MICRO BUSINESS MODULE

IN AGRICULTURE & ALLIED FIELDS FOR LIVELIHOOD OPTIONS IN A & N ISLANDS

R.C. Srivastava
S.K. Zamir Ahmed

CENTRAL AGRICULTURAL RESEARCH INSTITUTE
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B-51, Sahid Nagar, Bhubaneswar -751 007
Ph: 0674-2545484
E-mail: capital_a1press@yahoo.com

Preface

Agriculture in India is fast becoming the least preferred occupation for new generation. Due to this about 60% of practising farmers are above 50 years age. To retain farm youth in agriculture, an innovative approach of translating fourteen technologies as micro business modules was initiated at CARI to provide a decent livelihood to the unemployed youth and SHGs. To translate this approach in reality, capacity building of stake holders is necessary. This was done by the Institute through our institute projects as well as NGOs viz. Ashasagar Project, CARE India etc. During these capacity building programms, a need of project reports with detailed economic analysis was felt. This compilation is an attempt to bridge this gap. The project reports have been prepared by respective scientists after discussion with bank officials and stake holders.

We congratulate all the contributors for their effort in bringing out the project report as per the requirement. I also acknowledge the assistance provided by Mr. R. Nithyanandan, DGM, NABARD, Port Blair in this endeavour. We hope that this publication will fulfill the need of all stakeholders i.e., farmers, policy makers, extension agencies and bankers. We express our gratitude to Hon'ble Dr. H.P. Singh, Deputy Director General (Horticulture) for his encouragement and guidance in preparing this document.

R.C. Sirvastava

S.K. Zamir Ahmed

CONTENT

MBM-CARI - I

Integrated Farming System (IFS)

Rationale

Agriculture in this millennium, due to emerging production scenario, higher economic growth, population explosion and shifts in dietary pattern has changed the supply and demand profiles of food respectively. Integrated farming systems (IFS) seems to be the possible solution to meet the continuous increase in demand for food, stability of income and diverse requirements of food grains, vegetables, milk, egg, meat etc., thereby improving the nutrition of the small-scale farmers with limited resources. Integration of different agriculturally related enterprises with crops provides ways to recycle products and by-products of one component as input of another linked component which reduce the cost of production and thus raises the total income of the farm. Multiple land use through integration of crops, livestock and aquaculture can give the best and optimum production from unit land area. In other words, Integrated farming system is a resource management strategy to achieve economic and sustained production to meet the diverse requirement of farm household while preserving resource base. IFS can be practiced as micro business by farm youth for attaining regular income. IFS reduces the risk of failure as often one component or one crop based business leads to market instability. The other advantages of IFS include effective recycling of residues with in the farm there by reducing the cost of production per unit area.

Technical details

Area : 2000 m^2

Components

Crop/ Cropping sequence : 1500 m^2

Livestock components : 100 m^2

Farm pond and well : 250 m^2

Composting unit, storage godown, threshing floor etc : 150 m^2

Details of components

1. Crop/ Cropping sequence : 1600 m^2

Dry season (Feb – May)		Wet season (June – Oct)		Post wet season (Nov-January)	
Crop	**Area (m^2)**	**Crop**	**Area (m^2)**	**Crop**	**Area (m^2)**
Ginger-Fodder					200
Arecanut + Blackpapper + Crossandra					200
Sugarcane*+Marigold+Amaranthus					500
Vegetable + Marigold	500	Rice*	500	Maize	500
Fodder (Cumbu Napier /Para grass)		100			

* Rice and sugarcane needs to be rotated every year to reduce the pest build up

2. Livestock component : 100 m²

Species	No's	Area (m²)
Milch cow	3 No's	21
Bullock	2 No's	9
Backyard poultry	60 No's	20
Goat	11 No's	20

3. Farm pond, well & Azolla : 250 m²

Farm pond	1 No	200 m²
Poultry shed over pond	1 No	-
Poultry	16 No's	8 (with in the pond)
Duck	5	-
Embankment	Fodder, Marigold, Papaya,sapota, Guava, Fodder trees	-
Well	1 No	25 m²
Azolla	1 No	25 m²

4. Composting unit, storage godown, threshing floor etc : 150 m²

Item	Quantity	Area (m²)
Compost pits, rings (Vermi & quick composting)	2 No	50
Storage godown for inputs/outputs	1 No	50
Threshing cum drying floor	1	50

**Gliricidia* on the fence for fodder and green manure*

Input required & Source of availability

Input	Source of Availability
Seeds/Planting materials	Retail seed stores/CARI/Department of Agriculture/Near by farmers (Calicut)
Earthworms	Farmers / by collection from field
Bio control agents like *Trichoderma, Trichogramma,* insect traps, lures	CARI/Department of Agriculture/ CIPMC
Quick compost powder	Retail outlet

Input	Source of Availability
Milch cow	Farmers
Goat kids	Farmers
Poultry /ducks	Animal husbandry department of A&N, CARI
Fingerlings (Catla, rohu, mirgal, fresh water prawn)	Fisheries department, Andaman and Nicobar Administration
Azolla	CARI/farmers
RCC rings	Ring manufacturers

Flow chart, Time schedule & Cash Inflow

Farm development (Bunding, leveling, making of ring well, farm pond, Composting unit, Azolla)	2 months	Invest Rs. 50000
↓		
Collection of seed/ planting materials, Purchase of Animals/ poultry/duck, goat, establishment of shed over pond/fingerlings	2 months	Invest Rs. 50000
↓		
Planting and management of all the crops in all the season	12 months	Invest Rs. 40000 (Recurring cost)

*Total investment in 16 months : Rs. 140000

Expected cash in & out flow in different months

Cycle	Period	Component	Cash Inflow (Rs)	Cash outflow (Rs.)
First	1-4th month	-	100000	-
	5-8th month	Rice	40000	1600
		Eggs from poultry, ducks		3240
	9-12th Month	Vegetables, flowers		8000
		Eggs		8100
	13-16th month	Sugarcane		9300
		Crossandra		12500
		Ginger		4125
		Marigold		5150
		Maize		2650
		Fruits		500
		Eggs		8100
		Milk		25000
		Goat		18000
		Fish		3750
	Total		140000	110015
Cash position after first cycle (16th month)				**- 29985**
Second cycle	17 - 20th month	Rice	25000	1600
		Eggs from poultry, ducks		8100
		Milk		25000
		Amaranthus		1000
	21- 24th month	Vegetables, flowers	10000	8000
		Eggs		8100
		Goat		12000
	25- 28th Month	Sugarcane	5000	9300
		Crossandra		12500
		Ginger		4125
		Marigold		5150
		Maize		2650
		Fruits		500
		Eggs		12000

Cycle	Period	Component	Cash Inflow (Rs)	Cash outflow (Rs.)
		Goat		18000
		Fish		3750
	Total		40000	131775
Cash position after second cycle (28th month)				**61790**
Third cycle	29 – 32nd month	Rice	25000	1600
		Eggs from poultry, ducks		8100
		Milk		25000
		Amaranthus		1000
	33- 36th month	Vegetables, flowers	10000	8000
		Eggs		8100
		Goat		12000
	37- 40th Month	Sugarcane	5000	9300
		Crossandra		12500
		Ginger		4125
		Marigold		5150
		Maize		2650
		Fruits		500
		Eggs		12000
		Goat		18000
		Fish		3750
	Total		40000	131775
Cash position after second cycle (40th month)				**1,53,565**

Net returns in three years = 1, 53,565
Net income per annum per ha = 2.55 lakhs

The costing includes cost of family labour and therefore, the total income to family will be much higher.

Market Linkage: Sale of farm produces in the local market, milk & egg through co operative society

MBM-CARI-II

Broad Bed and Furrow (BBF) system

Rationale

In Andaman and Nicobar Islands, farmers mostly grow mono crop of traditional photosensitive low yielding lodging prone cultivar (C 14-8) with very low level of inputs and poor management. As a result, the productivity is also very low (2.3 –2.5 t/ha). The unpredictable rain dependent rice farming leads to unstable production and financial risks, which cannot ensure food security for these islands. Being a non-perishable commodity, paddy can be imported from Indian mainland. Thus to meet the challenges of sustaining food security and economic growth, crop diversification through system approach in rainfed lowland environments is essentially required to meet the human and crop nutritional imbalances arising from monocropping. Such approach can reduce the risk and improve stability, efficiency and sustainably convert the resources into higher quality produces without polluting environment and ecosystems and secure higher income and employment.

Vegetables in Bay Islands are cultivated mostly on the hills in about 3400 ha with a production of 13500 t and productivity of 3.9 t ha^{-1}. The total requirement of vegetables by 2010 A.D would be around 26000 t for an estimated population of 4.5 to 5 lakhs. The scope for horizontal expansion of vegetable area is bleak and any attempt to increase the production of this highly valuable and perishable commodity should concentrate on providing better micro-climatic conditions by manipulating the plant type or land. Besides, the islands also face major limitations in vegetable cultivation due to extensive damage by Giant African snail and bacterial wilt, post monsoon dryness, non-availability of full sun shine for vegetables in hilly land under plantations and lack of proper drainage system in the low-lying valley areas. The Broad Bed and Furrow (BBF) system offers solution to these problems during the monsoon season (May – December) in these islands.

Technical details

It is a technology identified to grow vegetables and fodders right in the midst of rice field. It involves making of broad beds (width 4 m, height 1m) and furrows(width 6 m, depth 1m) alternatively to provide drainage and standing water to the required crop *viz.,* vegetables and rice respectively. In addition to the vegetables, the BBF helps the farmer to include various IFS components like fish rearing in the furrows, fodder crops on the beds which in turn helps to include animal component in the system.

Area

AREA	:	0.2 ha (1/2 acre)	=	2000 m^2
BED	:	4m x 1m x 100m x 2 Nos.	=	800 m^2
FURROW	:	6m x 1m x 100m x 2 Nos	=	1200 m^2
Total				**2000 m^2**

Input required & Source of availability

Input	Source of Availability
Seeds/Planting materials /Fodder seeds or cuttings	Retail seed stores/CARI/Department of Agriculture/Fisheries/Animal husbandry/near by farmers
Bio control agents like *Trichoderma, Trichogramma,* insect traps, lures	CARI/Department of Agriculture/ CIPMC
Fingerlings (Catla, rogue, mirgal, fresh water prawn, Singhi and Magur)	Fisheries department, Andaman and Nicobar Administration
Azolla	CARI/farmers

Flow chart, Time schedule & Cash Inflow

Making of BBF through excavator	1 month	Invest Rs. 20000
↓		
Planting of crops in respective season and its management	12 months	Invest Rs. 20500

*Total investment in 12 months : Rs. 40500

Cash Inflow

S.No.	Activities	Amount (Rs)
1.	Making of BBF (through Hitachi) 20 hours @ Rs. 1000/hour **(One time investment)**	20000.00
2.	Land preparation (using Power tiller) @ Rs. 250/hour for 10 hours	2500.00
3.	Cost of FYM (4 t)	3000.00
4.	Seeds / Planting Materials / Fingerlings	2000.00
5.	Intercultural operations@ Rs.100/- (80 man days)	8000.00
6.	Harvesting and transportation @ Rs.100/- (50 man days)	5000.00
	Total	**40500.00**

Cash Outflow (quarterly)

Gross Returns from BBF

a. Bed I (Area 400 m^2)

	I	II	III
Month	July to October	November to February	March to May
Crop	Bhendi	Chillies	Coriander
Yield	180 kg	600 kg	30 kg
Income	Rs. 2700/- (@ Rs 15/kg)	Rs. 18000/- (@ Rs 30/kg)	Rs. 2100/- (@ Rs 70/kg)
Total Income (Rs.) (I + II + III)			22800/=

b. Bed II (Area 400 m^2)

	I	II	III
Month	August to November	December to February	March to June
Crop	Chillies	Cauliflower	Cowpea
Yield	600 kg	235 kg	130 kg
Income	Rs. 18000/- (@ Rs 30/kg)	Rs. 3525/- (@ Rs 15/kg)	Rs. 1950/- (@ Rs 15/kg)
Total Income (Rs.) (I + II + III)			23,475/-

c. Furrow 2 Nos. (Area 1200 m²)

	I	II
Month	June to August/Sept–Nov./ Dec or Long duration July-December	June to Jan/Feb
Crop	Paddy	Catla, Rohu, Mrigal (ratio 4:3:3) 150 nos.fry
Yield	600 Kg.	25-30 kg
Income	Rs. 4800/- (@ Rs 8/kg)	Rs. 1250/- (@ Rs 50/kg)
Total Income (Rs.) (I + II)		Rs. 6050/-

d. Total Gross returns (Rs.)

Gross returns (Rs.) (a+b+c)	Rs 52325

Net Returns from BBF (Rs.)

Particulars	Gross returns (Rs.)	Cost (Rs.)	Net returns (Rs.)*
Net income from I year	52325	40500	11825
Net income from II year onwards	52325	20500	31825

* Please note the income may vary from Rs. 30000- 50000 / year depending upon the vegetable crops taken in the beds

Net income from second year onward = Rs. 31,825 from 2000 m² area

Net income per annum per ha = Rs. 1,59,125/-

The costing includes cost of family labour and therefore, the total income to family will be much higher.

Market Linkage: Sale of farm produces in the local market & vegetable co operative society

MBM-CARI-III

Raised bed technology with coconut husk burial for year round vegetable Production

Rationale

Andaman and Nicobar Islands receives more than 3000mm of rainfall in a year from May-Nov and the weather conditions are very hostile during this period. Due to heavy rains, the vegetable production is very limited in these months and there is always scarcity of vegetables in the market and if available, it is beyond the reach of common man because of high prices. The land is a constraint and the demand of vegetables is increasing due to increase in local population as well as tourists. There is always a large and sustained demand of fresh vegetables all round the year.

If proper crop management and diversification is followed the vegetables can be produced round the year under open and controlled conditions. The areas, which are close to the sea or low lands which are flooded during heavy rains are left fallow due to the clayey nature of soil and water logging during heavy rainfall. These lands can be effectively converted into cultivable land by the raised bed method, which helps to overcome the stress of heavy rainfall. Under this method beds were raised to a height of 1 feet from the ground level, the coconut husk which was thrown as waste is chopped and laid over the soil and again covered with soil layer. The vegetables are taken on the raised beds**.** The furrows are used for growing border row trap crops like *Tagetus* and swamp taro. This facilitated survival of vegetable crops against the continuous and heavy rains and rise in the level of seawater. The beds sprayed

AREA				
BED	:	10 x 2 x 50	=	1000 m^2
FURROW	:	10 x 0.3 x 51	=	153 m^2
		Total		**1153m^2**

Investment

S.No.	Activities	Amount (Rs)
1.	A total of 33 numbers of man days is required for 50beds preparation @ Rs.130/manday [Inclusive of coconut husk procuring ,chopping & apply in beds] **(One time investment)**	: **4290**

with the liquid *Glyricidia* manure and low cost compost prepared in the fields. Biocontrol agents like *Pseudomonas* and *Trichoderma* should be included in the fields and sprayed regularly to the crops. Composting of the green and dry wastes should be carried out for sustainable production.

Cost of cultivation of Crops taken on 50 beds in three seasons

	May-Aug					Total
Crop	**Amaranthus**	**Cowpea**	**Okra**	**Radish**	**Palak**	
Area (m^2)	100	300	300	100	200	1000
No. of man days	3.5	10.5	12.5	3.5	6	36
Expenditure on inputs(seed/fert/ pesticide/Bio-fertilizers)(Rs)	95	353	352	144	270	1214
Expenditure on man days (Rs)	455	1365	1625	455	780	4680
Total Expenditure (Rs.)	550	1718	1977	599	1050	5894
Yield(kg)	100	1000	450	300	250	2100
Income(Rs)	700	10000	5400	2100	2500	20700
Net Income (Rs)	150	8282	3423	1501	1450	14806

	Sep-Dec					Total
Crop	**Coriander**	**French bean**	**Cowpea**	**Palak**	**Cauliflower**	
Area (m^2)	100	500	100	200	100	1000
No. of man days	4.5	15	6.5	7	6.5	39.5
Expenditure on inputs(seed/fert/ pesticide/Bio fertilizers)(Rs)	141	505	142	270	131	1279
Expenditure on man days (Rs)	585	1950	840	910	845	5130
Total Expenditure (Rs.)	596	2455	987	1050	716	6409
Yield(kg)	30	400	350	250	70	1100
Gross Income(Rs)	900	8000	3500	2500	1750	16650
Net Income (Rs)	304	5545	1917	1450	1384	11086

Crop	Dec. - May					Total
	Chilies	Capsi-cum	Cowpea	Brinjal	Okra	
Area (m^2)	600	100	100	100	100	1000
No. of man days	22	5.5	6.5	5.5	4.5	44
Expenditure on inputs(seed/fert/ pesticide/Bio fertilizers)(Rs)	431	106	142	144	135	958
Expenditure on man days (Rs)	2860	715	845	715	585	5720
Total Expenditure	1886	821	987	729	785	6678
Yield(kg)	500	60	350	200	1250	2360
Income(Rs)	10000	1800	3500	2000	1800	19100
Net Income (Rs)	8114	979	1917	1271	1015	18967

Total No. of man days/Year	119.5 days
Total Income/Year(Rs) from 1153 m^2	56450
Total Expenditure for 1153m^2	18981

Particulars	Gross returns (Rs.)	Total Cost (Rs.)	Net returns (Rs.)*
Net income of I year for 1153m^2	**56450**	**23271**	33179
Total income/year/ ha	489592	201830	287762

* Please note the income may vary depending upon the vegetable crops taken in beds from **Rs 30000/- to Rs 40000/-**.

MBM-CARI-IV

Oyster Mushroom Cultivation

Rationale

Mushrooms are called 'white vegetables' or 'boneless vegetarian meat' containing 20-35% protein (dry weight) which is higher than those of vegetables and fruits and is of superior quality. It is considered ideal for patients of hypertension and diabetics. Oyster mushrooms *(Pleurotus* species) can be grown on variety of crop refuses, saw dust, bagasse (a waste product from sugar mill), sludge (a waste from paper pulp mill) etc. Processing of agro-waste in to valuable protein rich food reduces the environmental pollution and its byproduct as spent mushroom is also a good source for making compost, manure, soil conditioner and can be used as feed for animal and fish. Paddy straw and banana leaves are available in these Islands which can be effectively utilized as substrate (growing medium) for mushroom cultivation.

Oyster mushroom cultivation as cottage industry has ample scope in the A& N Islands. For round the year cultivation the agro-climatic conditions are very conducive with modest temperature (25-30^0 C) and relative humidity (70-90 %). Most of the mushrooms for consumption are imported from mainland India. There is huge demand of canned, dried and fresh mushrooms and the farmers can get handsome price from sale of fresh (Rs. 100/ Kg) and dried (Rs.500-700/kg) oyster mushroom. There is great demand of fresh mushroom in local market for consumption of tourist in hotels. Apart from fresh consumption of mushrooms it can be exported as organic brand in dried form.

A micro business module with commercial viability has been prepared keeping in view the agro-climatic conditions, raw material, market and other related aspects for successful cultivation of the mushroom to generate employment and income to the farmers.

Technical detail

The main requirements are thatched house/ cropping room, bamboo/ wooden racks with shelves, substrate (paddy straw/ banana leaves), spawn, plastic bags (60 x 45 cm), chaff cutter, water boiling drum, wire cage, trays, sprayer and pesticides.

Cropping Room

		Measurement		Area ($m^{2)}$
Room	:	6m x 5m x 1 Nos.	=	30 m^2
Racks	:	2m x 1m x 2m x 4Nos	=	16 m^2

Input required & Source availability

Input	Source of Availability
Substrate (paddy straw/ banana leaves)	Farmers/ Local purchase
Spawn (seed of mushroom)	Spawn producing private organization/Department of Agriculture/ CARI
Poly bags, punch machine, chaff cutter, sprayer, pesticides, water boiling drum, wire cage	Local market shop
Fire wood or any other energy source for boiling the water	Local purchase / house hold materials

Flow chart, Time schedule & Cash Inflow

Construction of cropping room/ thatched house with bamboo racks	2 months	Invest Rs. 28000
⇩		
Cost input involve in mushroom cultivation	Four crops in a year (2 months for one crop)	Invest Rs. 31000

*Total investment in 12 months : Rs. 59000

Cash Inflow

S.No.	Activities	Amount (Rs)
1.	**One time investment**	
	Thatched house	20000.00
	Bamboo racks	20000.00
	Drum	1000.00
	Chaff cutter	5000.00
2.	**Cost input involve in mushroom cultivation**	
	Cost of paddy straw (20 quintals @ Rs. 200/q) for 5 crop in a year	4000.00
	Cost of spawn (2% wet substrate) @ Rs. 20/bottle	6000.00
	Polythene bags, pesticides, wood, water etc	3000.00
	Labour charges including harvesting and marketing@ Rs.100/- (180 man days)	18000.00
	Total	**59000.00**

2. Livestock component : 100 m^2

Species	No.	Area (m^2)
Milch cow	3	21
Bullock	2	9
Backyard poultry	60	20
Goat	11	20

Cash Outflow

Gross Returns from Mushroom Cultivation (from five crops / year)

Year	Particulars	Amount (Rs.)
I	Sale of mushroom 800 kg @ Rs 100/ kg	80000.00

Net Returns (Rs.)

Particulars	Gross returns (Rs.)	Cost (Rs)	Net returns (Rs)*
Net income from I year	80000	59000	21000
Net income from II year onwards	80000	31000	49000

Please Note : The income may vary depending upon type of substrate used and other management practices.

Market Linkage: Sale of mushrooms in the local market, hotels & vegetable co- operative society

MBM- CARI-V

Black pepper cultivation on hedgerows and *Gliricidia* standards

Rationale

Black pepper (*Piper nigrum*), called as the king of spices is one of the oldest and best-known spice in the world. In India there are only few states like Kerala, Karnataka, Tamil Nadu and Andaman and Nicobar islands that produce black pepper. Though, Kerala ranks the first in its production, the Andaman Islands are known for its quality. The black pepper has earned a high market, local, national and international as well because of its wide use in pharmaceuticals, flavouring industries and household consumption as a spice. According to the State Tourism Department of A & N islands, around 2,00,000 tourists visit Andaman Islands annually, but they do not get spices as the local vendors purchase them from farmers and export to mainland India.

Farmers of the Andaman and Nicobar islands are organic growers of spices, including black pepper, by default as they do not provide fertilizer or compost to spice trees in their homegardens. Total of 29000 ha (25000 ha coconut + 4000 ha arecanut) of arable lands (50, 000 ha) in the islands are under plantation crops which provide suitable environment for the spice production. In addition 3000 ha sloppy lands are under vegetable cultivation. If one-fourth of the coconut and arecanut plantation and sloppy lands are utilized for organic cultivation of black pepper, it is estimated to produce 2020 MT annually. Two technologies are developed for black pepper cultivation which make the cultivation efficient. They are described below:

Design of double hedgerows technology of black pepper cultivation

1. *Gliricidia* (stem cutting) plant to plant distance in a hedgerow : 0.50m
2. The hedgerow to hedgerow distance in double hedgerows : 1m
3. Double hedgerow to double hedgerow distance : 6m or more

Investment

Sl. No.	Activities	No.ha^{-1}	Rate (Rs.)	Amount Rs.ha^{-1}
I Year				
1.	Stem cutting of *Gliricidia*	2600	3per cutting	7800

Sl. No.	Activities	No.ha^{-1}	Rate (Rs.)	Amount Rs.ha^{-1}
2.	Black pepper seedlings	2600	2per seedling	5200
3.	Bordeaux mixture (1%)	-	-	5000
4.	**Labour**			
	Pit making and planting stem cutting	50	130per day per labour	6500
	Pruning of hedgerows	80	- do -	10,400
	Bordeaux spraying	10	- do -	1300
	Total			**36,200**
II Year				
1.	Labour for pruning of hedgerows	80	130per day per labour	10,400
2.	Labour for Bordeaux spraying	10	- do -	1300
3.	Bordeaux (1%)	-	-	5000
	Total			**16,700**
III Year				
1.	Labour for pruning of hedgerows	40	130per day per labour	5200
2.	Labour for Bordeaux spraying	10	- do -	1300
3.	Bordeaux (1%)	-	-	5000
	Total			**11,500**
IV Year				
1.	Labour for pruning of hedgerows	10	130per day per labour	1300
2.	Labour for Bordeaux spraying	10	- do -	1300
3.	Bordeaux (1%)	-	-	5000
	Total			**7,600**
V Year				
1.	Labour for pruning of hedgerows	10	130per day per labour	1300
2.	Labour for Bordeaux spraying	10	- do -	1300
3.	Bordeaux (1%)	-	-	5000
	Total			**7,600**

Sl. No.	Activities	No.ha^{-1}	Rate (Rs.)	Amount Rs.ha^{-1}
VI year to XX				
1.	Labour for pruning of hedgerows	10	130per day per labour	1300
2.	Labour for Bordeaux spraying	10	-do-	1300
3.	Bordeaux (1%)	-	-	5000
	Total			**7,600**

Production (t ha^{-1}) of different crops in double hedgerows technology of black pepper cultivation

	Year						
Crop	**I**	**II**	**III**	**IV**	**V**	**VI-XX**	**Rate Rs.kg^{-1}**
Black pepper	0	0	0.15	1.67	1.90	1.90	150
Maize	5.0	2.8	2.4	2.23	2.23	2.23	8
Okra	3.43	3.09	3.02	3.0	3.0	3.0	15

Economics of black pepper cultivation on double hedgerows of *Gliricidia*

Values are Rs.ha^{-1}

	Year					
Crop	**I**	**II**	**III**	**IV**	**V**	**VI-XX**
Black pepper						
Total out put	36,200	16,700	11,500	7,600	7,600	7,600
Input	0	0	22,500	2,50,500	2,85,000	2,85,000
Net income	-36,200	-16,700	-11,000	+2,42,900	+2,77,400	+2,77,400
Maize						
Total out put	40,000	22,400	-	-	-	-
Input	17,386	17,237	-	-	-	-
Net income	+22,614	+5,163	-	-	-	-
Okra						
Total out put	51,450	46,350	45,300	45,000	45,000	45,000
Input	26,626	26,520	31,229	31,330	31,800	31,800
Net income	+24,824	+19,830	+14,071	+13,670	+13,200	+13,200
Total Net income Rs. ha^{-1}	+11,238	+8,293	+3,071	+2,56,570	+2,90,600	+2,90,600

Inputs for maize and Okra included cost of seeds and fertilizes; tilth preparation, labour for seed sowing, weeding, fertilizer application, harvesting and post harvest operations. Maize cultivation should be dropped from 3rd year onward as the productivity is reduced and it becomes uneconomical.

Design of black pepper cultivation on *Gliricidia* standards in homegarden/coconut plantation

Design	
Coconut	7.5 m x 7.5 m spacing
Gliricidia stem cutting (1m length; 5cm dia)	7.5 m x 7.5 m spacing, 7.5 x 3.75 m
Black pepper	Panniyur-5

Investment

Sl. No.	Activities	No. ha^{-1}	Rs. Rate	Amount (Rs.ha^{-1})
I Year				
1.	No. of *Gliricidia* stem cutting 7.5 x7.5 = 177 7.5 x 3.75 = 355 Total = 532	532	3per cutting	1,596
2.	Black pepper seedling	532	Rs.2 per seedling	1,064
3.	Bordeaux (1%)	-	-	5,000
4.	Labour	100	130 per labour per day	13,000
	Total			**20,660**
II Year				
1.	Labour for pruning of *Gliricidia* standards	50	do	6,500
2.	Bordeaux	-	-	5,000
	Total			**11,500**
III Year				
1.	Labour for pruning of *Gliricidia* standards	30	Do	3,900
2.	Bordeaux	-	-	5,000
	Total			**8, 900**

Sl. No.	Activities	No. ha^{-1}	Rs. Rate	Amount (Rs.ha^{-1})
IV Year				
1.	Labour for pruning of *Gliricidia* standards	30	Do	3,900
2.	Bordeaux	-	-	5,000
	Total			**8, 900**
V Year				
1.	Labour for pruning of *Gliricidia* standards	30	Do	3,900
2.	Bordeaux	-	-	5,000
	Total			**8,900**
VI-XX Year				
1.	Labour for pruning of *Gliricidia* standards	30	Do	3,900
2.	Bordeaux	-	-	5,000
	Total			**8,900**

Black pepper production (t ha^{-1}) on *Gliricidia* standards

	Year						
Crop	**I**	**II**	**III**	**IV**	**V**	**VI-XX**	**Rate Rs.kg^{-1}**
Black pepper	0	0	0.05	0.5	1.06	1.06	150

Economics of black pepper cultivation on *Gliricidia* standards

	Year					
Crop	**I**	**II**	**III**	**IV**	**V**	**VI-XX**
Black pepper						
Total out put	0	0	7,500	75,000	1,59,000	1,59,000
Input	20,660	11,500	8,900	8,900	8,900	8,900
Net income per annum	-20,660	-11,500	-1,400	+66,100	+1,50,100	+1,50,100
Cumulative income	-20,660	-32,160	-33,560	+32,540	+1,82,640	+3,32,740

* Thus by fourth year, the expenditure is recovered back.

MBM – CARI-VI

Floriculture
(Crossandra, Marigold and Tuberose)

Rationale

Floriculture industry a lucrative business comprising traditional flowers , cut flowers, pot plants, dry floral crafts and planting materials, besides value-added products like bouquets, garlands, floral baskets, floral concretes, pot-pourii and oils. It has proved to be a highly profitable agro-business generating maximum returns per unit area. Flowers like Marigold, Crossandra, Jasmine, Tuberose yields profusely in these islands and can be profitably cultivated. Crossandra and marigold fetch very high prices in the local market and many farmers grow these in small areas in their homestead gardens. The package of practices for commercial cultivation of these crops has been standardized and technology has been transferred. This can be a good alternative and economic crop for the small stakeholders. The per unit returns from marigold, crossandra and tuberose was found to be very high in these islands.

Crossandra

Technical details of the technology

Crossandra is an important flower crop most widely grown in islands. It is commonly used for hair adornment, garlands. It is very popular because of its colour, light weight and keeping quality. The productivity of this flower crop is higher than any other flower crop. It can be grown in almost all types of soil and is adaptive to wide range of climatic conditions. It can be propagated through seeds or stem cuttings with a spacing of 50x50 cm. Fresh seeds should be used for raising the seedlings. Seedlings having 4 to 6 leaves are ready for transplanting in the field. For better growth NPK @ 50:100:60 should be added 50-60 days after planting at an interval of six months. For increased growth and flowering, NPK along with FYM and $ZnSO_4$ is recommended. Planting is done in June- July and Oct- Nov. Harvesting is done alternate days in the early morning hours. For 1 ha of crop of Crossandra about 22.5 g of seeds is required.

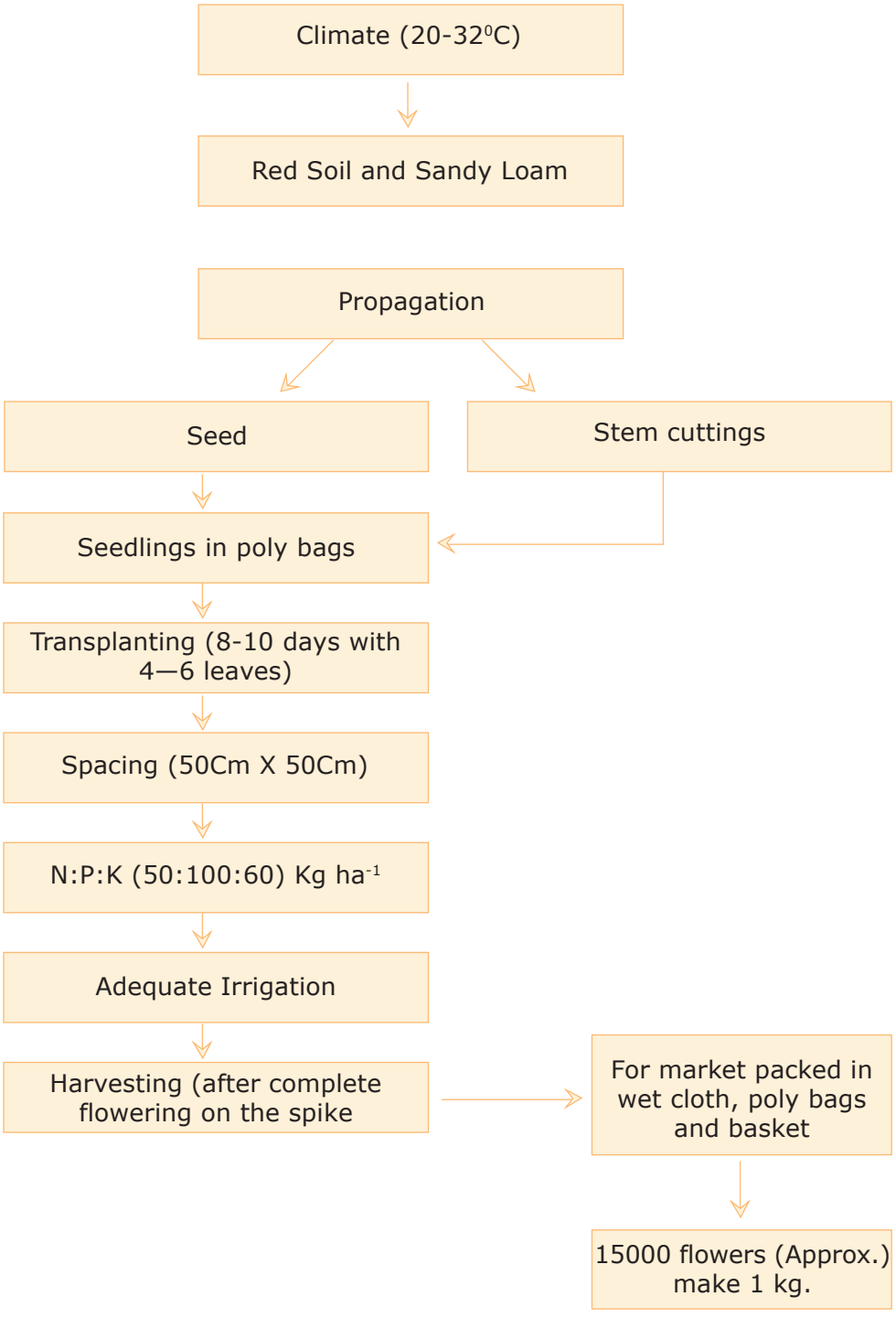
Input required

Good quality seedlings, nursery to raise seedlings, manpower, manures and fertilizers.

Source of availability

Elite seedlings can be procured from, CARI, Port Blair, IIHR, Bangalore and IARI, New Delhi., Manures and fertilizers from local market.

Activity flow chart- Crossandra



Time schedule

Seedlings raised	Transplanting time	Flowering season	Harvesting time
April – May Aug.- Sept.	June-July Oct.- Nov.	40-60 days after planting	Alternate days after complete opening of flower

Cash in flow and Out flow

Crop	Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross Return (Rs./ha)	Net Return (Rs./ha)	BC Ratio
HYV (Aboli)	29.5	1,24,500	8,87,500	7,63,000	7.1:1
Selling price of crossandra – Rs. 300/- kg.					

Inputs

Crop	Spacing	Req. plant material/acre	Rate (Rs.)	Total cost of plant material
Crossandra	50cmx50cm	16000 nos	Rs.2/-	Rs.32,000/-

Manures and Fertilizers

Highly fertile soil is essential for good yield. In condition to the basal application of FYM @25 tonnes/ha, periodical top dressing with fertilizers and organic manure is essential. The first application of fertilizers should be done in 50-60 days after planting, at the rate of 50 Kg of Urea, 100 kg of SSP and 60 kg of M.O.P/ha twice at interval of 6 months. The application of fertilizers is to be necessarily followed by irrigation. Weeding, application of manure/ fertilizer and earthing up are combined for easy maintenance and labour saving.

Irrigation

Adequate irrigation helps in rapid growth of the plant and also to obtain regular flower yield. At the time of planting the seedlings, the soil should have optimum moisture for initial growth, if there is no moisture at the time of planting then irrigation should be given immediately after transplanting the seedling in the field. During

dry period irrigation at shorter intervals and also during the flowering stages, result in more flower and also encourage better plant development.

Marigold

Marigold gained popularity amongst farmer and flower dealers on account of its easy culture, wide adaptability, attractive colour, shape, size and good keeping quality. Marigold is valued as loose flower for making garlands. Besides, it is used as trap crop in the borders to attract insects attacking the main crop. Three weeks old seedlings are planted which grows upto a height of 75-90 cm at maturity with deep orange or lemon yellow flowers. It is propagated through seeds and cuttings. For better growth and improvement, application of NPK @80:40:80kg/ha is recommended. Flowers are plucked when they have attained the full size and it should be done in cool hours of the day either in the evening or morning. Field should be irrigated before plucking, so that flowers keep well for long period after harvest. Farmers have opted the technology for growing marigold in large scale. Fifteen varieties were evaluated of which Co-1 marigold (30 kg/sqm) performed best followed by Namdhari marigold, First Lady and Pusa Narangi. Pinching of terminal leaves was found to significantly increase growth and yield in Pusa Basanti and Pusa Narangi gaindha. Pusa Narangi is mostly preferred due to higher flower production.

Input required

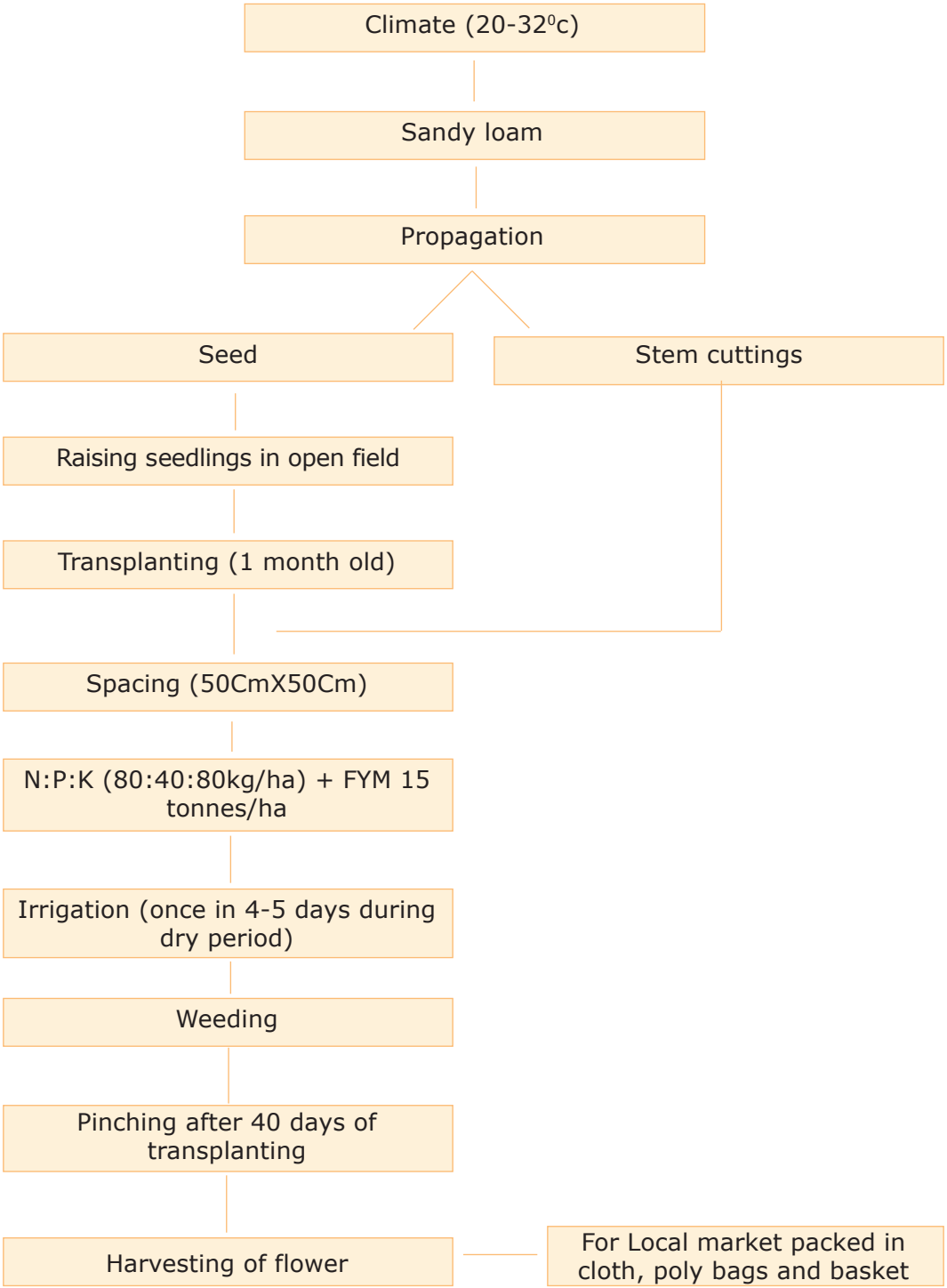
Good quality seedlings, nursery to raise seedlings, manures and fertilizers, manpower, water supply for proper irrigation.

Source of availability

Elite seedlings can be procured from, CARI, Port Blair, IIHR, Bangalore and IARI, New Delhi. Manures and fertilizers – From local market.

Sowing time	Transplanting time	Flowering season	Harvesting time
Mid June Mid Sept. Jan- Feb.	Mid July Mid October Feb.- March	Late rain Winter Summer	Picked once in 3 days; 60 days after planting

Activity Flow Chart - Marigold



Cash in flow and out flow

Crop	Yield (q/ha)	Cost of Cultivation (Rs./ha)	Gross Return (Rs./ha)	Net Return (Rs./ha)	BC Ratio
Local	54.5	64,540	1,63,500	98,960	2.5:1
HYV (Pusa Narangi)	62.4	70,700	1,87,200	1,16,500	2.6:1

Selling price of Marigold – Rs. 30/-/ kg.

Crop	Spacing	Req. plant material/acre	Rate (Rs.)	Total cost of the plant material (Rs.)
Marigold	50cmx50cm	16000nos	20/- per 100 seedlings	3200/-

Tuberose

Tuberose occupies a prime position because of its importance as cut flower, loose flower as well in perfume industry. It is profitably cultivated because of less pest attack and little input. Tuberose is grown in wide range of soils and is propagated vegetatively through bulbs; it begins to flower in 80-95 days after sprouting. Selection of good quality plant materials is necessary for obtaining high yield and good quality flowers. Best size of the bulb to be preferred is 2.5 to 3 cm. Evaluation of tuberose variety has shown that Double (Kolkata) performed well (30 spikes/sq m) followed by Shrinagar (Single). The optimum planting time was found to be Nov. to Dec., with maximum spike production of 29/ sqm.Tender nut water at 25% conc. doubled the vase life of tuberose blooms over control. Planting of bulbs at greater depth delays appearance of shoots but encourages better flower spike production. FYM @ 20 tonnes/ ha and split doses of NPK @200:80:150 kg/ha is recommended.

Input required

Disease free bulbs, manures and fertilizers, manpower, adequate water supply for proper irrigation.

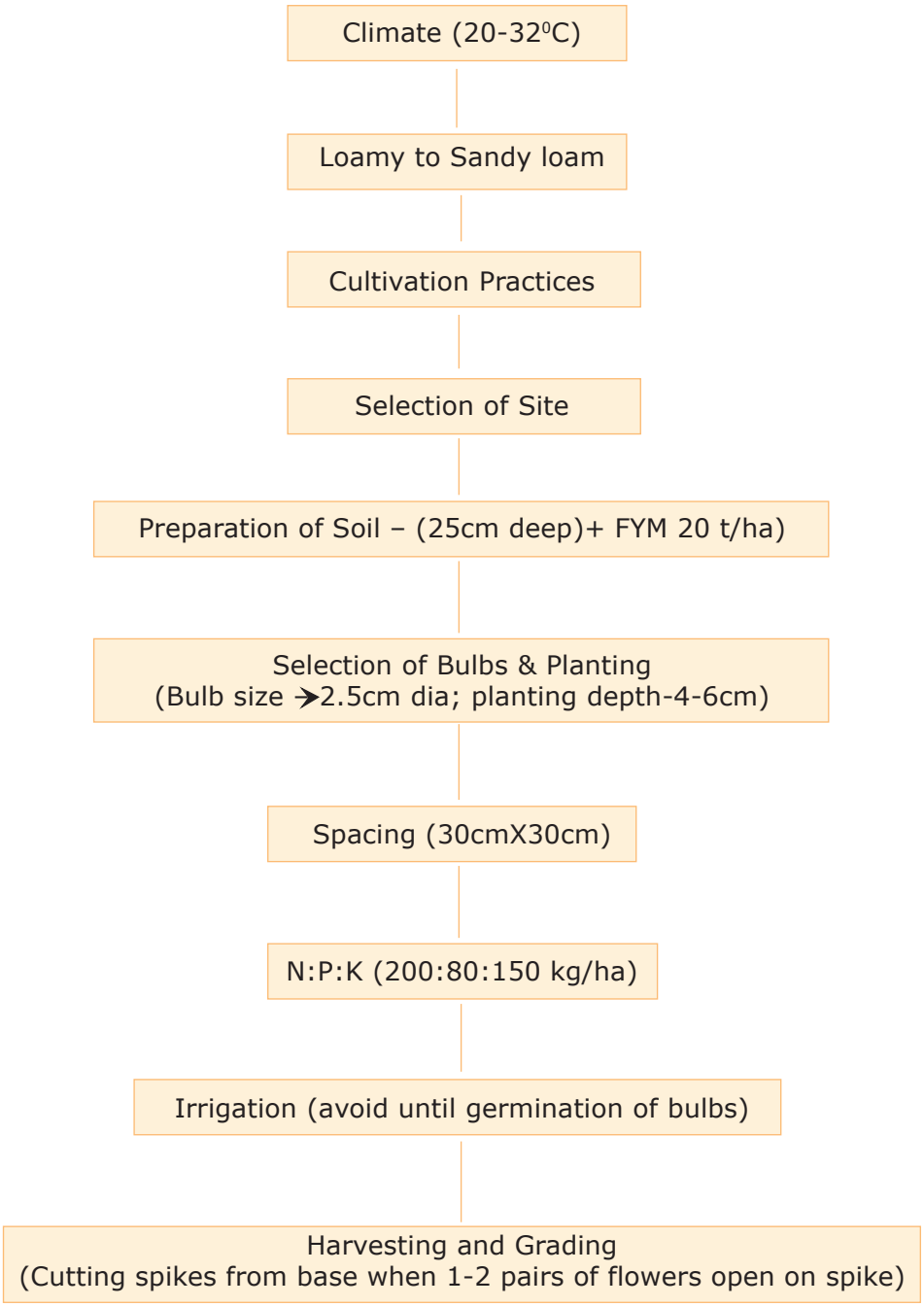
Source of availability

Elite bulbs can be procured from, CARI, Port Blair, IIHR, Bangalore and IARI, New Delhi. Manures and fertilizers – From local market.

Time schedule

Planting time	Flowering season
(Nov. to Dec)	80-95 days after sprouting. Flowers throughout the year

Activity flow chart - Tuberose



Cash in flow and out flow

Crop	Yield (q/ha)	Cost of Cultivation (Rs./ha)	Gross Return (Rs./ha)	Net Return (Rs./ha)	BC Ratio
Local	16.5	82,440	1,26,275	43,837	1.5:1
HYV	24.5	1,46,050	2,47,500	1,01,450	1.7:1

Selling price of Marigold – Rs. 50/-/ kg.				
Crop	**Spacing**	**Req. plant material/acre**	**Rate (Rs.)**	**Total cost of the plant material**
Tuberose	30 cm x30 cm	36000nos	Rs. 0.50/- Bulb	Rs.18000

Orchids

Technical details of the technology

The climate of these islands favors the growth of number of tropical orchids, without resorting to any sophisticated growing structures. Orchids are the mostly popular for their tremendous long vase life with fascinated colours. The islands have a large area (25000ha) under coconut plantations and 90 million nuts are being produced every year. The coconut shells which are available in plenty are wasted with out any use, which can other wise be utilized as hanging pots. The following indigenous orchids like *Cymbidium bicolor, Dendrobium crumenatum Dendrobium formosum, Oberonia iridifolia* etc were found suitable to be grown in coconut shell. An ideal location is required, with optimum light (75%), air and humidity for healthy and normal growth and development. Propagation is done by division or Kekis. Coconut shell can be used after varnishing it, which enhances beauty, and prolongs life. The medium for growth should be broken bricks, charcoal, coconut husk @ (1:1:2) with proper drainage.

Input required

Disease free Kekis , dried coconut shell , growing media.

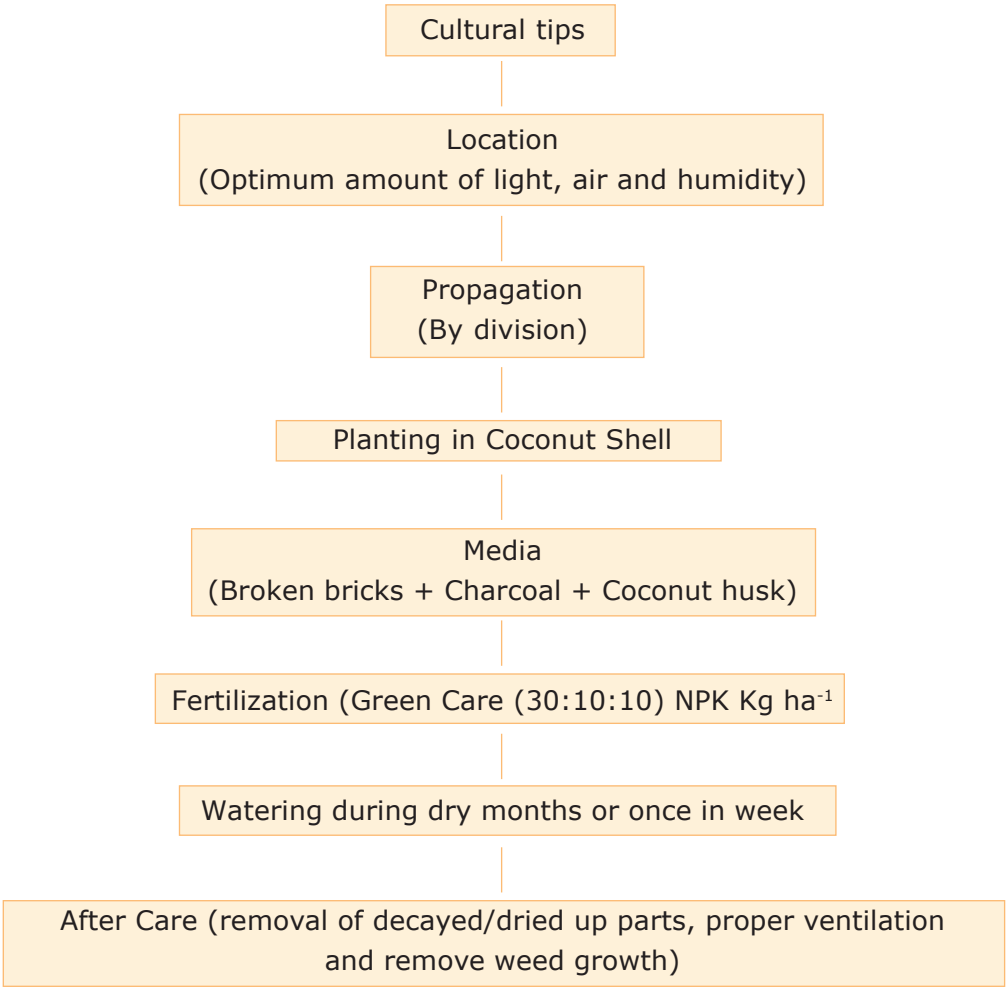
Source of availability

Division or Kekis can be procured from CARI, Port Blair.

ECONOMICS:

The estimated expenditure is Rs.20/- per hanging pots with the gross return of Rs. 200/- from 10 hanging pots with net income of Rs. 80/- per day.

Activity flow chart - (Growing Orchids in Coconut shell)



MBM-CARI-VII

Protected cultivation of High value vegetables

Rationale

Andaman and Nicobar Islands receive more than 3000mm of rainfall in a year from May-Nov and the weather conditions are very hostile during this period. Due to heavy rain the vegetable production is very limited in these months and there is always scarcity of vegetables in the market and if available, it is beyond the reach of common man because of high prices. The land is a constraint and the demand of vegetables and flowers are increasing with increased in local population as well as tourists.

Polyhouse cultivation is an alternate as it ensures high productivity per unit area with the genetic potentiality of the crop being fully exploited, off season vegetables can be grown which fetch high prices in the market, off season healthy nursery can be raised, good quality produce free from any blemishes and finally it is easy to protect the crops against pests and diseases and extreme climatic conditions.

Structure of low cost polyhouse

Polyhouses are framed structures covered with transparent or a translucent material and large enough to grow crops under partial or fully controlled environmental conditions to get maximum productivity and quality produce. Polyethylene/plastic film covered greenhouses are being widely used in recent years.

Low cost polyhouse has two distinct segments i.e. frame and glazing material. The frame made up of bamboo is important component of polyhouse as it provides support to glazing material. In this greenhouse north and south roof has been covered with FRP plain sheet or double layered UV stabilized 250 micron transparent polyethylene sheets and there is no provision of cooling arrangement like forced convection, evaporative cooling and misting. The roof provided in the greenhouse is protected from soil erosion. Heat and mass transfer will be through natural convection only. All four sides of greenhouse were covered with plastic coated GI wire / insect proof nets of 40 mesh to avoid the damage from giant snails, birds, dogs and animals. Cost of materials for low cost has been given in Table 1.

- Structures should be east - west oriented and sufficiently strong to withstand the wind pressure. Sufficient ventilation should be given for exchange of air/heat.
- Film must be stretched and secured to the frame tightly to avoid tearing the film.
- All ventilations must be provided with insect proof mesh

Materials required for effective area (15m x 4.5m) for polyhouse for cultivation

	Length	Quantity	Cost (Rs.)
Bamboo			
Central pole (9 cm dia)	8.0 ft	15 nos	300.00
Side pegs (16 cm dia)	3.0 ft	26 nos	350.00
Split bamboo strip	20 ft	30 nos	550.00
Cladding materials			
UV stabilized sheet (200 micron, 7m width)	18 m	25 kg	2,800.00
Other materials			
Tarkol 5 kg, GI, wire 3 kg, nut bolts, ordinary plastic film (5 kg)			250.00
Labour	6 man days		600.00
	Total		4,850.00

Cost / m^2 = Rs. 71.8 say Rs. 72 / m^2

Irrigation

Providing irrigation through drip system is desirable as it reduces the humidity build up inside polyhouse after irrigation. Application of fertilizers through irrigation helps in saving the quantity of fertilizers and labour.

Crops suitable for hi-tech cultivation

Due to the exorbitant market prices prevailing in the market some of the vegetables are found to be highly profitable provided they are taken in control conditions with utmost precautions in management. The following crops can be taken for cultivation under the polyhouse conditions namely, Capsicum, Tomato, French beans, Cauliflower, Chillies, Broccoli, Knol Khol, and Coriander.

Pests and diseases

Normally the incidence of pests and diseases in polyhouse is less as compared to outside conditions. However, due to high crop density and congenial microclimate inside the structure, spread of pests and disease is faster once there is an entry of pest by improper management of polyhouse. In humid tropical climate, proper ventilation with insect proof mesh is recommended.

Suitable crops varieties for hi-tech cultivation under low cost poly house

Crops	Varieties	Season
I- Year		
Tomato	Naveen,Kanaka	May- Aug
French bean	Kentucky Wonder, Contender	Sep- Nov
Cauliflower	White Marble,Indam	Dec- Feb
Coriander	CO-1, Mehak	Mar- April
Green Manure	Dhanicha	May
II- Year		
Tomato	Naveen, Kanaka	June-Sept
French bean	Kentucky Wonder, Contender	Oct- Dec
Chilies	KA-2, Arka Lohit	Jan- April
Cowpea	Arka Suman	May- June
Other Crops		
Okra/Bhendi	Arka Anamika	May- June
Palak	All Green, Pusa Joyti	June- July

Cost Benefit Ratio Analysis of Tomato Under Polyhouse

S.No.	Particulars	Quantity	Rate (Rs)	Amount (Rs.)
I	Nursery			
1.	Seed	15 g	600g	9.00
2.	Nursery management	1 manday	100/ manday	100.00
II	Main field			
1.	Land preparation	3 manday	100/ manday	300.00
2.	FYM & Fertilizer			
i.	Urea	5.2 Kg	7.55/ Kg	39.26
ii	Single Super Phosphate	6.64 Kg	7.85/ Kg	52.12
iii	Murate of Potase	1.96 Kg	7.60/ Kg	14.86
iv	Compost preparation			300.00
3.	Transplanting	1 manday	100/ manday	100.00
4.	Labour Charges			
i	Fertilizer application	1 manday	100/ manday	100.00
ii	Intercultural operations (weeding, earthing up, staking, irrigation etc.	30 manday	100/ manday	3000.00
5.	Plant production chemicals			400.00
6.	Harvesting (12 harvests)	1 manday/ harvest	100 manday	1200.00
7.	Miscellaneous expenses			400.00
	Total cost of cultivation			6015.00
	Average yield kg/500 sq m	1200 kg	15/kg	18000.00

Net Return- 18000-6015 = Rs. 11,985.00 for four month

Net return /rupees of investment = 15000 / 6015 = 2.50

Cost Benefit Ratio Analysis of Capsicum Under Polyhouse

S. No.	Particulars	Quantity	Rate (Rs)	Amount (Rs.)
I	Nursery			
1.	Seed	15 g	3000 g	45.00
2.	Nursery management	1 manday	100/ manday	100.00
II	Main field			
1.	Land preparation	3 manday	100/ manday	300.00
2.	FYM & Fertilizer			
i.	Urea	16.27 Kg	7.55/ Kg	123.00
ii	Single Super Phosphate	31.25 Kg	7.85/ Kg	245.00
iii	Murate of Potash	4.98 Kg	7.60/ Kg	37.84
iv	Compost preparation			300.00
3.	Transplanting	1 manday	100/ manday	100.00
4.	Labour Charges			
i	Fertilizer application	1 manday	100/ manday	100.00
ii	Intercultural operations (weeding, earthing up, staking, irrigation etc.	30 manday	100/ manday	3000.00
5.	Plant production chemicals			400.00
6.	Harvesting (12 harvests)	1 manday/ harvest	100 manday	1200.00
7.	Miscellaneous expenses			400.00
	Total cost of cultivation			6350.00
	Average yield kg/500 sq m	2000 kg	35/kg	70,000.00

Net Return- 70,000-6350 = Rs. 63,650 for five month

Net Return /rupees of investment = 70,000 / 6350 = 11.20

MBM-CARI-VIII

Goat Farming

Rationale

The importance of goat in the rural economy is evidenced by its unparalleled economic traits; ability to get acclimatized under diversified agro climatic conditions; unfastidious type in choosing the available forage; high fertility and short generation interval; practically no religious restriction for goat and its products among the diversified religious people in rural area. Economically goat is ideally suited for poor rural folk especially for marginal and landless laborers due to low cost maintenance, short term return on capital with low risk on capital investment. No involvement of extraneous labour, as such the entire rural family members especially woman folk and children are brought into the gamut of activity; hence health is bound to improve with availability of cheap and good quality protein through goat milk and meat (chevon). Goats thrive and add to the rural economy even in areas where it is difficult to raise cows and buffaloes.

The multivarious methods of utility of goat render the animal to be labeled as a "poor man's cow". Perhaps it is the only farm livestock which fits well for effective utilization in the diverse socio-economic situations of the rural India.

Technical details

Area : 4500 m^2 (0.45 ha)

Unit size: 2 : 40 (2 buck + 40 doe)

Components

Housing : 418 m^2

Store room : 50 m^2

Well : 20 m^2

Composting unit : 12 m^2

Fodder : 4000 m^2

Details of components

1. Housing : 418 m^2

Age group	Numbers	Floor space (m^2)/goat	Total area (m^2)
Adult	42	0.90	37.8
Kid to Adult	72	0.9	64.8
Housing area (Fenced)	114	3.7	418

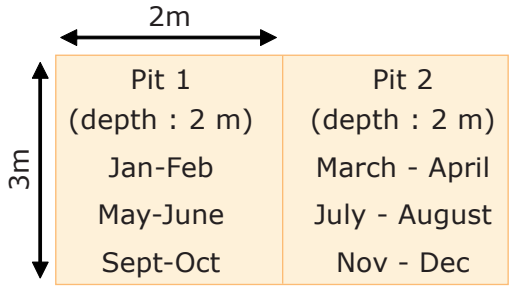
2. Store room : 50 m²

Materials
Feed
Chaff cutter
Dispensary
Utensils

3. Well : 20 m²

Drinking water for goats
Water for cleaning
Irrigation for fodder plot

4. Composting unit : 12 m²



5. Fodder : 4000 m²

Silvi pasture (Pasture grass + Fodder trees)

Fodder classes

Seasonal fodder : Fodder sorghum, Maize, Cumbu

Perennial fodder : Co1, Co 3 Cumbu Napier Hybrid, Guinea grass, Para grass, Kolukattai grass for grazing land for the period of 10 to 20 years

Fodder legumes : Stylo, hedge Lucerne, sun hemp, Fodder ground nut

Tree fodders: Subabul, Gliricidia, Erythrina, Moringa, Jackfruit tree, Agathi etc

Intercropping in Coconut and Arecanut gardens*: *Calapagonium, Stylo*, paragrass, Co 1 & 3 of Cumbu Napier hybrid (1 ha plantation area for 25 goats)

*** If no separate area is available for fodder cultivation, 4.5 ha of plantation area (either coconut or arecanut) is required to meet the green fodder requirement of 114 goats.**

Input required & Source of availability

Input	Source of Availability
Goat	CARI, Animal husbandry department & farmers
Fodder Seeds/Planting materials	Retail seed stores/CARI/Department of Agriculture/ Near by farmers
RCC rings	Ring manufacturers
Concentrate Feeds	Local market
Medicines	Local market
Chaff cutter	Local manufacturing unit
Housing materials	Locally available material or Market
Feeder & Waterer	Local available material or Market

Flow chart : Time schedule & Cash Inflow

Initial Fodder planting & establishment	2 months (November to December)	Invest Rs. 55000
↓		
Housing for goat, store room, feeder & waterer, making of ring well, Composting unit)	2 months (January to February)	Invest Rs. 71100
↓		
Purchase of goat (ready for breeding), medicines, concentrate	2 months (March-April)	Invest Rs. 144100
↓		
Management of Goat farm (Breeding)	Continuous	Invest Rs. 40000 (Recurring Cost)
↓		
First batch of goats for sale	19 Months (May to November)	Start of Income

*Total investment in 25 months : Rs. 270200

Expected cash in & out flow in different months

Cycle	Duration (month)	Component	Cash Inflow (Rs)	Cash outflow (Rs.)
First	1-2 months	Initial Fodder planting, establishment & Maintenance	55000	**-**
	3-4 months	Housing for goat, store room, feeder & waterer, making of ring well, pipes & connection Composting unit)	71100	**-**
	5-6 months	Purchase of goat (ready for breeding), medicines, concentrate	144100	-
	9th month	Sale of manure	-	8335
	11th month	Sale of manure	-	8335
	13th month	Sale of manure	-	8335
	13th month	Birth of first batch kids	-	-
	15th month	Sale of manure	-	8335
	17th month	Sale of manure	-	8335
	19th month	Sale of manure	-	8335
	21st month	Sale of manure	-	8335
	21st month	Birth of second batch kids	-	-
	23rd month	Sale of manure	-	8335
	25th month	First batch goats for sale (68 goats of 12 months old)	-	204000
	25th month	Sale of manure	-	8335
	Total	-	270200	279015
	Net profit after 25th month		**8815**	
Second	27th month	Concentrate feed, fodder plot maintenance, labour & medicine (for 7 months only)	64308	
	27th month	Sale of manure	-	8335
	29th month	Sale of manure	-	8335

Cycle	Duration (month)	Component	Cash Inflow (Rs)	Cash Outflow (Rs.)
	29th month	Birth of third batch kids	-	-
	31st month	Sale of manure	-	8335
	32nd month	Sale of manure	-	8335
	32nd month	Second batch goats for sale (68 goats of 12 months old)	-	204000
	Total		64308	237340
	Net profit (Rs) after 32nd month		**173032**	
Third cycle	33rd month	Concentrate feed, fodder plot maintenance, labour & medicine (for 7 months only)	64308	
	33rd month	Sale of manure	-	8335
	35th month	Sale of manure	-	8335
	35th month	Birth of fourth batch kids	-	-
	37th month	Sale of manure	-	8335
	38th month	Sale of manure	-	8335
	40th month	Third batch goats for sale (68 goats of 12 months old)	-	204000
	Total		64308	237340
	Net profit (Rs.) after 40th month		**173032**	

Although the above data have been given for a situation where a person wants to earn a decent livelihood, but the system can be downscaled for subsistence livelihood with less number of goats.

Market Linkage: Sale of goat & manure in the local market

MBM-CARI-IX

Pig Farming

Rationale

India possesses one of the largest livestock populations in the world which place a crucial role in rural economy and livelihood. Even at low productivity and off- takes rates livestock contributes significantly to economic development. Among the different livestock Pigs are believed to be the most prolific. In India pig raising and pork industry are run by traditional pig farmers belonging to the lowest social – economic stratum and Andaman & Nicobar Islands are no exception. There are four different genetic groups of pigs available in these islands. They are Andaman Wild Pig, Nicobari Pig, pure and Cross breeds of Large White Yorkshire and non descript pigs of Andaman.

In Andaman & Nicobar Islands pigs are mostly reared by Nicobari tribes. It is observed that each family has pigs for their livelihood and for them the number of pigs accounts for their wealth and assets and pigs are liked for their delicacy. The Nicobari generally prefer mass slaughter during festival seasons and rear them in backyard system by feeding coconut as major feed and kitchen waste etc.

The potential of pig farming can be exploited by creating awareness among farmers about scientific pig rearing and management which will ultimately provide gainful income as well as nutritional security to the islanders as a whole.

Technical details

Area : 600 m^2 (0.06 ha)

Unit size : 1: 9 (1 Boar + 9 Sow)

Components

Housing : 78m^2

Store room : 8 m^2

Well : 1 m^2

Composting unit : 12 m^2

Fodder Plot : 500 m^2

Details of components

1. Housing : 78 m^2

Age group	Numbers	Floor space (m^2)/pig	Total area (m^2)
Adult	10	4.6	46.00
Piglet to Adult	70	0.46	32.20

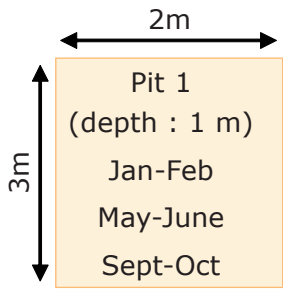
2. Store room : 8 m²

Materials
Feed
Office cum working space
Utensils

3. Well : 1 m²

Drinking water for pigs
Water for cleaning
Irrigation for fodder plot

4. Composting unit: 12 m²



Pit 1 (depth : 1 m)	Pit 2 (depth : 1 m)
Jan-Feb	March - April
May-June	July - August
Sept-Oct	Nov - Dec

5. Fodder : 500 m²

Silvi pasture (Pasture grass + Fodder trees)

Fodder classes

Fodder legumes : Stylo, Rice beans,Pui

Tree fodders: Subabul, Gliricidia, Erythrina.

Intercropping in Coconut and Arecanut gardens*: *Calapagonium, Stylo*, paragrass, (0.05ha. plantation area for 20 pigs)

*** If no separate area is available for fodder cultivation, 0.05 ha of plantation area (either coconut or arecanut) is required to meet the green fodder requirement of 10 Pigs.)**

Input required & Source availability

Input	Source of Availability
Input	Source of Availability
Pigs	CARI, Port Blair, Animal Husbandry Department & Farmers
Fodder Seeds/ Planting materials	Retail seed stores/CARI/Department of Agriculture/ Near by farmers
RCC rings	Ring manufacturers
Concentrate Feeds	Local market
Medicines	Local market
Housing materials	Locally available material or Market
Feeder & Waterer	Locally available material or Market

Flow chart, Time schedule & Cash Inflow

Initial Fodder planting & establishment	2 months (November to December)	Invest Rs. 1000
↓		
Housing for pig, store room, feeder & waterer, making of ring well, Composting unit)	2 months (January to February)	Invest Rs. 117750
↓		
Purchase of pig (ready for breeding), medicines, concentrate	2 months (March-April)	Invest Rs. 117600
↓		
Management of Pig farm (Breeding)	Continuous	Invest Rs. 43800 (Recurring Cost)
↓		
First batch of pigs for sale	16 Months (February to January)	Start of Income

*Total investment in 16 months : Rs. 280150

Expected cash in & out flow in different months

Cycle	Duration (month)	Component	Cash Inflow (Rs)	Cash Outflow (Rs.)
FIRST	1-2 months	Initial Fodder planting, establishment & Maintenance	**1000**	**-**
	3-4 months	Housing for pig, store room, feeder & waterer, making of ring well, pipes & connection Composting unit)	117750	**-**
	5-6 months	Purchase of pigs (ready for breeding), medicines, concentrate feed.	117600	-
	9th month	Sale of manure	-	1440
	11th month	Sale of manure	-	1440
	13th month	Sale of manure	-	1440
		Birth of first batch piglets	-	
	15th month	Sale of manure	-	1440
	16th month	First batch of piglets for sale (65 piglets of 3 months old)		97500
	Total		**235350**	**103260**
	Net Profit/Loss		-	(-)132090
SECOND	17th month	Sale of manure	-	1440
	18th month	Concentrate feed, fodder plot maintenance, labour & medicine (for 06 months only)	43800	-
	19th month	Sale of manure	-	1440
		Birth of second batch piglets		
	21st month	Sale of manure	-	1440
	22nd month	Second batch of piglets for sale (97 piglets of 3 months old)		145500
	Total		**43800+ 132090 =175890**	**149820**
	Net Profit/Loss		-	(-) 26070

Cycle	Duration (month)	Component	Cash Inflow (Rs)	Cash Outflow (Rs.)
THIRD	23rd month	Sale of manure	-	1440
	24th Months	Concentrate feed, fodder plot maintenance, labour & medicine (for 06 months only)	43800	-
	25th month	Sale of manure Birth of third batch piglets	-	1440
	27th month	Sale of manure	-	1440
	28th month	Third batch of piglets for sale (97 piglets of 3 months old)		145500
	Total		**43800+ 26070 =69870**	**149820**
	Net Profit/Loss		-	79950
FOURTH	29th month	Sale of manure	-	1440
	30th month	Concentrate feed, fodder plot maintenance, labour & medicine (for 06 months only)	43800	-
	31st month	Sale of manure Birth of forth batch piglets	-	1440
	33rd month	Sale of manure	-	1440
	35th month	Forth batch of piglets for sale (97 piglets of 3 months old)		145500
	Total		**43800**	**149820**
	Net Profit/Loss		-	106020

Thus from 28th month onward the person pay back the investment and income starts.

Market Linkage: Sale of pigs & manure in the local market

MBM-CARI-X

Quail farming

Rationale

Quail farming is a very profitable venture. Japanese quails are comparatively more delicate than chickens. It is hardy in nature, easy to handle and adaptable to varied environments. It requires less floor space and feed.

To start with quail farming it is essential to get financial assistance for purchasing fertile eggs, chicks, breeder flock, land, shed construction, equipment and to meet the expenditure of electricity and water. Therefore, to get financial assistance from bank a financial statement is required for setting up a quail farm.

There are three aspects in the economics of quail farming:
A. Initial Investments
B. Cost of production
C. Returns

A. Initial Investments:

Initial investment is crucial for any enterprises to start with. Certain amount of capital is required to procure the items, create the infrastructure, which are essential for any enterprise. It holds goods for quail farming also.

The major components of investment in case of quail farming are:

Purchase of chicks:

Investment is required initially to purchase chicks. Good germplasm with good phenotypic and genetic characteristics should be purchased while planning for quail farming. These can be purchased from Central Avian Research Institute, Izatnagar; AVM hatcheries and poultry breeding centre private limited, Coimbatore ;Central Poultry Breeding Farm ,Government of India located at Mumbai, Bangalore, Bhubaneswar and Chandigarh; M/S Venkateshwar Hatcheries Pvt. Ltd., Quail unit at Naigaon, Pune and also from CARI, Port Blair.

Construction of shed:

Capital is required to construct a good shed. The sheds can be constructed either kutcha or pucca depending upon the financial condition of the farmers. For small and marginal farmers construction can be done by using locally available materials like bamboo, arecanut and coconut stems etc. wooden planks can also be fixed on sides. For roofing purpose, leaves or thatch can be used to minimize the cost. Multitier cages made up of iron or bamboo can also be made.

Purchase of minor equipments:

Some amount of money has to be spent on purchase of small equipments, materials and utensils. Appropriate size feeder, waterer etc are needed for maintaining different kinds of flock of quails depending on age.

B. Cost of production:

Cost concepts are important components of economics of quail farming. They are required to calculate the cost of production or maintenance cost of birds

The cost items can be broadly classified into two types namely fixed cost (Non-Recurring) and variable cost.(Recurring).

1. Fixed cost:

It includes construction of sheds, cost of battery brooders, interest on fixed capital, depreciation on fixed assets and insurance costs.

Interest on fixed capital:

It is a payment for the use of fixed capital. The interest on fixed capital comprising value of sheds, equipments and machineries can be worked out at the rate of 15 percent per annum (bank lending rate).

Depreciation of fixed assets:

It refers to decline in value of fixed asset over a period of time. Depreciation at the rate of ten percent on permanent shed (pucca) and the rate of 15 percent on temporary (kutcha) sheds can be taken. The same can calculated at the rate of 20 percent per annum on equipment and machineries.

2. Variable costs:

It includes cost of chicks, fertile eggs, feed cost, labour cost and miscellaneous expenses.

Feed cost:

This refers to average value of concentrates fed per bird per day and was worked out by multiplying the quantities with their respective market prices.

Labour cost:

It includes the cost of permanent, family or hired labour employed for quail rearing and is computed on the basis of prevailing wage rates.

Miscellaneous expenses:

It includes recurring expenditure like cost of repair, electricity tariff, water charges etc.

Total cost:

It can be obtained by adding all the cost items included in fixed and variable Cost.

C. Returns:

Total returns can be obtained by adding the returns from sale of meat or eggs, returns from farm yard manure and sale of empty gunny bags.

Net returns are estimated by subtracting the total cost from total returns for a particular period.

Preparation of bankable project

Economics of quail farming (Broiler) (500 x 52 batches)

I. Assumptions:

Construction Cost: Rs.100 /sq.ft
Space required / bird : 0.15sq.ft
Cost of day old chick : Rs. 5/-
Feed cost (per kg.): Rs.13/-
Mortality rate : 10%
Live weight at 5wk : Rs. 200-250gms
Sale price (per kg. line wt.) : Rs. 150/-
Feed consumption up to 8th week : 600gms
Feed conversion Ratio : 2.4-3.0

II. Fixed Investment

Cost of 10x 75 Sq.Ft of shed
@ Rs. 100/ sq ft : Rs. 75,000/-
Cost of equipment for 2000 birds
@ Rs 5/ bird : Rs. 10,000/-
Cost of office, store 250sq.ft
@ Rs. 100/sq.ft :Rs. 25,000/-
Total (A) : Rs. 1,10,000 /-

III. Recurring Cost (Capitalized)

Chick cost: 4000 chicks @ Rs 5 per chick : Rs. 20,000/-
Feed cost 500x8 weeks x 0.6 Kg per bird @ Rs 13/Kg : Rs. 31,200/-
Labour cost Rs. 1000 X 2 months X 1No. : Rs. 2,000/-
Litter, Electricity and Miscellaneous Charges :
@Rs 2/bird : Rs. 8,000/-
Total (B) : Rs. 61,200/-
Total Financial Outlay (A+B) : Rs 1,71,200/-

IV. Fixed Cost

Interest on Capital Investment (Rs 1,71,200/-)
@15%/Annum : Rs 25,680/-
Depreciation on Building
@ 10%/Annum : Rs. 10,000/-
Depreciation on Equipments
@20%/Annum : Rs. 2,000/-
Total Fixed Cost : Rs. 37,680/-

V. Variable Cost Per Batch

Chick cost: 500 x Rs 5/chick : Rs. 2500/-
Feed cost: 500 x 0.6/bird@Rs 13/kg : Rs. 3900/-
Labour cost/batch : Rs. 1000/-
Litter, electricity, miscellaneous expenditure@Rs2/bird x 500= Rs.1000/-
Total variable cost : Rs.8400/-

VI. Total cost

Total Variable Cost per Year : Rs.37,680/-
Total Variable Cost @ Rs.8400 per Year @ X 52 batches Rs.8400 : Rs.4,36,800/-
Total Cost : Rs. 4,74,480/-

VII. Returns

By sale of quail 460 Quail (2% extra chicks &10% mortality),
(4.5 birds/Kg @ Rs.150/Kg) : Rs.15,333.30/-

By sale of manure (@ Rs 1.25/bird) : Rs. 400/-
By sale of gunny bags (5 bags @ Rs 10/kg) : Rs. 50/-
Total income : Rs. 15783.30/-
= Rs.15783/-

VIII. Net income per year

Total Income per year (Rs.15783 X 52 batches) : Rs. 8,20,716/-
Total Cost : Rs. 4,74,480/-
Net Income per year : Rs. 3,46,236/-
Net Income per batch : Rs. 6658.38/-

Economics of quail farming (layer) (500x 52 batches)

1000 quail chicks required to start with

I. Assumptions

Construction Cost : Rs. 100 per sq.ft
Space Required Per Bird : 0.15sq.ft
Cost of Day Old Chick : Rs. 5.00/-
Feed Cost (Per Kg) : Rs. 13.00/-
Mortality Rate : 10%
Live Weight @ : 200-250gms
Egg Production / bird / Kg bird : 300
Sale Price of per Kg bird : Rs. 150/-
Sale of Egg : Rs. 0 .6/egg
Feed Consumption (For Males) (to be sold after 6th week) : 600gms per Bird After 6th Week
(For Females) To be kept upto 1 Year : 7.5 kg per bird

II. Fixed investment

Cost of 10x 75 sq.ft of shed @Rs100/sq.ft. : Rs. 75000/-
Cost of equipment for 1000 bird @ Rs 5/ bird : Rs. 5000/-
Cost of office, store 250sq.ft @ Rs 100/sq.ft : Rs. 25,000/-
Total (A) : Rs. 1,05,000/-

III. Variable/ Recurring cost (capitalized)

Chick cost: 1000 chicks @ Rs 5/ chick : Rs. 5,000/-
Feed cost 500 x 0.60 kg/bird @ Rs 13 per kg (male) : Rs. 3,900/-
Feed cost 500 x 7.5 kg per bird @ Rs 13 per /kg (female) : Rs. 48,750/-
Labour cost Rs 1000 x12months x 1no. : Rs. 12,000/-
Litter, electricity and miscellaneous charges @ Rs 2/bird : Rs. 2,000/-
Total (B) : Rs. 71,650/-
Total financial outlay (A+B) : Rs. 1,76,650=00

IV. Fixed cost

Interest on capital investment @15%/annum : Rs. 26,347.50
Depreciation on building @ 10%/annum : Rs. 10,000/-
Depreciation on equipments @20%/annum : Rs. 1000/-
Total fixed cost : Rs. 37347.50

V. Total Cost

Total Fixed Cost Per Year : **Rs. 37347.50**

Total Variable Cost per Year : Rs. 71,650/-

Total Cost :Rs. 108997.50

VI. Returns

By sale of Quail

920 Quail (2%Extra Chicks & 10% Mortality)

(5 birds/Kg @ Rs.150/Kg) : Rs. 27,600/-

By Sale of Quail Eggs

(500 birds X 300 eggs/annum @0.60/egg) : Rs. 90,000/-

By sale of manure (@Rs1.25/bird) : Rs. 1250/-

By sale of gunny bags (53 bags @Rs 10/bag : Rs. 530/-

Total Income : Rs. 1,19,380/-

VII. Net Income Per Year

Total income per year : Rs. 1,19,380/-

Total cost : Rs. 1,08,997.50

Net income per year: Rs. 10,382.50

MODEL OF QUAIL HATCHERY AND MOTHER UNIT

Hatchery unit consists of the following:

A) Hatchery Unit

B) Mother Unit (8 in numbers)

C) Beneficiary (7 per mother unit)

FLOW CHART

8000 CHICKS PER WEEK

↓

4000 CHICKS PER BATCH

↓

500 CHICKS PER BENEFICIARY

ECONOMICS OF QUAIL HATCHERY UNIT

Aim : To produce 8000 chicks / week

Requirement : Setter 1 no. of 50,000 capacities
Hatcher 1 no. of 27,000 capacities

Assumptions :
1) Weekly hatch
2) No. of eggs required – 16,500 / week.
3) Hatchability – 51%

(A) Non recurring expenditure:

Hatchery Building (20x 30 ft.) @ Rs. 200/sq.ft.	= Rs.1, 20,000/-
Generator Room (8 x 8 ft) @ Rs. 250sq.ft.	= Rs. 16,000/-
Setter, Hatcher and generator	= Rs. 3,35,000/-
Electrical installation (5% of Civil cost)	= Rs. 6,000/-
Water tank and connections	= Rs. 13,000/-
Other equipments (Trolley, Table etc.)	= Rs. 10,000/-
TOTAL	**= Rs.5, 00,000/-**

(B) Recurring expenditure per hatch:

Cost of hatching eggs @ Rs. 1.10 / egg for 16500 eggs	= Rs. 18,150/-
Overhead on hatching which includes labour, electricity etc	= Rs. 3000/-
Total	**= Rs. 21,150/-**
Hence cost per chick = Rs. 21,150 / 8000	= Rs. 2.65/-

Net profit per chick assuming selling price to be Rs. 5/- chick = Rs.2.35

Hence yearly profit will be 2.35 x 8000 x 52 batch = Rs.9,77,600/-

Economics of Mother unit

Aim : To rear 52000 quail chicks up to 3 week in 13 batches i.e.4000 chicks / batch or 500 chicks / beneficiary

Shed required : one shed of 500 sq ft. i.e.0.125sq ft./bird

Assumptions:

No. of batches reared per year	:	13 batches
Birds reared for	:	3 weeks
Feed consumed in 3 weeks	:	0.225 kg
Mortality (%)	:	8%
Cost of feed	:	Rs. 13 / kg
Labour cost @ RS. 2000/ person/ month (1 labour)	:	Rs 1850/ batch
Overhead cost which includes medication, electricity, depreciation on shed and equipment @ 0.25 per bird for 4000 bird (batch)	:	i.e. Rs.1000/ batch

Non-Recurring expenditure:

1) Shed cost @ Rs. 100 /- sq. ft. x 125 sq. ft.	:	Rs. 12,500/-
2) Water supply and connections (lump sum)	:	Rs. 3,000/-
3) Electrical installations	:	Rs. 1,000/-
4) Equipment cost including feeder and waterer	:	Rs. 1,500/-
5) Miscellaneous	:	Rs. 1,000/-
Grand total	:	Rs. 19,000/-

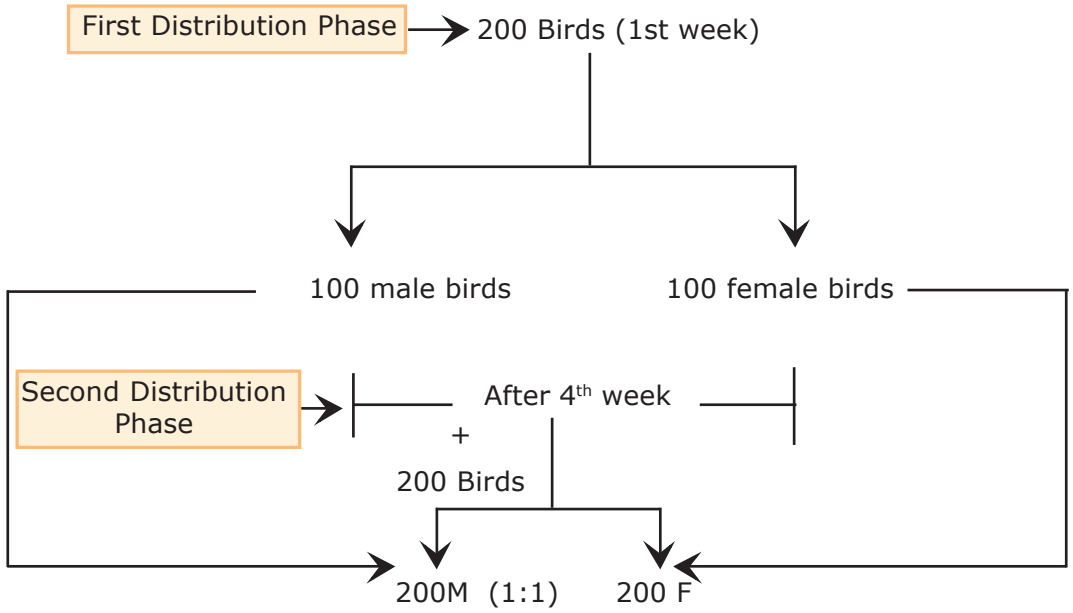
RECURRING EXPENDITURE PER BENEFICIARY (500 chicks /beneficiary)

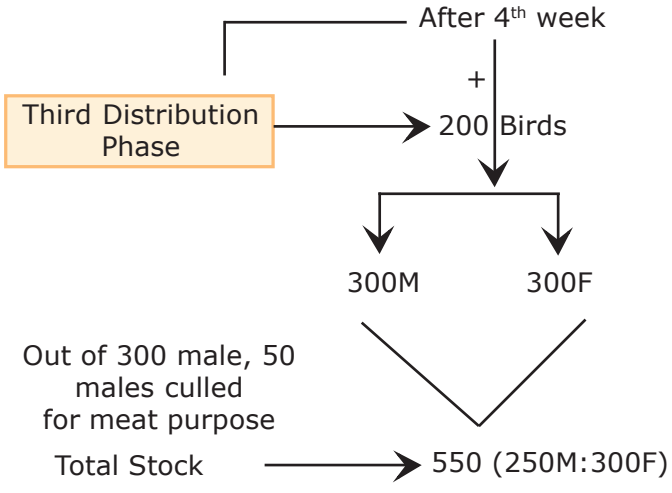
Cost of chicks @ Rs 5/ chick	:	Rs. 2,500/-
Cost of feed 500 x Rs 13 x 0.35 kg	:	Rs. 2,275/-
Labour cost	:	Rs. 1,850/-
Miscellaneous	:	Rs. 200/-
Grand total	:	Rs. 6,825/-
Hence cost/ bird 7975¸ 490	:	Rs. 13.93/-
Assuming selling price to be Rs 20 income 490 x 20	:	Rs. 9,800/-
Net profit / batch	:	Rs. 2,975/-

Development of Quail Production Unit for SHG's Model

Productive Phase for Ist SHG's

Distribution of the quail chicks and strengthening the stock size





The envisaged scheme will have the following major components:

Major components of the scheme are as follows :-

(i) Production Inputs

Quail Chicks: The one week old bird will be required instead of day old to reduce the mortality percentage.

(ii) Infrastructure development: Necessary in-built provision has to be made by the SHG's itself for purchase of replacement breeding stock, feed ingredients, transportation, medicines and vaccines etc. The amount so spent by the groups will be recouped from the sale of eggs, egg Pickle and culled birds etc. and can be in turn used for the farm year after year making it a financially self-sufficient unit. The second major infrastructure requirement is hatchery/ resource unit component which will be taken up after establishment of optimum stocking of size of SHG's.

ii) Training:

The requisite training will be imparted to SHG's on quail farming as well as the technology on quail egg pickle by the Resource person of KVK- CARI.

(iii) Marketing:

Marketing is series of activities involved in making available services and information, which influence the desired level of production relative to market requirements, and the movement of the product (or commodity) from the point of production to the point of consumption. The scheme needs to be supported by providing infrastructure for meat processing, packaging, preservation and marketing with value addition of products and maintaining a cold chain till the product reaches the consumer The State Implementing Agencies would ensure the marketing of surplus produce mainly through the mother units. The break-even price of delivering produce to the markets should have been calculated for running the business in profit.

Pattern of stocking the strength of quail

Date of Distribution	Sex	Week Intervals													Stock	Production of eggs	Sale of birds for meat	Total Stock
		2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th				
1 st phase	M	100	-	-	-	—	-	-	-	-	-	-	-	-	**100**	Nil	Nil	**200**
	F	100	-	-	-	-	-	-	-	-	-	-	-	-	**100**			
2nd phase	M					100	-	-	-	-	-	-	-	-	200	Nil	Nil	**400**
	F					100									200			
3rd phase	M	100				50				100					250	1960	50	**550**
	F	100				100				100*					300		Nil	

- **70% Hatching rate**
- **500 stock capacity will attain in January for First SHG's**
- **500 stock capacity will attain for Second SHG's till March end (Hatching capacity will improve with the contribution of hatchable eggs collected from First SHG's)**
- **500 stock capacity for third and Fourth SHG's will be completed till July end.**

Egg production status and culling of bird from second year onwards

Distribution Cycle phases

Parameters	Cycles							
	Aug to Mid Sept.	Mid Sept. to Nov.	Nov. to Mid Dec.	Mid Dec. to Feb.	Feb to Mid March	Mid March to May	May to Mid June	Mid June to August
No. of New stock (250M:250F)	500	500	500	500	500	500	500	500
Total Stock	1000	1250	1500	1750	2000	2250	2400	2500
No. of male stock	400	500	550	600	700	800	850	950
No. of female stock	600	750	950	1150	1300	1450	1550	1550
No. of Adult male stock	150	250	300	350	450	550	600	700
No. of Adult female bird	350	500	700	900	1050	1200	1300	1300
No. of female in laying (70% of total Adult)	245	350	490	630	735	840	910	910
No. of egg Production	10290	14700	20580	26460	30870	35280	38220	38220
No. of egg collected for fresh hatching	1000	1000	1000	1000	1000	1000	1000	1000
No. of male culled after completion of cyclic phase for meat purpose	150	200	200	150	150	200	150	250
No. of female culled	100	50	50	100	100	150	250	150
Total Stock culled for meat purpose	250	250	250	350	250	350	400	400
No.of egg pickle bottle prepared	615	915	1305	1700	1990	2285	2480	2480

ECONOMICS INVOLVED- CASH FLOW ANALYSIS- At a Glance

1. Stocking of 500No. of birds for First SHG's	3months
2. Stocking of 500 No.of birds for Second, Third and Fourth	2 months each
3. I year completed (on considering 3 months further stocking and stocking the strength of host institute)	
4. II year onwards	
3. No. of cycle per year	08
4. No. of birds per cycle	500
5. Average body wt. of birds (Kg./bird)	0.18 kg
6. Sale Price (Rs./kg. body weight)	Rs. 150
7. Avg. no. of eggs in 250gm for pickle	15 Nos.
8. No. of bottle of 250 gm for pickle /year/SHG's	11,485
9. Avg . price of pickle in 250gm presentation	Rs. 25.00
10. Income from sale of Pickle	Rs. 2,87,125.00
11. Income from sale of quail meat/ year	Rs. 67,500.00
12. Total Income (Sl. No. 10 + 11)	**Rs. 3,54,625.00**
13. Cost of feed purchase for eighth cycle	Rs. 1,80,000.00
14. Expenditure on procurement of chicks and other Miscellaneous	Rs. 75,000.00
15. Total Expenditure (Sl. No. 13+14)	**Rs. 2,55,000.00**
16. Net Profit (Sl.No. 12-15)	**Rs. 99,625.00**

Economics of Quail farming under cage rearing system

					Brooder size	6'x2.6'x0.9'
	Mortality (%)	6	Brooder Space s.ft/bird	0.16	5 wk Body wt.(g)	190
	Weekly prod.	500	Feed req.(kg)	0.62	No. of Pen	6
Sl.	**Particulars**		**Unit**	**Qty.**	**Unit rate (Rs.)**	**Total (Rs.)**
I	**Non-recurring Expenditure**					
a.	Building 16'x16'x7' including office space		Sq.ft	256	100	25600
b.	Battery brooders with equipments		no.	6	7000	42000
	Total (A)					67600
II	**Recurring Expenditure**		(for one year)			
a.	Day old chicks		no.	27560	5	137800
b.	Feed		kg.	16120	8.5	137020
c.	Water/Elect./Medicine		no.	27560	1	27560
d.	Labour		Man-months	12	1500	18000
	Total (B)					320380
III	**Capital Requirement**					
a.	Building & equipment		-	-	-	67600
b.	Chicks		no.	2650	5	13250
c.	Feed		kg.	775	8.5	6587.5
d.	Water/Elect./Medicine		no.	2650	1	2650
e.	Labour		Man-months	1.25	1500	1875
	Total (C)					91962.5

Sl.	Particulars	Unit	Qty.	Unit rate (Rs.)	Total (Rs.)
IV	**Income**				
a.	Broilers	no.	26000	16	416000
b.	Manure	tonnes	13	450	5850
c.	Gunny bags	no.	230.29	10	2302.86
	Total (D)				424152.86
V	**Gross Profit (E=D-B)**				103772.86
VI	**Over head cost**				
a.	Depreciation on building	-	5.00%	1280	
b.	Depreciation on battery brooders	-	10.00%	4200	
c.	Interest on capital investment	-	12.00%	11035.5	
d.	Maintenance of building and equip.		5.00%	3380	
	Total (F)				19895.5
VII	**Net profit (E-F)**				83877.36
VIII	**Net profit per bird**				3.23
	Net profit per kg				16.98
	Capital requirement per bird started (Rs.)				34.7

I	Objective	To provide financial assistance to beneficiaries with training and experience who are willing to take up production of quails for meat purpose in the vicinity of the urban areas.
II	Advantages	* Economic utilisation of space - 10 birds/sqft. * Short generation interval (3-4 generations in a year) * Fast growing bird - can be sold at 5 weeks * Can be used as ready to cook meat, pickled meat and tandoor quail * Start producing eggs at 6-7 weeks of age and continue to give high egg production upto 24 weeks of age (90 eggs/bird) * Egg size is 10 gm. and can be used as boiled egg or egg pickle * Feed consumption is low * Weight of broiler bird is 110 gm and of layer 130 gm
III	Source of chicks	CARI, Port Blair UAS, Bangalore CARI, Izatnagar CPBF, Chandigarh and Mumbai
IV	Project components	Sheds, Cages, Hatchery building, Processing and dressing room, Setters and Hatchers, Cooler for egg room, Deep freezer, MI structure, Working capital
V	Unit size	Breeder unit - 400 Females + 200 Males Rearing unit - 1000 Birds/Batch/Week
VI	Unit Cost/Bank loan	Rs. 4.00 Lakhs/Rs. 3.0 Lakhs
VII	Repayment period	Graded instalments over a period of six years. No grace period.
VIII	Implementation	A & N Islands, Maharashtra, Kerala, Tamil Nadu, Chandigarh, Calcutta, Mumbai & Hyderabad are also potential places for the scheme.

MBM-CARI-XI

Mud Crab Culture

Rationale

Mudcrabs, *Scylla serrata* (Forskal) are abundantly available in the mangrove areas of Andaman Islands. Fishing of mud crab is done in the area at subsistence level by the fishermen with the help of a long thick- wire or by employing bait net. The fishing method undertaken is cumbersome and time consuming. Secondly intensive fishing may deplete the crab population which is not desirable. It is in this context culture of mudcrab can be undertaken in places adjacent to mangrove areas or saline affected soils of Andamans. Sensing the prospects of such type of culture, Central Agricultural Research Institute, Port Blair has initiated experimental culture of mudcrab in the brackishwater ponds at Sipighat, Andamans.

Andaman and Nicobar Island are bestowed with about 17% of total mangrove area of Indian and have got a good population of mud crab. Although indiscriminate fishing may eventually lead to a heavy toll on the adult mud crab, especially on mature female crabs or berried crabs, in order to overcome this difficulty, culture of mud crabs from juvenile to marketable size can be undertaken in the fallow land or salt affected land in Andamans. Experiments conducted during 1992-1994 indicates that a maximum production of 900 kg/ha/yr is possible. The man constraints of mud crab culture is uncertainly regarding availability of wild juveniles at desirable time, this problem can be tackled with research activities on seed production of mud crab by establishing a suitable hatchery.

Types of Culture

Two types of culture are practiced

1. Rearing of juvenile crabs for a period of 3-4 months in earthen ponds provided with proper fencing to prevent the escape of reared crabs.
2. Rearing of "water crabs" in suitable earthern ponds, pens are cages for a period of 3-4 weeks, which is called as "fattening".

Suitable site selection

Grow-out ponds can be constructed in tidefed estuaries, backwaters and creeks. The crab ponds can also be established in traditional fish/ shrimp farms, by converting one portion adjoining the brackishwater canal, which would help increase the overall income of traditional fish/ shrimp farmers.

Grown out culture

Mud crabs can be cultured in brackihswater ponds with suitable modification. A case study of an existing (0.10 ha) earthern pond for mud crab culture is given below.

Investment

Pond size : 0.10 ha

Culture period : 6 months

Size at stocking : 50 - 60 g

Stocking density : 500 nos./ha

Survival % : 60%

Average weight at harvest : 260 gms

Yield/ crop : 78 kg

Cost of fencing with Bamboo mat for 3 yrs. : Rs. 3300

Cost of fencing / crop : Rs. 550

Cost of feed / crop : Rs. 550

Cost of juveniles @ Rs.3/ juveniles : Rs. 1500

Income for selling 78 kg crab @ Rs.60/ kg : Rs. 4680

Net income : Rs.2080/crop

For 2 crops the Income form 0.1/ha pond : Rs. 4160

For 1 ha pond : Rs. 41600

This economics is based on local market price of crab i.e. Rs.60/kg. In the event of development of export market, the crab price may shot up to Rs.100/- kg, therefore a 2.5 fold increase in income can be expected.

MBM-CARI-XII

Marine Ornamental Fishes (Damsels)

Rationale

The reef waters of A & N Islands harbors a variety of exportable and valuable ornamental fishes. Due to the continuous exploitation, natural resources are also threatened. In this juncture there is a need to develop proper marketing strategies and channels for marine ornamental fishes to promote their export as well as to exploit the available natural resources of these islands in a judicious way. There is now a big business in ornamental fishes on a global scale. The global trade value of exported ornamental fish & related products in terms of their production and maintenance costs was estimated at over US $ 15,000 million. The world trade of ornamental fish has been estimated to be around US $ 8.5 billion on 2005 and in making further strides with an annual growth rate of about 10 % per year. The annual global marine ornamental fish trade in estimated at US $ 200 – 330 million in 2001.

The export of ornamental fishes from the country at present in mainly confined to freshwater varieties and the export is limited to the fishes from the North – Eastern state (83 %) and fewmetro cities like Chennai, cochin, Mumbai &Hyderabad, inspite of the availability of rich fauna in and around coral reef areas of Lakshadweep, Andaman and Nicobar Islands and Mandapam area. The country could not make any headway in the export of marine ornamental fishes so far due to the non-availability of required infrastructure facilities. Even Sri Lanka's exports of marine ornamental fishes worth Rs. 100 crore during 2001. USA, Europian Union and Japan are the main importers of ornamental fishes. The above-mentioned data indicates that the ornamental fish rearing is having great prospects in A & N Islands in the following means:

Lucrative business opportunities: Due to high demand of ornamental fishes, in USA, E.U. & Japan. This business can be started as a high profit business.

Employment generation to rural youth: Unemployed youth can start their own ornamental fish-breeding center or may work in big aquarium house or ornamental fish breeding & rearing units if private entrepreneurs in A & N Islands establish it.

Rehabilitation of Tsunami affected people: Those who lost their livelihood due to tsunami can start ornamental fish breeding & rearing unit as a cottage industry by finan-

cial assistance from Govt. Semi Govt. or N.G.Os. & technical assistance from Govt. Research Institutes like CARI.

Establishment of export oriented units: Once the ornamental fish breeding & rearing will become functioning, many private entrepreneurs should come in this lucrative business & they may establish export oriented ornamental fish industry.

Source of foreign exchange: Exporting these high demanding fishes, we can earn valuable foreign exchange.

Area

AREA	0.1 ha	1000 m^2
Hatchery	Brooder tanks and associated paraphernalia	400 m^2
Rearing tanks	FRP tanks and aeration system with algal tanks and rotifer tanks	600 m^2
Total		**2000 m^2**

Investment

Capital cost (Fixed investment)	**Rate (Rs.)**	**Amount(Rs.)**
Hatchery shed with glass aquariums (2.5x2x1) m each with lids and fittings	60,000	60,000
Rearing area with cement cisterns (5 x 3 x 2) m/ FRP tanks (1.5 t)	10,000	30,000
Aerators/ blowers (2 nos)	5,000	10,000
Other equipments like hand net, buckets, pipes		5000
Sub total		1,05,000
Culture cost (Variable cost)		
50 female (wild collection)	@ Rs.100/female	5000
50 male (wild collection)	@ Rs.100/male	5000
Feed for one year		17,000
Others		2,000
Sub total		29,000
Total cost (Rs.)		1,34,000
Production		
Monthly production of 1000young		
Yearly production of 12000 young		
Sale		
1200 ornamental fishes	@ Rs.200	2,40,000

Net Returns from Marine Ornamental Fishes (Rs.)

Particulars	Gross returns (Rs.)	Cost (Rs.)	Net returns (Rs.)*
Net income of I year	2,40,000	1,34,000	1,06,000

* Please note the income may vary depending upon the rate and market of ornamental fishes

MBM-CARI-XIII

Small scale seed production and nursery rearing of Indian major carps

Rationale

Fishery is the fastest growing food producing sector in the world. In India this sector has grown at the rate of about 4.1% in last fifty years. The fresh water sector has increased by 16.2 times during this period and this is mainly due to the standardization and easy to adopt seed production technology. Fish hatcheries have been established in all parts of India and producing seeds to satisfy local demand as well as supplying to neighbouring states. Because of easy to operate and lucrative returns, it is becoming an important business opportunities for the people. Establishment of a fish hatchery can not only generate self employment avenues but also will trigger development of many subsidiary industries.

Freshwater fishery resources and scope for development of inland fisheries in these Inlands is limited in this island states. This is mainly due to absence of major rivers or large natural water bodies. However, fresh water fish culture is popular in Andaman. There is heavy demand for IMC fishes and the average price of IMC is always above Rs.140 per kg. Because of high rate of annual rainfall many farmers have constructed ponds for conservation of rain water and use either for either agricultural purpose or for water source for human or animal use. Recently Department of Agriculture constructed many ponds for the farmers where fish culture can be carried out. Total demand of fish seed for Andaman is around 10 lakh fingerling. However, at present there is no well established private fish seed producing farm in South Andaman that can produce and supply fish seeds are not only costly but also creating vulnerable situation of disease outbreak to the indigenous species of this island. The main objective of this project is to establish a small scale fish breeding unit through hapa breeding techniques to produce quality fish seed. This will not only help to increase freshwater fish production in these islands but will also be as an avenue of self employment.

Technology to be adopted for the:

(i) Development of small hatchery (hapa breeding)

- Proper design for spawning and incubation facilities will be adopted.
- Egg and spawn collection and transportation facilities will be made.

(ii) Nursery Management

- Construction of brood stock and nursery pond.

Technical Details

Fishes generally mature when they become 2 + years of old. In the brood stock pond healthy yearling can be procured and regular feeding and management techniques should be taken up till they mature. The breeding season starts in Andaman from the month of May to August. Special care has to be taken from January onwards as from this season development of eggs is in progress. If the farmers can procure brooders itself in the months of March-April breeding can starts in the same year itself after through acclimatization. Mature male and female can be identified through secondary sexual characteristic or by gently pressing the belly of the fishes. Fully ripe male freely ooze milt and female with swollen abdomen and pinkish genital opening. The carp should be selected with body weight of 2-5 kg for breeding. In small scale hapa breeding operation breeding and incubation will be carried out in the brood stock pond itself. The breeding operation last for about 3½ months. During the whole season, two-three times nursery management can be repeated. Note that from second year on wards more that two times nursery management can be practiced and production of the last one can be raised in the nursery pond itself to because fingerling or yearling. These fingerling and yearling will give an additional income to the farmer.

Flow chart, time schedule

Pond preparation	20 days
↓	
Collection of yearling & stocking in the brood stock pond	2-3 days
↓	
Feeding & monitoring growth till fish matures	2 years
↓	
Spawning and incubation	May – August
↓	
Nursery Rearing	June-July, July-Aug
↓	
Selling of fry	2 sets of fry production

*Total investment in 16 months : Rs. 140000

AREA

Area	0.2 ha	Number/Volume (in m^3)	Area (in m^2)
Brooders tank	50 m x 20 m of 2.5 m depth	1 (2500m^3)	1000
Nursery pond	10 m x 20 m x 1 m depth	4 (800 m^3)	800
Free space for breeding operation	10 m x 5 m	1	50
Packing shed	10 m x 5 m	1	50
Feed storage unit, office room etc		1	100
Total	-	-	2000

Input Required

S.No.	Item	Source of Availability
1.	Breeding hapa (2mx1mx1m)	Can be made by purchasing cloth from market and tailoring
2.	Incubation hapa set (2mx1mx1m)	- do -
3.	Conditioning hapa (2mx2mx1m)	- do -
4.	Spring balance	Market
5.	Hand net	Can be made by purchasing cloth from market and tailoring
6.	Ovaprim hormone	Procured through order
7.	Drag net	Market
8.	Potassium permanganate	Chemical shop
9.	Brooders (yearling)	Farmer's pond
10.	Feed	Market
11.	Lime	Market
12.	Cowdung	Farmer
13.	Urea and SSP	Fertilizer shop

Investments:

A. Fixed Cost:

Sl. No.	Item	No. Required	Rate (Rs.)	Total (Rs.)
1.	*Brood stock and Nursery pond construction (using Hitachi)	3300 m^3	Rs. 1000/ hour (20 m^3/hr)	165,000
2.	Breeding hapa	5	400	2,000
3.	Incubation hapa set	20	800	16,000
4.	Conditioning hapa	5	600	3,000
5.	Spring balance	1	2000	2,000
6.	Hand net	2	200	400
7.	Drag net	1	8,000	8,000
8.	Measuring cylinder, eyes glass syringe	-	-	600
	Total	-	-	197,000

* Cost of pond construction is a one time investment.

B. Variable cost :

Sl. No.	Item	No. Required	Rate (Rs.)	Total (Rs.)
1.	Brooders pond preparation		10,000	10,000
2.	Brooders (yearling)	80	5	400
3.	Feed for (2 years)	1000	12 / kg	12,000
4.	Potassium permanganate	500 g	500/ 500 g	500
5.	Ovaprim	3	500	1,500
6.	Nursery pond preparation	3 x two times	6000	16,000
7.	Labour (3 months)	2	100	18,000
8.	Miscellaneous	-	-	1,600
	Total	-	-	60,000

Total cost :

Sl. No.	Particulars	Amount (Rs.)
A.	Fixed cost	197,000.00
B.	Variable cost	60,000.00
	Total (A + B)	257,000.00

Gross Returns

Particulars	Fry produced	Rate of fry (Rs.)	Total expected revenue (Rs.)
Nursery pond	240000	1 per piece	2,40,000

Net Returns from small scale hatchery unit (Rs.)

Particulars	Gross returns (Rs.)	Cost (Rs.)	Returns (Rs.)	Net Returns (Rs.)
Net income of I year	2,40,000.00	257,000.00	- 17,000.00	
Net income II year onwards	2,40,000.00	60,000.00	+ 1,80,000.00	163000.00
Net income III year onwards	2,40,000.00	60,000.00	1,80,000.00	1,80,000.00

MBM-CARI-XIV

Vermicompost Production

Rationale

Andaman and Nicobar (A&N) Islands is known for its natural resources and biodiversity. Paddy, coconut, arecanut, clove, black pepper, cinnamon, nutmeg and vegetables are the major agricultural crops in these islands. Agriculture has always been a challenge for the people of the islands, both due to availability of limited cultivable area and low productivity. It is further constrained due to reduction of paddy land from 12000 ha to 7685 ha and plantation area from 28000 ha to 24978 ha after tsunami 2004.

Initially, agriculture in these islands was promoted to attain self sufficiency and thus intensive farming technologies, use of chemical fertilizers and pesticides were promoted in the past few decades. Subsequently, these islands have been seen as potential area for organic farming. Considering the limited area under crops, these islands can be brought under organic farming with available plant residues, animal wastes and forest litters from buffer zone. Since both area and productivity are constrained, farmers income can be enhanced through organic farming based agricultural products that fetch higher prices.

What is Vermicompost? : Organic manure in the form of vermicompost obtained from the earthworm is one way to overcome the problems of low productivity. The production of compost from any organic waste (agriculture and homestead) using earthworms is called vermicomposting. Earthworms feeds the organic waste materials and passes it through their digestive system (digested by microbes present in the guts of worms) and gives out in a granular form (cocoons) which is known as vermicompost. Vermicompost made from mix of dung, crop residues and kitchen wastes along with earthworms are rich in terms of nutrient availability compared to farm yard manure (FYM) which is from mere decomposition of dung.

Requirements for Vermicomposting

The following are the four major requirements for vermicomposting:

- Suitable organic wastes
- Multiplication of earth worms
- Structure for composting
- Suitable method of composting

Suitable organic wastes: Crop residues, plant litters, weeds, farm yard manure and kitchen wastes are the common organic wastes available in a typical farm.

Availability of organic waste from different sources

Source	Type of wastes	Residue production (kg/ha/year)
Paddy	Straw, weed biomass	3000-4000
Vegetables	Leaves, stalks, infected fruits, plants	2500-3250
Homesteads	Kitchen wastes, dried leaves, weeds	500 / family
Coconut	Coconut husk, coir pith, leaf litter	8100
Arecanut, blackpepper	Leaf litter, weed biomass	6900
Gliricidia in fence	Green leaves	1250
Livestock	Cowdung	5500 kg/cow/year
	Poultry	65 kg /bird/year
	Pig	750 kg/pig/year
	Goat	290 kg/goat/year

Multiplication of Earthworms: About 2-3 kg of earthworms is required for 1000 kg of biomass, whereas about 1100 number earthworms are required for 1 m^2 area. Non burrowing species are mostly used for compost making. Red earthworm species like *Eisenia foetida* and *Eudrillus enginae* are most efficient in compost making. Following steps should be taken for small scale multiplication of worms:

- Use flower pots or abandoned bucket for small scale earth worms multiplication
- Make small holes on the side of pot or buckets
- Put 3-4 big size gravels on the bottom of bucket /pot to enable aerobic condition
- Fill pot with well chopped (4-5 cm length) organic wastes of about 2 cm thickness
- Spread 2 cm thick layer of fresh cowdung (2-3 days old) over the organic wastes
- Fill organic wastes and cowdung alternatively till the pot is filled
- Introduce red earthworms (10 to 20 numbers) and cover the pot with gunny bag
- Sprinkle water once in a day on the gunny bag to keep it sufficiently moist
- Once decomposing process starts, space will be available on the top. Fill it with organic wastes and cowdung alternatively to give sufficient feed to earthworms
- Within 2 months, 4-5 kg of worms can be produced from 10 to 20 numbers which can be utilized for farm scale vermicompost production

Structure for composting: For production of farm scale vermicomposting in island conditions, different structures i.e. plastic tubs, earthen pits, cement concrete tank and RCC rings can be used.

RCC ring

RCC rings of 1, 1.5, 2 and 2.5 m diameter are commonly available in the islands. The number of rings required will vary depending upon the availability of ring diameter and quantity of organic wastes available.

- 2 m diameter rings will be the optimum size for production of vermicompost
- 6 RCC rings are required to produce vermicompost from one ha of each lowlying paddy areas and hilly plantations. Two units of 3 RCC rings each should be made in case of paddy land alone or hilly lands alone so that height (0.9 M) of structure is manageable for mixing and collection activities
- 8 rings are sufficient for producing vermicompost from 2 ha land having 1 ha each of paddy-vegetable and coconut/Arecanut+ Black pepper. Make two units of 4 RCC rings each, so that the height is 1.2 m only
- Make a thatched shed over the RCC ring at a height of 2.5 m using coconut leaves, so that structure can be protected from heavy rain
- In the bottom of the ring, put either gunny bag or boulders to protect earthworm moving inside the soil
- Approximate cost of one 2 m diameter RCC ring will be Rs.1500/-

Method of preparation: Vermicompost can be prepared in any one of the above mentioned structures by adopting the following steps:

- Collect the available organic wastes from crops and *Gliricidia*
- Chop the wastes in to small pieces of 5 cm using knife for hastening the decomposition process
- Heap the chopped materials under sun for about 7-10 days
- Sprinkle cow dung slurry (5 kg of dung in 5 litres of water) on the heap
- Place a thin layer of half decomposed cow dung (3-5 cm) at the bottom
- Place the chopped weed biomass and partially decomposed cow dung layer wise (10-20 cm thickness) in the rings up to the depth of 75 cm
- Organic waste and cow dung ratio should be mixed at 60: 40 on dry weight basis
- Release about 2-3 kg of red earthworms per 1000 kg of biomass
- Place wire net / bamboo net over the tank to protect earthworm from birds.
- Sprinkling of water should be done to maintain 70-80 % moisture content.
- Provide a shed over the compost to prevent entry of rainwater and exposure to direct sunshine.
- Sprinkling of water should be stopped when 90 % bio-wastes are decomposed.

- Maturity could be judged visually by observing the formation of granular structure of the compost at the surface of the tank. Normally after 60 days, compost will be ready for collection.
- Harvest the vermicompost by scrapping layer wise from the top of the tank and heap under shed. This will help in separation of earthworms from the compost. Sieving may also be done to separate the earthworms and cocoons.

Do's

- Always use chopped and wilted organic residues
- Bed temperature should be in range of 20-30°C and protected from predators like red or white ants, centipedes and others like rats, cats, poultry birds or even dogs
- Worms should not be injured during handling
- Frequent observation of culture bed is essential as accumulation of casts' retards growth of worms
- Optimum size of structure should be used for timely decomposition of materials
- Earth worms find it difficult to adopt themselves in new environments hence addition of inoculums as a bait from earlier habitat helps in early adaptation to new site of rearing
- After removing the earthworms from compost, mix 5 packets of *Trichoderma* or *Pseudomonas* in compost for value addition of compost in controlling pathogens

Don'ts

- Do not add raw green wastes as it will affect the survival of earthworms
- Moisture level in the bed should not exceed 40-50%. Water logging in the bed leads to anaerobic condition and change in pH of medium. This hampers normal activities of worms leading to weight loss and decline in worm population
- Do not mix non degradable materials such as polythene papers etc
- Do not mix any soil or stones with residues of crops or cowdung

Some composting tips

- Mixture of cattle dung with vegetable wastes forms ideal feed for worms
- Addition of neem cake in small quantity enhances growth of worms
- Biogas slurry aged aerobically for 15 days enhances vermicomposting process
- Mix *Trichoderma* or *Pseudomonas* with the compost which will increase the value of compost in controlling pathogens of crops
- The compost is very dark in colour and it is very similar to farmyard manure in uses and appearance
- Compost should be dark brown in colour and has a fine smell and should have 15-20 % moisture in it.

Application of Compost to Crops

Crop	Quantity (kg/ha)	Time of application
Paddy	2500	After transplanting
Vegetables (Chillies, Brinjal, Okra, Cowpea, Tomato)	5000	Just before sowing
Groundnut	1250	Just before sowing
Coconut	2500	2 kg/plant at the time of planting (Jun-Jul) 5 kg/plant (1-5 year old plants) 10 kg / Tree (6-9 year old trees) 20 kg/Tree (>10 years old trees)
Arecanut + Black Pepper	2500	2 kg/plant at the time of planting (Jun-Jul) 5 kg/plant (1-5 year old plants) 10 kg/tree (6-9 year old trees) 20 kg/tree (>10 years old trees)

Production of Vermicompost at Farm Scale

Production of vermicompost both at farm scale and large scale is essential for converting the agricultural lands in to organic production units.

Summary for Production of Vermicompost at Farm Scale

Parameters	Lowlying area	Hilly area	Low lying + Hilly area
Area (ha)	**1 (7.5 bigha)**	**1 (7.5 bigha)**	**1 + 1 = 2 (15 bigha)**
Cropping System	Paddy-vegetable	Coconut/ arecanut/ spices	Paddy-vegetable (1 ha) +Coconut/ arecanut/ spices (1 ha)
Vermicompost requirement (kg/year)	2500 + 5000 = 7500	2500	7500 + 2500 =10000
Crop residue requirement (kg)	7750 Paddy system + homestead waste	1750* from coconut or arecanut plantations	3000 from paddy system + 6500 from plantations
Gliricidia production from fence (kg)	1250	1250	2500

Cow dung required (kg)	6000	2000 kg	8000
Number of animals required	1 cow + 4 goats+ 10 poultry birds	1 cow	2 cows
Total waste for composting (kg)	15000	5000	20000
Earth worms required (kg)	7.5	2.5	10
RCC rings required Number of units	6 rings 2 (3 rings + 3 rings)	2 rings 1 (2 rings)	8 rings 2 (4 rings+ 4 rings)
Expenditure/year			
Capital Cost / year (A)			
Cost of rings (Rs.)	9000	9000	12000
Cost of shed (Rs)	2500	2500	3500
Running cost /year (B)			
Labour and Miscellaneous cost (Rs)	6000	6000	7500
Packaging cost @ Rs 10 for 20 kg bag (Rs)	3750	3750	5000
Total (A+B)	**21250**	**21250**	**28000**
Returns / year			
Vermicompost production (kg/year)	7500	7500	10000
Returns** (Rs/year) @ Rs 9/kg	67500	67500	90000
Net returns (Rs) /year	**46250**	**46250**	**62000**

* Coconut and arecanut produces around 8100 and 6900 kg of wastes/year, respectively. Hence, on an average, 7500 kg of wastes will be available per year for composting. If all the available wastes are utilized for production, the requirement of cowdung will be 5500 kg/year which can be met from one cow. Including *Gliricidia*, the total waste availability will be 15000 kg/year which requires 7.5 kg of earth worms and 2 units comprising 3 rings + 3 rings for composting. The total production will be 7500 kg of vermicompost/year. The additional quantity of 5000 kg/year available can be sold.

** Besides essential macro and micro nutrients, Vermicompost has potential to improve the soil environment which will enhance crop growth.

Net returns / year : Rs 46250+ Rs 46250+ Rs 62000 = Rs. 154500/=

The cost includes cost of family labour and therefore, the total income to family will be much higher.

Market linkage : Sale of compost to farmers and gardeners