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Comparative Study on Income Generation through Agriculture Crop and JanVan Yojana Plantation at Farmers Level in Ranchi District of Jharkhand

Md. Shahzad Ahmad[1,2*], Naheed Irfan[3], Jyoti Kumar[4]

[1]Research Scholar, Department of Botany, Ranchi University, Morabadi, Ranchi, India
[2]Department of Forest, Environment and Climate Change, Govt. of Jharkhand, Nepal House, Ranchi, India
[3]Assistant Professor & HOD, Department of Sociology, Sundarwati Mahila College, Tilka Manjhi Bhagalpur University, Bhagalpur, Bihar, India
[4]University Professor & HOD, Department of Botany, Ranchi University, Morabadi, Ranchi, India

***Address for Correspondence:** Md. Shahzad Ahmad, Research Scholar, Department of Botany, Ranchi University, Morabadi, Ranchi-843008, Jharkhand, India
E-mail: ahmadjkd2010@gmail.com

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ABSTRACT

Background: Jharkhand was carved out from Bihar and created as the 28th state of India. The state has a population of 32.9 million, constitutes 75.95% rural and 24.05% urban population whereas state capital Ranchi has population of 29.14 Lakhs, out of which, 56.9% are rural and 43.1% are urban. The main livelihood and primary source of income of 80% of the rural population of the state depend on agriculture.

Materials: In the present study, we have done a comparative analysis of the income generation from JanVan Yojana crops as compared to traditional cash crops.

Results: The study results indicate that JanVan Yojana crops i.e. fruit and timber yielding crops are generated higher income than other agricultural crops like paddy, wheat, gram etc. The collective net income generated from the several crop farming system in a year was Rs. 42,550, which is still less than income generated from JanVan Yojana crops.

Conclusion: The study suggests that horticultural fruit crops and silviculture can generate higher income compared to the other traditional crops at farmer's level. It is therefore suggested to the farmers to adopt and incorporate fruit as well as timber crops with the traditional agricultural crops. Hence, Jan Van Yojana must be proved as boon to the farmers in making their income double and also as a stepping stone for the self-sustaining Jharkhand.

Key-words: Horticulture, JanVanYojna, Jharkhand, Livelihood agriculture, Ranchi, Silviculture

INTRODUCTION

Jharkhand was created as the 28th state of India by carving it out from Bihar on 15th November 2000. The literal meaning of Jharkhand is "Land cover with Forest". The Jharkhand is devised by combining two words '*Jhar*' means 'bush' and '*Khand*' means 'land'. The state has a total geographical area of 79,716 Km^2 and the total recorded area of the Ranchi district is 5,097 Km^2.

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According to the 2011 census, Jharkhand has a population of 32.9 million, which constitutes 75.95% rural and 24.05% urban population, whereas as state capital Ranchi district has 29.14 Lakhs population out of which, 43.1% people lives in urban areas while 56.9% lives in the rural areas. The state ranks 6th in the scheduled tribe population and ranks 10th in the percentage share of the scheduled tribe population to the total population of the state [1]. The total tribal population of the Ranchi district is 10.42 lakhs (35.76%), out of which 5.20 lakhs are male 5.21 are females. Tribal's socio-cultural life mostly revolves around nature and has a very close relationship with the forest and their life and sustenance are harmonized with available forest resources. Forest and its products play an

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important role in the economic development of Jharkhand [2].

The main livelihood and primary source of income of 80% of the rural population of the state depend on agriculture. The state agricultural economy is characterized by its dependency on nature, low investment, low productivity, mono-cropping with paddy as the dominant crop, inadequate irrigation facilities and small and marginal holdings. The dependency of agriculture on the unpredictable rainfall can be estimated from the fact that about 92% of the total cultivated area is un-irrigated. However, negative impacts have been also observed due to agricultural expansion, landscape modification and deforestation on biodiversity, ecosystem services, shifting the species composition and their ecological functions that can significantly alter important ecosystem processes [3-8]. On the other hand, a progressively industrialized global economy, rapid population expansion, land degradation, land use pattern and various human activities have led the increased pressure on the natural resources such as the availability of land for sustainable livelihoods, and ecosystems are becoming unsustainable and fragile due overexploitation and extraction of the natural resources since last century [9]. To avoid these circumstances, tree (including fruit and timber plants) growing in combination to agriculture, as well as numerous vegetation management regimes, may improve soil fertility, carbon storage, produce fruits, provide fodder, produce fuel-wood and variety of wood products for farmers own use and sale without demanding additional land [8,10]. Planting trees and crops in the association can also produce direct financial benefits [11].

Keeping in view all the above points, the State government of Jharkhand has launched an ambitious scheme "JanVan Yojana" in the year 2016 [12]. The objective of the scheme is to increase the green cover and maintain the Environmental balance, conservation of the underground water by plantation, to reduce the pressure on the notified forest by planting the trees in the private land, to increase the farmer's income as well as to increase forest cover in the state by peoples participation [13]. Under the scheme, farmers have to plant trees in their private land and 75% of the cost incurred over the plantation and maintenance of the planted trees are borne by the forest department (Government of Jharkhand) for first three years [14].

The current study has been carried out to know the actual status of income generated from the plantation of the JanVan yojana crops including both fruit and timber yielding crops as compared to other main crops *viz.* paddy, wheat, gram, and mustard.

MATERIALS AND METHODS

Study area– A total of 200 respondents from Angara, Mandar and Burmu Block of Ranchi District were questioned for the structured questionnaire and data collected. Angara, Mandar and Burmu are located 21 km east, 30 km west and 37 km north from District headquarters Ranchi. Angara is surrounded by Ormanjhi Block towards North, Kanke Block towards west, Ranchi Block towards west, Namkum Block towards South. Mandar is surrounded by Ratu Block towards East, Chanho Block towards west, Burmu Block towards North, Bero Block towards South. Burmu is surrounded by Patratu Block towards East, Mandar Block towards South, Chanho Block towards west, Ratu Block towards South. The study has been carried out during the years 2018-19 and 2019-20.

Data collection and analysis- The data collection in this study by questioning respondents was commonly used method and is known to be simple and cheap method. However, the precision of the data depends on the aptitude and skill of the respondents and their truthful replies [15]. The previously designed questionnaires containing information regarding the land holding capacity, cropping pattern, cropping intensity, comparative income generated in agricultural and horticultural as well as timber crops of JanVan Yojana and the net return of the generated from different crops. Generally, the questioning was done to one respondent at a time, mostly to the head of the house. The collected data were analyzed to come up with their income structures.

RESULTS

The agro-climatic conditions of the region are as follows-

Soil- Soil orders namely Entisols, Inceptisols and Alfisols were observed in Ranchi district. Alfisols were the dominant soils covering 71% of TGA followed by Inceptisols (17.2%) and Entisols (9.6%).

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Rainfall- According to District weather office of Ranchi, the mean of the annual rainfall of Ranchi district was 1295.14 mm and the corresponding values for seasonal rainfall were 53.77 mm for winter, 82.43 mm for pre-monsoon, 1073 mm for monsoon and 83.69 mm for post-monsoon, respectively.

Temperature- Temperature of Ranchi district ranges between Min 5.3 to Max 20.9 in winter and Min 20.6 to Max 41.2 in summer.

Time Scale- The current study was carried out during the year 2018-19 and 2019-20.

Target Group- The present study was conducted among the farmers of the Angara, Mandar and Burmu Block of Ranchi district, Jharkhand, India.

The present study was undertaken to know the income generated from farming of different crops including horticultural and timber crops of JanVan Yojana. The study was carried out in identified villages of Angara, Mandar and Burmu Block of Ranchi district in Jharkhand. The results obtained for different agricultural as well as JanVan yojana crops are given in Tables (1-4).

Crops: Expenditure and Income analysis- For one acre plantation of paddy in rainy and summer seasons Rs. 22,185 and 27,160 was required as the cost of production, respectively. Total cost of production comprises the quantity of seed (35 kg) @ Rs. 1610, Land preparation @ Rs. 2000, Insecticides @ Rs. 1100 (in the rainy season) and Rs. 1600 (in summer season), FYM @ Rs. 1500, Fertilizer @ Rs. 1875 (in rainy season) and Rs. 2350 (in summer season) and total Labour cost (for 73 MDS) @ Rs. 14,600. Total return comes from one acre land is around Rs. 43,115 (in rainy season) and Rs. 37,670 (in summer season) and the net profit in rainy season was Rs. 20,930 and in summer season was Rs. 10,510 (Table 1).

We observed that for cultivation of Wheat in one acre of land, farmers spend approximately Rs. 13,600. The total production cost includes seeds cost (50 kg) @ Rs. 2750, land preparation cost @ Rs. 900, FYM @ Rs. 1000, Insecticides @ Rs. 500, Fertilizer @ Rs. 1,650, Irrigation @ Rs. 2200 and Labour cost @ Rs. 4,600. The gross income and net income generated are Rs. 19,250 and Rs. 5650, respectively (Table 1).

The current study shows that, for Mustard cultivation in one acre land, farmers require spending Rs. 11,125 as the total production cost includes (i) Cost of seeds- Rs. 225 (ii) land preparation cost- Rs. 900 (iii) FYM- Rs. 1000 (iv) Fertilizer- Rs. 900 (v) Irrigation- Rs. 600 (vi) Insecticides- Rs. 500 (vii) Labour- Rs. 7000. The total return from cultivation one acre land of Mustard was Rs. 26,550 and net income was Rs. 15,425 (Table 1).

However, for the cultivation of Grams in one acre land, the total cost of production was Rs. 14,000 and farmer's get net profit of Rs. 12,812.50 with Gross income was Rs. 29,812.50. The total cost of production includes seeds cost (30 kg) @ Rs. 4500, cost of land preparation @ Rs. 750, FYM @ Rs. 1000, Fertilizer including Rhizobium @ Rs. 650, cost of irrigation @ Rs. 600, insecticides @ Rs. 500 and total labour cost @ Rs. 6,000 (Table 1).

Table 1: Analysis of cost incurred and income generated from different agricultural cash crops

For one acre land	Cost (Rs.)				
	Paddy		Wheat	Mustard	Gram
	Rainy	Summer	Winter	Winter	
Seed	(35 kg) @Rs. 46/Kg = 1610	(35 kg) @Rs. 46/Kg = 1610	(50 kg) @Rs. 50/Kg = 2750	(2.5 kg) @Rs. 90/Kg = 225	(30 kg) @Rs. 150/Kg = 4500
Preparation of land	2000	2000	900	900	750
Insecticides	1100	1600	500	500	500
Fertilizer	1875	2350	1650	900	650 (including Rhizobium)
FYM	1500	1500	1000	1000	1000
Irrigation	–	3500	2200	600	600

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Total Labour Cost	73 MDS @ Rs.200/MD = 14,600	73 MDS @ Rs.200/MD = 14,600	23 MDS @ Rs.200/MD = 4600	35 MDS @ Rs.200/MD = 7000	30 MDS @ Rs.200/MD = 6000
Total cost	22,185	27,160	13,600	11,125	14,000
Production	21 Quintal @ Rs.1815 / Quintal = 38,115	18 Quintal @ Rs. 1815 / Quintal = 32,670	10 Quintal @ Rs.1925 / Quintal = 19,250	6 Quintal @ Rs.4425 / Quintal = 26,550	5.5 Quintal @ Rs.4875 / Quintal = 26,812.50
Paddy Straw	5000	5000	–	–	–
Gross Income	43,115	37,670	19,250	26,550	26,812.50
Net Income = Gross Income – Total Cost	20,930	10,510	5650	15,425	12,812.50

JanVan Yojana crops: expenditure and income analysis- According to the Yojana, there was a provision of planting 445 numbers of the timber yielding plant species *viz.* Rosewood, Teak, Ghamar, mahogany, Clonal Eucalyptus and Acacia whereas, 160 numbers of fruit yielding plant species *viz.* Kalmi Mango, Guava, Amla, Litchi, Jackfruit and Bael in acre of the private land of the selected farmers. The total cost incurred during the first 3 years of the plantation of the timber yielding plants was Rs. 28,602 and for fruit yielding plants was Rs. 32,438. The total cost incurred during 1st year of plantation includes (i) Labour costs- Rs. 7975.99 (for timber yielding plants) and Rs. 13,893.66 (for fruit yielding plants) (ii) Total cost of plants including transportation- Rs. 8900 (for timber yielding plants @ Rs. 20/plant) and Rs. 9600 (for fruit yielding plants @ Rs. 60/plant) (iii) Fertilizer and Insecticides- Rs.700 (for timber yielding plants) and Rs. 16,00 (for fruit yielding plants) (Table 2). The cost incurred during 2nd year of plantation includes (i) Labour costs- Rs. 1776 (for timber yielding plants) and Rs. 1184 (for fruit yielding plants) (ii) Fertilizer and Insecticides - Rs. 350.45 (for timber yielding plants) and Rs. 800 (for fruit yielding plants) (iii) Irrigation- Rs. 4450 (for timber yielding plants) and Rs. 1600 (for fruit yielding plants) (Table 2). The cost incurred during 3rd year of plantation includes (i) Labour costs- Rs. 1360 (for fruit yielding plants) (ii) Fertilizer and Insecticides- Rs. 800 (for fruit yielding plants) (iii) Irrigation- Rs. 4450 (for timber yielding plants) and Rs. 1600 (for fruit yielding plants) (Table 2).

Table 2: Analysis of cost incurred on the JanVan yojana plantation during three years of the plantation

For one acre land	**Cost incurred during first year of Plantation (Rs)**	
	Fruit yielding Plants of JanVan Yojana (160 plants per acre)	**Timber yielding Plants of JanVan Yojana (445 plants per acre)**
Total labour cost incurred on field preparation for plantation Labour cost@257.29 per day	26 days X Rs. 257.29/days = 6689.54	10 days X Rs. 257.29/days = 2572.90
Total cost of plants including transportation Fruit yielding plant@Rs 60/ plant & Timber yielding plant @Rs 20/ timber plant	160 plants per acre X Rs. 60/plant = 9600	445 plants per acre X Rs. 20/plant = 8900
labour cost incurred on making prescribed pit for Plantation	24 days X Rs. 257.29/days = 6174.96	10 days X Rs. 257.29/days = 2572.90
labour cost incurred on two weeding	4 days X Rs. 257.29/days =	11 days X Rs. 257.29/days =

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	1029.16	2830.19
Cost of fertilizer and insecticides etc	1600	700
Sub total expenditure in 1st year	25,093.66	17,575.99
Cost incurred during second year of Plantation (Rs)		
labour cost incurred on two weeding Labour cost@296 per day (15% increase in minimum wages)	4 days X Rs. 296/days = 1184	6 days X Rs. 296/days = 1776
Cost of fertilizer and insecticides etc	800	350.45
Cost of Irrigation	1600	4450
Sub total expenditure in 2nd year	3584	6576.45
Cost incurred during third year of Plantation (Rs)		
labour cost incurred on two weeding Labour cost@340 per day (15% increase in minimum wages)	4 days X Rs. 340/days = 1360	–
Cost of fertilizer and insecticides etc	800	–
Cost of Irrigation	1600	4450
Sub total expenditure in 3rd year	3760	4450
Grand total expenditure in three year	32,438	28,602

The present study shows that the income generation from the specified plants of JanVan yojana was high. The income generations of fruit yielding plants start from 3rd year of the plantation in guava to 5th year of the plantation in mango whereas timber yielding plants start after 5th year of the plantation in Eucalyptus and from 7-8 year of plantation in Teak (Saagwaan). The present study shows that total return from plantation of the mango, guava and Amla on one acre land was Rs. 2,00,000, Rs. 1,28,000 and Rs. 3,20,000, respectively (Table 3). The income return in Eucalyptus after 5th year of the plantation was Rs. 8,90,000 and after 10 years of the plantation was Rs. 1,33,50,000 in one acre of land cultivation. However, income generated from the plantation of teak in one acre land after 7-8 year of the plantation was Rs. 1,25,000 (Tree fell for poles 1000@Rs.125) by thinning of the trees. After 13-14 year of the plantation, thinning was necessary and it gives income of around Rs. 1,37,500 (Tree fell for poles 500@Rs. 275), whereas, after 20 year of the plantation, Rs. 4,87,500 (Tree fell for Heartwood 275 of 65cft@Rs. 7500) has been generated and after 30 year of the plantation income return was Rs. 16,20,000 (Tree fell for Heartwood 275 of 108cft@Rs. 15000) (Table 4).

Table 3: Analysis of income generated from some of the fruit yielding crops of the JanVan yojana plantation

From one acre plantation	**Fruit yielding plants (160 plants per acre)**		
	Mango	**Guava**	**Amla**
Income return from	5th year of plantation	3rd year of plantation	4th year of plantation
Production	50 quintal	32 quintal	40 quintal
Total Income	2,00,000 @4000/quintal	1,28,000 @4000/quintal	3,20,000 @8000/quintal

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Table 4: Analysis of income generated from some of the timber yielding crops of the JanVan yojana plantation

From one acre plantation	Timber yielding plants (445 plants per acre)	
	Teak (Saagwaan)	Eucalyptus
Income return starts from	7-8 year of plantation	5th year of plantation
Income after 5th year of plantation	–	8,90,000 @2000 per plant
Income after 7-8 years of plantation	1,25,000 (Tree fell for poles 1000@Rs.125)	–
Income after 10th year of plantation	–	1,33,50,000 @30,000 per plant
Income after 13-14 years of plantation	1,37,500 (Tree fell for poles 500@Rs.275)	–
Income after 20 years of plantation	4,87,500 (Tree fell for Heartwood 275 of 65cft@Rs.7500)	–
Income after 30 years of plantation	16,20,000 (Tree fell for Heartwood 275 of 108cft@Rs.15000)	–

DISCUSSION

We compared JanVan yojana crops with various crops such as Paddy grown in rainy as well as summer season in a year and Wheat, Mustard and gram grown once in a year with a crop span time is around 90-120 days. We found that the net income generated from the various farming systems in a year including Paddy both in the rainy as well as summer season and Mustard together was about Rs. 20,930 +10,510 +15,425= 46,865, which was still less than projected and estimated income generated from any of the JanVan yojana prescribed crops in one acre of land. The results of current study show that farming of the three different crops in a year could not able to earn as much profit as JanVan yojana plantation. Kumar *et al.* [16] also observed significantly higher yield and financial yield from the horti-silvicultural system than the sole cropping. Dhillon *et al.* [17] reported that poplar cultivation results net return annually per acre with intercropping and without intercropping were Rs. 29,332 and Rs. 22,156, respectively. Chauhan *et al.* [18] reported that the economics of horti-silvicultural system was better than the traditional crops. Getahun [19] also reported twice higher income return from fruit tree based agrofestry cropping system than the mono-cropping system in Wondo district, Ethiopia. Kurtz [20] also reported that agroforestry systems provide cost-effective alternatives that can increase profits and meets environmental goals. Horticultural cropping systems can able to provide higher income sustainability than existing traditional agricultural cropping system on the same area of land [21]. Sharma *et al*. [22] carried out different farming system experiments in various villages of Bhilwara district of Rajasthan and found that net return was increased by 2 to 5 times as compared to conventional cropping systems.

CONCLUSIONS

This comparative study on income generation through agriculture crop and JanVan yojana crops including both fruit and timber yielding crops at farmer's level suggests that horticultural fruit crops and silviculture are capable of more income generation than other traditional crops. It is therefore suggested to the farmers to adopt and incorporate fruit crops in their barren private land as well as timber crops on the ridge of the field with the traditional crops. Finally, Jan Van Yojana must be proved a boon to the farmers in making their income double and also as a stepping stone for the self-sustaining Jharkhand.

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CONTRIBUTION OF AUTHORS

Research concept- Md. Shahzad Ahmad, Dr. Jyoti Kumar
Research design- Md. Shahzad Ahmad, Dr. Jyoti Kumar
Supervision- Dr. Jyoti Kumar
Materials- Md. Shahzad Ahmad
Data collection- Md. Shahzad Ahmad
Data analysis and Interpretation- Md. Shahzad Ahmad, Dr. Naheed Irfan
Literature search- Md. Shahzad Ahmad, Dr. Naheed Irfan
Writing article- Md. Shahzad Ahmad, Dr. Naheed Irfan
Critical review- Dr. Jyoti Kumar, Md. Shahzad Ahmad
Article editing- Md. Shahzad Ahmad, Dr. Naheed Irfan, Dr. Jyoti Kumar
Final approval- Dr. Jyoti Kumar

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