



## Improvement in Livelihood Status of Tribal Farmers Through Crop Intensification in Rainfed Farming System of Kanker District (Chhattisgarh)

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### ABSTRACT

North Bastar Kanker is tribal dominated area with poor resource availability in sense of agricultural enterprises adoption & productivity. The Rice is an important food crop of Kanker district mainly grown as direct broadcast seeding under dry conditions. About 61% of the total rice area in the district is sown by this method. After onset of monsoon, farmers broadcast paddy seeds and plough by desi plough or tractor drawn cultivator. *Bueshening* (blind hoeing or biasi) is widely practiced in the district which covers about 80% 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 2010-11 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 :** Broadcasting, Intensification, Line sowing, Livelihood, Rainfed.

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. Agriculture may likely to suffer from 10-15 per cent reduction in available water by 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, 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 his 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. In broadcasting method, farmers prepare their land on the onset of monsoon and broadcast seeds followed by pata. Some farmers plough their land during summer by tractor & 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 did not occur during this period, farmers and leaving left the fields as such which results in drastic reduction of yield. In both the methods, *bueshening* (blind hoeing or biasi) is widely

practiced and farmers and leaving their fields fallow in rabi season (Fig. 1). 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.

### MATERIAL AND METHODS

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). North Bastar Kanker is tribal dominated area with less resource availability in sense of agricultural enterprises adoption & productivity. Due to this reason, the adoption & perception level is quite low resulting in low productivity of agricultural commodities. The economy of Kanker is agriculture based and also it is a main job of tribes.

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. 2). In 2009-10 and 2010-11, 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.

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 go for direct seed with minimal soil moisture, rather than waiting 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 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 crop a year. 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.3). 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.

### RESULTS AND DISCUSSION

Results across sites from 2009-10 to 2010-11 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 (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, 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 & Musa *et al.*, 2001)

### 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

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 to farmers that helps in establishment

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

Year	Location	T <sub>1</sub> (Farmers practice)		T <sub>2</sub> (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
2010-11	Kanhanpuri	27.25	32.40	2.28	38.20
	Largaon	29.25	34.75	2.25	40.47

T<sub>1</sub> – Traditional broadcasting method with biasi system.

T<sub>2</sub> – 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.



Fig. 1. Farmers Practice – Bisai System



Fig.2. Improved Practice – Line Sowing



Fig.3. Chickpea variety Vaibhav after direct seeded rice

Table 2. Economic impact of the technology.

Treatment 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	
T <sub>1</sub> Kanharpuri Largaon	10650	10815	28875	29975	18225	19160	2.71
	10650	10733	29810	32175	19160	21360	2.79
T <sub>2</sub> Kanharpuri Largaon	12100	12340	40326	42020	28226	29680	3.33
	12100	12220	41074	44517	28974	32177	3.39

of second crop. In traditional method, farmers sow their crops on onset of monsoon while, in dry line seeding, crops sown before onset of monsoon & 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.

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