

Integrated farming system model

for doubling farmers' income in western Uttar Pradesh

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There is urgent need to optimize the limited available resources with farmers and cut down the cost of production through integration of different enterprises at one place to use them as byproducts and supplementary for getting higher benefits. Thus, we can save inputs purchased from the market by 70-80% and only 20-30 % will be required from outside. Besides, most of the needs of farm family can be met out from the development of IFS model. The farming systems research is considered to be a powerful tool for natural and human resource management in developing countries like India. This is a multi-disciplinary whole-farm approach addressing the constraints of small-and marginal-farmers. The approach aims at increasing income and employment from small-holdings by integrating various farm enterprises and recycling of crop residues and by-products within the farm itself. The small and fragmented land holdings are coming in the way of mechanization and hence the whole crop operations are carried out by the farm family resulting in meagre farm production which is consumed by the farm family itself. The interaction of biophysical, technological, institutional and socio-economic conditions leading to temporal and spatial variability among the farming systems which not only helps in enhancing productivity and profitability in the farming system but also contribute in making available balanced diet.

Key words: Farmers, Income, Intergrated Farming System

THE benefits of advancement in agriculture were harnessed mainly by small group of large and medium category of the farmers who were resource endowed. At present about 84% farmers are marginal and small in India. Small-land holdings are not well suited to mechanize farming coupled with poor economic condition and lack of resources are responsible for slow growth rate in agricultural sector. The soil, water, climate, marketing, labour, transport and local demands of people are the main criteria to select the farming systems. For example in western plain zone of Uttar Pradesh, the irrigation facilities are ample, hence farmers are preferring sugarcane cultivation as a remunerative crop than rice, wheat and maize, the another important cereal crops which are being taken by

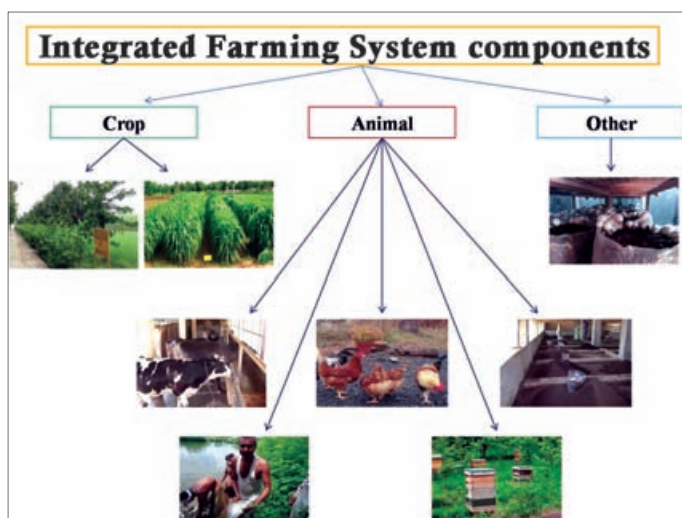
the farmers. Apart from this, pulses like pigeonpea, urdbean and moong bean are the second choice of the farmers. However, the legume crops like cowpea and *dhaincha* is used as green manure and fodder. Among the fruit crops *viz.* mango, guava, jackfruit and *jamun* etc. are the important component in integrated farming system. An important component of IFS model includes vegetables crops like cabbage, cauliflower, okra, french bean, tuber crops, floriculture, medicinal, aromatic and forest plants (used for timber /fuel/ fodder), grasses and fodder crops and hence alternatives suitable farming systems for different farming situation in the western plain zone of Uttar Pradesh is discussed here.

1. Crop alone

2. Crop+ dairy
3. Crops+ dairy + horticulture
4. Crops+ plantation+ dairy
5. Crop + horticulture

Research outcome

The integrated farming system model was designed on 1.5 ha of land. The cropping systems comprising ; sugarcane + cowpea (2:1) - ratoon + cowpea (2:1)-wheat; rice-wheat-*dhaincha* (GM); pigeonpea + maize (1:2)-chickpea-okra; maize-berseem-urdbean; sorghum(F)-mustard-moong bean; round the year fodder production (Napier + cowpea/Napier+berseem + Subabool); horticulture (guava, peach, pearl and mango) in 0.26 ha, dairy (2 buffaloes+1 cow) in 0.001 ha including 2m³ biogas unit and vermicompost unit in 0.001 ha, fish-



cum-poultry in 0.1 ha, mushroom (button, milky and dhingri) in 0.001 ha developed for small-and medium-farmers of western plain zone of Uttar Pradesh which provides round the year average production (43.06 tonne rice equivalent yield/ ha/year) from all the components involved when their values converted into rice equivalent yield. Whereas, it generates gross profit (4.02 lakh/

the commodities (cereals, pulses, oilseeds, vegetables, fruits, eggs, mushroom, milk and fishes) required for the farm family. Kitchen gardening and biogas unit were also found to viable to cater to household vegetable and fuel need to a great extent. Being diversified nature of IFS it also safeguard farmers against climate hazards and cut down in production costs through adding,

year/ha) and net profit was (2.68 lakh year/ha) and employment (341 man-days/year). The model also meets around 85% of inputs requirement arisen from different components within the farm providing additionally all

recycled products and saving in cost of market inputs by 30-40% or more (Table1).

Therefore, farmers need to switchover on the newly developed IFS model because it has certain higher benefits over existing farming systems as discussed here.

1. Crops (cereal, oilseed, pulse, vegetable, sugarcane, fodder) + dairy (2 buffaloes +1 cow) is the dominant farming system in the region.
2. Horticulture (fruits and vegetables) for enriching diet (most enterprising options for farming system are available for diversification of existing ones)
3. Round the year mushroom production(less space and resource are required) requires lowcost inputs.
4. Vermin-compost (productive use of cowdung and urine mixed with crop residues)
5. Boundary plantation (protective as well as productive use of field boundary).

Table 1. Production and economics of different farm components integrated into Integrated Farming System Model

IFS Component	Area/Number	Production	Variable cost (₹)	Gross return (₹)	Return (₹)
Cropping System					
Cereals, pulses, oilseeds, vegetables,sugarcane and green fodders	0.84 ha	66.50 tonne (SEY)	32,180	1,91,537	1,59,357
Dairy Animals					
Milk	2 B + 1 C + 3 calves	-2350 liter			
Vermi-compost	12.0 tonne				
Farmyard manure	6.0 tonne				
Animal sold	5 Nos.	1,37,350	2,36,000	98,650	
Horticultural Science					
Fruits	0.22 ha	-	22,430		
Mushroom		3,328 kg		55,5,80	33,150
(Button, Dhingari, Milky)	12 four-tier racks	1,436 kg mushroom + Byproducts (fodder and compost)	24,900	1,313,60	10,646,0
Boundary plantations	200 running meter	-	11,500	45,680	34,180
Citrus (Nimboo)	1,240 kg				
Bael	102 pieces				
Aonla	14 kg				
Karonda	510 kg				
Green fodder	1580 kg				
Fuel	900 kg				
Biogas Unit	5.9 tonne slurry	21.3 kg N,12.9 kg P, 9.9 kg K	1,354	2,520	1,166
Fisheries Science					
Fish	0.10 ha	347 kg	15,200	36,974	21,774
Recycled NPK (through pond water and silt)		(95.4 kg N,2.3 kg P and 29.6 kg K)			
Total			2,44,714	7,06,651	4,60,937

Use of fish pond water as irrigation

Fish pond water can be used as irrigation after the taken out fishes from the pond. The fish pond water is containing high NPK nutrients over underground and canal water because of rich nutrients in fish pond water due to addition of cowdung and urine of animals. The fish pond has to be used as a life-saving irrigation in the *rabi* crops. Thus, recycled animals-based waste through fish pond water has enormous potential having higher amount of plant nutrients. The fish pond mud can be used in agricultural crops as a source of nutrients as it contains higher amount of elements as compared to normal soil.

Utilization of mushroom spent as animal feed/ manure

After harvesting of mushroom the remaining waste is called mushroom spent, it can be used as animal feed or as organic manure in agricultural crops. The wheat and other crops

straw used for mushroom production is treated with beneficial poultry manure, Urea, DAP and MoP resulting in increased available nutrients (NPK) content than other farm waste. The wheat straw used for production of mushroom spent has good nutritional quality as animal feed rather than normal wheat straw.

Thrust areas for research

- The region specific integrated farming systems have to be developed through diversification of existing farming systems.
- There is need to develop such IFS models which may improve the livelihood of landless, marginal and small-farmers.
- There is also need to develop those models which can enhance the productivity, profitability ensuring nutritional security, minimizing the environment pollution through recycling of farm resources.
- Low input and high output ratio,

value addition of farm produces and introduction of non-traditional high value fruit crops can generate employment opportunities finally aiming at doubling the farmers' income.

SUMMARY

The model has been designed on 1.5 ha of land for 7 farm family members generating a total of farm production in terms of REY 43.06 tonne/ year, gross return of ₹ 6.02 lakh and net profit of ₹ 4.02 lakh with B: C (3.0). The model also produced 49.4 kg N, 15.6 kg P₂O₅ and 26 kg K₂O / year from farm wastes with an employment of 511-man-days in a year.

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Attracting and Retaining Youth in Agriculture (ARYA)

Realizing the importance of rural youth in agricultural development especially from the point of view of food security of the country, ICAR has initiated a program on "Attracting and Retaining Youth in Agriculture.

The objectives of ARYA project are:

- (i) To attract and empower the youth in rural areas to take various agriculture, allied and service sector enterprises for sustainable income and gainful employment in selected district;
- (ii) To enable the farm youth to establish net work groups to take up resource and capital intensive activities like processing, value addition and marketing; and
- (iii) To demonstrate functional linkage with different institutions and stakeholders for convergence of opportunities available under various schemes/program for sustainable of youth.

ARYA project will be implemented in 25 states through KVKs, one district, 200-300 rural youth will be identified for their skill development in entrepreneurial activities and establishment of related micro-enterprise units in the area of Apiary, Mushroom, Seed processing, Soil testing, Poultry, Dairy, Goatry, Carp-hatchery, Vermi-compost etc. KVKs will involve the Agricultural Universities and ICAR Institutes as technology partners. At KVKs also one or two enterprise units will be established so that they serve as entrepreneurial training units for farmers. The purpose is to establish economic models for youth in the villages so that youths get attracted in agriculture and overall rural situation is improved.

The trained youth groups will function as role model for other youths and will demonstrate the potentiality of the agri-based enterprises which will help in improving their confidence levels and encourage them to pursue farming as profession, generate additional employment opportunities to absorb under employed and unemployed rural in secondary agriculture and service related activities in rural areas.