

Integrated Farming System:

A boon in hill farming system

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Integrated Farming System (IFS) has consistently showed potential to provide sustainable income and employment to the farming community. Mrs. Premkit Simik Lepcha, a tribal lady staying in the remote area in the hilly district of West Bengal has shown a way of livelihood through IFS. With the adoption of different components, IFS has helped fetch good income. The B:C ratios of different components have shown promising results and ability for its sustainability. The IFS in hill farming system under study created more than 1685 mandays in a year.

Keywords: Economics, Employment generation, Hill region, IFS

SMALL scale IFS is family farming system through integration of different available components. This is a success story of a tribal lady Mrs. Premkit Simik Lepcha staying in the remote area in the hilly district of Kalimpong in West Bengal where life is not easy. She used to engage in small scale agriculture, horticulture, basically growing vegetables and her main focus was animal husbandry. In the year 2015, she came in contact with Darjeeling Krishi Vigyan Kendra, Kalimpong through a training programme. Learning new techniques in agriculture, horticulture and animal husbandry and then implementing those technologies and ideas were always her passion. Even after implementing many new ideas in her farm, she regularly visited the Krishi Vigyan Kendra of and on. Her IFS is one of the model farms for arranging exposure visit for farmers to showcase the ideal IFS in hill region.

Small profile of Integrated Farming System

It is a well-known fact that water scarcity is a major hurdle in hill region among majority of the farmers engaged in agriculture. Though Mrs. Lepcha had an area of 3 acre of land for engaging in field crop cultivation

and horticulture, it could not be fully utilized with a cropping intensity of 1.7. She also had some area under cardamom cultivation. Due to the problem of irrigation, she focused more on animal husbandry. She had a unit for Pig, Cattle and Poultry. She had purchased 6 months old Hampshire pigs (2 sow +1 boar) initially, which increased to 5 sows + 1 boar for production of piglets. She

had 2 dairy cattle and about 120 poultry birds which include Vanaraja, Rhode Island Red and desi poultry birds. She further cultivated vegetables (0.5 acre), large cardamom (1 acre), ginger (1 acre) and turmeric (1 acre) under rainfed agriculture.

Production practice and Economics of pig unit

She had spent around ₹ 6000 in



Pig unit under IFS

purchasing piglets in the year 2015 and spent around ₹ 50000 in construction of low-cost pigsty. Later, the farm was renovated and extended for accommodation of 5 sows and a boar which further included an additional expenditure of ₹ 1.2 lakhs.

The piglets she had purchased initially became adult at the age of 7-8 months which resulted in breeding. At the age of 13-14 months, the two sows gave birth to piglets with a litter size of 10-12 per sows, and about 44 pigs were added in one year of her pig farm which was a boom in the growth of her pig entrepreneurship.

In the first year (i.e. 2016), 39 piglets (3 piglets died due to cold, mismothering and unknown reasons) were sold out at ₹ 3500 per piglet (male) and ₹ 3000 per piglets (female) after weaning (i.e. 2 months age) and gave 1.27 lakhs within a year. Two piglets were kept for enhancing the breeding stock. In the year 2017-18, she had sold (on an average) about 120 piglets and earned approximately ₹ 3.78 lakhs. It was estimated roughly that the yearly income through small scale pig furrowing (5 sows and 1 boar) was about ₹ 3.97 lakhs, while the net return was about ₹ 2.71 lakhs. Additionally, the waste product of pig unit such as excreta, urine and water used during washing and cleaning were used in the vegetable field.



Cattle unit under IFS

Production practice and economics of cattle unit

The desi cattle reared for long were crossbred through artificial insemination procedure and thus the dairy unit consisted of 2 cross breed dairy cattle. The feeding was managed with available straw, tree fodder and green grasses under stall feeding practices. The milk production of the two dairy cattle was an average of 4.2 litres per animal per day during peak milk period which had an income of about ₹ 240 daily with total milk production of 860 litres per animal per lactation which earned an income of ₹ 51600 where B:C ratio was 2.62 and rate of return was 1.62 (Table 1). In addition to this, the dung was used as farm yard manure in crop field and the urine and water used during washing and cleaning of shed and utensils were used in the vegetable field.

Production practice and economics of poultry unit

Vanaraja and Rhode Island Red along with desi birds consisted of the poultry unit under the IFS where around 120 poultry birds were maintained on an average. Low-cost poultry shed were constructed with locally available bamboos and iron net. The birds were allowed for scavenging but sometimes supplemented with poultry feed. The eggs were sold locally and also to the nearby market for

around ₹ 8-10 depending on the demand of the eggs in the market. The annual income from poultry birds excluding the expenditure in feed, medicines and cost of chicks was ₹ 85600 where B:C ratio was 3.04 and rate of return was 2.04 (Table 1). The excreta of the poultry birds which is a very good sources of nitrogen was used as compost in the crop field. In addition to this, the poultry birds during scavenging consumed insects from the vegetable field and checked the insect load of the crop and thus reduced crop damage.

Production practice and economics of horticultural crops under IFS

Livestock units had contributed immensely to the income but it was also seen that horticultural crops had also contributed to the income of the farmers. As the area is rainfed, the crop chosen by the farmers were only



Poultry unit under IFS



Seasonal vegetables grown in the IFS

those which could be grown in rainfed condition. The yield, gross expenditure, gross return, net income with B:C ratio of different crops under IFS are shown in details (Table 2). Moreover, the vegetable wastes cleaned before marketing were used as fodder for livestock and also used in vermicompost.

Economics of seasonal vegetables crop

Vegetables like cabbage, cauliflower, pea, carrot, leafy vegetables, tomato, spinach beans and coriander leaves were cultivated round the year in a small plot of land. The economic analysis of all the seasonal vegetables in the small plot of land after family consumption is provided in Table 2. The study shows that it provides a net income of ₹ 7570 having B:C ratio of 2.09 and rate of return of 1.09. Additionally, the vegetable wastes which

were cleaned before marketing were used as fodder for livestock and some were also used in vermicompost.

Economics of large cardamom crop

Large cardamom is a high value perennial spice crop. Planting was done in June-July. Pits of 30 cm×30 cm×30 cm were prepared with a spacing of 1.5 m×1.5 m. The pits were left open for weathering for 15 days, then 3 kg of well decomposed

farm yard manure was added to each pit. Seedlings and suckers were planted in the middle of the pit. Organic mulching with dry leaves was done to retain moisture and control weed. The sucker came into bearing stage a year after planting and seedling came into bearing stage 3 years after planting. Sprinkler irrigation equivalent to 35-45 mm of rain at fortnight interval was done. The production of large cardamom

was around 5.70 quintals per acre under IFS and gave a net income of ₹ 63122 having B:C ratio of 1.70.

Economics of ginger crop

Disease free planting materials were procured from the village. 40-50 g of each having one or two buds were taken for sowing in February. At the time of planting, well-decomposed farm yard manure or compost @ 40-50 t/ha, neem cake @ 2 t/ha, biofertilizer (*Azospirillum* + PSB) @ 5-6 kg/ha were applied in rows. It was harvested in the month of November. Rhizomes to be used as planting material were harvested after the leaves became completely dry. IFS shows that it gave a gross income of ₹ 53480 and net income of ₹ 22880 having B:C ratio of 1.75.



Farm yard manure used in crop fields.

Table 1. Economic analysis of livestock units under IFS

Livestock Unit	Nos.	Gross expenditure (₹)	Gross return (₹)	Net income (₹)	B:C ratio	Rate of return
Piggery	6	126200	396700	271300	3.14	2.15
Cattle	2	31800	83400	51600	2.62	1.62
Poultry	120	41900	127500	85600	3.04	2.04

Note: B:C ratio= Gross return/ Gross expenditure; Rate of return= Net income/Gross expenditure.

Table 2. Economic analysis of horticultural crops under IFS

Crop	Area (acre)	Yield (quintal/acre)	Gross expenditure (₹/acre)	Gross return (₹/acre)	Net income (₹/acre)	B:C ratio	Rate of return
Vegetables	0.5	4.90	6939	14509	7570	2.09	1.09
Large cardamom	1.0	5.70	90278	153400	63122	1.70	0.70
Ginger	1.0	17.80	30600	53480	22880	1.75	0.75
Turmeric	0.5	8.10	13840	17842	4002	1.29	0.29

Note: B:C ratio= Gross return/Gross expenditure; Rate of return= Net income/ Gross expenditure

Additionally, the harvested plants were used as vermicompost.

Economics of turmeric crop

Sowing of turmeric was done in March and harvested in December under IFS. The gross income was ₹ 17842 per acre which gave a net income of about ₹ 4002 having B:C ratio 1.29. Moreover, the harvested

plants were used as vermicompost.

Employment generation

The economic analysis of the IFS shows that Mrs. Lepcha created more than 1685 mandays for the family which can be regarded as pretty good in the hill farming system. It is also seen that engagement in small scale IFS which

is a whole family approach can be done in hilly region.

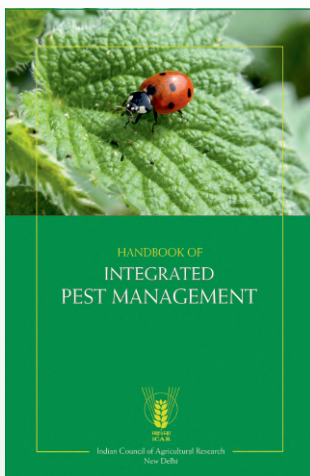
SUMMARY

Sustainable income and consistent employment can be achieved by the farming community by adopting IFS. The economic analysis of different components under IFS in hill farming system has shown considerably superior benefit : cost ratio. Economics of the IFS clearly shows that return was higher in livestock units in comparison to horticultural or agricultural crop. The IFS under study also demonstrated that it had created annual mandays of more than 1685 days.

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HANDBOOK OF INTEGRATED PEST MANAGEMENT

To reverse the loss of environmental resources and also to reduce biodiversity loss, the Government of India has Integrated Pest Management (IPM) as part of the National Agricultural Policy. Integrated Pest Management emphasizes the growth of a health crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms. IPM is not new – mechanical, cultural and biological tactics were used by farmers for hundreds of years before chemical pesticides became available. Besides, there are IPM techniques that have been developed more recently and are effective in suppressing pests without adversely affecting the environment.



The task of spreading the message of IPM across is tough due to poor awareness about the subject among people in line-departments as also among the farmers. The information on integrated pest management as a whole is scattered. This *Handbook* comprehensively deals with all the aspects of integrated pest management in field crops, horticultural crops under traditional, protected systems. Information on basic strategies and tactics of different methods of management including mass production of biocontrol agents, IPM policy and pesticide registration is provided in comprehensive form.

The *Handbook of Integrated Pest Management* comprises 82 chapters which are well written in lucid language with crispy sentences by the renowned scientists. The role of IPM is elucidated with different pests like *Trichogramma*, *Bacillus thuringiensis*, *Nomuraea rileyi* etc. and agricultural crops like rice, wheat, maize, sorghum, pearl millet, pulses, soybean, rapeseed mustard, groundnut, minor-oilseed crops, sugarcane, cotton, jute and mesta, potato, vegetable crops, fruits, grapes, citrus, banana, pomegranate, coconut etc. This *Handbook* will provide information of available useful technologies to educate on how to reduce or judiciously use chemical pesticides, safeguard ourselves from chronic poisoning, save the National environment while also reducing input costs and raise farmers' income. This compilation will be useful to teachers, students, trainers, line-department personnel and policy makers.

TECHNICAL SPECIFICATIONS

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