# IMPACT OF INTEGRATED FARMING SYSTEM ON INCOME OF SMALL AND MARGINAL FARMERS OF SOUTH-WEST PUNJAB

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**Abstract**

Punjab is known as "the bread basket" of India due to its significant contribution of grains to the central pool. But some serious problems are persistent in the agriculture of Punjab. The cropping pattern of Punjab is dominated by wheat-rice production. This leads to the deficiency of nutrients in the soil and poses major threats to productivity. There is a great need for diversification of cropping patterns. Small and marginal farmers have fewer resources. Therefore, the only possibility of their sustainability is that they can expand vertically by integrating farming which requires lesser space and minimum cost. Integrated farming system (IFS) is a combination of different allied activities along with crop farming. It ensures recycling of farm wastes or residues and saves energy which ultimately enhances income and employment opportunities round the year. It increases productivity, profitability, environmental safety and provides balanced and nutritious food. The present study analyses and compares the levels of income, per capita and per acre income of sampled farmers who are practicing integrated farming system (IFS) and conventional farming system (CFS). The study has been conducted in three districts of Punjab which has been chosen purposely and by multi-stage stratified random sampling method. The results have shown that IFS generates 1.5 times more annual income than that of CFS.

**Key words** - Integration farming, conventional farming and income analysis

## Introduction

Majority of the Indian population is living in rural areas. The main occupation of rural population is agriculture. Therefore, this is an important sector of the Indian economy for the sustained growth, generating income and employment. Indian government has made an announcement of doubling the income of farmers by 2020. Many strategies and policies are being implemented to achieve this target. Some farming systems have been favoured by farmers in the last decades. These systems save time, money and wastage as compared to conventional farming system. Integrated farming is one of these systems. It is useful for improving sustainability in agriculture. A modest attempt has been made to review the past research studies. According to **Behra and France, (2016)** an ideal IFS uses little fuel energy and produces more energy. Moreover, it acts as a risk reduction mechanism against climate changes which lead to crop failure. IFS is able to attain sustainability through effective use of by-products of linked components. **Khan, Dubey & Tiwari, (2015)** has analyzed that integrated farming is a practical way forward for agriculture that will benefit all society, not just those who practice it. According to **Sahoo, Lenka & Neduchezhiyan, (2012)** the aim of IFS is to derive a set of resource development and utilization practices. Integrated farming system is often less risky, if farmers manage it efficiently. **Khan and Parashari, 2018** stated that in the concept of sustainable agriculture, "Integrated Farming Systems" hold special position as in this system nothing is wasted, the by-product of one system becomes the input for another. Integrated farming is an integrated approach to farming as compared to existing monoculture approaches. This paper highlights the comparison of household income, per capita and per acre income of the small and marginal farmers who are practicing integrated and conventional farming in the districts of south-west Punjab. Moreover, an attempt has been made to analyse the distribution of income among farmers who are doing integrated and conventional farming. In the present study, the main allied activities being practiced by farmers are dairy farming, poultry, goat, sheep rearing, piggery, pisciculture, horticulture and bio gas plant.

## Objectives

- To analyse and compare the income levels of farmers who are practising integrated and conventional farming in south-west Punjab.
- To evaluate the per capita and per acre income of farmers who are practicing integrated and conventional farming system.
- To assess the distribution of income among farmers.

## Methodology

The present study was conducted in the south-west areas of Punjab. For the purpose of data collection, multi- stage stratified random sampling method is used. In the first stage, the present area is divided according to the agricultural productivity i.e. low productivity districts, medium productivity districts and high productivity districts. Keeping in view the differences in productivity of regions, the districts selected purposely are: Mansa district from the low productivity region, Bathinda from the

medium productivity region and Faridkot from the highest productivity region. In the subsequent stages; blocks, villages and small and marginal farmers have been selected. Out of 12 villages, 360 households have been selected for the survey, selecting 120 households from each district (Faridkot, Bathinda, Mansa). These 360 households comprise an equal number of households of integrated farming system (IFS) and conventional farming system (CFS). The proportional sample of farm households, comprising marginal farmers and small farmers has been taken for the survey. A detailed questionnaire has been prepared to collect the primary data. Standard statistical tools like averages, percentages and measures of dispersion like the Gini coefficient have been used for the analysis.

**Results and Discussion**

Integrated Farming makes a huge contribution to sustainable development by adding consideration of economic, ecological and social objectives. This flow diagram shows the role of IFS in sustainability that how outputs of one component are used as inputs in other component:

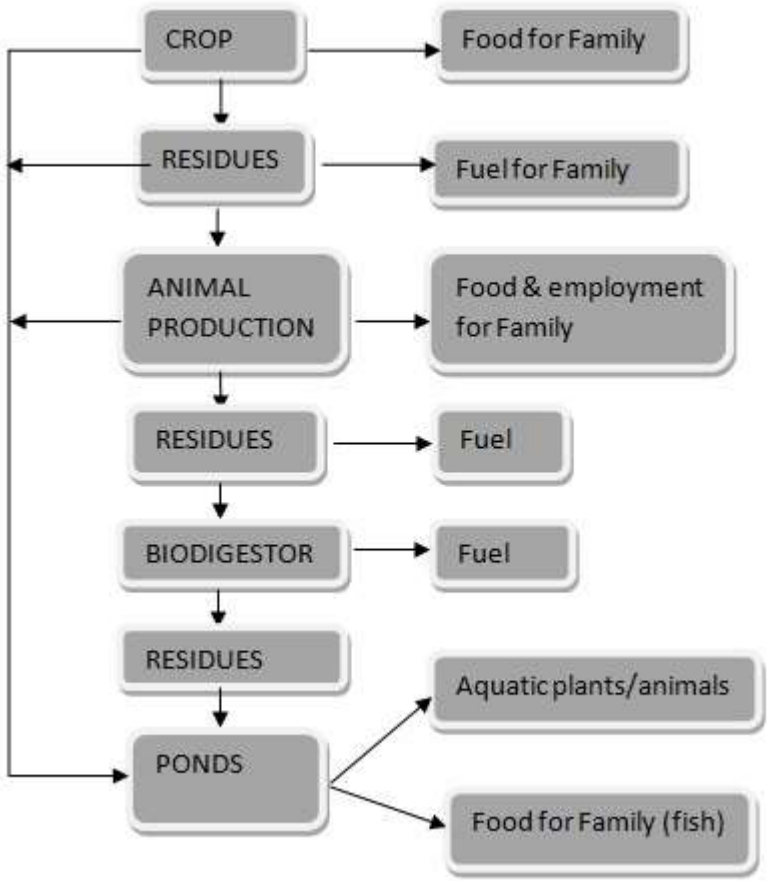


**Figure 1 Integration of different enterprises**

A close analysis of resource recycling in the above figure indicates the interdependence of the various components of IFS. It makes the farmers self- sufficient in terms of ensuring balanced diet, supplement income and employment opportunities through recycling of by-products and wastes. By-products of field crops such as straw of wheat and paddy can be used as fuel, feed for animals (cows, buffaloes, poultry etc.), compost preparation and raw material for other components. The by-product of animal husbandry (buffalo dung) forms raw material for biogas plants, used as manure in farm fields and fuel for cooking in households. Similarly, digested slurry from biogas plants forms useful feed for fishery, manure to raise the productivity of field crops and make the soil fertile. Apart from this, bio gas is used as fuel; it can be used for heating purposes such as cooking and can be used in gas engines to convert the energy into electricity and heat. Moreover, fish in the ponds can be nurtured with the residues of crops, animal husbandry and bio digester. Apart from these enterprises which have been shown in the above diagram, some other enterprises indicate the interdependence which makes farming economically sustainable such as poultry farm, apiary etc. For example, poultry droppings serve as feed for fish and increase soil fertility. An apiary apart from providing food products in the form of honey plays a role as pollination in improving the productivity of crops. These all components together provide better employment opportunities and higher income for the farm family. Thus, an IFS is a holistic, multidisciplinary, problem solving, location specific and farmer oriented approach (Behra & France, 2016).

**Income Levels of Different Categories of Farmers: Per Household**

The average income of farmers who are practicing CFS and IFS are shown in Table **1**. The table shows that an average farm household earns Rs. 480166.6 annually. However, there are substantial variations in the household income of farmers doing integrated farming and conventional farming. It can be observed that an average farm household earns a total income of Rs.581811.97 annually in the case of IFS and Rs.378521.22 annually in the case of CFS. The annual income of all sampled farmers doing IFS is found to be 1.5 times of the annual income of all sampled farmers doing CFS. It can be concluded that the total annual income of farm households practicing IFS is one and a half times more than that of CFS. The reason for more income in IFS is that there are more opportunities to increase the level of income. Further, out of all components, the share of farm

business income and income from cattle rearing is greater than all other components in both the IFS and CFS. It is evident from many research studies that the combination of livestock with cropping is a very experienced and profitable farming system. However, the present study shows the importance of other allied activities. The table depicts that apiary and horticulture are contributing a good proportion of income to farmers who are doing integrated farming. The relative share of different components has also been given in the table. On an average, 48.26 percent of the total income consists of farm business income of farmers. This proportional share is higher in case of CFS (56.33 per cent) than IFS (43.01 per cent). It shows that in case of CFS, the farmers earn most of the income from cropping whereas in case of IFS, the farmers earn income from cultivation along with other allied activities i.e. horticulture, fishery, apiary, cattle rearing, poultry etc. The second important source of income for an average sampled farm household is income from livestock/dairy farming/trade of animals. The table further illustrates that the main source of income of the marginal and small farm-size categories is farm business income. On an average, 42.16 per cent and 51.77 per cent of the total income consists of farm business income of the marginal and small farm size category, respectively. It has been found that the proportional share of income from allied activities contributes 32.23 per cent in the case of marginal farm size category and it is 28.37 per cent in the case of small farm-size category. It indicates that the marginal farmers are more interested in integrated farming.

**Table 1**
**Income levels of different categories of farmers: per household (in Rs. per annum)**

| Sr. no. | Source of income | IFS | | | CFS | | | Total Sampled Households | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **Marginal Farmers** | **Small Farmers** | **All Farmers** | **Marginal Farmers** | **Small Farmers** | **All Farmers** | **Marginal Farmers** | **Small Farmers** | **All Farmers** |
| 1 | Farm business income | 178655 **(36.82)** | 296880 **(46.04)** | 250247 **(43.01)** | 154964 **(48.57)** | 271460 **(61.98)** | 213212 **(56.33)** | 165412 **(42.16)** | 285383 **(51.77)** | 231729 **(48.26)** |
| 2 | Rent from leased out land | 0 **(0.00)** | 9357.80 **(1.45)** | 5666.67 **(0.97)** | 3055.56 **(0.96)** | 4777.78 **(1.09)** | 3916.67 **(1.04)** | 1708.07 **(0.44)** | 7286.43 **(1.32)** | 4791.67 **(1.00)** |
| 3 | Hiring out labor in agricultural sector | 1225.35 **(0.25)** | 0 **(0.00)** | 483.33 **(0.08)** | 3933.33 **(1.23)** | 666.67 **(0.15)** | 2300 **(0.61)** | 2739.13 **(0.70)** | 301.51 **(0.06)** | 1391.67 **(0.29)** |
| 4 | Hiring out agricultural equipment | 9901.41 **(2.04)** | 8495.41 **(1.32)** | 9050 **(1.56)** | 2400 **(0.75)** | 10444.44 **(2.39)** | 6422.22 **(1.70)** | 5708.07 **(1.46)** | 9376.88 **(1.70)** | 7736.11 **(1.61)** |
| 5 | Sale of seeds and manure | 57.75 **(0.01)** | 0 **(0.00)** | 22.78 **(0.01)** | 0 **(0.00)** | 0 **(0.00)** | 0 **(0.00)** | 25.47 **(0.01)** | 0 **(0.00)** | 11.39 **(0.01)** |
| 6 | Cattle rearing/ dairy farming/ trade of animals* | 171504 **(35.35)** | 169639 **(26.31)** | 170374 **(29.28)** | 25153 **(7.88)** | 30721 **(7.02)** | 27937 **(7.38)** | 89693 **(22.86)** | 106812 **(19.38)** | 99156 **(20.65)** |
| 7 | Poultry | 936.11 **(0.19)** | 11146.33 **(1.73)** | 7118.97 **(1.22)** | 0 **(0.00)** | 0 **(0.00)** | 0 **(0.00)** | 412.82 **(0.11)** | 6105.28 **(1.11)** | 3559.48 **(0.74)** |
| 8 | Apiary | 16200 **(3.34)** | 34484.59 **(5.35)** | 27272.33 **(4.69)** | 0 **(0.00)** | 0 **(0.00)** | 0 **(0.00)** | 7144.10 **(1.82)** | 18888.54 **(3.43)** | 13636.17 **(2.84)** |
| 9 | Goat | 15318.59 **(3.16)** | 5579.08 **(0.87)** | 9420.78 **(1.62)** | 0 **(0.00)** | 0 **(0.00)** | 0 **(0.00)** | 6755.40 **(1.72)** | 3055.88 **(0.55)** | 4710.39 **(0.98)** |
| 10 | Sheep | 9008.45 **(1.86)** | 0 **(0.00)** | 3553.33 **(0.61)** | 0 **(0.00)** | 0 **(0.00)** | 0 **(0.00)** | 3972.67 **(1.01)** | 0 **(0.00)** | 1776.67 **(0.37)** |
| 11 | Piggery | 995.21 **(0.21)** | 7734.13 **(1.20)** | 5076 **(0.87)** | 0 **(0.00)** | 0 **(0.00)** | 0 **(0.00)** | 438.88 **(0.11)** | 4236.28 **(0.77)** | 2538 **(0.53)** |
| 12 | Fishery | 8711.27 **(1.80)** | 11329.36 **(1.76)** | 10296.67 **(1.77)** | 0 **(0.00)** | 0 **(0.00)** | 0 **(0.00)** | 3841.61 **(0.98)** | 6205.53 **(1.13)** | 5148.33 **(1.07)** |
| 13 | Horticulture | 22249.86 **(4.59)** | 23400.73 **(3.63)** | 22946.78 **(3.94)** | 0 **(0.00)** | 0 **(0.00)** | 0 **(0.00)** | 9812.05 **(2.50)** | 12817.49 **(2.33)** | 11473.39 **(2.39)** |
| 14 | Bio gas plant | 2642.25 **(0.54)** | 0 **(0.00)** | 1042.22 **(0.18)** | 0 **(0.00)** | 0 **(0.00)** | 0 **(0.00)** | 1165.22 **(0.30)** | 0 **(0.00)** | 521.11 **(0.11)** |
| 15 | Other allied activities | 7312.68 **(1.51)** | 0 **(0.00)** | 2884.44 **(0.50)** | 0 **(0.00)** | 0 **(0.00)** | 0 **(0.00)** | 3224.84 **(0.82)** | 0 **(0.00)** | 1442.22 **(0.30)** |
| 16 | Govt. services | 9295.77 **(1.92)** | 18341.28 **(2.84)** | 14773.33 **(2.54)** | 38266.67 **(11.99)** | 59066.67 **(13.49)** | 48666.67 **(12.86)** | 25490.68 **(6.50)** | 36759.80 **(6.67)** | 31720 **(6.60)** |
| 17 | Pvt. services | 5915.49 **(1.22)** | 13981.65 **(2.17)** | 10800 **(1.86)** | 36600 **(11.47)** | 26146.67 **(5.97)** | 31373.33 **(8.28)** | 23068.32 **(5.88)** | 19483.42 **(3.53)** | 21086.67 **(4.39)** |
| 18 | Pensions and remittances | 10183.10 **(2.09)** | 21155.96 **(3.28)** | 16827.78 **(2.89)** | 12264.44 **(3.84)** | 9455.56 **(2.16)** | 10860 **(2.87)** | 11346.58 **(2.89)** | 15864.32 **(2.87)** | 13843.89 **(2.88)** |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 19 | Hiring out labour in non-agricultural sector | 169.01 **(0.03)** | 0 **(0.00)** | 66.67 **(0.01)** | 1244.44 **(0.40)** | 0 **(0.00)** | 622.22 **(0.16)** | 770.19 **(0.19)** | 0 **(0.00)** | 344.44 **(0.08)** |
| 20 | Other sources** | 14873.24 **(3.07)** | 13247.71 **(2.05)** | 13888.89 **(2.39)** | 41200 **(12.91)** | 25222.22 **(5.75)** | 33211.11 **(8.77)** | 29590.06 **(7.54)** | 18663.32 **(3.38)** | 23550 **(4.90)** |
| | **Total Income** | **485154.54( 100)** | **644773.03 (100)** | **581811.97 (100)** | **319081.44 (100)** | **437961.01 (100)** | **378521.22 (100)** | **392319.16 (100)** | **551239.68 (100)** | **480166.6 (100)** |

*Source: Field Survey, 2017-18*
*Note –Net income is taken.*
*Figures in brackets are column-wise percentages.*
*IFS- Integrated Farming System, CFS- Conventional Framing System*
**dairy farming/trade of animals is taken in IFS and cattle rearing is taken in CFS*
***It includes income from small business like shop keeping etc.*

**Income Levels of Different Categories of Farmers: Per Acre**

The landholding size of an average sampled household is 3.01 acres. The average landholding size of all sampled households practicing IFS is 3.21acres and 2.82 acres for CFS. Due to the variations in the landholding size among different types and categories of farming, it is required to look into the per acre income levels of marginal and small farmers who are doing IFS and CFS. The per acre income of farmers following IFS is Rs. 1,81,249.84 and in the case of CFS, it is Rs. 1,34,227.37 annually. Per acre income of all sampled households in the case of IFS is 1.35 times more than that of CFS. It is also found that the per acre income from farm business is the highest among all other components. The table indicates that most import allied activity of IFS is dairy farming/trade of animals which accounts for Rs. 53076.01 per acre of an average income farm household. Out of remaining allied enterprises, per acre income of apiculture is the highest which contributes Rs. 8496.05 followed by horticulture, fishery, goat, poultry, piggery, sheep rearing, other allied activities and bio-gas plant. The average landholding size of the marginal farmers practicing IFS and CFS is 1.71 and 1.76 acres, respectively. The average landholding size of the small farmers following IFS and CFS is 4.18 and 3.88 acres, respectively. An average sampled farm household earns total per acre income of Rs.2,25,470.78 annually in the case of marginal farm size category. On the other hand, an average sampled farm household under small farm size category earns Rs. 1,36,445.46 per acre annually. Per acre income of the marginal farmers is 1.65 times the per acre income of the small farmers. But there are differences in per acre income levels of marginal and small farm size categories under IFS and CFS. Per acre income of an average farm household of the marginal and small farm-size categories is Rs. 283716.11 and Rs. 154251.92 annually, respectively under IFS while per acre income of average farm household of the marginal and small farm-size categories is Rs. 181296.27 and Rs. 112876.55, respectively under CFS. The above analysis showed that likewise income levels, per acre income of farmers practicing IFS is more than that of farmers who are practicing CFS.

**Table 2**
**Income level of different categories of farmers: per acre (Rs. per annum)**

| Sr. no. | Source of Income | IFS | | | CFS | | | Total Sampled Households | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Marginal Farmers | Small Farmers | All Farmers | Marginal Farmers | Small Farmers | All Farmers | Marginal Farmers | Small Farmers | All Farmers |
| 1 | Farm business income | 104476.61 | 71023.92 | 77958.57 | 88047.73 | 69963.92 | 75607.09 | 95064.37 | 70639.36 | 76986.38 |
| 2 | Rent from leased out land | 0 | 2238.71 | 1765.32 | 1736.11 | 1231.39 | 1388.89 | 981.65 | 1803.57 | 1591.92 |
| 3 | Hiring out labor in agricultural sector | 716.58 | 0 | 150.57 | 2234.85 | 171.82 | 815.60 | 1574.21 | 74.63 | 462.35 |
| 4 | Hiring out agricultural equipment | 5790.30 | 2030.40 | 2819.31 | 1363.64 | 2691.87 | 2277.38 | 3280.5 | 2321.01 | 2570.14 |
| 5 | Sale of seeds and manure | 33.77 | 0 | 7.10 | 0 | 0 | 0 | 14.64 | 0 | 3.78 |
| 6 | Cattle/dairy farming/trade of animals* | 100294.74 | 40583.49 | 53076.01 | 14291.48 | 7917.78 | 9906.74 | 51547.70 | 26438.61 | 32942.19 |
| 7 | Poultry | 547.43 | 2666.59 | 2217.75 | 0 | 0 | 0 | 237.25 | 1511.21 | 1182.55 |
| 8 | Apiary | 9473.68 | 8249.90 | 8496.05 | 0 | 0 | 0 | 4105.80 | 4675.38 | 4530.29 |
| 9 | Goat | 8958.24 | 1334.71 | 2934.82 | 0 | 0 | 0 | 3882.41 | 756.41 | 1564.91 |
| 10 | Sheep | 5268.10 | 0 | 1106.96 | 0 | 0 | 0 | 2283.14 | 0 | 590.26 |
| 11 | Piggery | 581.99 | 1850.27 | 1581.31 | 0 | 0 | 0 | 252.23 | 1048.58 | 843.19 |
| 12 | Fishery | 5094.31 | 2710.37 | 3207.69 | 0 | 0 | 0 | 2207.82 | 1536.02 | 1710.41 |
| 13 | Horticulture | 13011.61 | 5598..26 | 7148.53 | 0 | 0 | 0 | 5639.11 | 3172.65 | 3811.76 |
| 14 | Bio gas plant | 1545.18 | 0 | 324.68 | 0 | 0 | 0 | 669.67 | 0 | 173.13 |
| 15 | Other allied activities | 4276.42 | 0 | 898.58 | 0 | 0 | 0 | 1853.36 | 0 | 479.14 |
| 16 | Govt. service | 5436.12 | 4387.87 | 4602.28 | 21742.43 | 15223.37 | 17257.68 | 14649.82 | 9098.96 | 10538.21 |
| 17 | Pvt. service | 3459.35 | 3344.89 | 3364.49 | 20795.45 | 6738.83 | 11125.29 | 13257.66 | 4822.63 | 7005.54 |
| 18 | Pensions and remittances | 6323.45 | 5061.23 | 5242.30 | 6968.43 | 2437 | 3851.06 | 6521.02 | 3926.81 | 4599.30 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 19 | Hiring out labour in non-agricultural sector | 98.84 | 0 | 20.77 | 707.07 | 0 | 220.65 | 442.64 | 0 | 114.43 |
| 20 | Other sources** | 8697.80 | 3169.31 | 4326.76 | 23409.09 | 6500.57 | 11776.99 | 17005.78 | 4619.63 | 7823.92 |
| | **Total Income** | **283716.11** | **154251.92** | **181249.84** | **181296.27** | **112876.55** | **134227.37** | **225470.78** | **136445.46** | **159523.8** |

*Source: Field Survey, 2017-18*
*Note –Net income is taken.*
*IFS- Integrated Farming System, CFS- Conventional Framing System*
**dairy farming/trade of animals is taken in IFS and cattle rearing is taken in CFS*
***It includes income from small business like shop keeping.*

**Per Capita Income of Farm Households**

Per capita income of a family is the ratio of total income and number of family members. The family size of an average sampled household is 4.89 in the present study. However, there are differences in the family size of sampled households. The average family size of all sampled households practicing IFS is 5.09 and 4.68 for CFS. Due to the variations in the family size among different farm types of farming, it is more important to look into the per capita income levels of farm households who are following IFS and CFS. The study shows that an average household earns per capita income of Rs. 98193.59 annually. However, there are differences in the per capita income levels of farmers who are practicing IFS and CFS. The per capita income of farmers following IFS is Rs. 114304.01 and in the case of CFS, it is Rs. 80880.59 annually. The per capita income of all sampled households in IFS is 1.41 times more than the per capita income of the average sampled household in CFS. Moreover, an average sampled farm household earns per capita income of Rs.79902.08 annually in the case of marginal farm size category. On the other hand, an average sampled farm household of small farm size category earns Rs. 113423.8. The per capita income of the small farmers is 1.42 times the per capita income of the marginal farmers. But there are differences in the per capita income levels of marginal and small farm size categories under farm type IFS and CFS. The per capita income of an average farm household of the marginal and small farm-size category is Rs. 94941.32 and Rs. 127174.16 annually, respectively in the case of IFS while the per capita income of an average farm household of the marginal and small farm-size categories is Rs. 67033.91 and Rs. 95002.39 annually for the farm type CFS. Farm business income is the most important source of per capita income which contributes Rs. 33688.80 in case of marginal farm size category and Rs. 58720.78 in case of small farm size category followed by cattle rearing/dairy farming/trade of animals and government services.

**Table-3**

**Per capita income of farm households (Rs. per annum)**

| Sr. no. | Source of Income | IFS | | | CFS | | | Total Sampled Households | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Marginal Farmers | Small Farmers | All Farmers | Marginal Farmers | Small Farmers | All Farmers | Marginal Farmers | Small Farmers | All Farmers |
| 1 | Farm business income | 34961.84 | 58556.21 | 49164.44 | 32555.46 | 58885.03 | 45558.12 | 33688.80 | 58720.78 | 47388.34 |
| 2 | Rent from leased out land | 0 | 1845.72 | 1113.29 | 641.92 | 1036.39 | 836.90 | 347.88 | 1499.27 | 979.89 |
| 3 | Hiring out labor in agricultural sector | 239.79 | 0 | 94.96 | 826.33 | 144.61 | 491.45 | 557.87 | 62.04 | 284.60 |
| 4 | Hiring out agricultural equipment | 1937.65 | 1675.62 | 1778.00 | 504.20 | 2265.61 | 1372.27 | 1162.54 | 1929.40 | 1582.03 |
| 5 | Sale of seeds and manure | 11.30 | 0 | 4.48 | 0 | 0 | 0 | 5.19 | 0 | 2.33 |
| 6 | Cattle rearing/ dairy farming/ trade of animals* | 33562.43 | 33459.37 | 33472.30 | 5284.24 | 6663.99 | 5969.44 | 18267.41 | 21977.78 | 20277.3 |
| 7 | Poultry | 183.19 | 2198.49 | 1398.62 | 0 | 0 | 0 | 84.07 | 1256.23 | 727.91 |
| 8 | Apiary | 3170.25 | 6801.69 | 5358.02 | 0 | 0 | 0 | 1455.01 | 3886.53 | 2788.58 |
| 9 | Goat | 2997.77 | 1100.41 | 1850.84 | 0 | 0 | 0 | 1375.85 | 628.78 | 963.27 |
| 10 | Sheep | 1762.91 | 0 | 698.10 | 0 | 0 | 0 | 809.10 | 0 | 363.33 |
| 11 | Piggery | 194.76 | 1525.47 | 997.25 | 0 | 0 | 0 | 89.38 | 871.66 | 519.02 |
| 12 | Fishery | 1704.75 | 2234.59 | 2022.92 | 0 | 0 | 0 | 782.41 | 1276.86 | 1052.83 |
| 13 | Horticulture | 4354.18 | 4615.53 | 4508.21 | 0 | 0 | 0 | 1998.38 | 2637.34 | 2346.30 |
| 14 | Bio gas plant | 517.07 | 0 | 204.76 | 0 | 0 | 0 | 237.32 | 0 | 106.57 |
| 15 | Other allied activities | 1431.05 | 0 | 566.69 | 0 | 0 | 0 | 656.79 | 0 | 294.93 |
| 16 | Govt. services | 1819.13 | 3617.61 | 2902.42 | 8039.22 | 12812.73 | 10398.86 | 5191.59 | 7563.75 | 6486.71 |
| 17 | Pvt. services | 1157.63 | 2757.72 | 2121.81 | 7689.08 | 5671.73 | 6703.70 | 4698.23 | 4008.93 | 4312.20 |
| 18 | Pensions and remittances | 1992.78 | 4172.77 | 3306.05 | 2576.56 | 2051.10 | 2320.51 | 2310.91 | 3264.26 | 2831.06 |
| 19 | Hiring out labour in non-agricultural sector | 33.07 | 0 | 13.10 | 261.44 | 0 | 132.95 | 156.86 | 0 | 70.44 |
| 20 | Other sources** | 2910.61 | 2612.96 | 2728.66 | 8655.46 | 5471.20 | 7096.39 | 6026.49 | 3840.19 | 4815.95 |
| | **Total Income** | **94941.32** | **127174.16** | **114304.01** | **67033.91** | **95002.39** | **80880.59** | **79902.08** | **113423.8** | **98193.59** |

*Source: Field Survey, 2017-18.*
*Note: IFS- Integrated Farming System, CFS- Conventional Framing System*
**dairy farming/trade of animals is taken in IFS and livestock is taken in CFS*
***It includes income from small business like shop keeping etc.*

**Distribution of Household Income**

The pattern of distribution of income among sampled farm families who are practicing integrated farming and conventional farming has been evaluated by taking cumulative percentages of per household and per capita income for each decile group after arranging the same in ascending order. Gini coefficients have been calculated to justify the pattern of distribution. The Gini coefficient expresses equality and inequality of income. A Gini coefficient having value zero means perfect equality whereas the value one represents maximum inequality.

**Distribution of Household Income: On Decile Basis**

The distribution of household income among the farmers who are doing integrated farming and conventional farming has been analyzed and results are given in Table **4**. The table shows that the bottom 10 percent of the farmers doing IFS earn 3.42 percent of the total household income while the corresponding figure for the farmers doing CFS stands at 2.86 percent. On the other hand, the top 10 percent farm households bring in 22.11 and 26.34 percent of the total farm income of farmers practicing IFS and CFS, respectively. It has been found that the value of Gini coefficient is 0.28 and 0.35 for the farmers who are following IFS and CFS, respectively. This shows that the concentration of income and social inequality is higher in the case of CFS as compared to IFS.

**Table 4**
**Distribution of household income-on decile basis**

| Cumulative Percentage of Households | IFS | | CFS | |
|---|---|---|---|---|
| | Cumulative Percentage | Percentage | Cumulative Percentage | Percentage |
| 10 | 3.42 | 3.42 | 2.86 | 2.86 |
| 20 | 8.55 | 5.13 | 7.02 | 4.16 |
| 30 | 14.67 | 6.12 | 12.18 | 5.16 |
| 40 | 21.88 | 7.21 | 18.35 | 6.17 |
| 50 | 30.03 | 8.15 | 25.60 | 7.25 |
| 60 | 39.61 | 9.58 | 34.24 | 8.64 |
| 70 | 50.62 | 11.01 | 44.77 | 10.53 |
| 80 | 62.92 | 12.3 | 57.38 | 12.61 |
| 90 | 77.89 | 14.97 | 73.66 | 16.28 |
| 100 | 100 | 22.11 | 100 | 26.34 |
| **Gini coefficient** | **0.28** | | **0.35** | |

*Source-Field Survey, 2017-18*

**Distribution of Per Capita Income: On Decile Basis**

The distribution of per capita income among the farmers practicing IFS and CFS has been shown in Table **5**. On an average, the bottom 10 percent farmers claim only 2.90 percent and 2.96 percent in the case of IFS and CFS, respectively. On the other hand, the top 10 percent farm households who are doing IFS and CFS share 23.16 and 26.12 percent, respectively of the total per capita income. The value of Gini coefficient for the per capita income of farm households following IFS and CFS is 0.30 and 0.35 percent, respectively. This indicates that the concentration of per capita income is higher in the case of CFS than IFS.

**Table 5**
**Distribution of per capita income: on decile basis**

| Cumulative Percentage of Households | IFS | | CFS | |
|---|---|---|---|---|
| | Cumulative Percentage | Percentage | Cumulative Percentage | Percentage |
| 10 | 2.90 | 2.90 | 2.96 | 2.96 |
| 20 | 7.73 | 4.83 | 6.95 | 3.99 |
| 30 | 13.71 | 5.98 | 12.01 | 5.06 |
| 40 | 20.82 | 7.11 | 18.18 | 6.17 |
| 50 | 29.05 | 8.23 | 25.60 | 7.42 |
| 60 | 38.62 | 9.57 | 34.50 | 8.9 |
| 70 | 49.81 | 11.19 | 45.16 | 10.66 |
| 80 | 62.33 | 12.52 | 57.83 | 12.67 |
| 90 | 76.84 | 14.51 | 73.88 | 16.05 |
| 100 | 100 | 23.16 | 100 | 26.12 |
| **Gini coefficient** | **0.30** | | **0.35** | |

*Source-Field Survey, 2017-18*

**Conclusions and Policy Implications**

Integrated farming system acts as a risk reduction mechanism against climate changes which is the most common cause of crop failure. It is able to achieve sustainability through effective use of by-products of inter-linked components. It is evident from the above analysis that the adoption of multiple allied activities in an integrated manner ensures higher income than the conventional farming system. Integrated farming system gives 1.5 times more annual income to the farm households than CFS. Moreover, per acre income is also higher in case of IFS than CFS. Another important aspect has been seen that per capita income (Rs. 114304.01) in case of IFS is greater than that of CFS (Rs. 80880.59). Furthermore, the concentration of income and inequality is higher in the case of CFS as compared to IFS. The data indicates that integration of cropping with apiary and horticulture is more profitable in IFS. The only need of the hour is to make the farmers aware of integrated farming techniques to supplement their farm income and employment. Suitable training programmes should be established in districts so that farmers can get skills and

knowledge for managing different enterprises. The government should provide financial support to set up new businesses and loan methods should be simple.

**References**

[1] Behra, U. K. and France, J. (2016*)* Integrated Farming Systems and the Livelihood Security of Small and Marginal Farmers in India and Other Developing Countries. *Advances in Agronomy*, 138, 235-74.

[2] Khan, N., Dubey, M. and Tiwari, U.S. (2015) Integrated Farming Systems: An Approach for Livelihood Secuirty of Small and Marginal Farmers. *International Journal of Science and Nature,* 6(3),515-520. Retrieved from: www.scienceandnature.org/IJSN_Vol6(3)J2015/IJSN-VOL6(3)15-37CS3.pdf

[3] Khan, N.K. and Parashari, A.K. (2018) Income and Employment Generation through Integrated Crop-Livestock Farming System in Bulandshahr district- A Geographical Analysis. *Acta Science Agriculture*, 2(5), 36-39.

[4] Sahoo, B., Lenka, A. and Neduchezhiyan, M. (2012) Sustainable Livelihood Support through Enterprise Convergence in Pond based Farming System. Odisha Review, 46-51.