DOI: 10.15740/HAS/AU/10.3/278-281
Agriculture Update
Volume **10** | Issue 3 | August, 2015 | 278-281
Visit us : *www.researchjournal.co.in*
e ISSN-0976-6847

A CASE STUDY :

Crop intensification in rainfed farming system of tribal district of Kanker of Chhattisgarh state

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ARTICLE CHRONICLE :
Received :
27.05.2015;
Revised :
28.07.2015;
Accepted :
25.08.2015

SUMMARY : The rice is an important food crop of Kanker district mainly grown as direct broadcast seeding under dry conditions. About 61 per cent of the total rice area in the district is sown by this method. After onset of monsoon, farmers broadcast paddy seed and plough by desi plough or tractor drawn cultivator. *Bueshening* (blind hoeing or biasi) is widely practiced in the district which covers about 80 per cent of the rice area. Thus, there is need to replace the biasi system by line sowing. This method of sowing with early maturing rice variety helps in establishment of succeeding *Rabi* crop which gave additional return to farmers in turn improves his socio-economic condition and livelihood status. To overcome the problem, KVK, Kanker (C.G.) has started dry line sowing of paddy by seed cum fertilizer drill with post-emergence application of herbicide and establishment of succeeding chickpea crop in residual moisture. Line sowing of rice variety MTU-1010 followed by chickpea variety 'Vaibhav' was compared with farmer's practice of broadcasting rice with biasi system. Results across sites from 2009-10 to 2012-13 showed that the direct seeding in line + application of post-emergence herbicide gave the most consistent yield ranging from 30.30 to 34.75 q/ha than the farmers practice. In addition to the rice yield, the improved practice gave a chickpea yield ranging from 2.00 to 2.50 q/ha. In terms of cropping system performance, the rice equivalent yield ranged from 36.66 to 40.47 q/ha. The improved practice rewarded additional net return of Rs. 10287/ha over farmers practice. Benefit: Cost ratio was 2.81 and 3.42 under farmer and improved practice, respectively.

KEY WORDS:
Crop intensification, Biasi, Livelihood, Line sowing

How to cite this article : Sahu, Birbal, Savu, Rama Mohan, Dange, Atul and Pali, G.P. (2015). Crop intensification in rainfed farming system of tribal district of Kanker of Chhattisgarh state. *Agric. Update*, **10**(3): 278-281.

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BACKGROUND AND OBJECTIVES

Agriculture may likely to suffer from 10-15 per cent reduction in available water by 2025 (Anonymous, 2014). The dwindling water resources challenge food security in our country. Demand for irrigation water management would increase from 48.9 to 57.6 M ha-m in 2010 to 61.9 to 73.4 M ha-m in 2025. The drastic reduction will have far reaching consequences on rice production. Therefore, it is imperative to formulate the future strategies for water efficient rice production technology constituting both establishment practices of rice and succeeding *Rabi* crop (Ghosh *et al.*, 2007).

Economy of Kanker district is agriculture based and also a main job of tribes. Rice is an important food crop and livelihood system of the district mainly grown as direct broadcast

seeding under dry conditions. The whole operation depends on rainfall. Under this system, in general, poor plant stand and heavy weed infestation is observed particularly at early stage of rice crop and results in lower grain yield. Productivity of this crop is very low in the district due to varying land situation, insufficient input use, lack of irrigation, poor management, poor economy etc. Area under rice crop in Kanker district is 1.69 lakh ha, out of which 1.04 lakh ha area is under rainfed condition (Anonymous, 2012). In broadcasting method, farmers prepare their land on the onset of monsoon and broadcast seeds followed by patta. Some farmers plough their land during summer by tractor and left the fields for sun drying. After onset of monsoon, they broadcast paddy seeds and plough by desi plough or tractor drawn cultivator. If rainfall is delayed, the biasi operation is also delayed and sometimes if rains not occur during this period, farmers left the fields as such which results to drastic reduction in yield. In both the methods, *bueshening* (blind hoeing or biasi) is widely practiced and farmers left their fields fallow in *Rabi* season (Fig. A). The whole operation depends on rainfall. Under this system, in general, poor plant stand and heavy weed infestation is observed particularly at early stage of rice crop and results in lower grain yield. These rice fallows can be used to grow an additional crop to utilize the moisture still retained.

Fig. A : Farmers practice – Bisai system

RESOURCES AND METHODS

The economy of Kanker district is agriculture based and also it is a main job of tribes. North Bastar Kanker district is a land of paddy located in the southern part of Chhattisgarh state (20° 06’20" N and 80° 40’81" E, 502 m above mean sea level). District is tribal dominated area with less resource availability in sense of agricultural enterprises adoption and productivity. Due to this reason, the adoption and perception level is quite low resulting in low productivity of agricultural commodities.

To overcome these problems, Krishi Vigyan Kendra, Kanker (C.G.) has started dry line sowing of paddy by seed cum fertilizer drill with post-emergence application of herbicide and establishment of succeeding chickpea crop in residual moisture (Fig. B). KVK has laid thirty demonstrations every year of one acre each in two villages of Kanker district namely Kanhanpuri and Largoan. Farmers having same farming situation were randomly selected and laid out trails. Line sowing of rice variety MTU-1010 followed by chickpea variety Vaibhav was compared with farmer’s practice of broadcasting rice with biasi system.

Fig. B : Improved practice – Line sowing

Direct seeded rice increases the capacity of poor farmers to cope with climate induced change by offering a choice of rice establishment methods and by reducing the amount of water required for crop establishment and subsequent crop growth. Further, faced with early drought, farmers can direct seed with minimal soil moisture, rather than wait for sufficient rainfall for transplanting. Earlier crop establishment through this technology and adopting post-emergence herbicide reduces 35-60 per cent labour requirement in rice compared to traditional broadcast biasi (Rathore and Haefele, 2007). This technology also

Fig. C : Chickpea variety Vaibhav after direct seeded rice

reduces the risk of yield loss from late-season drought and promotes succeeding crop of chickpea in *Rabi* season.

A new cropping system helps farmers grow two crops a year where before they could only grow one. The new system combines dry direct seeding of early maturing rice variety by seed cum fertilizer drill in line followed by chickpea. Because, rice can be sown early on dry condition and harvested early, there's time to sow chickpea crop to take advantage of the moisture still left in the soil (Fig. C). This cropping system improves the socio-economic condition of the farmer and provides employment in the succeeding season. Inclusion of pulse crop is not only profitable but also helps in building the nutrient status of the field.

OBSERVATIONS AND ANALYSIS

Results across sites from 2009-10 to 2012-13 showed that the direct seeding in line + application of post-emergence herbicide gave the most consistent yield ranging from 30.30 to 34.75 q/ha than the farmers practice (Gill and Sharma, 2005 and Musa *et al.*, 2001). In addition to the rice yield, the improved practice gave a chickpea yield ranging from 2.00 to 2.50 q/ha. In terms of cropping system performance, the rice equivalent yield ranged from 36.66 to 40.47 q/ha (Table 1).

In view of economic impact, the improved practice rewarded an additional net return of Rs. 10287/ha over farmers practice. Benefit : cost ratio was 2.81 and 3.42 under farmer and improved practice,

Table 1 : Yield of rice and chickpea in different technologies and locations

Year	Location	T_1 (Farmers practice)	T_2 (Improved practice)		
		Yield of unmilled rice (q/ha)	Yield of unmilled rice (q/ha)	Chickpea yield (q/ha)	Rice equivalent yield (q/ha)
2009-10	Kanhanpuri	26.25	30.30	2.50	36.66
	Largaon	27.10	32.25	2.00	37.34
2012-13	Kanhanpuri	27.25	32.40	2.28	38.20
	Largaon	29.25	34.75	2.25	40.47

T_1 – Traditional broadcasting method with biasi system.
T_2 – Dry seeding in line by seed cum fertilizer drill with post-emergence application of herbicide {(chlorimuron ethyl + metsulfuron metyl) @ 20g + (phenoxaprop-p-ethyl) @ 625ml/ha} + succeeding chickpea crop.
*Cost of unmilled rice was Rs. 1100/q and chickpea was Rs. 2800/q.

Table 2 : Economic impact of the technology

Treatments	Location	Cost of cultivation (Rs./ha)			Average gross return (Rs./ha)			Average net return (Rs./ha)			B:C ratio		
		2009-10	2010-11	Pooled	2009-10	2010-11	Pooled	2009-10	2010-11	Pooled	2009-10	2010-11	Pooled
T_1	Kanhanpuri	10650	10815	10733	28875	29975	29425	18225	19160	18693	2.71	2.77	2.74
	Largaon	10650	10815	10733	29810	32175	30993	19160	21360	20260	2.79	2.97	2.88
T_2	Kanhanpuri	12100	12340	12220	40326	42020	41173	28226	29680	28953	3.33	3.40	3.36
	Largaon	12100	12340	12220	41074	44517	42796	28974	32177	30576	3.39	3.60	3.49

respectively (Table 2).

It was also found that after rice, there is fairly high probability for establishment of post-rice crop chickpea in residual soil moisture (Rathore and Haefele, 2007; Tarwariya and Maurya, 2013 and Ruby Saha *et al*., 2009).

Horizontal spread of technology :

Results of two years of demonstration in two villages has spread the technology in 2500 ha area of 20 villages in Kanker district.

Conclusion :

In traditional method, farmers sow their crops on onset of monsoon while, in dry line seeding, crops sown before onset of monsoon and just after rains it germinate in 7-8 days before traditional method. Similarly, in traditional system, plants take one week for adjusting after biasi whereas in line sown plants grow regularly. Hence, saves 15 days which promote possibility of second crop after rice. Thus, dry seeded rice is superior to traditional biasi method in respect of opportunities for crop intensification, resource use efficiency, farmer's income and employment opportunities. The traditional establishment system is labour intensive as weeds are controlled by the biasi operation, which make the subsequent manual redistribution of rice seedlings necessary. The new technology use a tractor drawn seed cum fertilizer drill for rice establishment and post-emergence herbicide application in place of biasi operation followed by chickpea establishment in succeeding *Rabi* season. The technology is suited for rainfed medium and low land paddy. This technology also saves 15 days of farmers that helps in establishment of second crop.

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REFERENCES

Anonymous (2012). Annual Report, Department of Agriculture, Uttar Bastar Kanker.

Anonymous (2014). Agricultural Survey Chhattisgarh state.

Ghosh, A., Rao, K.S., Dash, R.N., Singh, O.N., Samal, P., Meena, D.S. and Pandey, M.P. (2007). Strategies for the development of water saving rice production technology under deficit irrigation. In : South Asian Conference on Water in agriculture: Management options for increasing crop productivity per drop of water, pp. 26-34.

Gill, M.S. and Sharma, G.C. (2005). Cropping systems diversification opportunities and conservation agriculture. *J. Farm. Syst. Res. & Develop.*, **11** (2): 127-134.

Musa, A.M., Harris, D., Johansen, C. and Kumar, J. (2001). Short duration chickpea to replace fallow after aman rice: the role of on-farm seed priming in the High Barind Tract of Bangladesh. *Exp.Agric.*, **37** (4) : 509-521.

Rathore, A.L. and Haefele, S.M. (2007). Dry direct seeded rice for improved rainwater use, productivity and cropping intensity of lowland ecosystem. In: South Asian Conference on Water in agriculture: Management options for increasing crop productivity per drop of water, pp. 43-49.

Saha, Ruby, Jagdish Singh and Kalyan Singh (2009). Effect of crop diversification and intensification in rice-wheat cropping system on system productivity, profitability and energy use efficiency. *Asian J. Soil Sci.*, **4** (2) : 290-297.

Tarwariya, M.K. and Maurya, B.M. (2013). Crop diversification and intensification of rice based cropping system under irrigated condition of Madhya Pradesh. *Internat. J. agric. Sci.*, **9**(1): 213-215.