

# INCOME AND LIVELIHOOD ISSUES OF TRIBAL FARMERS IN JHARKHAND

**Dr. NITESH RAJ**

Assistant Professor, University Department of Economics, Ranchi University, Ranchi.

## Abstract

Tribal farmers' income is unstable, which has a negative impact on their livelihoods by limiting their access to health, education, housing, employment, savings, and investment. Our tribal farmer suffers from low income due to low productivity due to less fertile land, less use of manure, dependency on monsoons, backward technology, and unproductive use of debt. Thus, we see that there are various income and livelihood issues for tribal farmers in Jharkhand. All these issues can be shortened if we adopt the bottom-up effect. The bottom-up effect is the way in which the base farmer will be involved in agricultural development. At the farmer level, basic needs will be met with the help of real penetration of funds through banks and other financial institutions such as NABARD. As reported by NABARD, the share of small and middle-level farmers' accounts in the total number of accounts financed by all agencies grew from 60.07 percent in 2015-16 to 72.06 percent in 2016-17. And banks across the country have provided loans totaling 26,848.13 crores (Agriculture Credit to Farmers in India—NABARD, <https://www.nabard.org/news-article>). Currently, India's banks and financial institutions contribute almost 36 percent of the debt on the accounts of tribal farmers. Thus, this research paper has tried to discuss the income and livelihood issues of tribal farmers in Jharkhand and also suggest remedies to resolve these issues.

**Keywords:** Tribal Income; Livelihood; Penetration of Fund; Base Farmers; Agricultural Development.

## 1. INTRODUCTION

The Indian economy contracted by 7.3 percent in the two-year period of COVID-19 (2020–21). Agriculture production, on the other hand, has increased by 3.63 percent. The tribal farmers of Jharkhand do the farming work among their own inhabitants and live peacefully in villages. But things worsen when we go deeper in the sea. The majority of past studies examined fluctuations in agricultural GDP or agricultural production and attempted to explain them in terms of resource use, electricity consumption, infrastructure facilities, etc. This has changed the emphasis from production orientation to farmer orientation. In reality, a paradigm shift appears to be taking place at the highest policy level, in line with PM views of "doubling farmers' income by 2022," which prioritised farmers' income over productivity, resulting in a paradigm shift toward the well-being of the farmers. There are a large number of causes that really affect the welfare of farmers. Indian farmers look happy from the outside but are affected by so many factors. It may be a combination of pleasure and sorrow. In economics point of view, we try to identify those factors that are affecting the income level (Y) of tribal farmers. In this study, we consider some important factors such as the monsoon (X<sub>1</sub>), land size (X<sub>2</sub>), an effective irrigation system (X<sub>3</sub>), fertiliser use (X<sub>4</sub>), means of information (X<sub>5</sub>), credit facilities (X<sub>6</sub>), mental and physical fitness (X<sub>7</sub>), the use of agricultural tools (X<sub>8</sub>), machinery and equipment (X<sub>9</sub>), the labour force (X<sub>10</sub>), the nutritional values of the food they eat (X<sub>11</sub>), the use of electricity (X<sub>12</sub>), and the minimum supporting infrastructure. That determines the actual

performance of agricultural production. Subsequently, the increased income and livelihood status of farmers have improved their overall welfare in Jharkhand.

### 1.1 Livelihood

According to Chambers & Conway, (1991), "a livelihood comprises the capabilities, assets (including both material and social resources), and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stress and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base."

### 1.2 Livelihood Assets

According to UNDP's Guidance Note on Recovery: Livelihood, "assets may be tangible, such as food stores and cash savings, as well as intangible, such as trees, land, livestock, tools, and other resources. Assets may also be intangible such as claims one can make for food, work, and assistance, as well as access to materials, information, education, health services, and employment opportunities".  
([https://www.unisdr.org/files/16771\\_16771guidancenoteonrecoverylivelih.pdf](https://www.unisdr.org/files/16771_16771guidancenoteonrecoverylivelih.pdf))

Human Capital	Skills, knowledge, health and ability to work
Social Capital	Social resources, including informal networks, membership of formalized groups and relationships of trust that facilitate cooperation and economic opportunities
Natural Capital	Natural resources such as land, soil, water, forests and fisheries
Physical Capital	Basic infrastructure, such as roads, water & sanitation, schools, ICT; and producer goods, including tools, livestock and equipment
Financial Capital	Financial resources including savings, credit, and income from employment, trade and remittances

Sources: Eldis – Livelihoods Connect, Retrieved from <http://www.eldis.org/go/topics/dossiers/livelihoodsconnect/what-are-livelihoods-approaches/livelihoods-assets>

### 1.3 Income

According to investopedia.com, "income" refers to the money that a person or entity receives in exchange for labor or products. Income may have different definitions depending on the context—for example, taxation, financial accounting, or economic analysis. For most people, income means their total earnings in the form of wages and salaries, the return on their investments, pension distributions, and other receipts. "For businesses, income means the revenues from selling services, products, and any interest and dividends received with respect to their cash accounts and reserves related to the business".

According to groww.in, "Agricultural income" refers to the income earned or revenue generated from sources essentially premised on agricultural activities. "These sources of

income include farming land, buildings on or identified with agricultural land, as well as commercial produce from horticultural land." (<https://groww.in/p/tax/agricultural-income>)

Section 2 (1A) of the Income Tax Act, 1961, lays down the definition of "agricultural income" under the following three activities: 1. Rent or revenue derived from agricultural land situated in India and used for agricultural purposes. 2. Income earned from agricultural land through the commercial sale of produce gained from this land 3. Revenue derived from renting or leasing of buildings in or around agricultural land."

According to Vogel & Johnson (2000), "Income can be measured and interpreted at multiple levels of aggregation. In the United States, farm income is quantified for the agricultural sector of the economy, for agricultural businesses, and as a source of revenue for farm households. Each level of measurement has an impact on the kinds and quantities of data required to put ideas into practice and generate precise estimations. Net farm income (NFI) represents the net worth of products and services produced by farming operations over a specific calendar year for sector-wide measurement. This indicator of net income equals gross cash and non-cash income less cash and non-cash production costs."

According to Economic Research Service (U.S. Department of Agriculture) (2021) "Gross cash farm income (GCFI) consists of government payments, farm-related income, and cash receipts for commodities. Nearly 98 percent of American farms in 2021 were family farms of various forms, where the operator and their relatives often owned the majority of the firm.

#### 1.4 Agriculture Production in Jharkhand

According to **mdbiocoals.com**, "Jharkhand mainly produces three crops: rice, wheat, and maize. The minor crops are arhar, urad, moong, gram, and mustard. The farming sector in Jharkhand provides a livelihood for around 80 percent of rural people. Agriculture in Jharkhand depends on low investment, low productivity, paddy crops, bad irrigation facilities, and small land holdings the primary agricultural products include paddy, maize, legumes, sunflowers, groundnuts, and fruits. The state has the potential to convert more land to agriculture, as existing fallow, other fallow, and cultivable wasteland total 18.35 lakh hectares".

According to **ICAR**, "the state's cultivated area is about 1.8 million hectares, comprising 22% of the geographical area. The net irrigated area is about 0.16 million ha, constituting 9.3% of the cultivated area. Being largely rain-fed, the state has a cropping intensity of 126%. The state has 1.4 million ha under rice cultivation, which is mainly a rain-fed shallow and upland area. The area has slightly decreased from 1.48 to 1.36 million ha during the last seven years. The average productivity in the state is around 1.2 t/ha. The major constraints in production are drought in uplands, low soil fertility, low coverage of high-yielding varieties, and severe incidences of weeds and blasts. The major interventions are: "drought-tolerant short-duration varieties like Vandana, Anjali, Sada Bahar, Birsa Dhan 109, and Birsa Dhan 110 may be popularised in uplands, growing of suitable hybrids KRH 2, PHB 71, and 6444 (lowlands), and the adoption of integrated weed management practices.". (<https://icar.org.in/files/state-specific/chapter/62.htm>)

### **1.5 Agricultural Schemes in Jharkhand:**

According to manage.gov.in 1. Jharkhand Mukhyamantri Krishi Ashirwad Yojna 2. Jharkhand Krishi Rin Mafi Yojana 3. Jharkhand Kisan Fasal Rahat Yojana 4. Samakit Birsa Gram Vika Yojana cum Krishak Pathshala. 5. Birsa Kisan Yojana (BKY) 6. Mukhyamantri Krishi Wrin Mafi Yojana 7. Meethi Kranti Yojana (Sweet Revolution Scheme) 8. Interest Free Farm Loan Scheme 9. Attracting & Retaining Youth in Agriculture (ARYA) Scheme. (<https://www.manage.gov.in/fpoacademy/SGSchemes/Jharkhand.pdf>)

### **2. OBJECTIVES OF THE STUDY**

- 1) To study the impact of monsoon and land size on the income and livelihood status of farmers
- 2) To study the impact of effective irrigation systems and the use of fertiliser on the income and livelihood status of farmers
- 3) To study the impact of means of information, the minimum supporting price (MSP), market price, and credit facilities on the income and livelihood status of farmers
- 4) To study the impact of mental & physical fitness and nutritional values of food on the income and livelihood status of farmers
- 5) To study the impact of the use of machinery & equipment, the use of labour force, and use of electricity on the income and livelihood status of farmers
- 6) To investigate the impact of education and skill & training on farmer income and livelihood status.
- 7) To study the impact of economic trends on the income and livelihood status of farmers

### **3. HYPOTHESIS**

- 1) There is no significant relationship between agriculture production and the income & livelihood conditions of farmers.
- 2) There is no significant relationship between welfare and income & livelihood conditions for farmers.

### **4. METHOD OF RESEARCH**

The method of the research in this section deals with the establishment of statistical derivation inferences, tabulation, and categories. All required data has been collected through primary and secondary data sources. Regression and multiple regression tests were performed for the purpose of examining the correlation and predictive abilities of the dependent variables used in this study. For the hypothesis testing results, a regression test has been used. The study is confined to the tribal agricultural farmers of Jharkhand.

#### **A) Techniques of Data Collection**

The study is based on primary data. A total of five districts, namely Ranchi, Ramgarh, Khunti, Gumla, and Lohardaga, are taken as samples. The sample size is 200 households, which are

chosen at random. Secondary data have been collected from different governmental departments like NSSO, NITI, the Aayog Report, Census data, Internet searches, reports in official gadgets, journals, research papers, magazines, books, CACP, ICAR, and MoSPI, as well as other government and non-government agencies.

### **The Variables**

The income level of tribal farmers is measured by Y. In this study, we consider some important factors such as monsoon (X<sub>1</sub>), land size (X<sub>2</sub>), an effective irrigation system (X<sub>3</sub>), fertiliser use (X<sub>4</sub>), means of information (X<sub>5</sub>), credit facilities (X<sub>6</sub>), mental and physical fitness (X<sub>7</sub>), the use of agricultural tools (X<sub>8</sub>), machinery and equipment (X<sub>9</sub>), labour force (X<sub>10</sub>), the nutritional values of the food they eat (X<sub>11</sub>), the use of electricity (X<sub>12</sub>), and the minimum supporting infrastructure.

In this study, the dependent variable is the income level (Y) of tribal farmers. Monsoon (X<sub>1</sub>), land size (X<sub>2</sub>), an effective irrigation system (X<sub>3</sub>), fertiliser use (X<sub>4</sub>), means of information (X<sub>5</sub>), credit facility (X<sub>6</sub>), mental and physical fitness (X<sub>7</sub>), machinery and equipment (X<sub>8</sub>), labour force (X<sub>9</sub>), nutritional values of food they eat (X<sub>10</sub>), use of electricity (X<sub>11</sub>), minimum supporting price (X<sub>12</sub>), market price (X<sub>13</sub>), education, skill and training (X<sub>14</sub>), and economic trends (X<sub>15</sub>). And as per the aforesaid problems, the research work is about how factors responsible for the welfare of farmers (X) and their respective determining independent variables (as X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>,...) lead to improvements in income level (Y), i.e.,  $Y = f(X)$ .

## **5. DATA PROCESSING AND ANALYSIS**

The collected data has been classified and tabulated by using different tables, charts, and graphs. Overall, the primary data has been used to analyse all the objectives mentioned above using the factor analysis technique. A total of five districts, namely Ranchi, Ramgarh, Khunti, Gumla, and Lohardaga, are taken as samples. The sample size is 200 households, which are chosen at random. There are various factors affecting the income level (Y) of tribal farmers, like the monsoon (X<sub>1</sub>), land size (X<sub>2</sub>), effective irrigation system (X<sub>3</sub>), use of fertiliser (X<sub>4</sub>), means of information (X<sub>5</sub>), credit facility (X<sub>6</sub>), mental and physical fitness (X<sub>7</sub>), machinery and equipment (X<sub>8</sub>), use of labour force (X<sub>9</sub>), nutritional values of the food they eat (X<sub>10</sub>), use of electricity (X<sub>11</sub>), minimum supporting price (MSP) (X<sub>12</sub>), market price (X<sub>13</sub>), education, skill The factor analysis method is used to show the factors' impact on the income of the farmers. In Jharkhand, the monsoon (X<sub>1</sub>), an effective irrigation system (X<sub>3</sub>), the use of fertiliser (X<sub>4</sub>), a credit facility (X<sub>6</sub>), machinery and equipment (X<sub>8</sub>), and the use of electricity (X<sub>11</sub>) are some influential factors that are affecting the income and livelihood conditions of farmers. X<sub>2</sub>, X<sub>4</sub>, and X<sub>7</sub> have a larger impact on Ranchi and Ramgarh. while X<sub>1</sub> and X<sub>9</sub> have impacted the income level of Khunti district. X<sub>1</sub>, X<sub>3</sub>, X<sub>5</sub>, X<sub>6</sub>, X<sub>7</sub>, X<sub>8</sub>, X<sub>11</sub>, X<sub>14</sub>, and X<sub>15</sub> have severely impacted Gumla and Lohardaga districts. At present, education and skill-based training are the key factors that can change the overall scenario of agricultural farming and the corresponding income and livelihood conditions of farmers in Jharkhand.

The economic survey for 2021-2022 revealed that the average monthly income per agricultural household in the country was Rs. 10,218 in 2019 while it was only Rs. 6,426 in 2014. The "Land and Livestock Holdings of Households and Situation Assessment of Agricultural Households" (SAS) survey said that "net receipts from crop production increased by 22.6 percent as compared to the previous SAS report of 2014; net receipts from other sources increased by 92.6 percent with an increase in overall net receipts of 59 percent." The survey further said, "Crop income, with a share of 37 percent, continues to be an important source of farmer's income, but there is a visible diversification in the sources of income of the farmers." However, the SAS reports also show "the increasing fragmentation of holdings." "The average size of household ownership holdings has declined from 0.725 hectares in 2003 to 0.592 hectares in 2013 and further to 0.512 hectares in 2019."

### 5.1 Income Status of Farmers:

According to NABARD's research of 2021 titled "Farmers' Welfare in India: A State-wise Analysis." "Farmers' well-being depends on six variables, according to Production and post-production factors that might improve or reduce a farmer's well-being include things like market access, input prices and quality, labour availability and wage rates, output prices, and post-harvest amenities. If the physical and financial infrastructure has facilities like connectivity, irrigation, power, a banking network, and penetration, among others, then these backward and forward linkages would be effective. Social infrastructure, including institutions for education and health care, a web of neighbourhood organisations, and the amount of social capital accumulated, etc."

**NABARD's formula for dimension indices (Di) was:**  

$$D_i = \frac{\text{Actual value} - \text{Minimum value}}{\text{Maximum} - \text{Minimum value}}$$

Dimension indices of indicators within a dimension are combined using a simple average with equal weights. Such dimension indices are combined by taking an arithmetic average to compute the Farmers' Welfare Index (FaWI).

According to NABARD, Jharkhand has an agriculture area of 7972 hectares, a rural population of 76.0 percent, a rural density of 314, a rural sex ratio of 961, and operational holdings of 2, 803, 00. Agriculture density is 35.2/km<sup>2</sup> (source: Census, 2011, Agricultural Census 2015–16). According to the Land and Livestock Holdings of Households and Situation Assessment of Agricultural Households' (SAS) survey, the average monthly income for agricultural households in 2021 is Rs 10,218 while it was Rs 6,426 as per the last SAS Report of 2014. According to NABARD, the average monthly household income (NAFIS) (A) of Jharkhand is Rs. 5853; the average monthly agricultural household income (Ag) is Rs. 6991; and the average monthly non-agricultural household income (N) is Rs. 4676. Agriculture has a ratio of N = 1.5 and a ratio of A = 0.8.

According to NABARD, the Farmers' Welfare Index and its Dimensions in Jharkhand are as follows: production is 0.13, post-production is 0.45, infrastructure is 0.10, social development is 0.55, the ecological dimension is 0.07, and the fiscal dimension is 0.24.

**Table 1: Average annual income per farm household**

S.N.	Years	Average annual income (at current prices) per farm household (in Rs.)	Average Annual Increase of Total Farm Income (In %)
1	2002-2003	25,380	20.38
2	2012-2013	77,112	11.90
3	2018-2019	1,22,616	11.45

Sources:<https://www.thehindubusinessline.com/opinion/why-farm-income-in-india-is-so-low/article37075687.ece>

**Table 2: Growth of Income realized from Crop Cultivation**

S.N.	Years	Growth of Income Realized From Crop Cultivation
1	2002-03 to 2012-13	21.80
2	2012-13 and 2018-19	4.65

Sources:<https://www.thehindubusinessline.com/opinion/why-farm-income-in-india-is-so-low/article37075687.ece>

It is obvious from the above table that other sources of income (like wages, crop cultivation, farming of animals and non-farm business) of farmers, the decelerated sharply. And the main sources of income is not from the farming but mainly contributed by wages and farming of animals.

**Table 3: Registered Average Annual Increase from Wages and Farming of Animals**

S.N.	Years	Registered Average Annual Increase From Wages and Farming of Animals
1	2012-13	19.24
2	2018-19	21.47

Sources:<https://www.thehindubusinessline.com/opinion/why-farm-income-in-india-is-so-low/article37075687.ece>

## 5.2 State Wise Status:

The average monthly income from cultivation for 12 States is Rs. 10,000 and it is in the range of Rs. 4,013 - 9,995 in rest of the 16 States in the year 2018-2019. The average monthly income of agricultural households in Jharkhand was 4,895 in the year 2018-2019 while it was Rs. 7,068. In Odisha it was Rs. 4,013 while it was Rs. 26,973 in Meghalaya. In Bihar, Jharkhand, Madhya Pradesh, Odisha, Telangana, Uttara Pradesh and West Bengal the national average income is decreasing. Thus, it is clear that income of farmers across States was also decreasing. JOSHI, P. K., (2018) in IFPRI Blog Post (OPEN ACCESS | CC-BY-4.0) "Five ways to reduce farm distress in India" on 29.01.2018 said that there are five ways to increase the farmers income are Agricultural transformation is should be faster by new invention and support of the government, Generating employment opportunities by making cultivation industry, reducing

risks in agriculture by more private and government investment, by developing agriculture infrastructure and by improving quality of rural life.

### **5.3 Issues of Tribal Farmers in Jharkhand:**

- 1) Technological obstacle
- 2) Lack of adequate and timely assured irrigation facility
- 3) Per hectare productivity is low
- 4) Lack of manpower in the household
- 5) Increasing preference to single family upon joint family
- 6) Migration from rural to urban areas
- 7) Loss of interest in Farming
- 8) Lack of education and training among farmers

## **6. RESULT AND DISCUSSION**

- 1) The income of tribal farmers has been increased by an average of 60 percent from 2010 to 2022. The return on investment in farming sector in this period has been increased by 55 percent and so has the cropping intensity. Result says that not only Rabi and Kharif crops but Vegetables are also contributing in enhancement in income.
- 2) Result says that income of the 15 percent farmers have increased by 30 percent who have their own land.
- 3) It is also obvious that income of more than 50% of the farmers who are cultivating in others land through the acquisition of land, through mortgage, leasing, or contract, has increased by approximately 30 percent.
- 4) Due to the gestation period of 2010 to 2022 the diversified livelihood activities the planting of fruit trees and introduction of dairy animals, has not yet resulted in a rise in income.
- 5) During the reference period migration has also been reduced its resultant in 90 per cent of the population having food security.
- 6) Almost 2 percent sample population income has been increased by milk and milk products.
- 7) Result says that all most 40 percent of income has been expended on house, health and education and it was from the increased income.
- 8) The contribution of monsoon and land size in income was of 35 percent.
- 9) The impact of effective irrigation system and use of fertilizer in income and livelihood status of farmers was of approximately 35 percent.
- 10) The impact of means of information, minimum supporting price (MSP), market price and credit facility in income and livelihood status of farmers was of approximately 55 percent.



- 11) The impact of mental & physical fitness and nutritional values of food in income and livelihood status of farmers was of approximately 40 percent.
- 12) The impact of use of machinery & equipments, use of labour force and use of electricity in income and livelihood status of farmers was of approximately 50 percent.
- 13) The impact of education and skill & training in income and livelihood status of farmers was of approximately 70 percent.
- 14) The impact of economic trends in income and livelihood status of farmers was of approximately 10 percent.

## 7. CONCLUSION AND SUGGESTIONS

Thus, it is clear that income of farmers depends of various factors. All these factors are important to determine the income and subsequent welfare of the farmers in Jharkhand. There are few suggestions that are equally important to to increase the income and welfare of the farmers. These are (a) farmers and Government both should go for market centric approach. (b) Besides the MSP the procurement infrastructure must be strengthen. Therefore, it is necessary to procure 20-25 per cent of production in each mandated crop to benefit the farmers. (c) The state government should effectively execute the Price Support Scheme (d) Price Deficiency Payment Scheme and Private Procurement Stockiest Scheme for the benefit and welfare of farmers. (e) As per the suggestions of National Agricultural Policy, 2000 the producer market must be strengthen by eliminating the middleman. (f) As suggested by Expert Group Committee on Indebtedness chaired by Professor Radhakrishna (2007), the farmers should be given the benefit of Market Intervention Scheme (MIS). (g) Local needs should be met locally (h) Use of bio-fertilizer to protect soil fertility (i) Use of organic farming technique (j) Effective water management plan for conservation of water (k) Effective and timely dissemination of information to farmers (l) Tie up between universities corporate and farmers for invention and innovation to increase the productivity.

Thus, besides price incentive and market support the State government and private party should come forward to reduce the cost of farming. Thus, it is obvious that to strengthen the income and livelihood condition of farmers all the mentioned factors must be taken into consideration.

### References

1. <https://www.businesstoday.in/latest/economy/story/economic-survey-average-monthly-income-per-agricultural-household-at-rs-10218-320921-2022-01-31>
2. P. K. Joshi is IFPRI's South Asia Director. This post was originally published in The Business Standard. <https://www.ifpri.org/blog/five-ways-reduce-farm-distress-india>
3. United Nations. Transforming our World: The 2030 Agenda for Sustainable Development; United Nations: New York, NY, USA, 2015. [Google Scholar]
4. United Nations. Millennium Development Goals Report 2015; United Nations: New York, NY, USA, 2015. [Google Scholar]

5. Scoones, I.; Wolmer, W. Introduction: Livelihoods in crisis: Challenges for rural development in South Africa. *IDS Bull.* 2003, 34, 1–14. [Google Scholar]
6. Sarker, M.; Wu, M.; Alam, G.; Shouse, R.C. Life in riverine islands in bangladesh: Local adaptation strategies of climate vulnerable riverine island dwellers for livelihood resilience. *Land Use Policy* 2020, 94, 104574. [Google Scholar]
7. Huiling, L.I.; Haixia, M.A.; Yang, R. Influence of cotton farmer’s livelihood capitals on livelihood strategy—Based on the survey data of Manas and Awat counties, Xinjiang. *J. Arid Land Resour. Environ.* 2017, 31, 57–63. [Google Scholar]
8. **Sources:** Eldis – Livelihoods Connect, Retrieved from <http://www.eldis.org/go/topics/dossiers/livelihoodsconnect/what-are-livelihoods-approaches/livelihoods-assets>
9. <https://icar.org.in/files/state-specific/chapter/62.htm>
10. <https://www.manage.gov.in/fpoacademy/SGSchemes/Jharkhand.pdf>
11. <https://www.investopedia.com/terms/i/income.asp>
12. <https://groww.in/p/tax/agricultural-income>
13. <https://in.indeed.com/career/farmer/salaries>
14. Banerjee, K.G., Jharkhand an Outline:, Kailash Paper Conversion (P) Ltd., Ranchi, 2009, p.5.
15. Deogharia PC (2011) ‘Employment of Agriculture Labour in Mechanised and Non Mechanised Farms of Jharkhand’ *Southern Economist*, Vol.-50, No.-15.
16. LP Donald, and L W Donald, (1995): Technology for Sustainable agriculture, *Sci. Am.* 273 (3): pp.182- 186.
17. Bhilegoankar M G, (1976): A Study of Fertilizer Utilization Behaviour of Farmers and Communication Pattern under Constraints, IARI, New Delhi, p.87.
18. VNP Sinha and LKP Singh, (2003): Jharkhand Land and People, Rajesh Publications, New Delhi, p.385.
19. Vogel, F. & Johnson, J., (July 5-7, 2000) “Measuring Agricultural Income with the Changing Face of Agriculture” Paper presented at the 7th IWG-AGRI Agricultural Economic Statistics Seminar Luxembourg