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FOOD SECURITY AND INTEGRATED FISH FARMING

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Abstract: Food security is one of the challenges that face in India. Food Security means that all people at all times have physical & economic access to adequate amounts of nutritious, safe, and culturally appropriate foods, which are produced in an environmentally sustainable and socially just manner. Urbanization causes the decreasing of land. Agriculture alone cannot support sufficiently for the production of food for the next generation. So the abundantly available water bodies could be making use for the culture of fishes in plenty, which could supply the richest protein at a lowest cost. When compare to the other food materials. India is bestowed with suitable water bodies, fresh, brackish and marine for aquaculture, which is appreciated as an alternation food production source. Monoculture practices are not sufficient for producing food we need because the deficiency of land. So monoculture cannot give a sustainable food supply. Integrated farming is successfully practiced in many countries all over the world. It is a practice that gave more income through less cost. The waste or by product of the system can be successfully recycled. We can expect multiple incomes through integrated farming. It helps to improve the living condition of farmers. In India the food of the people include fruits, vegetables, meat, fish, egg, etc. Thus there is an importance of integrated farming. For satisfying our needs integrated farming it also help for recreation. It creates income and employment opportunity of the rural from households. The main gains of integrated farming are high productivity, and recycling.

Key words: Food security, Urbanization, integrated farming, Prodictivity

INTRODUCTION

In India population has raised up to 120 cores. Food for all is also an increasing demand and a need of the hour. If each family can produce their own food it becomes a great footstep to food security. Kitchen gardens are a common practice in India. Attached to these kitchen ponds as well as integrated farming could be practiced successfully. There is a possibility to produce good quality fish and vegetables through utilizing water resources in urban as well as small ponds, canals in rural areas. For producing 1kg fish, we need only one cubic meter water, 3 or 4 fish seed, 1100gm manure out of which 100gm inorganic fertilizer, one kg supplementary feed. The benefit in turn of money wise will be around Rs 61,000 from one hectare water body. In the case of integrated farming from this one hectare, additional income could be obtained from associated livestock, agriculture or horticulture. A less expensive method and to be start with interesting individuals, and association of house wives and cooperatives. In the case of aquaculture most part integrated farming money is used for feed and manure for fishes. One of the major advantages of the there is no need of fishing gear or another expensive harvesting methods. The cultured fish can easily been collected by dewatering the pond. Food security and economic security are the two major outcomes of this activity. It can be practiced by interesting people in an ecofriendly method where sufficient water is available.

The following Tables (1-8) show a comparative account of the Economics,

ECONOMICS OF MONOCULTURE FISH FARMING (1 hectare)

Fish farming and poultry

For eggs and meat hens and ducks can be cultivated with fish. Better scientific method is available for this culture in present days. Chicken house can be constructed over the pond or on the embankment. It can be constructed over the pond at least 0.5ft2 spaces. It can be made with locally available cheap material like bamboo. The discards are used as fish feed and manure. Poultry manure is a complete fertilizer.

Table. 1

Expenditure	
Items	**Expected Money (Rs.)**
Lease amount of the pond	10,000.00
Renovation of pond, neseaary water including pumping Electricity & aeration	1,000,00.00
Manure including cattle dung, urea etc	25,000.00
Fish Seed	2000
Watch & Ward (5 Number)	1,20,000.00
Fishing	10000
Total Expenture	2,67,000.00
Income	
Sale of Fish (4000kg)-(1kg/ 100)	4,00000.00
Profit	1.33lakhs

Table. 2

FISH AND POULTRY- Expenditure	
Items	**Expected Money (Rs.)**
Construct of Birds nest	25000.00
Purchase of Chicks (150 Number)	2500.00
Transportation	5000.00
Other expenditure	10000.00
Total expenditure	42,500.00
Income	
Sales of eggs	40000.00
Sale of Meat	16000.00
Sale of Chicks	25000.00
Income	1,37,000.00
Profit	0.945lakhs

Table. 3

FISH AND DUCK- Expenditure	
Items	Expected Money (Rs.)
Construction of Birds nest including floating Cages	100000.00
Purchase of Ducklings (150 Number)	5000.00
Maintenance charge	25000.00
Transportations	15000.00
Other expenditure	15000.00
Total expenditure	60,0000.00
Income	
Sales of eggs	80,000.00
Sales of Meat	20,000.00
Total income	1,00,000.00
Profit	0.40lakhs

Table. 4

FISH AND CATTLE (COW)- Expenditure	
Items	**Expected Money (Rs.)**
Construction of cow shed	10000.00
Purchase of cow	50000.00
Maintenance of charge	10000.00
Transportation	10000.00
Other expendititure	1,00000.00
Total expendititure	1,80,000.00
Income	
Milk production	2,16,000.00
Sale of calves	50,000.00
Sale of meat	50,000.00
Total income	3,16,000.00
Profit	1.36lakhs

Table. 5

FISH AND PIG - Expenditure	
Items	**Expected Money (Rs.)**
Construction of shelter	4000.00
Purchase of pig leg (30 number)	6000.00
Maintance charge	10000.00
Transportation	5000.00
Other expenditure	5000.00
Total expenditure	30,000.00
Income	
Sales of pig	4,00000
Total income	4,00000
profit	4.70lakhs

Table. 6

FISH AND HORTICULTURE - Expenditure	
Items	**Expected Money (Rs.)**
Cost of plantation	20000.00
Maintanace charge	10000.00
Transportation	5000.00
Other expenditure	10000.00
Total expenditure	45,000.00
Income	
Sales of Vegetable	200000.00
Sales of Fruit	100000.00
Total income	3,00000.00
profit	2.55lakhs

Table. 7

FISH AND MUSHROOM - Expenditure	
Items	**Expected Money (Rs.)**
Construction of Mushroom bed	10000.00
Transportation	5000.00
Other expenditure	50000.00
Total expenditure	65,000.00
Income	
Sales of Mushroom	1,00,000.00
Profit	0.35lakhs

Table. 8

FISH AND TOURISM - Expenditure	
Items	**Expected Money (Rs.)**
Construction of hut	50,000.00
Purchase of canoes and other recreative facilities	25,000.00
Other expenditure	15,000.00
Total expenditure	90,000.00
Income	
Visit of 10 people /day	1,80,000.00
Profit	0.90lakhs

Table. 9

Total income from Integrated farming	
Items	**Amount (Rs.)**
1. Fish and Poultry	0.945lakhs
2. Fish and Duck	0.40 lakhs
3. Fish and cattle (cow)	1.36 lakhs
4. Fish and pig	4.70 lakhs
5. Fish and Horticulture	2.55 lakhs
6. Fish and Mushroom	0.35 lakhs
7. Fish and Tourism	0.90 lakhs
Profit from integrated farming	11.205lakhs

It composed of organic and inorganic fertilizers. (Banerjee *et al.,* 1979) and fresh chicken manure contains 1.6% nitrogen, 1.5% phosphorous and 0.9% potassium (Woynarovich, 1979). Report revealed that one kg of fish can be produced by using about 17 kg of chicken manure (Fang *et al.,* 1986). About 80% of the chicken manure has undigested feed stuffs with 25% dry matter. This is primarily due to the very short digestive tract of chickens; most of their excreta are only partly digested. In inte-grated chicken-fish farming the pond is continually fed in gradual amounts with dropping from chicken. The study has also shown (Gupta, 1992) that integration of this two components are technically feasible and economically viable. It was observed that about 40% of N in the chicken manure was released as either ammonia or nitrate-N after 6days' immersion in pond water (Knud Hansen *et al.,* 1991). 1000 birds can provide sufficient manure for 1ha water body.As a result the zooplankton

production and the fish uses as their food. The nest can be constructed above the pond in a space with 400 or 700 chicks can be cultivated per hectare. From one hectare pond we can gain 5 to 6 ton fishes.

Fish and Duck

Another profitable thing is the duck and fish culture. Floating cages are constructed for this. The cages will move on the pond surface by the mercy of wind and as a result the casting will spread uniformly in the pond and the dissolved oxygen level will be increased. Duck wasted 20-10% of its food. Duck dropping contains 81% water, 0.91% nitrogen and 0.38% phosphorous. This directly consumed by fish. In areas of low depth the ducks agitate the mud and water .This help for the out coming of vegetative matter in the mud. Duck feed small dangerous insects and larvae. Ducks swimming and other activities create small vibrations on the water surface of pond. One duck voided about 125- 150 gms excreta in a day. Therefore by stocking 250-300 ducklings/ ha (30- 40 Ducklings/ bight) water spread area the required quantity of duck excreta, i.e. 10000- 15000 kg/ year / ha (1300- 2000kg/ year/ hectare water) can be received These activities oxygenated the pond and enrich the pond for fish cultivation automatically. In duck-fish integration 3000-4000kg fish harvested from one hectare. Beside this 4000-6000 eggs and 500-750kg meat get from duck. Here in this method floating duck house over the pond water surface is constructed using mobile oil barrels or tiers of heavy vehicles as float. There is a hole in the floor of the house and because of this hole the duck droppings are directly fall into the pond water. Therefore by stocking 250- 300 ducklings/ ha (30- 40 ducklings/ hectare) water spread area the required quantity of duck excreta, i.e. 10000- 15000 kg/ year / ha or 1300- 2000kg/ year water spread area, can be received. So it has been found that about 200- 300 ducks/ ha water spread area is sufficient to produce manure to fertilize a pond of 1 hector (1 bigha) water spread area under fish culture. Duck excreta are used as fertilizer in a fishpond, which stimulates the growth of fish food organisms in the pond. Ducks feed on snails and gastropods available in the pond which otherwise serve as vectors for certain diseases and the ducks thus serve in reducing their incidence (Thakur and Thakur 1991). Ducks further help in aerating the pond water along with pond bottom raking effects, which is beneficial for fish. As small-scale farmers comprise the bulk of the population in India, their socio-economic conditions encourage them for duck-fish integration to raise farm productivity (Edwards et al 1988). Concluded that the movement of ducks in the pond helped in aerating the water.

Cattle-Fish Farming

This is a system for doubling the profit of a farmer. In this system the animal excreta is recycling for fish production without the application of fertilizers. The good aquatic environment depends up on the quality and quantity of water. The cow shed can be constructed on the embankment of the fish pond. A healthy cow excretes over 4,000-5,000 kg dung, 3,500-4,000 liter urine on one year. Cow manure particles sink slower (6 cm/min) than any other livestock. This provides sufficient time for fish to consume edible portions available in dung. Manuring with cow dung, which is rich in nutrients result in increase of natural food organism-detritus and bacteria in fishpond. A unit of 5-6 cows can provide adequate manure for 1 ha of pond. 9,000 kg of milk, about 3,000-4,000 kg fish/ha/year can also be harvested with such integration. After cleaning cow sheds, the waste water with cow dung, urine and unused feed, can be drained to the pond.

Fish -Piggery

The food waste from restaurant is used for feeding pigs. Full-grown pig provides500 to 600 kg of dung in a year.40-45 pigs provide required quantity of manure in a year. The excreta of fish composed of 85% moisture, 15% organic matter 0.6% Nitrogen 0.5%Phosphorous and 0.4% Potash It is estimated that the excrete of 30-35 pigs is equal to the one ton of Ammonium sulphate.The application of this excreta enhances the growth of zooplankton and phytoplankton.3-4 tones of fishes can be harvested without any feed. Pig attains 60-70 kg weight within 6 months.

Horticulture and Fish Farming

The bund of the fish pond and other area can generate additional income to the farmer. Fish and vegetables are the high value cropes.Through fish farming with agriculture can be getting double cropping in to a single enterprise. The waste water from the pond or fish tank used to irrigate and fertilize the plants. This way vegetable bed act as biofilter to clean waste water so that it recycled back in to the fish tanks or ponds. This water can be used for land cultivation .Pineapple, Ginger, chili, etc. and gladiolus rose,cabbage, banana etc are the commercially valuable items. Daily income can be expected from agriculture and floriculture.

Fish and Mushroom culture

For the culture of mushroom the humid nature is a essential fact. Pond and agriculture environment provide such humid nature. Mushroom is called white vegetable also a protein rich source. I n an integrated fish farm its importance is the mushroom bed or spent mushroom substrate (SMS) contains 1.9N 0.4Phosphourus and 2.4 potash (Kuldeep and Mishra, 2011). Hay and the unwanted grass are used for mushroom culture. It also gives an additional income to the farmer.

Fish and Tourism

Tourism is a fast developing industry .Aqua tourism is a new introduction in the aqua culture system.This potential can also be make use in integrated farming. The aesthetic look of the water and the vicinity of the farm will be notified to attract the tourists. Small canoes,gardens,rowing facility, and a small cafeteria will be furnished. All the constructions will be on ecofriendly lines by using locally available bamboo poles, coconut cadjans, etc. The beautifully managed pond surface is also used for swimming . Sport fishing or angling is another possibility of fish farm. An outing in a group or with the family is one of the best way of enjoying a holiday and get fresh fish for eating at less expenses. It is best achieved by organizing Angler's club. It is also serve as commercial fishing .In West Bengal the village groups organizes an angling competition in the month of Shravan (July/August) each year when it throws open the 0.6 hectare community pond for angling on all Sundays charging a small fee and earns a huge amount in just four days at most no expense. It helps to farmer saving labour cost on fishing. Besides this it helps to remove big fishes from pond and help the smaller one to grow faster to taking maximum food from the pond. (Tripathi, 2011). In this way fish farm provide nutritional food, employment opportunities, additional income and recreational facility .This converting poor fisher man's lifestyle in to a skilled businessman. The possibility of angling club can also be tried while the project is reaching its full stage.

CONCLUSIONS

Integrated fish farming is a sustainable aquaculture method. Through which job opportunities would be created. In an integrated farm enterprise the job facilities can be created from the level of illiterate poor man to a higher educated one. Creation of job opportunities are an urgent need of our country. Integrated farming in one hectare area gives sure monthly income to more than 5 people. In this system farmer can earn money from an integrated approach. In monoculture farmer get money only at the time of harvest of fish. In integrated system daily income from selling vegetables, flowers, recreations,etc is an advantage. Integrated farming with technical knowledge will lead to 'green-blue revolution'. Bringing integrated aquaculture will not only boost up the fish production but also other agricultural varieties which are very supportive to the food security. The Parliament of the India has recently passed a bill for the food security. This sort of activities will definitely support the production of quality protein which could be supplied to the people at lower rate Together with food grains, fish and other animal protein can be produced maximum. Integrated farming once practiced and put in to effect, no doubt the rural economy, employment generation and small scale industries will be developed faster. This will ultimately help in the development of the nation through eradication of poverty.

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