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Farming system of small and marginal farmers in Gorakhpur district of eastern Uttar Pradesh

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Abstract

The field study was performed in 2022 and included four blocks of Gorakhpur district, namely Bharohiya, Jungle Kaudiya, Campierganj and Pali. This study based on the exiting farming System of Small and Marginal Farmers of Gorakhpur district of Uttar Pradesh. The study aimed to find out what are the reasons for their inclusion and what could be the extension strategy to popularize the farming system approach appropriate to the small and marginal farmers of the areas. One hundred twenty small and marginal farmers were selected by simple random sampling method from twelve villages by using proportionate random sampling technique. The respondents had medium level of farm power, annual income, social participation, material possession, extension agency contact, mass media exposure, risk bearing, scientific orientation, economic motivation, and progressivism and storage facilities. It was found that maximum investment on the farm building followed by machinery implements and livestock. On overall farm per farm investment was positively related with holding size but per hectare investment was inversely related. These findings indicated low income of farmers due to their lack of technical knowledge as well as scientific farming. A whole farm approach or an integrated farming system approach would be of great relevance to the small and marginal farmers to deal with such situations.

Keywords: IFS, cropping pattern, vegetable, livestock, farming, income

Introduction

India is an agrarian country. Agriculture is the most important occupation for more than 58% population either directly or in indirectly. It is the backbone of our economic system. In India agriculture contributes 16% of total GDP and 10% of total exports (Economic survey, 2018- 2019). Next to Punjab, eastern part of Uttar Pradesh rich in natural heritage is considered to be the major contributor to the food bowl of the country. Uttar Pradesh (UP), India's most populous state, leads the nation in terms of agricultural production, accounting for a quarter of the country's total agricultural output, yet average farmer incomes are low because of smaller land holdings and lower levels of technology adoption. As the state with the most area of land under irrigation (86%), it is vulnerable to climate change. Gorakhpur is one of the major food grains, vegetable and livestock producing district of Uttar Pradesh. The total geographical area of Gorakhpur district is 3483.8 sq km, out of this total cultivated area is 248723 ha, forest 6031 ha, land under non agriculture 45875ha, Pasture 211 ha and cultivable waste land 2255. Annual average rainfall is 1100 mm. Maximum temperature goes up to 43.50°C in summer and minimum temp. about 6°C goes in winter. The soil is sandy loam, clay loam and loam. The cropping intensity is

154.4. Dominant cropping system is Rice-Wheat which is grown in about 80% area. (Gulati *et al.* 2021) ^[4] reported that Uttar Pradesh is largely dominated by small and marginal farmers with 93% of agricultural households operating 65% of land. The average landholding size declined marginally from 0.76 ha in 2010-11 to 0.73 ha in 2015-16. Agriculture is the main occupation in the state. According to the Situation Assessment of Agricultural Households (2012-13), UP had 18 million agricultural households, which accounted for 20% of the total agricultural households in rural India. With its varied Agro-ecological situation, Gorakhpur is able to produce a wide variety of horticultural crops. These include fruits, vegetables, flowers, medicinal plants, mushrooms, honey and spices and so on. Potato is the major horticultural crop in Gorakhpur district. Majority of farmers engaged in Crop production along with rearing of livestock (crops + livestock) in the district. As component of farming systems Crop Production + Livestock, Crop Production + Poultry, Crop Production + Fisheries, Crop Production + Vegetable Production are the major cropping systems in the region. Mostly women who are engaged in the care and management of livestock. Goat rearing is another major occupation for small and marginal farmers in the district

rural population. (Kumar *et al.* 2022) [5] reported that the maximum investment of the farmers on the farm building followed by machinery implements and livestock. The present study was undertaken to determine the small and marginal farmers farming systems in Gorakhpur district. What are all the major components? What are the reasons for their inclusion and what could be the extension strategy to popularize the farming system approach appropriate to the small and marginal farmers of the areas.

Methodology

Present Study was carried out in 20220 to study the Farming System of Small and Marginal Farmers in Bharohiya, Jungle Kaudiya, Campierganj and Pali blocks of Gorakhpur district in Uttar Pradesh. A sample of 120 small and marginal farmers were selected from twelve villages by using proportionate random sampling technique. About twenty-one personal attributes viz., age, education, family nature, house owned, occupation, farming experience, farm size, herd size, annual income, irrigation status, farm power, material possession, marketing facilities, storage facilities, social participation, extension agency contact, mass media exposure, credit behaviour, risk orientation, urban contact, scientific orientation, progressivism and economic motivation of farmers were studied employing suitable scoring procedures developed. A farming system index was worked out as a ratio of number of complementary units of farming system practised by an individual farmer to the total number of components of farming system being practised in these areas. Further, reasons for incorporation of components and inputs for suggesting an extension strategy for popularizing farming system approach appropriate to the small and marginal farmers of such areas were identified through a pre tested interview schedule, observation and discussion with farmers. Frequency and percentage analysis were used to interpret the data collected.

Results and Discussion

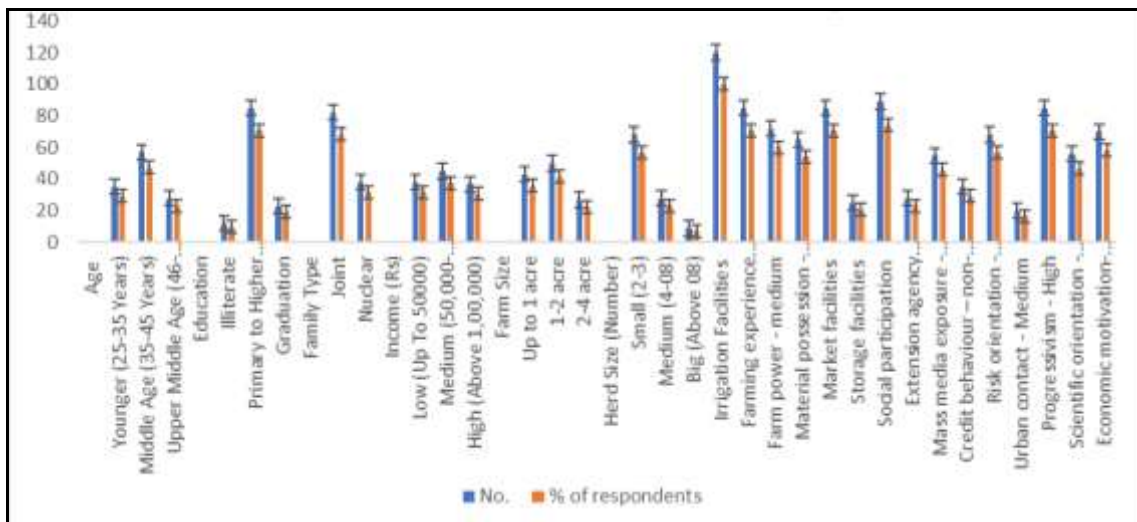
1. Socioeconomic Characteristics of respondents

The socio-economic profile of the small and marginal farm families shown in the Table-1 indicated that majority (47.5 %) of respondents were from middle age group followed by younger (29.17 %) and upper middle (23.33 %) age group. This implies that upper middle and younger age group were less involved in crop, vegetable, livestock, poultry and fisheries activities. Results on education showed that majority of respondents were having education Primary to Higher secondary (70.83 %) followed by graduate (19.17 %) and illiterate (10 %). It means that highly educated persons are not involving in farming. It was also observed that majority of respondents belonged to joint family in compression to nuclear family. This means agricultural enterprises mostly run in joint families. Farming was the major occupation of the respondents while some of them worked as labour in other farms during busy agricultural seasons. Majority of the respondents (70.83%) had 10-30 years of farming experience since farming was their way of life. As this was confined to small and marginal farmers about 42 and 36 per cent of them possessed up to 1 and 1-2 acres of farm land respectively and 100 per cent of them had irrigation facilities for their farm. It was evident (Table 1)

that majority of the respondents (37.50 %) had medium income followed by low (31.67 %) and high (30.83%). A high percentage of herd size, 56.67 per cent families had small herd holding whereas 28 and 9 per cent were in medium and big category respectively (Fig. 1). The respondents had medium level of farm power, annual income, social participation, material possession, extension agency contact, mass media exposure, risk bearing, scientific orientation, economic motivation, and progressivism and storage facilities. These findings indicated low income of farmers due to their lack of technical knowledge as well as scientific farming.

Table 1: Key Socio-economic Profile of Small and marginal farmers

| S. N | Characteristics | No. | % of respondents |
|------|--------------------------------------|-----|------------------|
| 1 | Age | | |
| | Younger (25-35 Years) | 35 | 29.17 |
| | Middle Age (35-45 Years) | 57 | 47.50 |
| | Upper Middle Age (46-60 Years) | 28 | 23.33 |
| 2 | Education | | |
| | Illiterate | 12 | 10.00 |
| | Primary to Higher secondary | 85 | 70.83 |
| | Graduation | 23 | 19.17 |
| 3 | Family Type | | |
| | Joint | 82 | 68.33 |
| | Nuclear | 38 | 31.67 |
| 4 | Income (Rs) | | |
| | Low (Up To 50000) | 38 | 31.67 |
| | Medium (50,000-1,00,000) | 45 | 37.50 |
| | High (Above 1,00,000) | 37 | 30.83 |
| 5 | Farm Size | | |
| | Up to 1 acre | 43 | 35.83 |
| | 1-2 acre | 50 | 41.67 |
| | 2-4 acre | 27 | 22.50 |
| 6 | Herd Size (Number) | | |
| | Small (2-3) | 68 | 56.67 |
| | Medium (4-08) | 28 | 23.33 |
| | Big (Above 08) | 9 | 7.50 |
| 7 | Irrigation Facilities | 120 | 100 |
| 8 | Farming experience (10-30 years) | 85 | 70.83 |
| 9 | Farm power - medium | 72 | 60.00 |
| 10 | Material possession - medium | 65 | 54.17 |
| 11 | Market facilities | 85 | 70.83 |
| 12 | Storage facilities | 25 | 20.83 |
| 13 | Social participation | 89 | 74.17 |
| 14 | Extension agency contact - medium | 28 | 23.33 |
| 15 | Mass media exposure - medium | 55 | 45.83 |
| 16 | Credit behaviour - non-institutional | 35 | 29.17 |
| 17 | Risk orientation - Medium | 68 | 56.67 |
| 18 | Urban contact - Medium | 20 | 16.67 |
| 19 | Progressivism - High | 85 | 70.83 |
| 20 | Scientific orientation - Medium | 56 | 46.67 |
| 21 | Economic motivation-Medium | 70 | 58.33 |



Socio-economic Profile of Small and marginal farmers

2. Farming systems practiced by the small and marginal farmers

The study, as shown in Table-2, revealed that three different types of farming systems with four main components were adopted by the small and marginal farmers in these areas. The main components were crops, animal husbandry, horticulture and fisheries. Crop production along with rearing of milch animals (crops + dairy) is the prevailing farming system in these areas about 78 per cent farmers of the area adopt this system. As component of farming systems rice-wheat are the major cropping systems in the region. Livestock considered to be a valuable and critical asset of the farmers in supporting their livelihoods particularly during unfavourable times. Mixed (crop livestock) farming systems provide flexible asset regime and reduce risk and vulnerability of the farmers. Observations also suggested that farmers of the region can think of diversifying their farming system with inclusion of the other

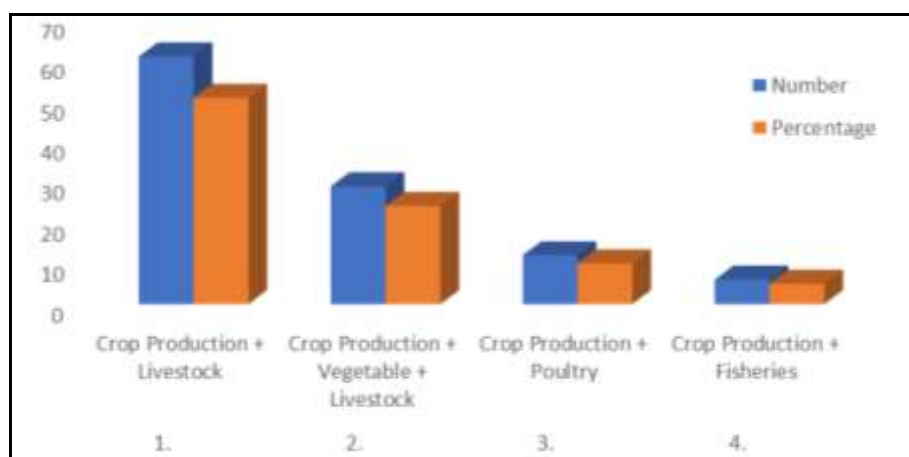
enterprises. However, adoption of new enterprises should depend upon farmer’s skills, resources, availability of credit, future demand, and availability of market channels in the area.

2.1 Crop production

Table 2 indicates the crops grown and the crop combinations followed in the study area. More than 50% of the respondents followed Crop Production + Livestock type of crop combination and another one fourth of the respondents (24.17 %) followed Crop Production + Vegetable + Livestock, Crop Production + Poultry (10 %) and Crop Production + Fisheries (5%) respectively. Rice, wheat, mustard were the important food crops and potato, banana, groundnut and vegetables were the major cash crops widely grown by the respondents. The income from cash crops were used to meet the farm and other essential expenses.

Table 2: Agricultural Crop Combinations Practiced by the Farmers N=120

| S. No. | Crop combinations | Number | Percentage |
|--------|---|--------|------------|
| 1. | Crop Production + Livestock | 61 | 50.83 |
| 2. | Crop Production + Vegetable + Livestock | 29 | 24.17 |
| 3. | Crop Production + Poultry | 12 | 10.00 |
| 4. | Crop Production + Fisheries | 6 | 5.00 |



Crop Combinations Practiced by the Farmers

2.2 Animal husbandry

Animal husbandry included the rearing of livestock components such as cattle, poultry, backyard poultry, sheep rearing and goaterly. Livestock husbandry units practised by the respondents are indicated in the Fig - 2. Almost all the respondents (87.5 %) possessed dairy animals. Most of the respondents reared the breeds of murrah buffaloes, crossbred and Sahiwal cows. Dairy provides milk, cash income and manure. The excess milk was sold through milk man and through local merchants. Only 12 % respondents engaged in crop production with poultry farming while poultry supplements the farm income and serves as nutritive source of food.

2.3 Horticulture

Horticultural crops are nutritionally rich mainly of essential proteins and vitamins which make human diet complete and help human being physically fit and mentally more sound. During the survey it was also observed that horticultural crop production is being owned by small and marginal farmers. Horticultural crop production in these areas includes cultivation of fruit and vegetables. Mango, guava, lemon and banana were the major fruits grown by the respondents. Regarding vegetables, Cucumber, sponge gourd, bottle gourd, bitter gourd, brinjal, Cauliflower, cabbage, tomato, vegetable pea, leafy vegetables, radish, carrot, moringa, and beans were grown by the respondents. While fruit trees were planted mainly for home consumption, vegetables were grown for sale and to some extent for home consumption.

2.4 Fisheries

Fish farming is one of the fastest-growing sectors in India and has the potential for large scale employment. However, this sector is dominated by small and marginal fish farmers adopting traditional technologies resulting in low productivity and nominal impact on their livelihood. Table 2 indicates that only 5% of the respondents involved in crop production with fish farming because of their social factor, use of small size ponds, theft, poisoning, lack of technical knowhow and un- awareness among farmers. From the study it is also found that farmers in the study area are involved in farming of carps along with fish production

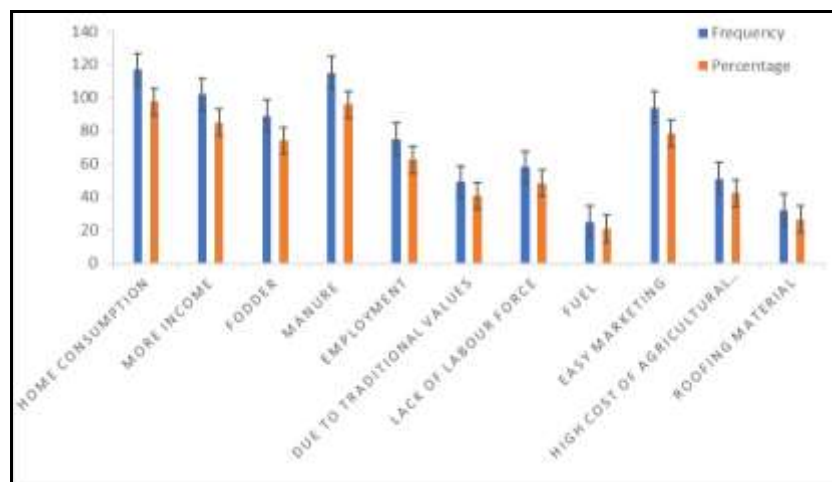
like Rohu, Silver, Big head, Common Carp, Grass and Nain. High cost of fingerlings and feed are the principal constraints of the maximize production from their composite fish culture of carp (Mishra *et al* 2021) [6].

3. Reasons for inclusion of various components of farming system

It may be observed from the Table 3 that most of the respondents practised various components of farming system to meet the consumption requirement of the family, more cash income, fodder for cattle and to meet the manurial requirements of the land. Livestock considered to be a valuable and critical asset of the farmers in supporting their livelihoods particularly during unfavourable times. Mixed (crop livestock) farming systems provide flexible asset regime and reduce risk and vulnerability of the farmers. Maintaining different components provide additional employment of family members and satisfied their traditional beliefs. Respondents stated that maintaining different components provide additional employment for family members an satisfied their traditional beliefs. During the study some of the respondents reported that lack of labour force they practised components which need minimum labour force and water. Fuel for working, easy marketing, high cost of agricultural inputs and roofing material for house and cattle and shed were the other important reasons for inclusion of various components.

Table 3: Reasons for inclusion of various components of farming systems N=120

| S. No. | Reasons | Frequency | Percentage |
|--------|----------------------------------|-----------|------------|
| 1. | Home consumption | 117 | 97.50 |
| 2. | More income | 102 | 85.00 |
| 3. | Fodder | 89 | 74.17 |
| 4. | Manure | 115 | 95.83 |
| 5. | Employment | 75 | 62.50 |
| 6. | Due to traditional values | 49 | 40.83 |
| 7. | Lack of labour force | 58 | 48.33 |
| 8. | Fuel | 25 | 20.83 |
| 9. | Easy Marketing | 94 | 78.33 |
| 10. | High cost of agricultural inputs | 51 | 42.50 |
| 11. | Roofing material | 32 | 26.67 |



Inclusion of various components of farming systems

Need for Farming System Approach

The need for Farming Systems Approach in the present scenario is mainly due to high cost of farm inputs, fluctuation in the market price of farm produce, risk in crop harvest due to climatic vagaries and biotic factors. Environmental degradation, depletion in soil fertility & productivity, unstable income of the farmer, fragmentation of holdings and low standard of living add to the intensity of the problem. Integration of different component of integrated farming system will certainly enhance the socio-economic status of the small and marginal farmers (Dahiya *et al.*, 2019) [2]. The Integrated Farming Systems therefore assumes greater importance in sustainable agriculture as in this system nothing is wasted, the by-product of one system becomes the input for other. Integrated farming systems with environment friendly and cost-effective practices for efficient water, soil, crop and pest management must be included for sustainable development in agriculture (Walia and Kaur, 2013) [8]. Integrated farming systems entail a holistic approach to farming aimed at meeting the multiple demands (impart farm resilience, farmer livelihoods, food security, ecosystem services, and making farms adaptive and resilient, etc.). Dhaka *et al.* [3], reported that IFS assume greater attention of proper management of available farm resources to boost productivity besides reducing environmental degradation.

4. Extension Strategy for popularizing farming system approach to the small and marginal farmers

In view of the suggestions given by the respondents and experience gained during the study period, the following points are presented for consideration in evolving a strategy for popularising farming system approach appropriate to the small and marginal farmers of these areas.

1. It has been determined that a farming system centered on crops, livestock, horticulture, and fisheries is suitable for the small and marginal farmers in these regions.
2. A broad-based extension strategy might be used to give farmers access to training and information on linked businesses in addition to agriculture.
3. Encouraging and teaching farmers to use more locally available resources rather than relying too heavily on outside assistance.
4. A location-specific cropping pattern with high cropping intensity may be used, along with production techniques like multiple cropping and intercropping.
5. One of the best ways for farmers to generate income over the long term is to incorporate floriculture and flowers into their farming system.

Conclusion

The research findings have shown that the majority of farmers in these regions are small and marginal farmers. It is crucial to integrate various enterprises to enhance income and production, promoting sustainable development by efficiently utilizing waste materials from different enterprises in integrated farming systems. The integrated farming approach can significantly contribute to the economic growth of farmers in general, and especially small and marginal farmers. This system offers farmers the opportunity to generate income from multiple sources

simultaneously, such as dairy, poultry, goatry, and fisheries. Establishing small enterprises with minimal investment is also feasible. The integration of complementary enterprises will undoubtedly improve the socio-economic status of small and marginal farmers. To make farming systems profitable for small and marginal farm holders, a conservative approach must be adopted at all stages of farming. This includes maximizing land use for suitable crops, selecting cost-effective enterprises for diversification, recycling farm wastes, and making productive use of farm boundaries and waste lands. The study's analysis highlights the current demand and supply scenario of inputs/commodities necessary for livelihood or subsistence. Integrated Farming Systems are particularly beneficial for the economic upliftment of small and marginal farmers, known worldwide for their sustainability and profitability. Therefore, the widespread adoption of IFSs should be considered by small and marginal farmers.

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