

Mini Review

Prospect of Intercropping Chickpea in Autumn Planted Sugarcane in Barind Tract of Bangladesh

Ratan Kumar Ganapati*

Scientific Officer, Bangladesh Sugarcane research Institute, Bangladesh

*Corresponding author

Ratana Kumar Ganapati, Scientific Officer, Breeding Division, Bangladesh Sugarcane research Institute, Ishurdi, Pabna, Bangladesh, Tel: 880732663414; Mobile No: 8801717612298; Email: rkganapati@hotmail.com

Submitted: 31 July 2015

Accepted: 23 October 2015

Published: 26 October 2015

ISSN: 2333-6668

Copyright

© 2015 Ganapati

OPEN ACCESS

Keywords

- Drought
- Sugarcane
- Chickpea
- Intercrop
- BCR

Abstract

Intercrop chickpea with sugarcane is well adopted in water deficit barind region in Bangladesh where ground water table is lowering by affecting with climate change. Intercropping technology is popular and challenges to make it more benefit to the incumbent. A Drought tolerant sugarcane variety with the high water use efficient chickpea is combined for drought prone barind region. Different varietal comparison Isd 32 is better in respect of yield 64.70 t ha⁻¹ for barind region and intercropping with chickpea is 85.62 t ha⁻¹ and only chickpea yield 0.79 t ha⁻¹ is alarming. Considering the economic benefit intercropping chickpea with sugarcane gives 3.5 times compare to solely cultivated chickpea. Among the chickpea cultivars BARI chickpea is well adopted for barind region.

ABBREVIATIONS

T. Aman: Transplanted Aman; BSRI: Bangladesh Sugarcane Research Institute; PRC: Pared Row Cane; BARI: Bangladesh Agricultural Research Institute; DAE: Department of Agriculture Extension

INTRODUCTION

In Bangladesh, major cultivated area of High Barind Tract (>85%) is still under rain fed condition. Sugarcane is a relatively drought tolerant crop and it may be grown at low rainfall zones but germination failure is the main limiting factor for sugarcane cultivation in rain fed condition. If germination can be ensured it is possible to grow sugarcane successfully in High Barind Tract under rainfed condition just after harvesting of T. Aman. Pulses are a major and cheap source of protein in the daily diet of the people. Autumn planted sugarcane occupies the land for more than a year and competes with Rabi crops and, therefore, area under autumn planted sugarcane can only be increased at the cost of other Rabi crops. This problem can only be overcome by intercropping some suitable Rabi crops in autumn planted sugarcane. On global basis, Chickpea (*Cicer arietinum*) is the third important pulse crop after dry beans and dry peas in Bangladesh [1]. It is an important source of human food and animal feed, it also helps in the management of soil fertility, particularly in dry lands [2,3]. Chickpea is found to be a suitable dry land rabi crop with residual soil moisture after harvesting T.

Aman in High Barind Tract. The High Barind tract is driest part of the country, which occupies an area of 16000 m² constituting 10% of the whole Barindh tract. Here the average temperature is 35-40 °C and Rainfall 1000-1200 mm and having 0.6-0.8% organic matter in soil. Peoples have no work after harvesting T. Aman rice. Under rain fed condition farmers mainly grow single T. Aman rice. Growing rabi crops in Barind Soil under rain fed situation after harvesting long durated T. Aman is difficult due to moisture stress. Within this adverse situation chickpea acreage is increasing gradually. BARI chickpea adoption is also observed to be increasing.

RESULTS AND DISCUSSION

Table 1 shows that no significant difference was found in germination, tiller production among the tested varieties but differences were observed in millable cane where Isd 33 produced the higher number of millable cane (81.71 × 10³ ha⁻¹) followed by Isd 34 (81.09 × 10³ ha⁻¹) but it was at per statistically. The lowest number of millable canes was recorded in Isd 30 (51.29 × 10³ ha⁻¹), which differed significantly over all other varieties. In case of yield, the higher cane yield was recorded in Isd 32 (64.70 t ha⁻¹) followed by Isd 33 (57.40 t ha⁻¹) and that differed significantly. But nosignificant yield difference was observed among Isd 34, Isd 35 and Isd 36. The higher brix percent 21.85% was recorded in Isd 35 which significantly differed among all other varieties. However lowest Brix of 17.87% was recorded in Isd 32 [4].

Result presented in Table 2 reveals that, the tested varieties showed significant differences in percent germination, number of tiller production, number of millable cane, yield and percent Brix in cane. Among the test varieties Isd 34 showed the higher germination of 41.37 % followed by 40.96 % in Isd 36 and 40.47 % in Isd 35 which were statistically at par but differed statistically over Isd 33, Isd 32 and Isd 30. The higher number of tillers ($224.80 \times 10^3 \text{ ha}^{-1}$) was recorded in Isd 35 followed ($212.10 \times 10^3 \text{ ha}^{-1}$) in Isd 36 which were statistically identical but significantly differed over Isd 30, Isd 32, Isd 34 and Isd 36. However cane variety Isd 32 produced higher number of millable cane ($110.68 \times 10^3 \text{ ha}^{-1}$) followed by Isd 34 ($92.70 \times 10^3 \text{ ha}^{-1}$) and Isd 35 ($91.71 \times 10^3 \text{ ha}^{-1}$). The lowest number of millable cane was recorded in Isd 30 ($76.35 \times 10^3 \text{ ha}^{-1}$) whose effect statistically significant over all other varieties. Again highest yield of 72.39 t ha^{-1} was obtained in Isd 32 followed by 64.00 t ha^{-1} in Isd 35. The yields of Isd 33, Isd 34 and Isd 35 were 63.38 , 62.57 and 64.00 t ha^{-1} respectively and showed statistically similar. The lowest yield was found in Isd 36 (57.37 t ha^{-1}). In case of percentage of Brix, Isd 35 was superior (20.20%) followed by Isd 36 (19.95%), which was statistically

identical but they significantly differed over Isd 30, Isd 32, Isd 33 and Isd 34 [4].

In Table 3 among the different treatments PRC + Chickpea show higher ($122.18 \times 10^3 \text{ ha}^{-1}$) Tiller production. PRC + Chickpea intercropping shows 83.64 Millable Cane (t ha^{-1}) and 75.62 (t ha^{-1}) cane yield. Ultimately PRC + Chickpea intercropping shows higher 85.62 (t ha^{-1}) [5].

The economic analysis of experiment under different treatment was shown in Table 4. Among the treatments PRC + Chickpea show highest cost of production (66,500.00Tk.) and lowest cost of production for chickpea as a sole crop. Highest gross return was observed for PRC + Chickpea is 1, 15,587.00 Tk. and lowest for Chickpea only 14,460.00 Tk. But benefit cost Ratio was highest (2.20) for growing only chickpea and lowest (1.74) for PRC + Chickpea [5].

In Table 5 Within the sampled farmers, average 0.26 ha/farm was covered by BARI chickpea which was 60% of their land. Total BARI chickpea coverage is 31.60 ha, which was 58% of total land. In case of Naogaon it shows less adoption i.e., 50% [6,7].

Table 1: Performance of Bangladesh Sugarcane Research Institute bred sugarcane varieties in respect of yield and yield attributes at High Barind Tract of Rajshahi area under rain fed condition.

Varieties	Germination (%)	No. of Tillers (10^3 ha^{-1})	No. of millable cane (10^3 ha^{-1})	Yield (t ha^{-1})	Brix (%)
Isd 30	35.24	209.41	51.29c	55.50b	18.60c
Isd 32	37.15	210.00	68.64b	64.70a	17.87d
Isd 33	34.54	196.37	81.71a	57.40b	18.72c
Isd 34	35.41	204.53	81.09a	48.40c	18.60c
Isd 35	34.20	202.09	68.22b	46.80c	21.85a
Isd 36	35.76	192.62	68.58b	49.80c	20.68b
Lsd (5%)	NS	NS	6.75	5.26	0.60

In a column figures having similar letter do not differ significantly whereas figures with dissimilar letters differ significantly at 5% level.

Table 2: Performance of Bangladesh Sugarcane Research Institute bred sugarcane varieties in respect of yield and yield attributes at High Barind Tract of Rajshahi area under rain fed condition, 2005-2006.

Varieties	Germination (%)	No. of Tillers (10^3 ha^{-1})	No. of millable cane (10^3 ha^{-1})	Yield (t ha^{-1})	Brix (%)
Isd 30	32.47c	166.20bc	76.35c	61.93bc	18.50b
Isd 32	37.83b	153.10c	110.68a	72.39a	17.25c
Isd 33	36.37b	126.50c	85.15bc	63.38b	18.75b
Isd 34	41.37a	160.40c	92.70b	62.57b	18.39b
Isd 35	40.47a	224.80a	91.71b	64.00b	20.20a
Isd 36	40.96a	212.10ab	108.47bc	57.37c	19.95a
Lsd (5%)	2.53	46.26	11.93	4.56	1.00

* In a column figures having similar letter do not differ significantly where as figures with dissimilar letters differ significantly at 5% level of significance.

Table 3: Number of tillers, number of millable canes, cane yield, chickpea yield and adjusted yield.

Treatment	Tiller ($\times 10^3 \text{ ha}^{-1}$)	Millable Cane (t/ha)	Cane Yield (t/ha)	Yield of Chickpea (t/ha)	Equivalent Cane Yield (t/ha)	Total adjusted Yield (t/ha)
PRC only	120.93	89.75	78.69	-	-	78.69b
PRC + Chickpea	122.18	83.64	75.62	0.30	10	85.62a
Chickpea only	-	-	-	0.79	-	0.79c

Table 4: Economics and Benefit Cost Ratio (BCR) of Sugarcane and Intercropped Chickpea.

Treatment	Total cost of production (TK. ha ⁻¹)	Gross Return (TK. ha ⁻¹)	Gross Margin (TK. ha ⁻¹)	BCR
PRC only	52,000.00	1,06,366.50	54,366.50	2.05
PRC + Chickpea	66,500.00	1,15,587.00	49,087.00	1.74
Chickpea only	6,543.00	14,460.00	13,070.00	2.20

Table 5: Adoption of BARI chickpea in high Barind Tract.

Item	Location			Average	
	Rajshahi	Nowabgonj	Naogaon		
Cultivated area:					
Average(ha/far)	BC	0.24	0.38	0.17	0.26
	L	0.26	0.11	0.15	0.18
Total (ha)	BC	9.60	15.20	6.8	31.60
	L	10.40	4.00	6.0	20.40
percent of adaptation:					
Area	BC	48	79	53	60
	L	52	21	47	40
Farmer	BC	62	62	50	58
	L	28	28	50	42

BC-BARI Chickpea, L-Local Variety

CONCLUSION

In light of above discussion a few conclusions have been drawn. There is a scope of increase chickpea production by adoption the sugarcane - chickpea intercropping technology in barind area under rain fed condition. Farmers are interested to grow chickpea with sugarcane. Adoption is less in Noagaon, motivational programme like farmers trainings should be strengthened by BSRI in collaboration with of DAE.

ACKNOWLEDGEMENT

The research was conducted by renowned scientists concern to agronomy and adaptive research of BSRI and BARI during 2003 to 2007.

REFERENCES

- Saxena MC. Problem and Potentials of chickpea production in the nineties". Proceedings of the Second international Workshop on Chickpea Improvement. 1989.
- Sharma D, Jodha NS. Pulse production in semi-arid region of India. In Proceedings, Pulse Production Constraints and opportunities.1884.
- Suzuki F, Konnon So. Regional Report on Grain Legumes Production in Asia. In grain Legumes Production in Asia, Tokyo, Japan: Asian Productivity Organization. 1982; 15-93.
- Bashar MK, RahamanMS, Hossain MM, AhamedT. Variability Suitability Assessment Underfed Rainfed Condition In high Barind Tract of Bangladesh. Pakistan Sugar Journal. 2011; 26- 2.
- Islam AKMR, HossainMS, AlamMJ, RahmanMK, Haque MA, KabirML. Yield of Different Winter Crops with Cane as First and Mung bean as Second Intercrop in Rain fed Condition under Paired Row Planting System. Bangladesh J. Sugarcane.2009; 31: 38-44.
- Islam QMS, KarimMR, Ali MO, Rahaman MM. Adoption of BARI Chickpea Varieties and Their Profitability over Local varieties in High Barind Tract of Bangladesh. Bangladesh J. Agril. Res. 2004; 29: 521-531.
- Shahajahan M, Rahaman MA, SalamMA. Cultivation of Chickpea with Modern Technique in High Barind Tract. On Farm Research Division, BARI, Barendra Center. Rajshahi. 2005.

Cite this article

Ganapati RK (2015) Prospect of Intercropping Chickpea in Autumn Planted Sugarcane in Barind Tract of Bangladesh. *Int J Plant Biol Res* 3(4): 1049.