



Full Length Research Article

ADOPTION OF NEW TECHNOLOGIES OF HORTICULTURE TO FARMAR'S OF JAMTARA AND DUMKA DISTRICTS OF JHARKHAND PROVINCE IN INDIA

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ABSTRACT

To increase the livelihood security of the poor tribal farmer of Jamtara and Dumka ditricts the horticulture technologies like, 1) Off season vegetable cultivation, 2) Year round vegetable production from 10 decimal area 3) One acre multi tier cropping were implemented and 4) vertical cultivation of vine vegetables (pointed gourd) successfully introduced through NAIP project launched by BAU, Ranchi and HARP, plandu as one of the consortium partner. The maximum net income of Rs.24,950/- from filler crop (guava) intercrops (vegetables like potato, tomato, brinjal, radish, okra, chilli) was obtained by the farmer in the 5th year (2013) under fruit based multi-tier cropping system established at farmers field, which generated employment of 181 man-days. Farmers earned the maximum net income of Rs.1571/- (Rs.3,92,750/ha) from bottle gourd cultivation in 1.0 decimal (40 m²) area which generated employment of 11 man-days. The maximum annual net income of Rs.2544/- was obtained by the marginal farmer through cultivation of summer kharif vegetables in 1.0 decimal. This income generated an employment of 24 man-days. The farmer had expanded his area of pointed gourd cultivation from 2.75 decimal to 12.5 decimal (500 m²) through vertical trallies. From the present study it may be concluded that income of farm family had been increased from Rs. 24,446 to Rs.73, 684 in 6 years in NAIP with different interventions. The highest adoption rate of 90 % was found in pointed gourd cultivation where as lowest was observed in Fruit based multi tier cropping system (24%).The additional income alleviate the standard of living of farmer's of economically disadvantaged districts of Jharkhand by making more expenditure towards purchase of household items, education for their children and overall developments. They are happier. This extension activities provide an opportunity for increasing self esteem of the farmers and they gain the confidence on farming and their proverty driven face smeared with happy smile.

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INTRODUCTION

Jharkhand is a new state with immense possibilities of development in both the industrial as well as agricultural sectors. Out of 10.13 million working population, 76.9% are engaged in agriculture. In Jharkhand 60% of the land is rainfed upland which is generally utilized under mono cropping of paddy. Under this situation, draught hardy and precaucious bearing fruit crops like guava and Mango (Amrapalli) play an important role increasing land use efficiency to the small and marginal farmar of Jharkhand in the scheme of one acre multitier cropping system.

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Apart from this 10 decimal vegetable production for year round model is very attractive to the farmer's who have assured irrigation facility. Poly tunnel cultivation attracted small farmer for raising summer crop like bottle gourd and cucumber to avail early crop and profit. Last but not least cultivation in vertical treillies of pointed gourd and coccinia fascinated small number of farmers. A farming system entails some input to to produce farm production soil, water, crops, livestock, labor and other resource- within an environmental setting and output like production and net profit. Decision making model of Norton and Mumford (1983, cited by Heong, *et al.* 1994) shows that, on the basis of perception of the problem, farmer assumes expected outcomes. The farmer's choice of action (decision) will depend on his evaluation skills and thereby outcomes. According to Ingold (2002), definitions of technology differ widely, which means the way farmers could get more profit by easy cultivation and maintenance.

Rogers (1983) reported that technology is a design for instrumental action that reduced drudgery and give more production. Accordingly Valera *et al.* (1987), technology transfer refers to the general process of moving information and skills that generates at research laboratories and universities to stakeholder such as farmers.

The new technology transfer attributes the farmers' adoption and bringing this into practice and maintenance and further diffusion to the neighboring farmers. So good technology necessitates diffusion, which is the process by which an innovation is communicated through certain channels overtime among the members of a social system (Rogers, 1983). The change agent (extension worker, professional, etc.) and the plight of farmers like socio-economic condition and biological, and physical environment in which the technology will be tested Cruz (1987). According to Van de Ban and Hawkin (1988), perception is the process by which we received information or stimuli from our environment and transform it into psychological awareness. Keeping this in view, a study regarding technology assessment and their adoption were performed Under NAIP project launched by BAU and consortium partner HARP plandu Ranchi to find out most suitable technology that adopted to farmers of Jamtara and Dumka of Jharkhand in their integrated farming system model. Fthe above said four technologies were tested by the farmers of most disadvatagiuos distric t in Jamtara and Dumka district.

MATERIALS AND METHODS

The average rain fall of Jamtara and Dumka direct was about 1200 mm but still water is the major constraint in agriculture along with soil erosion as it is sandy and acid soil. People have to migrate for work as laborers for their livelihood.

Average rainfall of Jamtara and Dumka are (1200 mm /annum) if trapped properly, it may improve the irrigation facilities and make it possible to grow a second crop after kharif. Technical backup to the allied components may give more employment, income generation and food for the poverty driven family. In order to fulfill the objective of varietal replacement with improved varieties o vegetables, 26 farmers of the village Rupaidih and 19 farmers of the village Duladih of Jamtara black of Jamtara district and a farmers of the village Madnadih of Narayanpur block of Jamtara district of Jharkhand were provided seeds of improved varieties of bottle gourd (Arka Bahar), Watermelon (Arka Manik), Cucumber (Swarna Sheetal), ridge gourd (Swarna Uphar), long melon (Sel-1) and sponge gourd (Swarna Prabha for demonstration trials at their fields. In Dumka district of Jharkhand, one farmer of the village Kodokicha-6, 2 farmers of the Kodokicha-7, one farmer of the village Guhijajori and 4 farmers of the village Karmatand under Dumka block and 3 farmers of the village Gajenda, one farmer of the village Ragat, one farmer of the village Karela, 2 farmers of the village Bhaura and 2 farmers of the village Palasi were provided seeds of improved varieties of bottle gourd (Arka Bahar), Watermelon (Arka Manik), tomato (Arka Abha), brinjal (Swarna Shyamli), Cowpea (Arka Garima) and long melon (Sel-1) for demonstration trials at their fields. For demonstration of 1.0 acre model of fruit based multi-tier crop production system, 3 farmers in Jamtara bloc and 4 farmers in Narayanpur bloc in Jamtara district and 2 farmers in Dumka bloc and 3 farmers in Jama bloc in Dumka district were selected. Totally, 6820 fruit crops including base (mango) and filler crops (guava and papaya) have been purchased and kept for planting. The Rapid Rural Appraisal (RRA) in relation to horticultural activities in 2 villages (Rupaidih and Duladih) of Jamtara block and 3 villages (Madnadih, Baramajhladih and Rampur) of Narayanpur block of Jamtara district of Jharkhand

Table 1. List of villages of the project area

District	Block	Villages
Jamtara	Jamtara (Barakar sub catchment)	Charedih, Dahar Tola, Sawrimundu, Sinju Tola, Rupaidih, Jilimtanr, Nawadih, Karmatar
	Narayanpur (Barakar sub catchment)	Rai Tola, Mal Tola, MuslimTola, Rampur, Bada Majhladih, Maira Tola
Dumka	Dumka (Mayurakshi sub catchment)	Karmatanr, Kodokicha-6, Kodokicha-7, Guhijajori, ipur, Sagbehri, Jiyathar, Mayurnacha
	Jama (Brahmini sub catchment)	Bhounra, Palasi, Ragat, Karela, Gaiha, Lilatari, Muswachak, Pipra, Sarepahari, Meghi Santhali

Table 2. Details of horticulture activities

Activity	Household covered	Area (ha)	NET Income (Rs./Household/Yr)	Employment Man days
Improved vegetable cultivation	713	38	2050	24
Low Polyunnel for cucurbit for early production	88	0.4	1012	18
Poined gourd cultivation in vertical trelies	4	0.004	43,165	11
Fruit based multitier cropping system in upland (1 acre model)	20	8	14,045 (from filler crop and intercrop) 3 rd year, 24950 On 6 th Year	181

Table 3. Adoption rate of different technology at farmer's field

Sl No.	Technology	Type of farmer	Primary Adoption rate (%)	Maintenance (%)	Success of adoption (%)
1	Improved vegetable cultivation (10 decimal model)	Small(<0.5 ha)	95%	60%	57 %
2	Low Polyunnel for cucurbit for early production (off season Vegetable production)	Medium(0.5-2.5 ha)	80%	80%	64%
3	Poined gourd cultivation in vertical trelies rather than in horizontal bamboo frame.	Small(<0.5 ha)	90%	100%	90%
4	Fruit based multitier cropping system in upland (1 acre model)	Rich(>2.5 ha)	60%	40%	24%

and 5 villages (Kodokicha-6, Kodokicha-7 Guhiadih, Karmatand and Andipur) of Dumka block and 5 villages (Gajenda, Ragat, Karela, Bhaura and Palasi) of Jama block of Dumka district of Jharkhand was completed.

RESULTS AND DISCUSSION

Demonstration of vegetable cultivation: The improved method of vegetable cultivation was demonstrated in the field of 713 farmers.

The maximum annual net income of Rs.2544/- was obtained by the marginal farmer through cultivation of summer kharif vegetables in 1.0 decimal (40 m²) area of backyard garden which generated employment of 18 man-days. Rahman *et al* (2008) also reported that vegetable cultivation year round at homestead provides food and nutritional security to the poor and earned maximum prices from the local market for their sale.



A. One acre multitier cropping system



B. Cultivation of pointed gourd on Vertical trellises



C: Poly tunnel cultivation of bottle gourd during late winter

Off-season cultivation of cucurbits under low poly tunnel

Low poly tunnel cultivation of cucurbits in winter for early summer harvest with better remuneration was demonstrated in 88 farmers' fields. Farmers earned the maximum net income of Rs.1571/- (Rs.3,92,750/ha) from bottle gourd cultivation in 1.0 decimal (40 m²) area which generated employment of 11 man-days. The crop was sown on 13.12.2012, the first harvest began on 10.3.13 continued till 14.5.2013. Total harvest was 191 kg (estimated 47.75 t/ha) which was sold at the rate of Rs.8-10 per kg. Kumar *et al.*, (2015) also suggested that poly tunnel cultivation of bottle gourd produce more Vegetables (production) than non poly tunnel cultivation of this crop during summer. Early cultivation with improved market linkage fetched maximum prices to the farmer. This is kind of value addition by using appropriate time and distant marketing.

Demonstration of fruit based multitier cropping system

Twenty mangoes and guava based multitier orchards established, fourteen are being maintained successfully. The maximum net income of Rs.24,950/- from filler crop (guava) intercrops (vegetables like potato, tomato, brinjal, radish, okra, chilli) was obtained by the farmer in the 5th year (2013) of fruit based multi-tier cropping system established that generated employment of 181 man-days. Nath *et al.*, (2003) also reported that fruit based multi-tier cropping system is best fitted horticultural technology under eastern plateau and Hill region.

Vertical cultivation of vine Vegetables

Pointed gourd, a perennial cucurbit was introduced as a new crop in NAIP area in three farmers' fields. Its cultivation was found to be remunerative. Shri Churamani Prasad Yadav of Jama block of Dumka district harvested 163 kg produce from 2.75 decimal (110 m²) area of pointed gourd planted on 28.02.10 earned Rs.3347/- during harvest period from 7.5.10 to 31.10.10. The estimated yield was 14.81 t/ha. The sale price of pointed gourd was Rs.20-25/- per kg. This income generated an employment of 24 man-days. The farmer had expanded his area of pointed gourd cultivation from 2.75 decimal to 12.5 decimal (500 m²) through propagation of pointed gourd plants by vine cutting. He was also engaged in diffusion of this technology of pointed gourd cultivation to non-traditional non-NAIP villages. He sold 1208 rooted plants of pointed gourd to 7 farmers of 7 villages covering 4 blocks namely Jama, Dumka, Jarmundi and Saraiyhat of Dumka district. Yadav *et al.*, (1987) also suggested that vertical trellis produces more vegetables than conventional methods.

Implementation Problems

Water scarcity in winter and summer is a major problem. If water is made available through rain water harvesting and storage, crop production and productivity would be increased through intensive cultivation of vegetables, off-season vegetable cultivation and fruit based multi-tier crop production leading to increase in farm income. Farmers are unaware of quality vegetable seeds and planting materials of fruit crops

which need to be made available. They need to be trained for seed production of improved vegetable varieties at farm level. Grazing is a severe problem in villages. Farmers need to be motivated so that they can provide fencing for protection of crops. The self impact from this study of the project revealed that income had been increased from Rs. 24,446 to Rs.73, 684 in 6 years in NAIP. The farmers are now making more expenditure towards education for their children and purchase of household items from the additional income.

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