J Krishi Vigyan 2021, 9 (2) : 120-123 DOI : 10.5958/2349-4433.2021.00023.4

Maize Sowing with Multi Crop Planter under Rain Fed Conditions in Rajouri District of J & K Proved Beneficial

Abhay Kumar Sinha, Ashok Kumar Sinha, Shushil Sharma, Sanjay Khar, Vinod Gupta, Suraj Parkash, Sunil Kr Mishra and Saurav Gupta

Sher-E-Kashmir University of Agricultural Sciences & Technology, Jammu (J & K)

ABSTRACT

An experiment was carried out at farmer's field in intermediate zone of Rajouri district in Jammu & Kashmir to assess the effect of sowing system on yield and cost of practice of maize crop. The study consisted of treatment T1: broadcasting of maize seed after three times tractor drawn cultivator, T2: broadcasting of maize seed after one time tractor operated rotavator and one time cultivator and T3: Tractor drawn multi crop planter after one time tractor operated rotavator for sowing of maize crop at farmers' field. The multi crop planter was used for line sowing of seed and fertilizer at proper depth to achieve increased productivity. The use of precise planter for seeds could save the seed in the require 15 to 20 per cent. Multi crop planter helped in efficient conduct of intercultural operation to reduce the weeds and use of other inputs. It was found that the yield of maize under treatments T_1, T_2 and T_3 was 21.0q/ha, 23.0q/ha and 31.0q/ha, respectively where as net returns were Rs 18,400/ha, Rs 22,100/ha and Rs 31,200/ha, respectively. The benefit cost ratio in treatments T_1, T_2 and T_3 was 1.38, 1.86 and 1.98, respectively. Increase in yield by treatment T_3 was 42.86 per cent over treatment T_1. The results of agronomic observations revealed that plant height and depth of root were superior in treatment T_3 where as treatment T_1 was found to be less effective.

Key Words: Benefit cost ratio, Cultivator, Rotavator, Tractor, Yield.

INTRODUCTION

Maize is one of the important crop of rain fed agriculture is grown in low, mid and high hill altitudes in all three seasons namely rainy (*Kharif*), winter (*rabi*) and summer. Of these three seasons, nearly 90 per cent of the production came from *Kharif* season, 7-8 per cent during rabi season and remaining 1-2 percent during summer season. Jammu and Kashmir contribute 2.48 per cent to the total Indian maize production. The sowing of maize crop is mainly by broadcasting after three to four tillage operations resulting in high labour requirements and drudgery. Because of the seasonality of rain fed farming, maize planting is often late resulting in considerable losses in crop yield. A need exists for improved maize planting tools that allow farmers to plant in a timely manner in order to increase yield and reduce drudgery. Early planting is one of the most basic requirements for good crop production due to benefits from the higher soil fertility present at the beginning of the rainy season. As the season progresses, nutrients leach below the root zone and are therefore no longer available for uptake. Early planting also benefits from more days of sunshine. Sharma *et al* (2014) revealed that farmers of the area were cultivating the spring maize and harvested an average grain yield of 96q/ha but the water requirement is very high which result in low water productivity. Unfortunately, farmers are reluctant to see the long-term effect of maize cultivation during spring season. Further, Manan *et al* (2016) indicated that adequate plant spacing coupled with plant population per unit area gives a good yield. The number of rows per cob, cob

Corresponding Author's Email: abhaysinha.1995@gmail.com

girth, grain weight and cob length were the factors which contribute to increase in cob yield and grain yield. Besides these factors, number of plants per unit area or plant density is also one of the main factors which ultimately led to increase in cob yield or grain yield only per unit area.

The selections of suitable sowing methods play an important role in placement of seed and fertilizer at proper depth and maintain row to row and plant to plant spacing which ensures better yield. In hilly region of Rajouri district, maize is sown through broadcasting on a large area after wheat harvesting. Broadcasting not only requires higher seed and fertilizer rate but also poor yield. Seeing the importance of the crops, it seems necessary to study the economics of different methods of maize sowing after wheat in rain fed condition of Rajouri district in Jammu and Kashmir (J&K).

MATERIALS AND METHODS

An experimental plot consisting of three treatments and five replicates was laid out at farmers' field. The treatments consisted of three sowing methods as given below:

T1 = Broadcasting method of seed sowing after three times use of tractor drawn cultivator; T2 = Broadcasting method of seed sowing after one time use of rotavator and one time cultivator and T3 = Tractor drawn multi crop planter after one time use of tractor operated rotavator. Multi crop planter cultivation of maize reduces the number of field operation from an average of three to one over conventional maize cultivation. The conventional tillage refers to the intensive tillage with multiple passes of tractor to accomplish land preparation for maize sowing. The cost concept was considered for the estimation of cost of maize production. The cost was taken into account in this study to calculate net income and benefit cost ratio. The cost included all directly expenses paid in cash for crop production such as hired human labour, seeds, fertilizers, plant protection measure, overhead charges and input value of family labour.

The cost of human labour and diesel were taken on actual expenditure basis. Gross income included the total value of main crop and by- product. Net income was calculated as the difference between gross income and cost of production. The five furrows tractor mounted multi crop planter was tested in laboratory before taking to actual field conditions. The seed were passed through the inclined plate planter to check the regularity of flow and damage. The inclined plate of multi crop planter was fitted for line sowing at 60 cm. The parameters recorded were sowing time and operational energy, depth of sowing, labour requirement, man-h/ha, population of established plant in unit area, fuel requirement, cost of operation, cost of production and grain yield (q/ha).

RESULTS AND DISCUSSION

The machine was field evaluated at farmers' fields for raising maize crop after wheat in comparison to conventional method of broadcasting. Data related to machine performance, crop growth and yield of different treatments are presented in Table 1.

Sowing time and Operational energy

The results showed that multi crop planter was the most time and energy effective for 68.5 and 65.0 per cent, respectively over the conventional practice. Treatment T2 that was single pass tillage with tractor drawn rotavator after single pass cultivator was 28.86 per cent energy efficient compared to the farmer's practice. The time taken with treatment with TI, T2 and T3 are 10.80 h/ha, 7.105h/ha and 3.40h/ha, respectively. The depth of sowing of multi crop planter was found to be 7 cm compared to broadcasting method in which seed remains on top surface of the soil. The Labour requirement for sowing of maize with multi crop planter was much less compared to broadcasting method. The study showed that multi crop planter saved 72 per cent labour requirement as compared to farmers' practice. Similar result was reported by Murumkar *et al* (2015)

Table 1. Field performance for different treatments for sowing of maize.

Sr. No.	Particular	Treatment		
		T1	T2	T3
1.	Sowing time, hr/ha	10.80	7.10	3.40 (68.5)
2.	Operational energy, MJ/ha	1926.76	1370.78	674.43(65.0)
3.	Depth of sowing, cm	Top surface of the soil	Top surface of the soil	7 cm
4.	Labour requirement, man-hr/ha	7.0	5.0	3.0
5.	Fuel requirement, l/ha	33.80	24.10	17.90
6.	Cost of operation, Rs/ha	3400	2400	1600
7.	cost of production, Rs/ha	12500	11400	10200
8.	Grain yield, q/ha	20.50	21.80	29.60
9.	Net return, Rs/ha	27500	29500	36800
10.	Benefit–cost ratio	2.20	2.58	3.31

Plant Population

The plant population in unit area was much more by multi crop planter compared to broadcasting method. The plant population was found to be 70mt^2 multi crop planter whereas 45 plant by broadcasting method. Similar result was reposted by Abbas *et al* (2009). The study have indicated 72 per cent reduced incidence of weeds in maize in long run resulting into reduced use of weedicides.

Fuel requirement

Fuel used by multi crop planter was less as compared to broadcasting method as reduced tillage operations. The study showed that fuel used by multi crop planter was 17.90 l/ha whereas 33.80 l/ha in treatment T1 method. Multi crop planter was saved 47.04 per cent fuel as compared to broadcasting method.

Cost of operation and cost of production

The study showed that cost of operation was Rs 3400, Rs 2400 and Rs 1600 /ha in the treatments T1, T2 and T3, respectively. Multi crop planter saved 52.94 per cent cost of operation as compared to broadcasting method. The cost of production was Rs.12500/-, Rs.11400/- and Rs.10200 /ha in the treatments T1, T2 and T3, respectively.

Grain yield

The estimation of grain yield in various treatments was estimated by measuring the plot cutting yield. This was done by measuring the grain yield production/plot area under a particular treatment. The cutting of crop each plot and measure the yield in each treatment. In treatment T1, T2 and T3 yield was found to be 20.50, 21.80 and 2.96 q/ha respectively. The study showed that the biometrics growth of plants increased in the treatment T3. Therefore, yield of grain as well as benefit cost ratio increased in the treatment T3. The benefit cost ratio was 3.31 in multi crop planter whereas 2.20 in farmers' practice.

CONCLUSION

It can be concluded that maize sowing by multi crop planter was very encouraging besides a net saving of Rs.9300/ha as compared to farmers' method of maize establishment. This was mainly because of saving of fuel, labour and other inputs. The tractor operated multi crop planter can be acceptable machine for the farmers for sowing of maize after wheat harvesting since it gave maximum plant population, less requirement of labour, reduce cost of cultivation and higher yield compared to farmers' practice methods. Multi crop planter has been proved to be more beneficial in terms of saving of numbers of operations required for maize sowing, saving of tractor hour, saving of diesel fuel and reduce incidence of weeds infestation. Sowing

with multi crop planter has advantage of better inter-culturing operation, management of insect, pest and disease and mechanical harvesting.

REFERENCES

Abbas G, Ali MA, Abbas G, Azam M and Hussain I (2009). Impact of planting methods on wheat grain yield and yield contributing parameters. *J Anim and Plant Sci* **19 (1) :** 30-33.

Gerhard Moizi, Szalay T, Schuller M, Wagentristl H, Refenner K, Weingartmann H, Liebhard P, Boxberger J and Gronauer A (2013). Effect of tillage systems and mechanization on work time, fuel and energy consumption for cereal cropping in Austria. *Agril Engineer Int: CIGR E Journal* 15(4): 94-101.

Ismail W I W (1998). Cost analysis model for crop production machinery.

Manan Jatinder, Gurmeet Singh, Sharma M and Singh Gobinder (2016). Effect of plant spacing on yield and yield attributes of maize hybrids. *J Krishi Vigyan* **5** (1) : 41-45

Murukumar RP, Usha R, Dongarwar DS, Phad DS, Pisalkar PS (2015). Assesment of seed cum fertilizer drill for wheat sowing after paddy harvest. *Int J Innov Sci Eng & Tech* **2**(6) 760-765.

Shahare PU (2012). Agricultural Mechanization in Konkan Region of Maharashtra. *Agri Engineer Today* **36**(2): 6-9.

Sharma M, Onkar Singh, Gobinder Singh and Gurpreet Kaur (2014). A snap shot of spring maize cultivation in Kapurthala and Jalandhar district under Central Plain Zone of Punjab. *J Krishi Vigyan* **3**(1) : 1-4

Singh S (2007). Hill agricultural mechanization in Himachal Pradesh - A case study in two selected districts. *AMA* **38** (4):18-25.

Singh SP and Verma HN (2001). Scope of farm mechanization in Shivalik hills of India. *AMA* **32**(1): 59-64.

Vatsa DK and Saraswat D C (2003). Agricultural Mechanization in hills of Himachal Pradesh: A case study. *AMA* **34**(1):66-70.

Vatsa D K (2006). Energy analysis for mechanizing Himachal Pradesh of India. *Agri Engineer Today* **30** (5, 6):7-15.

Received on 16/10/2020 Accepted on 15/03/2021