate to the contributors for brining the farm innovations from the islands for benefit of fellow farmers and concerned stakeholders.

12 June, 2012
Port Blair


Director 12/6/12

Prologue

Agricultural innovations and diffusion of new technologies are important factors for food security. Today, agricultural research like much of development strategy has bypassed the needs of small and marginal farmers and concentrated primarily on better endowed regions, commodity-intensive production systems and commercial crops. Small and marginal producers particularly those operating in resource poor areas like these islands, has benefitted much less from the recent technological breakthroughs in agriculture. In order to attack poverty and hunger, it is critical to redirect and augment resources devoted to agricultural research to the farming and livelihood systems of poor rural communities. Some institutions both at national and International level, have long advocated the critical needs of extending research to the low potential areas and the traditional crops grown by the small and marginal farmers and island population building on their local knowledge and cultural practices.

Andaman and Nicobar Islands is an archipelago of 572 Islands located in Bay of Bengal. These islands are spread from 6° N to 14° N latitude and 92° E to 94°E longitudes having humid tropical climate. Due to remote location of these islands, adoption of improved technological knowledge becomes very difficult.

An innovation is an idea, practice or object that is perceived as new by an individual or others in a given system. Irrespective of time period the idea or practice was originally developed, when a person first becomes aware of it, it is an innovation to that person. Using something old in new ways or applying something new to the production system so as to achieve desired social and economic outcome is an innovation. Traditional practices encompass information on diseases and their control, remedies

and clinical practices, production practices and post harvest practices. These practices, generally known as Indigenous Technological Knowledge (ITKs) go hand in hand with innovations and complement each other. The traditional knowledge differs not only from region to region but also among and within communities.

Apart from scientific package of practices developed and transferred from R&D institutes, innovations in the form of grass root level technologies and methodologies developed by some of the innovative farmers and rural youth complement farmers to make self-sufficient in production of food commodities. The integration of indigenous knowledge and innovations with the advances in science and technology forms the basis of agricultural revolutions and increased supply of food commodities.

Benefits accrued from such innovative ideas and practices need to be widely shared across the country and the scientific talents behind such grass root level innovations need to be encouraged and recognized. Valuable ideas and techniques generated by them largely go unnoticed owing to lack of proper documentation and opportunities for wider dissemination. An initial and pioneering attempt in this direction has been made by the CARI to document such innovations and traditional practices developed across these islands in the form of this publication "***Farm Innovations and ITKs in Andaman and Nicobar Islands***" for the benefit of various stakeholders and to protect the interests of farm innovators and/or communities. Apart from this, it will provide base for basic research needs and will encourage the innovators to participate in research and development activities.

The KVKs located in South Andaman and Nicobar have played a key role in searching and collecting information on these innovations of practical importance. The expert committee comprised of SMSs from KVKs

and Institute scientists analyzed the innovations and ITKs for their scientific logic and further screening was done at island level for selecting them with replicable results and wider applicability in similar conditions. The expert committee has taken care of following parameters to select the innovations and ITKs for this publication viz:

Description of innovation, Nature and intensity of the problem addressed, Genesis and conceptualization of idea, Scientific rationale about the practice, Supporting data for the innovation, Relative advantages of innovation and ITK like adaptability, eco-friendliness, sustainability, gender-friendliness, economic viability, comparative cost advantage etc, Horizontal spread, Socio economic implications, Display of innovation and ITKs in exhibitions/*kisan melas*, Income generated out of them by the innovator, Feed-back from farmers and field level workers, Institutional acceptance of the innovation, Recognition in the form of honours, certificates/awards etc, Action photographs, printed materials/electronic materials like CD, video clippings etc, photo copies of certificates of honours, Profile of farmer (photograph, name and address, phone number, educational qualification, landholding, farming experience, name of the crops/livestock/other enterprises adopted by the farmer, social recognition like member, leader, president etc in social institutions) etc.

Keeping these parameters in view, the innovative farmers were interviewed and in addition to that, feedback collected from fellow farmers/ villagers on the considered parameters. Comparative statements were prepared and then final selection was made. Put together all this information has been divided in to two parts. First part deals with innovations and second part throws light on ITKs which are being used in these islands. ITKs have been further sub-grouped in to three sections related with Dairying and animal husbandry, Crop production and General. These selected innovations and several ITKs have been documented and

presented in this publication in a uniform format giving details of innovators, innovations, ITKs and their applications illustrated with suitable photographs.

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Farm Innovations



DARI – A Novel Tool for Efficient Vermicompost

Shri Ashok Sarkar

Village- Govindpur, N & M Andaman District

Profile

Education	:	5 th
Land holding	:	2.1 ha.
Crops grown	:	Paddy, maize, vegetables, flowers, coconut and areca nut
Livestock	:	Backyard Poultry, duck, cow, fish.

Recognition:

1. Received best farmer award by Dept. of Agriculture (A & N Island) in 2009.
2. Received best farmer award twice by CARI in 2009 & 2010.
3. Received many recognition certificates as best farmer in different agencies.



Farmer holding *Dari*

Description of Innovation

This farmer has developed tool "*Dari*" for making cow dung slurry for vermicompost preparation. Earlier he used to prepare the cow dung slurry and fermented it for two days then used to dump the slurry in the compost pit for better composting. In that process, it leads to infection of nails and hands. To avoid this, the farmer has developed a small tool named as "*Dari*" using indigenous material Bamboo. The length of the tool is 1.5 meter. The bamboo piece is split into four equal parts which are joined by a wire ring.

Practical Utility of Innovation

It is used for uniform mixing of cow dung for slurry making. The length of the tool is more convenient which directly protect from infection. The slurry made from dung adds to the quality and nutrient composition of the compost.

Economic Value:

The quality of compost is enhanced up to 25-30% by uniformity of slurry and adding there of into the material. It avoids infections to the hands and nail of the farmer thus saves much on the medical expenses which had occurred otherwise.



Machan Drying : Efficient way for Post-Harvest Management of Arecanut

Shri Promod kumar Mondal

Village-Kadamtala, N & M Andaman District

Profile

Age	:	44 yrs
Education	:	Graduation
Land holding	:	4.0 ha
Crops grown	:	Paddy, green gram, vegetables, coconut and areca nut
Livestock	:	Backyard Poultry, goat, duck, cow, fish.

Description of Innovation

After harvesting arecanut, farmers to dry there on roadside, open grounds or top of the roof. In the open ground, dust and other contamination affect the quality of the nuts. Quite often, heavy rains also damage the nuts. The farmer has prepared the *machan* in the areca nut field itself by utilizing the areca nut stem and wood. He also constructed low cost shed using locally available materials for drying areca nut. After harvesting the nuts, the farmer dried them on the *machan* for better drying in direct sunlight. For protecting the dried nuts from rain he used to cover it with polythene.

Practical Utility of Innovation

After 50 percent drying in the field he transferred the nuts into the shed for complete drying. The main advantage of drying nuts in low cost shed is that it protects directly from rain, reduces the nuts damage, easy drying and frequent care is not required. After complete drying it is easier for dehusking the nuts. The farmer found it more suitable and convenient for drying more number of nuts at a time. The quality of the nuts was better in machan drying than that of open drying on ground which gives a higher return.

Economic Value:

Machan drying facilitate better aeration and avoids moisture absorption in the floor drying which result in about 20-25% saving in the time to dry. As a consequence of better drying and avoidance of repeated moisture contamination which happens in the floor drying, the quality of *challis* (Kernel of the nut) improves upto 10-15%.



Machan for areca nut drying

Low cost house for drying areca nut





Wooden Dibbler: Vegetable Planting Made Easy

Shri Vikash Gayen

R K Gram Village, N & M Andaman District

Profile

Age	:	45 yrs
Education	:	12 th
Land holding	:	1.2 ha
Crops grown	:	Paddy, Pulses, Vegetables.
Livestock	:	Poultry, duck, cattle.

Description of Innovation

For planting vegetables after preparing fine seed bed, small pits are made with spade for planting saplings which requires much of labour and consumes time. Shortage of labor during the peak hours aggravates the problem further. To mitigate this problem, Shri Vikash Gayen invented a simple device called “wooden dibbler” from a wooden pole which is locally and easily available in all farmers’ field. The dibbler – a wooden pole of around 120-140 cm height and 18 cm girth make knock like pencil (10 to 12 cm) at one end. With the help of this device small holes are made make small hole in to the prepared field/ ridges very easily and the tender saplings are transplanted.

Practical Utility of Innovation

Making holes/pits by the dibbler is much easier than that of spade work. During peak hours, due to unavailability of labour, planting of vegetables gets delayed and farmers have to incur economic losses. Apart from this, dibbling is energy efficient then spade work and thus enables farmer to do more planting work per unit of time.

Economic Value:

As per farmers’ observation, the energy requirement of dibbler is half than that of spade work thus reduces labour cost and time by up to half which is reflected directly in cost of cultivation. Mortality of sapling also reduces from 30% to 20% in the field.



Wooden dibbler



Dibbler on ridge



Saplings on ridge



Tackling Problem of Banana Suckers: Drum Push Way

Shri Kartick Mondal

Karakachang Village, South Andaman District

Profile

Age	:	52 yrs
Education	:	6 th
Land holding	:	2.1 ha
Crops grown	:	Vegetable and Banana
Recognitions	:	Best Innovator (Farm innovators Day - 2012).

Description of Innovation

Generally, after three months of banana planting daughter plants or follower come up in 5-8 numbers and they compete with the mother plant for nutrients, resulting in lower bunch weight. Periodically these suckers are removed six times in a crop year. To reduce the above problem, Shri Karthik Mondal developed a device called "wooden drum push" made from a piece of wooden plank (15 cm length, 10 cm breadth and 5 cm thick) around 250 g weight by making a hole in the centre for fixing the handle (5cm diameter) of 1.5 m. length.

Practical Utility of Innovation

After crushing the suckers no further sprouting take place and the problem is solved in one go. The device is very light and comfortable to handle.

Economic Value:

The time and cost of labour incurred in removing the suckers has been reduced by this device up to 1/6th level. As the energy wastage is arrested which otherwise was to be taken up by the suckers gets converted into banana fruiting. It leads to quality enhancement of fruits, thereby farmers get premium in the market upto 10-15%.



Cutter suckers farmer



Wooden weight device



Suppressed suckers farmer



Grafting of Sapota on Saline Resistant Root Stock: A Miracle

Shri Shyampada Roy
Billy ground, N & M Andaman District

Profile

Age	:	48 yrs
Education	:	8 th
Land holding	:	1.2 ha
Crops grown	:	Arecanut, Coconut and fruit crops
Livestock	:	Poultry, duck, cattle.



Salt resistance sapota root stock

Description of Innovation

Agro climatic condition of these islands are ideal for Sapota (Chiku) cultivation and also there is market for that. Generally sapota is grafted on the root stock "Rayan" (*Manilkara hexandra*) but these species are not found in these Islands. Shri Shyampada Roy, a farmer from Billyground discovered a similar root stock called "Sea mohwa" (*Manikara littoralis*) which is saline resistant commercial forest tree, grown in the coastal sea areas of Andamans. Shri Shyampada Roy collected two wild species i.e Poon (*Calophyllum inophyllum*), and Sea mohwa (*Manikara littoralis*) from the forest of the middle Andaman and neighbouring areas. He sowed two thousand seeds of the above two species in his nursery and started grafting by collecting scion from his home stead. Today he has become as a role model on plant multiplication and also known as a father of plant nurseries in the village. This species will be the next generation rootstock of sapota for the farming community of this universe.

Practical Utility of Innovation

In coastal areas no root stock is available for grafting of sapotas. So, Andaman & Nicobar Administration Imports about 4000 plants annually. Local availability of root stocks will pave the way for commercial intensive sapota cultivation and farmers will not have to depend upon imported stocks.

Economics Value :

By locally available root stocks, the import of root stocks worth Rs. 7,200/- per year can be avoided. This import substitution will have impact on islands agro-economy and will improve the availability of sapota in the island. Plant quarantine issues which are involved in import of planting materials will also be avoided. Sapota can also be introduced into coastal areas. It will be a great step towards revolutionizing the island agriculture.



Poly Nursery For Raising Vegetable Seedlings

Shri Mahadev Majumder

Village-Jaipur(Billi ground), N & M Andaman District

Profile

Age	:	44 yrs
Education	:	Graduation
Land holding	:	4.0 ha
Crops grown	:	Paddy, green gram, vegetables, coconut & areca nut
Livestock	:	Backyard Poultry, goat, duck, cow, fish.

Description of Innovation

Fragile ecosystem and unpredictable rains has emerged as a great challenge for the vegetable production in these Islands. The availability of vegetables in the Andaman & Nicobar Islands is greatly affected by rains. Farmers generally raise the seedlings in nursery bed in open condition. Many seedlings are damaged due to heavy rainfall, insects and pest attack. So Shri Mahadev Majumdar, a progressive farmer from Billi ground started vegetable nursery (Brinjal) by using small poly bag in his court yard to get early vegetable when the rice is harvested. The farmer raised the seedlings of vegetables in poly nursery. Individual seeds are raised in small poly pack which minimizes the seedling damage.

Practical Utility of Innovation

“Early birds gather more worms” like that farmers want to send their vegetables early to the market to catch more money. For that, this farmer has devised the poly nursery for vegetables. The farmers do not have to wait for stopping of rains to get seedlings. Now the vegetables can be planted very early.

Economic Value:

The innovation has made possible to produce vegetables earlier than what it used to be in the Andamans, thereby, the farmers can get the offseason price in the market which is atleast 20% higher than the seasonal price.



Poly nursery for seedlings





Cotton + Gur: Indigenous Way of Controlling Rat and Squirrel in Plantation Crops

Smt. K. Chellammal

Village-Rangachang, South Andaman District

Profile

Age	:	58 yrs
Education	:	3 rd
Land holding	:	2.0 ha
Crops grown	:	Arecanut, Coconut and fruit crops

Description of Innovation

Rats and squirrel damage upto 35-50 % nuts every year and the traditional control measure of wrapping of polythene sheet to the palm tree do not prove successful. So, Smt. K Chellammal, made garlands of cotton ball (marble size) by wetting in molasses or sugar syrup and ties up to the palm tree. When the rats climb up the palm, they chew the sweet cotton ball and swallow it which suffocates their respiration system.

Practical Utility of Innovation

The practice of wrapping of polythene sheet to the trunk is expensive and not producing the desired results. That practise will be replaced by a control measures which reduces the damage significantly. The material used in the innovations is commonly available in the rural areas. It will control the damage and increase the production of plantation crops.

Economic Value:

The damage of nuts due to rats and squirrel attack which goes upto 50% gets arrested. The treatment by this (gur + cotton) innovation costs about Rs. 5 per plant where as traditional chemical control costs about Rs.25 per plant. This leads to healthy and environmentally safer production which will help achieve the goal of making these islands as "Organic Islands".



Damaged coconut and cotton and gur treated palm





Eco-Friendly Bamboo Straw for Drinking of Juices

Shri Budwa Lakra

Bakultala, Rangat, N & M Andaman District

Profile

Age	:	48 yrs
Education	:	7 th
Land holding	:	1.0 ha.
Crops grown	:	Bamboo and fruit crops.

Description of Innovation

Now a days drinking of juices and coconut water with plastic straw is very common. It is not available in remote villages and islands. It is also not suitable to eco-tourism concept because these are inimical to the environment. Bamboo (*Schizostachyum spp.*) which is commonly found in the forest of Andaman and Nicobar Islands is favoured for this purpose because of the uniform size with a diameter of 2-3 cm and length of 28-30 cm. Shri Budwa Lakra proved this bamboo straw as an alternative to plastic straws.

Practical Utility of Innovation

Creating sustainable employment and brightening the prospects of farming in the islands, it is necessary to find out the practical utility of the innovation. The Popular use of bamboo straw for drinking purpose will lead to employment generation and strengthening backward as well forward linkages.

Economic Value:

The collection of bamboo straw in rural areas can provide an economic opportunity to the tribals. The use of bamboo straw will help establishment of secondary and tertiary economic activities in the rural areas of these islands. Avoiding usage of plastic and medical expenses on the teeth health of the masses will be an immense contribution towards ecology and economy of the islands. It will also help these islands in achieving the goal of organic islands.



Bamboo straw



Cutting plier “Jugaad” – Alternative Arecanut Dehuskar
Shri Gourango Mistry
Radhanagar, Havelock, South Andaman District

Profile

Age	:	34 yrs
Education	:	IX
Land holding	:	10 Bigha
Crops grown	:	Arecanut and fruit crops.



)

Description of Innovation

Till now there is no proven technology for de-husking of arecanut among the farmers of Andaman and Nicobar Islands. Traditionally, arecanut husk is full drying and nuts are recovered using a sword. This is very risky and dangerous to hands and figures.

The quality of nuts also observed to be sub-standard. Shri Gourango Mistry developed a device for removing the husk of the dried arecanut by using cutting pliers made from a piece of iron weighing 150-200 gm each. He fixed the pliers in to a cut of wooden beam so that it can't move while working.

Practical Utility of Innovation

This equipment has increased the work efficiency, smoothness and its speedier. Today every farmer is trying to adopt this equipment. The dehusking in arecanut is a major problem and it requires a lot of labour. By the development of this equipment, the efficiency has increased to a large extent. It is very smooth to dehusk the nuts and it is speedier as well. The risk of injuries to the fingers to mitigated.

Economic Value :

The machine is so efficient that nearly 50% time is saved in dehusking the nuts and the work efficiency increases significantly. The inner chalis remains protected in the process which fetches around Rs.20/Kg higher price in the market. Avoidance of injuries is a huge economic benefit of this innovation which is very difficult to quantify.



Post Harvest Management of Coconut: Way to Avoid Unwanted Sprouting

Shri Mosses

Village- Mus, Elsah Tuhet, Car Nicobar, Nicobar District

Profile

Age	:	34 yrs
Education	:	IX
Land holding	:	10 Bigha
Crops grown	:	Arecanut and fruit crops.

Description of Innovation

In Nicobar, most of the coconut plantations are very dense because people here never try to collect the fallen mature nuts timely from their field and they germinate and convert the field into dense coconut forest and it becomes breeding ground of insect pests, and give poor yield. Shri Mosses a tuhet leader tried the forest vine in to the two coconut palms and hang the nuts one by one in to the rope.

Practical Utility of Innovation

The innovated techniques enhances the quality of the nuts and help them dry properly and easy for dehusking. It facilitates collection and transportation of nuts as and when required.

Economic Value:

The timely collection and storing of nuts helps to maintain plant population and checks the field in becoming a dense jungle, thereby, it improves the productivity. The copra quality degradation due to spoilage of nuts and their sprouting is arrested and help get better price in the market. The nuts lying in heaps on the ground are damaged by pigs (upto 10%). It is really a novel way of sustaining commercial coconut farming.



Hanging coconut farmer



Nut on rope farmer



Coconut forest farmer



**First Time Intensive Vegetable Cultivation in
Nicobar**
Shri Lionlad
Village- Chuk- chuka, Car Nicobar, Nicobar District

Profile

Age	:	52 yrs
Education	:	6 th
Land holding	:	0.3ha.
Crops grown	:	Vegetable and coconut
Recognitions	:	Best Farmer (ITF-2012)

Description of Innovation

Generally, Nicobarese tribal are not much fond in leafy and fruit vegetables but they prefer root and tuber crops. They do not have the culture of vegetable cultivation in their backyard as well as under coconut areas. Lack of knowledge on vegetable cultivation and its management practices are the main identified problems for them. Among the tribal community Shri Lionlad used his court yard and small area (two Bigha) under different vegetable cultivation by making live fencing to protect from stray Pigs and cattle. He grows different types of vegetables like dolichos bean, cow pea, amaranths, radish, okra, chillies and tuber crops in the same field with different technologies. Collected decomposed leaves from the forest and mixed into the prepared land and put all three seeds like cucumber, ridge gourd and sponge gourd in every single pit. It is not required to prepare separate plot for three crops. It saves his family time and choice of the vegetable are also not far from his kitchen.

Practical Utility of Innovation

The Nicobari tribe will also learn the intensive vegetable cultivation that will contribute in improving their nutritional and their economic security.

Economic Value :
It helps to provide different vegetables in different seasons and help in establish market for the vegetables. Land utilization efficiency in this system goes up to 300%.



← **Three cucurbits in a hill**

Ridge gourd /sponge gourd/cucumber →





Coconut Shell: A Safe Storage for Vegetable Seeds
Self Help Groups of Tapoimin
Village- Tapoimin, Car Nicobar, Nicobar District

Description of Innovation

The storage of seeds of vegetables in tropical humid climatic conditions of Nicobar island is serious challenge to the tribals. They have used various mean over thge years but few years back the women of tribal group has innovated a mini-storage bin from their local resources. This was 'the died coconut shell'. The small bins are now in common use for storing the seeds of various vegetables in Car Nicobar. The instrument is improved and made in decorative shape by the Self-help group of women of Nicobari tribes. The coconut shell are vacated properly and dried in sun to hard stage. The cap is closed with bamboo piece. The commonly stored vegetable seeds of crops are amaranthus, chillies, brinjal, radish, okra, pumpkin etc.

Practical Utility of Innovation

This container is very handy and easy for transportation from yard to field. The women are very comfortable for using it for the storing the seeds and using its decorative property.

Economic Value:

Safe storage of seeds in the shells avoids chemical treatment of seeds which incurs an expenditure of Rs. 5-10 per kg roughly. The longevity of the seeds rises up to two years which is otherwise not more than six months in warm and humid climate. Extra labour put to manufacture these storages incurs no extra cost as opportunity cost of family labour is near zero.



**Coconut Shell:
storing vegetable
seeds**





Bamboo Bin: Self Storage for Tuber Crops in Tribal Area

Mr Robert

Village- Parka, Car Nicobar, Nicobar District

Profile

Age	:	53 yrs
Education	:	10 th
Land holding	:	Tuhet
Crops	:	Tuber crops

Description of Innovation

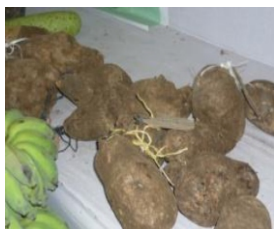
Nicobarese by tradition prefer tuber crops and also conducts tuber crops fare or festival as '*Bada din*' every year. The commonest type of yam store in Nicobar is the yam barn. Basically it consists of ring walls of vertical pieces of bamboo, each 5-10 cm in diameter, one meter high and set about half meter diameter. The vertical wall is often made of split bamboo. It is considered that this will reduce the risk of attack by termite. Inside the barn the tubers may put individually, vertical wise or arranged to allow maximum air circulation.

Practical Utility of Innovation

Storage life of tuber crops is very less in warm and humid climate. The bamboo bin enhances the storage life significantly. The products are kept safely without foul smell for longer duration, up to six month and it enables the product to be marketed in good quality.

Economic Value:

Enhanced storage life enables the product to be sold up to six months in the market thereby earning a premium of more than 25%. The loss due to pests and rats etc which occurs up to 20% can be avoided by this innovation.



Nicobari Alu farmer



Storage of Nicobari Alu in bamboo cage



Storage of Nicobari Alu in wire net

Indigenously Developed Fishing Gears and Crafts for Efficient Fishing

Shri Nasir Hussain

Village-Teetop, Car Nicobar, Nicobar District

Description of Innovation

The saying 'necessity is the mother of invention' is well reflected in fishing crafts and gears developed by these tribal fishers. The tribal of this island mostly uses traditional fishing gear for capturing fishes which includes spears, harpoon, plant poisoning and also employing hook and line, cast net gill net, troll line and long line with few hooks. The Nicobari tribal well known for their craftsmanship and as per fishing craft is concerned, they build their own fishing craft *Hodi* (Out rigger Canoe) by cutting the locally available trees (*Kattal etc.*) could able to venture into sea frequently. They were fishing for 10-15 days during calm season and not more than 5-10 days during the offseason. For rest of the time, they were fishing in near shore, shallow, coral reef, rocky area by melting of lead sinkers in a pan using fire wood and fixing of thin iron wire in the readymade mould (which gives a hole, the way for tying line). They poured the melted lead in the hole of the iron or clay mould. Then leave undisturbed for 15 minutes for make sinker hard and shape .Remove sinker from the mould. Put it in the water bucket to cool the sinker.

Practical Utility of Innovation

The development of indigenous fishing gears and crafts is the innovation which enables for fishing in deep sea. Employment has been generated as the fisherman can be engaged themselves during high tides and off season as well.

Economic Value:

The innovation helps employment generation. The employable man-days are increased to more than double for fisherman by using this novel technique of fishing. The innovations has potential to exploited commercially as a result of which backward and forward linkages will be established and that will be enormous contribution to fish economy of this islands.



Melting of lead
farmer



Pouring melted
lead in iron mould
farmer



Clay shaped
mould structure
farmer



Farm Fencing With Corals Tuhet System, Car Nicobar, Nicobar District

Description of Innovation

In Nicobar, bricks or stones are to be imported to erect a wall. To protect their farms, the tribals have devised a cost effective way of fencing the farms. They used dead coral for fencing and found it strong enough to protect from animals and has much longevity.

Practical Utility of Innovation

Easily available dead corals can be used for protection of crops and house hold items from wild animals and pigs. It is much needed in Nicobar.

Economic Value:

Huge Expenditure is avoided by using the material for erecting walls and fencing. Also the cost incurred in transportation of building material from other islands to Car Nicobar is avoided.



Dead coral fencing



Chelorodendron spp. : Pest Repellent Plant for Rhinoceros Beetle

Shri S. Alfril

Village- Arong, Car Nicobar, Nicobar District

Description of Innovation

As coconut is the major crop in the region, any improvement in the income from the coconut holdings would directly help majority of the population to improve their standard of living and make coconut palm into “Tree of Life for Nicobarese. The scenario of the Post Tsunami reflects that most of the coconut trees are affected by the Rhinoceros beetle because of death of palm and debris nearby the coconut area. In pre Tsunami there was no report of Rhinoceros beetle damage on coconuts. Sh. S. Alfril reported that wherever *Chelorodendron spp.* was growing there was no attack of Rhinoceros Beetle. The plant is a repellent for Rhinoceros Beetle.

Practical Utility of Innovation

The cause Damage due to Rhinoceros Beetle can be contested has been discovered and its repellent plant spp. has been discovered the yielding Car Nicobar can be sustained.

Economic Value:

Rhinoceros Beetle attack damages the plant and yield is reduced upto 50 per cent. The innovation of repellent plant (*Chelorodendron spp.*) will help to check this yield loss.



Chelorodendron spp.

Low cost Trap with Aggregate Pheromone Lure
Shri Ashim Kumar Sarkar
Neil Island, South Andaman District

Profile

Age	:	38 yrs
Education	:	12 th
Land holding	:	1.1 ha
Crops	:	Coconut, arecanut
Livestock	:	Cattle, poultry



Desi pheromone trap

Description of Innovation

Scientists have persuaded the farmers to use pheromone traps and beneficial insects in vegetable fields to control harmful pests naturally, but neither the scientists nor the government so far ensured sufficient supply of those inputs. The Magic Traps are popular among farmers in Neil Island of Andaman and demands for those have increased very quickly. But ironically the supply is so little that farmers face problems in practice this novel device for controlling pests in a natural, environment-friendly, safe and secured way to boost crop production. Skillfully sh. Ashim collected unused empty plastic bottles from the roadside and made them as container to keep the lure inside.

Practical Utility of Innovation

The innovation has replaced chemical control of insect pests by utilizing locally available material (plastic bottles). It helps minimise insect population and protects eco-balance.

Economic Value:

Chemical control for 1 ha. Crop costs at least Rs. 500/- whereas this pheromone lure in a bottle costing only Rs. 60.0/- attracts male insects and kills. The modern insect trappers for 1 ha area will cost more than Rs. 300/-

Hollow bamboo: A Technology to mitigate water stress

Shri Bimal Chander Gyan

Village- Govindpur, N & M Andaman District

Profile

Age	:	53 yrs
Education	:	8 th
Land holding	:	1.2 ha
Crops grown	:	Paddy, vegetables, banana & arecanut
Livestock	:	Cattle



Hollow bamboo irrigation

Description of Innovation

The vegetables are predominant source of income in post-paddy period. But water scarcity poses serious challenges and causes great losses to productivity of vegetables which is around 7.0 t/ha, just around half of the national average. The clay loam soils show crack very early in water stress situation in tropical climate of island during dry period. To mitigate the water stress Sh. Bimal Chandra Gain, has devised a novel technique of micro-irrigation. He inserted a hollow bamboo (1.5 feet length, 1.5 inch dia.) adjacent to the chilli plant. Instead of normal practice he poured the water (1 lt) in the pipe. It takes 3 hrs for water to release into root zone through the pipe otherwise it would have been leached down immediately. With this process he is irrigating the chilli crop at 4 days interval.

Practical Utility of Innovation

The successful example of irrigating the chilli crop with very limited quantity of water at 4 day interval indicates its potential to irrigate cucurbits, tomato, brinjal, capsicum etc. Normally, furrow irrigation is given at 3 days interval in chilli cultivation in island conditions whereas this innovation has extended the irrigation interval by one day and also used very less quantity of water than furrow irrigation. Both points support the case for up scaling of the innovation to other farmers and crops for efficient utilization of water during dry period.

Economic Value:

The plants produce around 10-15 per cent over the furrow irrigation which contribute in monetary returns of the farmers. The labour requirement is more in this technology which is more than offset by higher production water require also gets reduced by 25% and so is the cost of irrigation to the vegetables. Water use efficiency is increased significantly.



Indigenous Coconut Grater: Tool for Coconut Industry Car Nicobar

Description of Innovation

Nicobares youth have perceived the well the making potential of coconut products and potential of coconut products and started taking up the secondary activities in the coconut farming in their own way. They have devised a novel way of extracting virgin coconut oil. They got an idea to explore the spiny nature of locally grown wild palm 'Kuniyal' for the purpose and developed the process for the same. In this process, the milking stage coconut is cut into handy pieces and subbed against spiny strand of wild palm. It results in very nice shred and virgin coconut oil simultaneously in the shredding plate.

Practical Utility of Innovation

The shreds are being used in household and for local marketing in packets. The shreds also have utility in making various household sweet dishes and confectionaries. The process produces coconut virgin oil in small quantity which they are using for home purpose. This can also be upscaled for Tapioca as well.

Economic Value:

The innovation can be upscaled for the benefit of tribal youth through government sponsored schemes in Coconut Mission or National Horticulture Mission. This has potential in generating employment opportunities for youth and farm women of the islands. The grater machine costs at Rs. 350/- whereas this indigenous grater costs nil.



Women Empowerment through Broad Dhaniya

Smt. Selin Rani

Village- Macca Pahad, South Andaman District

Profile

Age	:	37 yrs
Education	:	10 th
Land holding	:	3.5 ha.
Crops grown	:	Coconut, arecanut, Burma dhania
Recognitions	:	Best Farmer Award 2011 Kisan Mela

Description of Innovation

Broad dhaniya is an indigenous leafy vegetable in the islands which grow well as intercrop in coconut and arecanut plantations. It is one of the highly remunerative components in Integrated farming system. To utilize the interspace between coconut and banana plantation Smti. Selin Rani collected broad dhaniya seedlings from CARI and planted in upper side of the sloppy field. She followed natural practices of agriculture besides using vermicompost and *Panchgyava* and frequent weeding. She frequently watered the down side area and for better germination and growth of broad dhaniya. This resulted in appearance of a prospective crop having great economic impacts.

Practical Utility of Innovation

The innovation indicates potential of utilizing the vast area under plantation crops for their economic and eco-friendly utilization. The innovation also showed the way for promoting the indigenous vegetables of these islands.

Economic Value:

By growing this crop in interspaces of plantations has resulted in additional income of around Rs. 6000/- per ha per month. Broad dhaniya is a surface covering crop which reduced soil erosion to great extent in slopes. Its cultivation improve the soil heath by maintaining proper soil moisture for microbes and chemical reactions.



← Broad Dhaniya under plantation

Broad Dhaniya seed
production →





Bilambi Pickle for Household and Local Market

Shri Sampad Roy

Village- Billiground, N & M Andaman District

Profile

Age	:	48 yrs
Education	:	8 th
Land holding	:	1.2 ha
Crops grown	:	Arecanut, Coconut and fruit crops
Livestock	:	Poultry, duck, cattle.

Description of Innovation

Bilambi is an under- utilized perishable fruit, rich in vitamin C and available in plenty in these Islands. The fruits are thrown as waste due to its limited use. The farmer Sampad Roy prepared pickles both sweet and salty type in his home using indigenous knowledge without addition any chemical preservative. The pickle can be stored for 4-6 months without any contamination and spoilage. He prepared the pickle from raw bilambi fruit by adding with oil, salt, sugar, spices like mustard, cumin seed, garlic, ginger and black pepper in it.

Practical Utility of Innovation

Pickles are consumed frequently in households. The quality of the pickle is very good and also has demand in the local market. It provide employment despite of providing gainful employment to the womenfolk.

Economic Value:

Due to its demand, he used to prepare the pickle in large scale and sold it to the local markets and hotels in his locality. He sold the pickle at Rs. 200 per kg. During the season, besides his home consumption he earned Rs. 2000-3000/- by selling the bilambi pickle in the local market.



Bilambi fruit

Indigenous Way to Artificial Pollination in Sweet Gourd

Shri Khitish Mondal

Village- Manglutan, South Andaman District

Profile

Age	:	49 yrs
Education	:	9 th
Land holding	:	2.1 ha
Crops grown	:	Paddy, Vegetables, Arecanut.

Description of Innovation

Shri Khitish Mondal developed a novel technique of artificial pollination by plucking male flowers, removal of petals, collection of pollens by hammering with a wooden stick in a glass, diluting with water, sieving using a net and pollinating female flowers by putting a drop of solution using dropper. In rainy season, plucking of male flower buds is done in the afternoon and these are kept overnight in water and plants are pollinated in the morning when the weather is favorable.

Practical Utility of Innovation

The artificial pollination has the potential to increase the yield of sweet gourd significantly and potential to extend this technology to other crops as well. The innovation help generate employment to a large extent.

Economic Value:

Yield is 3.1 times higher when artificial pollination is practiced. Gross return is Rs. 2,57, 000 per acre with an additional cost of Rs. 37,000 towards labour cost for artificial pollination (5 persons/ family-members/children @ 1.5 hours per day acre required for pollination). Fruit setting is better, size is good and weight of the fruit is more 70% 18-20 fruits weigh one kg.

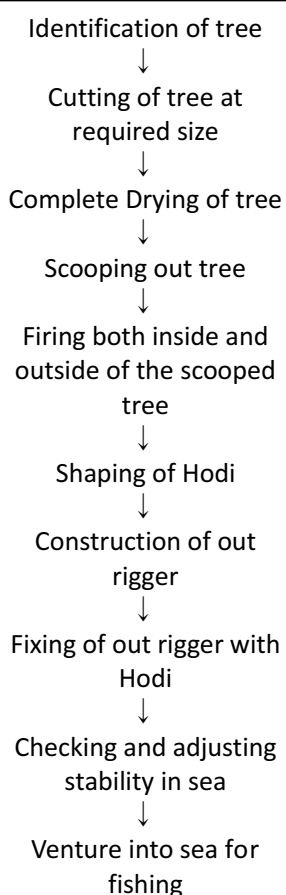


Sweet Gourd fruits

Hodi : A Desi "Jugaad" for Efficient Fishing

Car Nicobar, Nicobar District

Description of Innovation



The out rigger canoe (*Hodi*) is a traditional craft used by the Nicobari tribes for long time which is having out riggers like fan, used for stability purpose. This *hodi* is made of single log by scooping out the wood. Generally they are firing the log repeatedly both inside and outside of the scooped log for making Hodi light in weight, strength, dry and hard. Most commonly used log is *kattal* (Jack fruit). The Nicobari tribes of this island are working together for making of a hodi and to construct a *Hodi* they takes even month time. Following is the construction procedure for making *Hodi*

Practical Utility of Innovation

As fishing is most common profession and commercial boats are very costly, the community, 'Nicobarese' have devised this *jugaad* for fishing purpose and transportation. It has applicability in everyday life and to support the livelihood of Nicobaris.

Economic Value:

The *hodi* solves the purpose of transportation and fishing activities, thus proves to be an alternative to boats. So much money is saved which otherwise would have been invested in purchasing boats.



Scooping out a trunk of tree



Shaping of tree by Nicobarese



A Constructed *Hodi* came with fish catch

Bamboo Tongs and Jute Sack used by Nicobarese for Catching Crabs Car Nicobar, Nicobar District

Description of Innovation

In Car Nicobar, during the beginning of South-west monsoon, a huge quantity of crabs starts moving towards sea for breeding and is being harvested. Enormous quantity of crabs comes from the jungle to road side. These crabs are collected during night in large numbers and consumed by the Nicobari tribes by their own preparation method like crab soup, steamed crab, crab gravy, crab pickle etc. They collect live crabs by bamboo tongs made of thin bamboo covering the hands with a piece of Jute sack. The picked up crabs are stored in a jute sack, transported, cleaned, boiled/steamed/prepared different types of dishes and consumed.

Practical Utility of Innovation

The innovative method of catching the crabs has wider applicability for employment and income generation. It contributes to health of Nicbarese. It protects the people from crab bites and injuries. The method has been practiced by the tribe as a whole.

Economics Value :

The nutritional value of crabs is enormous and it is the high-value food which Nicobarese consume. The innovation has the potential of taking shape of major economic activity in the Car Nicobar.



Hand covered with
jute sack



Collecting the crab by
using bamboo tongs



Crab collected by hand

Kewada Dish: A Nutritious Food for Nicobarese Car Nicobar, Nicobar District

Description of Innovation

The mature kewada (Fruit of *Pendanus*) is harvested from the jungle or garden. Then the fruit is broken into pieces by the axe. The pieces are then boiled and cooked in water for 4 to 6 hrs. The boiled fruits are cooled and the pulp is removed by scratching with blunt object. The pulp is made to dough and the fibres are removed by threading. Then the kewada dough is wrapped in wild areca leaf and steam cooked for 2 hrs. The kewada dish is ready to serve. It can be kept for one to two days in ambient temperature and upto one week in refrigerator.

Practical Utility of Innovation

The kewada dish is one of the staple foods for Nicobarese and they really relish it. It is having high energy content and it has supported life of the tribe along with other food material available locally from time immemorial. This dish is important to sustain life in adverse conditions. This Kewada dish can be made into other sweets and confectionaries by adding different flavours and other ingredients.

Economic value:

It is sold at high rates during festivals and supplements farm income upto 10-20% of those who engage in its processing.



**Kewada
enveloped in
banana leaves**



Kewada pulp

Feeding Trough for Pigs in Nicobar Car Nicobar, Nicobar District

Description of Innovation

The Nicobarese feed their Pigs with coconut and kitchen waste in the morning and evening hours. They make the feeding trough by carving wood by the use of axe and other implements resembling boat shape. Some of them also use Bamboos for this purpose. They split piece of large bamboo into two equal half and use it as feeding trough for animals.

Practical Utility of Innovation

The feeding trough thus prepared is used for providing feed to the animals. It can be cleaned easily and made with locally available materials. It helps the tribal farmers with an option to provide clean feed to the animal minimizing feed waste. The farmers having backyard or small farms can use this technique to make feed trough by themselves from locally available materials for minimizing cost.

Economic value:

The construction cost of feeding trough is enormous in Nicobar due to non-availability of materials and high cost of labour. The innovation helps in saving this cost of materials and provide very cost effective local feeding trough.



Feeding process and equipment for pigs

Bamboo Drum for Signalling Pigs: A Unique Nicobarese practice

Car Nicobar, Nicobar District

Description of Innovation

A small Piece of bamboo with two nodes having medium to short internode length is cut to make a slot in the internode making it more audible during beating. One small piece is left attached to one of the node which serves as handle for holding it during beating. One stick is also kept with it for beating this bamboo drum.

Practical Utility of Innovation

The Nicobarese rear pigs in extensive system and only provides feed once in a day or in alternate days. For feeding the pigs the bamboo drum is beaten in different rhythms, unique to individual farmers. This gives signal to the pigs of particular farmers that it is feeding time. The pig spontaneously comes at feeding site.

Economic value

It saves on the management time of the farmer and increase the production as the feed is given timely to the pigs. It saves time upto 20-25 per cent of management.



A Nicobari using bamboo drum for signaling pigs

Ear Notching practice for Identification of pigs by Nicobarese

Car Nicobar, Nicobar District

Description of Innovation

During the grower stage, the ears of the pigs are notched at different positions in varied sizes and shapes. The pigs are the asset of Tuhet (consisting of a number of families of relatives with a Head) as pigs are fed coconut from the coconut plantation owned by the Tuhet. Hence, the individual farmer has no right over the pig. The individual tribal farmer needs to get necessary permission from the Tuhet head for doing anything with the pig. The pattern of ear notching varies and each Tuhet has its own pattern of ear notching for identification of pigs.

Practical Utility of Innovation

The Pigs enjoy a special status in the social life of Nicobarese. The ear-notching practice followed by Nicobarese makes it possible to identify from which village and Tuhet the pigs belong. This practice avoid dispute regarding ownership of pigs among them.

Economic value

Identification of pigs with the particular village/tuhet facilitates a bonding between tuhet members and animal. It results in better caring, feeding practices and overall economic value of pigs.



A Nicobari pig with notched ear

ITKs in Dairying and Animal Husbandry

ITKs in Dairying and Animal Husbandry

1. Foot diseases in cattle

Sl. No.	ITK identified	Description
i.	Application of Betel-nut leaves extract	The leaves of Betel-nut (<i>Areca catechu</i>) are soaked well in water and applied to the affected area to cure foot diseases for 7 days.
ii.	Application of common salt on affected part	About 20 g of salt is dissolved in 1.0 L of water, then heated up and applied on the affected areas.
iii.	Applying salt water with potash	Salt water prepared by 100 g salt with 1.0 litre water is applied with potash (50g) on the affected areas.
iv.	Applying mud	The infected animal is allowed to remain in mud for three days and foot disease gets cured.
v.	Application of jack and Neem cake for FMD	Leaves of jack and neem bark are boiled in 2 liters of water until it becomes 1 liter. Half a liter of this decoction is given orally for 2 times

2. Retention of placenta

i.	Feeding bamboo leaves	Raw bamboo leaves are given directly to cattle or chopped and mixed with feed and given.
ii.	Feeding bottle gourd	Boiled Bottle gourd (approx. 1 Kg) is mixed in feed and given to animals once a day.
iii.	Feeding rice	Boiled rice(100-200 g) is given to cattle two or three times or till placenta is released.
iv.	Feeding coconut	A crushed coconut is given twice daily to animal along with feed
v.	Feeding paddy with onion	Paddy (0.5 kg) mixed with 4-5 small onion plant and fed to animals
vi.	Feeding the leaves of gular	Gular (<i>Ficus racemosa</i>) leaves (1-2 kg) is given to animal directly or along with the feed for the release of placenta.
vii.	Feeding Bottle	Two bottle guards along with 1.0 kg gur is fed to the

	guard and gur	animal 2-3 times.
viii.	Feeding the leaves of <i>Mangifera indica</i> .	The leaves of <i>Mangifera indica</i> are fed directly to the animal or along with the feed.

3. Increased body weight and milk production

i.	Feeding flesh of Dhamen snake	After removing the head portion of <i>Dhamen</i> snake and clearing the skin of whole body, body is boiled in water and bones are removed. Then a paste is made by adding jeera and kacchi haldi (raw turmeric).. The mixed supplement is then boiled again as a thick mass and given to animal.
ii.	Feeding jaggery with bottle gourd	Boiled 50g jaggery with 2 kg bottle gourd and given daily to animal for one week.
iii.	Feeding of sweet potato	<i>Sweet potato</i> leaves mixed with feed and daily to the animal.
iv.	Feeding of <i>Eclipta alba</i> (kesraj)	<i>Eclipta alba</i> mixed with feed and given to animal for 10-15 days..
v.	Feeding of bhui amla	<i>Phyllanthus nirui</i> (bhui amla) mixed with feed
vi.	Feeding of leaves of tapioca and ground nut	Tapioca leaves (handful) and ground nut leaves are mixed in equal proportion and given to animal for week with feed.
vii.	Feeding of <i>Mimosa pudica</i> (chhuimui)	Dry the whole plant of <i>Mimosa pudica</i> in shade and give it to the animal with feed.
viii.	Feeding of pulp of bael fruit	Cooked the tender Bael fruit in a low flame and take out the pulp and separates the seed after that prepare the juice of that pulp and fed the animals weekly ones.
ix.	Feeding of hadjor with	<i>Cissus quadrangularis</i> (hadjor), kacchi haldi, and jeera are mixed well and fed to weak animals for a period of 7-10

	haldi and jeera	days. The health of animal recovers significantly.
X.	Beetal leaves and Arecanut improve digestion of animals	For preventing indigestion in dairy animals, beetal leaf and nuts of arecanut are crushed well, mixed and given to the animals. Beetal leaf along with arecanut nut enhance the digestion.

4. Broken horn

i.	Applying leaves of <i>Weedelia biflora</i>	Leaves of <i>W. biflora</i> are crushed, macerated and applied on the wound for 2-3 times a day until it gets healed.
ii.	Applying crushed tobacco leaves with lime	Tobacco leaves are crushed and mixed with lime. The paste is applied on the affected areas and covered with a bandage.
iii.	Applying crushed tobacco leaf with salt lime	One Tobacco leaf, 1-2 scales of garlic, one spoon salt and lime are grinded to paste; this is applied on the wound.
iv.	Applying paste of red sandal, turmeric and mustard oil	A paste is prepared by mixing one spoonful of each red sandal, turmeric powder and mustard oil. The paste is applied on the broken horn.
v.	Applying paste of turmeric, black carbon and neem oil	Turmeric powder, black carbon of lamp and neem oil, mixed together to make a paste. This is applied on the wound.
vi.	Applying paste of lime and sugar with tobacco	A mixture of lime and sugar is applied first. Then, a paste of tobacco leaves and lime is applied.
vii.	Applying mustard oil, salt and neem oil	One spoonful mustard oil and half spoonful salt are mixed and applied on the wound and covered by cloth bandage. Neem oil is occasionally poured on the bandage which heals the wound and repels the flies.
viii.	Applying paste	Battery carbon, petrol and dry tobacco leaf are grinded

	of battery carbon, petrol and tobacco	to form a paste and applied twice a day.
ix.	Applying paste of battery carbon with mustard oil	Black carbon from the woven or from burnt vest is applied with mustard oil.

5. Cut and wound

i.	Applying paste of turmeric with alum	A paste is made from raw turmeric and small amount of alum, applied twice a day.
ii.	Applying mustard oil with salt	One cup mustard oil and one spoonful salt are boiled and allowed to cool down. This is now applied on the cut or wound.
iii.	Applying Black carbon with neem oil	Carbon from the old used alkaline battery and neem oil are mixed together to form a paste, this is applied on the wound and covered with bandage.
iv.	Applying paste of doob ghas and ginger with banana.	The flowers of doob ghas and ginger each are grinded to a paste. A small banana leaf is taken and 3-4 perforations are made in it. Now this paste is kept on this leaf and covers the wound with a tight cloth-bandage.
v.	Applying paste of tobacco with white lime and neem oil	The affected area is first washed / cleaned well. One part dry tobacco leaf, 3-4 spoons white lime and 3-4 spoons neem oil are mixed to form a paste and applied on wound. Neem oil is also applied twice a day. This keeps away the flies and also heals the wounds.
vi.	Applying paste of turmeric and mustard oil along with cow dung	First the wound/cut is washed thoroughly with warm water. Then a paste made up of turmeric powder and mustard oil is applied on the cut area. Fresh cow dung is made hot and applied on the injured part and covered by a bandage.
vii.	Applying paste of tobacco leaf	The wound is washed with petrol. The paste made from tobacco leaf and lime is applied regularly till the wound

	and lime	heals completely.
viii.	Applying paste of tobacco leaf with sugar and petrol	The wound is washed with phenyl and warm water. An ointment is prepared by mixing one spoonful of each tobacco leaf powder, sugar and petrol.
ix.	Applying Naphthalene powder	Naphthalene powder (100g) mixed with 100 ml coconut oil or half a litre petrol is applied on the wound.

6. Diarrhoea

i.	Feeding sapota fruit	One Sapota fruit is crushed and fed regularly for 2-3 days interval.
ii.	Feeding leaves of <i>Adhatoda vasica</i>	Leaves of <i>Adhatoda vasica</i> are fed to cattle twice in a day for 2-3 days.
iii.	Feeding bael fruit	Pulp of a green bael fruit is boiled with water and fed to animals 2-3 times in a day.
iv.	Feeding tamarind with chilly, ajowan and salt	50g ajwain, 10 nos. red chilly, 100g tamarind and 100g salt, crushed together with water and given to the animals.
v.	Feeding ajowan, heeng and ginger together	5m ajwain, 1g heeling and 10g ginger, crushed together and given to the animals twice a day.
vi.	Feeding bamboo leaves	Fresh bamboo leaves along with rice husk or one kg bamboo leaves alone fed to animals.
vii.	Feeding seed of gila fruit	One number seed of <i>Entada phaseoloides</i> (gila) fruit is powdered and mixed with water and given to animals.
viii.	Feeding bitter-gourd with banana leaves	The inner white mass of bitter-gourd is crushed and given with banana leaves to animals.
ix.	Feeding pad patti with medhak bahji	Pad patti (<i>Paderia scandis</i>) and medhak bhaji (<i>Centella asiatica</i>) are given together to poultry.
x.	Feeding leaves of bottle gourd	100g bottle gourd leaves are fed for thrice a day.
xi.	Feeding leaves	Each 100g dried bottle gourd leaves and fresh green

	of bottle gourd and green bamboo together	bamboo leaves and fed for thrice in a day.
xii.	Feeding leaves of arum	Three well matured leaves of arum (<i>Colocasia esculenta</i>) are crushed and prepared as round tablets. It is fed 2 times for 7 days to animals.
xiii.	Oral feeding of plant of tamarind	250g of two year old tamarind plant is boiled in water to form a thick mass. This is taken in a bottle and given to the cow.
xiv.	Oral feeding of tamarind and guava	1/2 cup juice each of old tamarind and tender guava leaves together is given to animals.
xv.	Oral feeding of curd	500g Curd is mixed in half liter water and given to animals.
xvi.	Feeding of tald fish	A alive Tald fish (<i>Channa punctatus</i>) is kept hidden within bamboo leaves and the animals is forced to swallow the fish.
xvii.	Feeding of banana flower	Fed directly the inner white portion of banana flower to the animal once a day for two days.
xviii.	Feeding of ash of burnt wood, pipli, salt, turmeric and <i>Acoras calamus</i>	Ash of burnt wood, two buds of pipli, salt, turmeric powder and <i>Acoras calamus</i> mix properly and fed twice a day till cure.
xix.	Feeding of heeng, garlic with rice	Mix heeng, garlic and rice in water and leave it whole night next morning given to the poultry.

7. Muscle pain/injury

i.	Applying paste of booty leaves	Paste of the grinded booty leaves is applied on the muscles.
ii.	Applying paste of leaves of	Leaves of <i>Vitex trifolia</i> are made hot and tied around injured part

	<i>Vitex trifolia</i>	
iii.	Applying paste of neem leaves, mango bark and sumaloo roots	Neem leaves are mixed with bark of mango tree and sumaloo roots. The mixture is boiled and applied on affected portion in cattle.
iv.	Applying paste prepared by burnt rice husk and bottle gourd	Rice husk is burnt to get the carbon. This carbon is grinded with bottle gourd leaves to form a paste. Now the paste is applied on the sprained muscles.
v.	Applying paste of tamarind leaves	Boil the leaves of tamarind in water and give the hot fermentation over the swollen area by dipping a cloth in the water recovery occur within 3-4 days.

8. Tick infection

i.	Applying paste of tobacco leaves	Tobacco leaves are soaked in water for 12 hours and then crushed well and applied to the affected areas.
ii.	Applying paste of lime and salt	Lime and salt (50 g each) are mixed and applied on whole body along with petrol.
iii.	Washing with phenyl	2-3 ml phenyl is dissolved in 1 lit of water and washes the body for 2-3 days.
iv.	Applying paste of ginger, red sandal, black pepper and alcohol	The body is washed with petrol and a paste prepared by using ginger, red sandal, black pepper and alcohol is applied on the affected area.

9. Stomach problems / indigestion / constipation

i.	Feeding tender bamboo leaves with black salt and heeng	When the cattle stops eating, small tender bamboo leaves are crushed, mixed with one spoon black salt and a small amount of heeng (<i>Asafoetida</i>) and fed to cattle.
ii.	Feeding leaves	Leaves (handful) of <i>Bryophyllum pinnatum</i> are fed to

	of <i>Bryophyllum pinnatum</i>	goats to cure indigestion along with other feeds.
iii.	Feeding leaves of patthar kucchi	Leaves (handful) of patthar kucchi fed to goats to cure stomach problems.
iv.	Feeding seeds of <i>Jatropha curcas</i>	Crush one or two seeds of <i>Jatropha</i> , mix with water and given the animals for treatment of constipation in cattle and goats.
v.	Feeding leaves of <i>P. scandis</i>	Give the leaves of <i>P. scandis</i> (pad patti) with feed to control loose motion in goat and poultry.
vi.	Feeding leaves of <i>C. quandragularis</i>	Give the leaves of <i>C. quandragularis</i> with feed to control the constipation problems in goat.
vii.	Feeding the barley with molasses.	Stomach ache due to indigestion is treated by feeding the animals Jowar (barley) along with molasses.
viii.	Feeding one liter of sugar-cane juice mixed with chili dust and ginger	For treating stomach upset accompanied with fever, a medicine is prepared by mixing one spoon chilli powder and macerated ginger (one spoon) in one litre of sugar-cane juice. The solution is kept for sometimes and administered at a dose of 150g per day.
ix.	Feeding leaves of bamboo	A stomach upset accompanied with fever is treated by feeding the bamboo leaves.
x.	Feeding with neem leaves	For stomachache in buffalo, 50g of neem leaves are crushed in water and administered to the animals.
xi.	Oral feeding of sirka with salt	While grazing the animals may sometimes take the insect. In such cases, 100ml fermented sugarcane juice (sirka) and 25g of salt in 100ml water is given.

10. Hump Sore

i.	Applying leaves of bottle gourd	Four Bottle gourd leaves with 30g salt are grinded to paste; this paste is applied thrice for two days.
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ii.	Applying paste of carbon with neem oil	Carbon from the old used alkaline battery is powdered and mixed with neem oil. Applied on the wound twice in a day.
iii.	Applying paste of old vest burnt with neem oil	An old vest is burnt to get the ash. This ash is mixed with neem oil to make a paste and applied on the wound.
iv.	Applying paste of carbon with charcoal and neem and engine oil	Black carbon created by the smoke from the "Chullah" (Woven), charcoal powder, engine oil and neem oil; all are mixed together to make paste and applied on the wound.
v.	Applying paste of carbon of battery with coconut oil	Carbon from the old used alkaline battery is powdered and mixed well with coconut oil to form a paste and applied on the wound.
vi.	Applying grease	Grease is applied once a day till the wound heals. This also keeps away the mosquitoes
vii.	Applying cow dung	The wound is washed with hot water and fresh cow dung is applied after making it hot.

11. Worm infection in stomach

i.	Oral administration of Tald fish	Feed Tald fish (<i>Channa punctatus</i>) to cattle for a week. It kills the entire intestinal worm and animals become healthy within 2 weeks.
ii.	Oral administration of human urine	Keep human urine in Bottle; cover it in cow dung for 10 days, given it to cattle.
iii.	Oral administration of hadjor with turmeris and jeera or chilli	<i>Cissus quadrangularis</i> , turmeric powder and jeera or chilli grind it and give the juice to the animals.

12. Mouth Ulcer

i.	Applying paste of salt with mustard oil	Mix the salt with mustard oil, keep it on banana stem and rub inside animal's mouth slowly.
ii.	Applying paste of neem with mango and sumaloo	Mix neem leaves, mango tree stem bark and sumaloo (<i>Vitex trifolia</i>), boil and applied on affected portion in cattle.
iii.	Applying paste of turmeric with tamrind	Mix turmeric powder along with salt and tamarind leaves and rub on the affected portion

13. Broken bones

i.	Applying paste of hadjora with egg	Stem of Hadjora plant is crushed and mixed with the albumin (white portion) of the egg. This is applied around the affected part. A bandage supported by bamboo splinters to avoid dislocation.
ii.	Applying paste of salt, hadjora, turmeric and alum	Firstly one teaspoon of salt is mixed in hot water and hot compression is given to the broken area with this solution. A paste is prepared by crushing 2 pieces of "Hadjora" stem (each 6 inch long), 100g raw turmeric and 25 g alum. This paste is slightly cooked in 100ml mustard oil and applied little hot around the broken area. Application of hot compression and medicines are repeated until of get healed.
iii.	Applying paste of alum, turmeric and onion	Alum (1 inch), 100g raw turmeric and one piece of onion are ground to a paste. This is then cooked in 50gm mustard oil and allowed to cool. Now white albumin of egg is mixed and heated slightly. This medicine is now applied around the injured/ fractured portion and repeated for some days.

14. Lacrimation

i.	Washing of cattle eye	A man takes a sip of water, stirs well in mouth and sprinkle the water in eye of animal. This is done twice a day and is repeated for 7 days. First mouth wash after wake-up has more impact.
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15. Prevention of diseases

i.	Spraying of lime	Sprayed lime in poultry shed twice a week to control bacterial and fungal infections to prevent diseases.
ii.	Feeding of chilli mixed with rice	Bombay chili (one tea-spoon) mixed with 0.5 kg boiled rice feed to poultry to cure diseases.

16. Tongue sore

i.	Rubbing paddy grains	Paddy grains with salt (2-3 spoon) are rubbed on the tongue in tongue sore.
ii.	Rubbing salt with auram	Salt (2-3 tea-spoon) is rubbed on the tongue with the stem of auram plant for tongue sore.
iii.	Feeding of sugarcane or bamboo	Cattles are fed with sugarcane or bamboo leaves.
iv.	Rubbing salt with mustard oil	The tongue is rubbed with 2 spoon salt and 100g mustard oil is given to the animals.

17. Cold and coughing

i.	Creating smoke using ridge gourd and maize	Take one dry ridge gourd and cut the both ends. Now one side burnt and dhuno (maize leaf) is added to create to smoke. The other end is pressed against the nose so as to force the animals to inhale the smoke through the nose in cold and coughing.
ii.	Burning jute bag	Smoke is created by burning jute bag and the animals are forced to take the smoke.
iii.	Rubbing salt with mustard oil	50g salt is rubbed on the tongue along with 20ml mustard oil thrice a day.
iv.	Rubbing mustard oil	When the animals are coughing, mustard oil is rubbed well on its horns.

18. Mastitis

i.	Applying paste	Boiled the tamarind leaves and applied on the affected
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	of tamarind	area.
ii.	Applying paste of datura	Raw fruit and 2-3 leaves of datura crushed and applied.

19. Flatted stomach

i.	Feeding mango and ginger	Mango and ginger are macerated, this mixed in one glass of water and given to the animals.
ii.	Feeding mustard oil with salt	A buffalo is administered 25ml mustard oil along with one spoonful salt. This is given twice for 2-3 days.
iii.	Feeding ajwain	A flatted stomach in buffalo calf is treated by giving 50g ajwa in powder dissolved in a glass of water. Usually this is given twice for 3-4 days.
iv.	Feeding bamboo	Bamboo leaves are macerated and fed with water.
v.	Feeding hukka water	Hukka (tobacco pipe) water is administered to the animal
vi.	Feeding of heeng with salt	Heeng and salt are boil in 250ml of water and administered to the animals

20. Snake bite

i.	Feeding of black pepper with desi ghee	25g black pepper is powdered and mixed with 1/2 kg hot desi ghee and fed to animals in case of snake bite.
ii.	Feeding of burma booti	Burma booti (<i>Chromolaena odorata</i>) plant is uprooted; crushed and fed with water.

21. Intestinal worm

i.	Feeding of <i>Enhydra fluctuans</i>	For a young calf, leaves of <i>Enhydra fluctuans</i> are fed for 3-4 days to kill Intestinal parasites/worm.
ii.	Feeding of <i>Swertia chirata</i>	<i>Swertia chirata</i> is kept in water overnight and the water is drench to the animals for Intestinal parasites/worm.
iii.	Feeding of	The animals are given 100g mustard oil with feed for 2

	mustard oil with feed	days in a week for two months.
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22. Ecto-parasite

i.	Feeding of bamboo leaves	Fed a handful of bamboo leaves once in a day for two or three days to kill ecto-parasites.
ii.	Applying paste of tobacco with kapoor (camphor)	Mixture of tobacco and Kapoor plugged in wound of animal, it kills maggot.
iii.	Rubbing coconut oil with garlic	Grinded garlic (2-4) with 100 ml coconut oil and rubbed on whole body for 3-4 days or till recovery.
iv.	Feeding of garlic	Feeding 4-5 garlic daily remove ecto-parasite.

23. Fever

i.	Feeding of chilli powder	Chilli powder is mixed in feed for poultry in fever.
ii.	Applying lime	When suffered from fever, lime is applied on the horns 2 times for 3 days.
iii.	Applying papaya juice and fruit	Juice of papaya is given to animal and fruit residue is applied on whole body for 3 days, especially for goats.
iv.	Applying fume of ridge gourd	Burn dried and ripped ridge gourd with coconut husk and gave fume in nose of cattle twice in a day for 2-3 days.

ITKs in Crop Production

ITK in Crop Production

1. Micro-nutrients and plant growth environment

Sl. No.	ITK identified	Description
i	Coconut milk as Growth promoter for paddy and fruits	Fermented coconut milk solution (1litre in 20 liters of water), sprayed during vegetative phase of the crop and also it can be repeated at 17-20 days interval.
ii	Biogas slurry to prevent immature fruits of mango	The mixture of biogas slurry with water in 1:10 ratio is sprayed to mango inflorescence which improves fruit set and prevents fruit drop.
iii	Country Earthworm collection	A gunny bag dipped and coated with cow dung is placed on a shaded land for a day. The earthworm is coming to the gunny bags are collected and used for vermicomposting.
iv	Cow dung controls mites & ants	The spraying of cow dung slurry on the soil shows anti-mite and anti-fungal properties. This is used by some of the farmers to prevent the incidence of mites in crops also.
v	Extract of calotropis overcome Boron deficiency in plants	Calotropis is used by the farmers to avoid boron deficiency in crop plants. For this, the leaf extracts or leaf powder is applied to the soil and also sprayed on the leaves.

2. Plant Protection

i	Neem seed cake mixed with sand check	About 250 g of sand mixed with 100 g of Neem seed powder placed at the base of leaf Sheath after removing the old spathe in coconut to control Rhinoceros beetle. Sand with neem powder will enter into the neck of the
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	Rhinoceros beetle	beetle and due to coarse nature, cut the neck from the body as beetle moves the head.
ii	Castor seeds for Management of white grubs	Castor seeds to be pulverized and mixed with water. Keep it for about 10 days for fermentation. Add 2 liters of fermented castor solution in each buried mud pot and fill with water up to neck portion and trap the beetle during the rainy period.
iii	Papaya leaf extract control bacterial and viral diseases	Spraying of papaya leaf extract of papaya leaves + 100 litres of water)
iv	Marigold trap crop for control of moths	Planting of marigold in between the <i>solanacea</i> crops like Brinjal, tomato and chillies. Marigold flowers attract the moth.
v	Kerosene used for controlling leaf folder & stem borer in paddy	Kerosene @ 1 liter mixed with soap & water is sprayed in the paddy field when water are standing in the paddy field.
vi	Papaya leaves and old news paper control African giant snail	Pieces of old news paper and small cuts of papaya leaves and stem mixed well and put in to the corner of the kitchen garden, snails are gathering in the night time and pick up the snails and destroyed by manuals.
vii	Gundhi bugs are attracted towards fermented fish	Gundhi bugs are the problem when paddy plants are in milking stage, they suck the juice and makes grain chaffy. Fermented fish and chemical insecticides are mixed and used to attract the gundhi bugs.
viii	Control of rat and squirrel	Plastic carry bags are tied to sticks of 2' height and stacked around the farm boundary at an interval of 2.0 m.

	by plastic bags	The sound of the whirling wind and bags scare away squirrel and birds.
ix	Control of ear head bug	Spraying of bird's eye chilli leaf extract is sprayed usually after the appearance of the incidence of ear head bug. The bug is controlled to a large extent.
x	Aseophoteda and turmeric powder for control of fusarium wilt	Before planting the seedlings are dipped in water, which contains one gram of aseophoteda and turmeric powder per litre of water.
xi	Turmeric powder and ash control sucking pests like aphids, hoppers etc	Spray turmeric powder and ash solution (2Kg of turmeric powder + 8 Kg of ash + 200 litre of water per acre)

3. Post Harvest Management and Safe Storage

i	Tulsi, Neem and Adathoda used for controlling storage pests for pulses and oil seeds.	Dried leaf powder of tulsi, neem and adathoda mixed with pulses seeds for preventing damage of storage pests .The chemicals present in the leaf powder deter the pest from damaging seeds of pulses. Low cost, easy to adopt & replace the use inorganic pesticide during storage. Does not impair the germination potential of seeds
ii	Chillies and Neem leaves for safe storage of pulses	Storage container of pulses in the houses were filled with red chillies, neem leaves , Samalu patti mixing with the pulses and oilseeds crops, save the damages of seeds.
iii	Cucumber for management of Red ants	Outer Skin of cucumber is grinded to liquid form and spread on to the affected plants. Ants will go away.

4. General







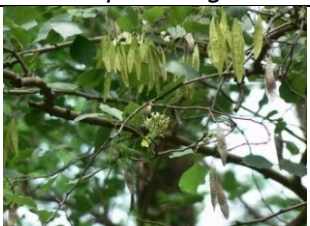



i.	Taming small and slow moving fish by applying indigenous methods.	The Nicobari tribes are using seeds of an indigenous plant locally called <i>Kinyav</i> (<i>Barringtonia asiatica</i>) for fish stupefying. They collect the seeds from the jungle then dry it properly in sun and store for the future use. The dried seeds are cut open and rubbed against the spiny surface of the stump of the indigenous tree locally called <i>kunial</i> . The pulp of seed is scattered over the water during the low tide in shallow and calm waters. Even to some extent the tribes mix the pulp of seed with any dust to make the water turbid.
ii.	Pigeonpea leaves as traditional medicine for treating of jaundice nausea and ailments	The pigeonpea is not widely cultivated as pulse crop in this island but it is being cultivated as a kitchen garden crop in these islands for use as medicinal plant. Its green tender leaves are macerated in water and given the drink to patients of jaundice, nausea and other ailments. It has very effective medicinal properties to speedy recover from jaundice and nausea in particular.
iii.	<i>(Kadwa bhaji)</i> <i>Enhydra</i> <i>flactuans</i> leaves in clearing worms from intestine	The leaves of <i>Enhydra fluctuans</i> are bitter and occasionally consumed as vegetables by mixing with tubers. The tender and immature leaves of <i>Enhydra fluctuans</i> are chewed to squeeze the juice in mouth. Its leaves have strong property clearing worms from the intestine of children and adults. This is commonly used in islands for the treating the worms infections.
















As most of these methods show very effective curative properties, local people use them very frequently. All these practices give an indication about the rich knowledge and understanding of the use of various methods, plants and their products by local users.

Further studies to explain the rationale behind the use of these remedies should be conducted based on biological and chemical analyses. These should form the bases of recommendations made to communities. The documentation of traditional knowledge will help our farmers to protect their rights.

Medicinal Plants in IITKs

		
<i>Colocasia esculenta</i>	<i>Ipomea aquatica</i>	<i>Ipomea batata</i>
		
<i>Arachis hypogaea</i>	<i>Carica papaya</i>	<i>Acathia nilotica</i>
		
<i>Acorus calamus</i>	<i>Adhatoda vasica</i>	<i>Aegle marmelos</i>
		
<i>Achras zapota</i>	<i>Annona squamosa</i>	<i>Azadirachta indica</i>
		
<i>Kanta bhaji</i>	<i>Bauhinia variegata</i>	<i>Bamboo sp.</i>

		
<i>Bauhinia racemosa</i>	<i>Tagetes erecta</i>	<i>Calotropis gigantea</i>
		
<i>Capsicum annum</i>	<i>Cassia tora</i>	<i>Ziziphus jujuba</i>
		
<i>Cassia fistula</i>	<i>Cissus quadrangularis</i>	<i>Citrus limon</i>
		
<i>Curcuma angustifolia</i>	<i>Dalbergia sissoo</i>	<i>Datura stramonium</i>
		
<i>Eclipta alba</i>	<i>Ficus racemosa</i>	<i>Enhydra flactuans</i>

		
<i>Rosa chinensis</i>	<i>Jatropha caracus</i>	<i>Momordica charantia</i>
		
<i>Moringa oleifera</i>	<i>Nicotiana tabacum</i>	<i>Musa paradisisca</i>
		
<i>Phyllanthus niruli</i>	<i>Piper longum</i>	<i>Psidium <u>guajava</u></i>
		
<i>Piper nigrum</i>	<i>Pongamia pinnata</i>	<i>Swertia chirata</i>
		
<i>Tamrindus indica</i>	<i>Gilloe</i>	<i>Vitex trifolia</i>

**Central Agricultural Research Institute
Port Blair - 744 101.**

Phone: 03192-250547, 250239, 250436

Fax: 03192-251068, 233281

E-mail: director@cari.res.in, kvkcari@gmail.com