ACTA SCIENTIFIC AGRICULTURE (ISSN: 2581-365X)

Volume 2 Issue 11 November 2018

Review Article

A Review on Biasi Cultivation in Chhattisgarh

Piyush Pradhan[1]*, Ajay Verma[2], Mukesh Pandey[3] and Kanhaiya Lal[4]

[1]*Assistant Professor and, Agriculture University Jodhpur Rajasthan, India*

[2]*Professor, Indira Gandhi Krishi Vishwavidyalaya Raipur, Chhattisgarh, India*

[3]*PhD Scholar, Indira Gandhi Krishi Vishwavidyalaya Raipur, Chhattisgarh, India*

[4]*Mtech scholar, Indira Gandhi Krishi Vishwavidyalaya Raipur, Chhattisgarh, India*

***Corresponding Author:** Piyush Pradhan, Assistant Professor and, Agriculture University Jodhpur Rajasthan, India.

Received: August 27, 2018; **Published:** October 26, 2018

Abstract

Present paper was a review on Biasi cultivation on paddy field which is important intercultural operation in Chhattisgarh. Paddy cultivation is most important agricultural practices in India where it contributes 42% food grain of India. In Chhattisgarh still more than 50% farmers are direct sowing because of less labor, and maintenance cost as compared to transplanting. Biasi is a intercultural operation done on standing crop after 25 - 30 DAS at 5 - 10 cm depth of water for loosening the soil, reducing weeds and maintaining plant population and increase the yield. Biasi cultivation is operated by animal drawn indigenous plough, trifal, and power tiller which increase the yield 15-20% yield as compared to no Biasi paddy field.

Keywords: Biasi Cultivation; Chhattisgarh

Introduction

Paddy cultivation is one of the most important food crops of India and is second largest producing country after china and it feeds more than 50 percent of the world's population. It is the staple food of most of the people in South-East Asia. Asia contribute about 90 percent of the world's paddy cultivation and production. In Productivity in India is much lower than in Egypt, Japan, China, Vietnam, USA and Indonesia and even below the world's average due to small land holding size, less adopting of farm mechanization, less irrigation facilities. It makes up 42 percent of India's total food grain production and 45 percent of the total cereal produced in the country. As a natural consequence of economic growth and structural changes in the economy, the share of agriculture and allied sectors in the total GDP declined from around 19 percent in 2004-05 to 14 percent in 2013-14, fishing are removed, agriculture (including livestock) accounted for about 12 percent of the national GDP. However, with around 50 percent of the population still dependent on agriculture for its livelihood.

Rice crop is grown nearly 44 million ha of land in the country with the production of 142.3 MT and productivity of 2.2 t/ha which is less than the productivity of many countries. In India direct seeded rice has grown in the area of 7.2 M ha. In Chhattisgarh, rice occupies average of 3.77 million ha with the productivity of the state ranging between 1.2 to 1.6 t/ha depending upon the rainfall and the production is 8.58 MT. Chhattisgarh state has 7th rank for rice production with 6608.83 thousand tones in all over India Paddy is one of the most important cereal crops in the country. Chhattisgarh occupies a prominent place in paddy cultivation. The state's share to national paddy area and production is 8.61% and 6.30% respectively. Chhattisgarh is the paddy dominated mono-cropped state with more than 80 percent kharif cultivable area under paddy. Direct seeded rice (DSR)- Line sowing and Broadcasting, transplanting, system of rice intensification (SRI) etc. are the main methods of sowing of paddy. About 70 percent farmers go for direct seeding of paddy by broadcasting method in Chhattisgarh. The yield levels of the state are very low at 1766 kg/ha compared to national average of 2416 kg/ha, and much below the potential yield of 2910 kg/ha. However, the broadcasting method of sowing of paddy under DSR is still prevalent and being adapted in Chhattisgarh owing to limited window of sowing time, large number of operational holdings with the SMF to afford seed drills;

poor access to custom-hiring of seed drills, and deep traditional wisdom of farmers to grow paddy with "Biyasi" operations. In rain-fed and deep water ecosystems, dry seed is manually broadcast onto the soil surface and then incorporated either by ploughing or by harrowing while the soil is still dry. Dry seeding of rice can be done by drilling the seed into a fine seedbed at a depth of 2-3 centimeters. The direct sown paddy saves about 25 percent irrigation water as it avoids puddling and enhanced irrigation intervals. There was a net saving of Rs. 13,000/ha in crop establishment due to direct sown paddy as against the conventional puddled transplanted rice. Biasi' is a local term used for paddy cultivation in 5-20 cm standing water at 30-50 days after sowing. The farmers of Chattisgurh arc using 'Biasi' word from the ancient years. Perhaps the word derived from BIAS. The Sanskrit word 'BIAS' means distribution of rice seedlings evenly, after ploughing in the field.

Practice of Biasi

Ghose., *et al*. [1] reported that Beusani is done to incorporate green manure in areas where rice is inter cropped with green manure and hence increases yield by reducing vegetative growth for 12 to 18 days. Patra and Gite [2] reported that during Biasi operation ploughing is done 45 days after sowing with the small wooden plough-Biasi plough-in 10 cm standing water 45 DAS, about 30 cm height of crop plant. Shrivastava., *et al.* [3] have reported that the 'Biasi' operation is undertaken for better crop establishment. Presently the 'Biasi' system includes sowing of dry paddy by broadcasting either before monsoon in dry dusty field condition or in delay arrival of monsoon it is known as Khurra or Dhuria sowing [4], or dry sowing of paddy after pre monsoon rains in moist or wet field condition, known as Battar. It is followed by ploughing and planking of paddy crop in standing water at 35 - 45 DAS followed by manual redistribution of seedlings and filling gaps, known as Chalai.

Fujisaka., *et al.* [5] reported that intercultural operation in water stagnant paddy crop is followed in many countries and named with different terms. Like 'Gogarancah' in Indonesia, 'Kakularf in Shri Lanka and 'Sabog Tanim' in Phillipines. In India and Bangladesh, it is an age old practice and known as Aus, Beausani or Biasi. It is reported that the Biasi operation is done mainly to control weeds, to create semi puddle conditions, to arrest percolation losses and to decrease the initial high plant population and to slightly adjust the plant population through Chalai [4]. In general, under broadcast Biasi method, rice seeds are broadcast in a ploughed field immediately after the onset of monsoon. After about 30 to 45 days when sufficient water is impounded in the field, the fields are ploughed in the standing crop. This is called Biasi or bushening. The uprooted seedlings are transplanted (in situ transplanting) after Biasi, which is called Chalai in local language [4].

Hisashi [6] reported that watered rice paddy field can tilled with a long sole plough; water reduces the adhesion resistance of drawing, and also deep tilling is not required for non-fertilized field. Watered ploughing, also called floating ploughing, can be seen in many historical evidences, farm literatures written during two hundred years period before the modern era in Japan.

Time of biasi

Bhan., *et al.* [7] found that the direct sown rice gave highest yield when kept free of weeds up to 30 DAS. Two hand weeding (15 and 45 or 30 and 45 DAS) gave similar results to those of weed free condition. This reflects that the Biasi operation should be followed at about 30-45 days after sowing. The Biasi operation between 25 to 40 DAS appeared promising whereas delayed in Biasi about 55 DAS decreased the yield up to significant level [8]. Igbeka [9] indicated that the timing rather than the frequency of weeding was a major determinant of effective weed control for rice. The weeds compete with the crop for water, nutrients and adversely affects the microbial climate around the plant and directly reduce the crop yield. Krishna Kumar [10] reported that the Biasi operation should be followed at about 25-40 days after sowing of rice. Igbeka [9] reported that the timing rather than the frequency of weeding was a major determinant for effective weed control in paddy cultivation.

Chalai operation

Anonymous [4] reported that the Chalai operation (gap filling) should be performed within 3 days otherwise the seedling mortality is more and delay in Chalai operation up to 6 and 9 days resulted in decrease in yield by 30 to 40 percent. Further it was reported that the Saghan Chalai (intensive gap filling) had helped in increasing the yield by 15 to 20 percent.

Plant population

Most of the scientists have concluded that, in broadcast Biasi system, the sowing is done by broadcasting seed and when the crop is 4-6 week old, ploughing is done in the field with 10-15 cm of stagnant water. In this operation, the plant population is very adversely affected and low plant population is the major constraint in improving the productivity. It is reported that, 100-125 plants/

sq. m after Chalai operation gave significantly higher yield than higher or lower plant population/sq. m [4].

Improved biasi

Mishra., *et al.* [11] observed that as an improved Biasi, the ploughing is done in between the paddy rows, this practice reduced the plant mortality (16-30 per cent) over Biasi (33-38 per cent), with increased paddy crop yield. In order to improve the plant population, technology was developed by sowing extra seedlings in l/20th area and using them for gap filling after Biasi known as improved Biasi. It has been found as effective measures, to improve the plant population. Further it was reported that, due to improved Biasi the yield was increased by 23.9 percent over the traditional broadcast Biasi [4]. Patre., *et al.* [12] observed during Biasi operation in developed Biasi implement trifal and indigenous plough in standing water in paddy field that was higher field capacity (0.23 ha^{-1}), lesser plant mortality (11.80%), and more weeding efficiency (72.22%) in modified Biasi plough while in indigenous plough field capacity (0.029 ha^{-1}), lesser plant mortality (23.28%), and more weeding efficiency (65.62%).

Weed control in biasi

Traditional implements Patra and Gite [2] reported that, in the present method of rice cultivation the farmers do the intercultural operation with the help of small country plough (Biasi plough) and weeding is done "by hand picking of weeds. The farmers spent on an average 20 percent of the total cost of cultivation on this operation. At times, they also do not go for weeding when the problem gets severe. This results in substantial loss of production. So, if a proper intercultural implement can be introduced, it will reduce drudgery of the farmer and also increase the yield. Ramington and Posner [13] conducted a study to develop and test weed control options and concluded that manual weeding would not allow earlier, more rapid and repeated weeding in direct sown rice in West Africa. They concluded that cultivation 21 and 42 days after sowing with the animal drawn accidental hoe controlled inter-row weeds yielding 1.3 t/ha in upland rice and 3.2 t/ha in rain fed low land rice with no control of inter-row weeds. Interrow weeds were effectively controlled by broadcasting oxiazon (RONSTAR) at 0.75 kg/ha a.i. They reported that the use of herbicide was not profitable in upland rice and only slightly profitable in rain fed lowland rice. The complete hand pulling of inter-row weeds in upland rice required 89-man days/ha and was not profitable. Selectively removing only, the larger weeds reduced hand weeding n time to 37-man days/ha and increased yield by 11 per cent. They concluded that effective weed control without external inputs could be attained by row sowing, cultivating twice with the accidental hoe and selectively removing inter-row weeds by hand pulling. Hisashi [6] reported that the conventional plough used in paddy field before the modern period of Japan has a long and wide sole. The sole of this plough gives the drawing stability and also the function of plastering soil pan for preventing water seepage. The function is no less important than digging and turning. The irrigating-draining control of the rice paddy field, in relation to the growing stage of paddy has been taken from ancient years. Such water control available in a limited condition of land, soil and water utilization. The plastering soil pan in sticky soil is possible by using the plough of wide and long sole. Siopongeo., *et al*. [14] reported that Beausani enhanced rooting of rice at shallow depth as a result of soil loosening with reduced weeds competition. They found that hand weeding and herbicide required higher labor and material cost compared to Beausani.

Mechanical weeder

Rajput [15] reported that weed control in broadcasted crop was difficult and in such crop, the weeds are removed with manual labour once only. Due to this, the weeding is not effective, and the operation gets delayed resulting in non-timeliness and loss of yield. In line sown crops, this problem does not arise as mechanical weeders and bullock driven implements can be used to control the weeds effectively and timely. Further, he concluded that depth of tillage did not have significant effect on yield of paddy crop. Biswas (1990) surveyed and reported the details of 14 animal driven weeder used in India, mostly used for weeding under dryland line sown condition. Farmers use traditional hoes and improved traditional hoes in large number. The blade hoe is a traditionally used, animal driven weeder that is widely used for weeding and inter cultivation operation in upland, wide spaced line sown crops. Use of a single blade is very common although double blades are also used. Islam and Khondakar (1991) developed a low cost weeder for lowland paddy and compared it with the Japanese type manual weeder. They reported that the average field capacity of BRRI weeder (weeder developed at Bangladesh Rice Research Institute) was 0.0351 ha/h higher than Japanese type manual weeder 0.0327 ha/h in sandy loam soil with weed density of 375 weeds/m2. Also, the cost of Japanese manual weeder (TK 250) is higher than BRRI weeder (TK 164). Further they concluded that

the Japanese type manual weeder was almost inoperable in clay soil because its spikes were clogged with sticky clay. The power requirement of the Japanese type manual weeder was high as compared to BRRI weeder as it has two sets of spikes, hence the operator gets tired quickly. The low power requirement of BRRI weeder was due to single set of spikes. Mishra and Vishwakarma [16] have reported the advantage of developed paddy weeder that the output capacity of a man is increased by 8 to 10 times in weeding with Ambika Paddy Weeder. The weeder cut the weeds into small segments and incorporates them into the mud and in this way recycles the plant nutrients into the field and improves the soil quality. Its field capacity was reported to be 0.05 ha/h and observed economical than manual method. Mishra., *et al*. [11] conducted various experiments at ZARS, Ambikapur and observed that line sowing of Dhuria paddy and weeding by Ambika Paddy Weeder gave better yield and return than transplanting and chemical weed control. They further reported that, if the developed weeder is not available, even the bullock drawn local plough can be operated successfully between the rows of paddy which gave the field capacity in the range of 0.2 to 0.3 ha/day with comparable weeding efficiency and good paddy yield.

Effect on soil and crop establishment

Ghose., *et al.* [1] reported the better root growth as a result of ploughing, improved tillering as a result of thinning of seedling and reduced weed as a result of planking. They also reported that Beausani increases rice yield, with long duration varieties by 9 to 40 percent as compared to non-Beausani. Patra and Gite [2] reported that after Biasi operation plant can again establish itself in a short duration of time while the weeds cannot. The tillering takes place vigorously due to disturbance to the original roots of rice plants. Gill and Kollar [17] reported that weeds directly reduce crop yield by competing with the crop in respect of space, sunlight, water and nutrient, and adversely affects the microclimate around the plants, which increases harmful diseases and pests. Weeds increase the cost of production and lower the quantity as well as the quality of the crop. Depending on the weed density 20 to 30 per cent, loss in grain yield is quite usual which may increase to 50 percent when the crop management practices are not properly followed. De Datta [18] reported that deep cultivation and leveling of land in stagnant water affects crop rooting because if the water is too deep, root anchorage is poor.

Mourya [19] reported that planking controls weeds by submerging them in water or planking their shoots. After planking rice plants erect again, whereas weeds, observed in rice, were more susceptible to shoot breakage and node detachment than rice upon planking. Siopongeo., *et al.* [14] have conducted experiments with three establishment practices i.e. Row Sown Dry Seeded Rice (RDSR) Broadcast Dry Seeded Rice (BDSR) and Transplanted Rice (TPR) and these were given four post establishment practices viz. 1. Conventional hand weeding 2. Herbicides plus hand weeded 3. Ploughed and cross ploughed with non-turning plough 4. Beausani, wet ploughed and planked at 47 days after emergence. They reported that Beausani enhanced rooting at shallower depth as a result of soil loosening but reduce lesser weeds (38 per cent) than hand weeding (87 per cent) and herbicide. Weeded plots yield more than all other management practices. Further, they concluded that hand weeding and herbicide required higher labour and material cost than Beausani. Al- Tahan., *et al.* (1992) reported that bulk density is affected by plowing treatments directly and indirectly. With direct effect of plowing, the soil is pulverized, disturbed and its volume increased at which the bulk density is decreased [20].

Improved Biasi

Mishra., *et al.* [11] observed that improved Biasi practice in paddy field reduced the plant mortality by 16-30% with increased crop yield for 33-38% over the traditional Biasi cultivation. Kawade (2001) designed and developed Biasi implement for Biasi/'mtercultural operation and stated that improved Biasi implement having three furrow openers was suitable for inter-cultural operation in 5-10 cm standing water in paddy fields. He reported that improved Biasi implement gave 28.9% higher field capacity (0.0528 ha/h), 33.37% less plant mortality (25.94 per cent) and 14.20% more weeding efficiency (48.25 per cent) over traditional Biasi plough. He found that the cost of operation using improved Biasi implement was Rs. 148 per hectare compared to Rs. 2207- per ha with traditional Biasi plough, giving thereby saving of Rs. 72 per hectare. He stated that due to Biasi operation, disturbance to the original root zone of rice plants helped in enhancing the plant growth.

Conclusion

From the review paper it was concluded that Biasi is most promising intercultural operation for broadcasted paddy field which have advantages in terms of reduction in weed, increase the

infiltration capacity, less fertilizer requirement, doesn't required nursery, puddling not required, and low cost as compared to other sowing methods. It was also concluded that it has disadvantage in terms of required large amount of seed, poor weed control and lack of high yielding variety. The conclusion of this review paper that Biasi operation should be modified with power operated cultivation and high yield variety of seeds.

Bibliography

1. Ghose RLM., *et al*. "Rice in India". ICAR New Delhi (1960).

2. Patra SK and Gite LP. "Farm Implement and Agricultural Practices in the Tribal Areas of Bastar District. echnical Bulletin No. CIAE 78/1. CIAE, Bhopal, India: (1980): 14-33.

3. Shrivastava., *et al*. "Increasing Rice Production in eastern M.P". *Indian Farming* 36 (1987): 13-15.

4. Anonymous. "Impact of National Agricultural Research Project on the Agricultural Development in eastern M.P. Publication of I.G.K.V. Raipur (1996): 107.

5. Fujisaka S., *et al*. "A descriptive study of farming practices for dry seeded rainfed low land rice in India, Indonesia and Myanmar". *Agriculture, Ecosystems and Environment* 45 (1993): 115-128.

6. Hisashi Horio. "Medium Sole Plough and Its Appropriateness. In: Proceedings of International agril". Engng. Conf. Bankok, Thialand 7-10 (1998): 222-225.

7. Bhan VM., *et al*. "Characterization of critical stages of weed competition in direct seeded rice". *Indian Journal of Weed Science* 12.1 (1980): 75-79.

8. Chandrakar BL and Chandrawanshi BR. "Studies on weed control and time of Biasi operation under broadcast seeded rice". In: Ann. Progress Report ZARS, Raipur (1982): 78-79.

9. Igbeka JC. "Development in rice production mechanization". *AMA* 10.1 (1984): 27-32.

10. Krishna Kumar. "Effect of rice cultivation method on yield". *Krishak Jagat* 44 (2000): 15-18.

11. Mishra BP., *et al*. "Effect of different weeding methods on energy and economic management under 'Khurrd paddy cultivation system. All India seminar of Agric. Engineers. Inst. Of Engineers. (India) held at Jabalpur (1993): 20-21.

12. Nikhil Kumar Patre., *et al*. "Performance Of Modi Fied Biasi Plough Suit Able For He Buffalo,Progressive Research". *An International Journal* 10 (2015): 2379-2382.

13. Ramington TR and Posner JI. "On farm evaluation of low external input weed control technologies in direct seeded rice in Savanna Zone of West Africa". *AMA* 25.4 (1994): 65-70.

14. Siopongeo, JDLC., *et al*. "Beausani effects on root growth and soil physical characteristics on simulated rain fed lowland rice. Presented in 7th Annual FCSSP meeting, IRR1 (1991).

15. Rajput DS. "Scope of multipurpose-wheeled tool carriers in increasing work output of draft animal power. In: Utilization and economics of draft animal power. Proceedings of National Seminar on Status of Animal Energy Utilization". Technical Bulletin No. CIAE/87/51. CIAE, Bhopal, India (1987): 26-54.

16. Mishra BP and Vishwakarma DN. "In Hindi: Amhika Touchi ihvara kam kharch maiyndhan nindayee". Krishi Jagat, Bhopal. (1992): 12.

17. Gill HS and Kollar JS. "*Weed Control in Rice in Progressive Farming* 7 (1981): 6.

18. De Datta SK. "Technology Development and Spread of direct seeded flooded rice in South East Asia". *Journal of Experimental Agriculture* 22 (1986): 417-426.

19. Mourya DM. "The innovative approach of Indian farmers: farmers first. Farmers' innovation and Agril. Research Chambers, R. A. Pacey and La Thrupp, eds. London: Intermediate Technology Publications (1989): 12-38.

20. Priyanka Gautam., *et al*. "Beushening: A Traditional Method of Rice Crop Establishment in Eastern India, Popular Kheti 1.1 (2013): 1-4.

Volume 2 Issue 11 November 2018