SHORT COMMUNICATION

STUDY OF ECONOMICS ON MAIZE (*ZEA MAYS* L.) INFLUENCED BY WEED MANAGEMENT

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Abstract: A field investigation was conducted at BAU experimental Farm, Ranchi during *kharif* season 2015 on sandy clay loam soil. The experiment was laid out in a RBD with 13 treatments: pretilachlor 1.0 kgha^{-1} PE (T_1),atrazine 1.0 kgha^{-1} PE (T_2),pendimethalin 1.0 kgha^{-1} PE (T_3), metribuzin 0.35 kgha^{-1} PE (T_4),pretilachlor 0.5 + metribuzin 0.175 kgha^{-1} PE (T_5), atrazine 0.5 + pendimethalin 0.5 kgha^{-1} PE (T_6), pretilachlor 1.0 kgha^{-1} at 15 DAS (T_7), metribuzin 0.35 kgha^{-1} at 15 DAS (T_8), atrazine 1.0 kgha^{-1} at 15 DAS (T_9), green manuring by *Sesbania* @ 80 kgha^{-1} *fb* 2,4-D 0.625 kgha^{-1} at 30 DAS (T_{10}), two mechanical weeding at 20 and 40 DAS (T_{11}), two hand weeding at 20 and 40 DAS (T_{12}),and weedy Check (T_{13}), replicated thrice. Results revealed that gross return (70591Rs.ha^{-1}), net return (44623Rs.ha^{-1}) and B: C ratio (1.72) were observed maximum due to application of same treatment (atrazine 0.5 + pendimethalin 0.5 Rs.ha^{-1}PE). The cost of treatment (atrazine 0.5 + pendimethalin 0.5 kg ha^{-1}PE) is much lower (1768 Rs.ha^{-1}) against mechanical weedings (3749 Rs.ha^{-1}) and hand weedings (9372 Kg.ha^{-1}).

Keywords: Maize, Weed management, Economics, Investigation

INTRODUCTION

Maize (Zea mays L.) is one of the most versatile crops having wider adaptability under diverse soil and climatic conditions. Globally, maize is known as the "Queen of Cereals" because it has the highest genetic yield potential amongst the cereals owing to its better dry matter accumulation efficiency in a unit area and time particularly up to 30° North and 30° South latitude. It is cultivated in an area of about 150 M ha in 160 countries in diverse soil types, climate, and management practices with wider plant biodiversity that contributes about 36% towards the global food grain production (Anonymous, 2013a). It is the third most important crop of India after rice and wheat that occupies an area of about 8.67 M ha with an average productivity of about 2.57 t/ha compared to the world average productivity of about 4.94 t ha^{-1} (Anonymous, 2014). It is grown on an area of 1.86 m ha with an average productivity of 1.45 t ha^{-1} in Jharkhand (Anonymous, 2013b). Yield losses caused due to different weed categories in maize were quantified as 77.4% by grassy, 44.2% by broad-leaf and 38.4% by sedges, indicating the need for weed management for realizing optimal crop yields.Manual weeding is exhaustive, lengthy, economically not feasible and laborious. Availability of man power for manual weeding at critical period of maize growth is difficult owing to pre-occupied farm work in other crops like rice, pulses etc. For controlling weeds in maize crop, pre-emergence or early post-emergence application of atrazine depending upon the soil type has been recommended. Application of pendimethalin also has been recommended under maize + legume intercropping situations. These herbicides do not control hardy weed species like *Commelinabenghalensis*, *Ageratum conyzoides*and *Brachiariaramosa*as they appear late in the season. The infestation of these weeds is increasing day by day in the maize-growing areas of the state especially where the farmers are using atrazine year after year. So in order to widen the weed control spectrum, it is imperative to use combination of herbicides having different mode of action. After reviewing these facts a studies performed with the objective to find out the economics of maize as influenced by weed management practices.

MATERIAL AND METHOD

The experiment was carried out during *kharif*, 2015 at BAU experimental Farm, Ranchi on sandy clay loam soil. The experiment was laid out in a RBD with 13 treatments: pretilachlor 1.0 kgha^{-1} PE (T_1),atrazine 1.0 kgha^{-1} PE (T_2), pendimethalin 1.0 Kg.ha^{-1}PE (T_3), metribuzin 0.35 kgha^{-1} PE (T_4), pretilachlor 0.5 + metribuzin 0.175 kgha^{-1} PE (T_5),atrazine 0.5 + pendimethalin 0.5 kgha^{-1} PE (T_6), pretilachlor 1.0 kgha^{-1} at 15 DAS (T_7), metribuzin 0.35 kgha^{-1} at 15 DAS (T_8),atrazine 1.0 kgha^{-1} at 15 DAS (T_9), green manuring by *Sesbania* @ 80 kgha^{-1} *fb* 2,4-D 0.625 Kg.ha^{-1}at 30 DAS (T_{10}), two mechanical weeding at 20 and 40 DAS (T_{11}), two hand weeding at 20 and 40 DAS (T_{12}),and weedy Check (T_{13}), replicated thrice.Maize *var.*Suwan was sown (on 30-06-2015) with spacing of 70 x 20 cm, seed rate 20 kgha^{-1} and RDF 120:60:40 kgha^{-1}.Gross return and cost of cultivation was calculated for each treatment, using current purchase price of inputs and the selling price of outputs prevailing in local market. Net profit was calculated as gross income subtracted

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by cost of cultivation. Benefit cost ratio was computed as the ratio of net return and cost of cultivation.

RESULT AND DISCUSSION

Economics

Economics of maize production as influenced by weed management practices are presented in Table 1. It was observed that percent increase (highest) in gross return, net return and B: C ratio was to the tune of 44.30, 71.10 and 70.93%, respectively due to application of atrazine 0.5 + pendimethalin 0.5 kg/ha PE (T_6) in comparison to weedy check (T_{13}).

Cost of treatment with application of atrazine 0.5 + pendimethalin 0.5 kgha^{-1} PE (T_6) was lower (1768 Rs ha^{-1}) compared to normal practice of hand weedings at 20 and 40 DAS (9372 Rs ha^{-1}) and resulted cost of cultivation 25969 and 33572 Rs ha^{-1}, respectively. Application of atrazine 0.5 + pendimethalin 0.5 kgha^{-1} PE (T_6) recorded maximum gross return (70,591 Rs ha^{-1}) which was *at par* with two hand weedings at 20 and 40 DAS (T_{12}), two mechanical weedings at 20 and 40 DAS (T_{11}), atrazine 1.0 kgha^{-1} PE (T_2) and pretilachlor 0.5 + metribuzin 0.175 kgha^{-1} PE (T_5). Weedy check recorded significantly lowest gross return (39,318 Rs ha^{-1}) and also it recorded significantly highest net return (44,623Rs ha^{-1}) as compared to rest of the other treatments. Weedy check recorded significantly lowest net return (15,117 Rs ha^{-1}) and significantly highest benefit: cost ratio (1.72) was observed with application of atrazine 0.5 + pendimethalin 0.5 kg ha^{-1} PE (T_6) as compared to rest of the other treatments. Weedy check recorded significantly lowest benefit: cost ratio (0.63).Similar results were also reported by Walia *et al.* (2007), Shantveerayya *et al*. (2013), Shankar *et al*. (2015) and Barla*et al.* (2016).

Table 1. Effect of weed management practices on economics (Rs ha^{-1}) and B: C ratio in maize (*var.* Suwan) during *kharif*, 2015.

	Treatments	Cost of weed management practice (Rs ha^{-1})	*Cost of cultivation (Rs ha^{-1})	Gross return (Rs ha^{-1})	Net return (Rs ha^{-1})	B:C ratio
T_1	Pretilachlor 1.0 kgha^{-1} PE	1695	25895	50152	24256	0.94
T_2	Atrazine 1.0 kgha^{-1} PE	1295	25495	59399	33903	1.33
T_3	Pendimethalin 1.0 kgha^{-1} PE	2241	26442	52822	26380	1.00
T_4	Metribuzin 0. kgha^{-1} PE	1950	26150	50481	24330	0.93
T_5	Pretilachlor 0.5 + metribuzin 0.175 kgha^{-1} PE	1637	25838	58935	33097	1.28
T_6	Atrazine 0.5 + pendimethalin 0.5 kgha^{-1} PE	1768	25969	70591	44623	1.72
T_7	Pretilachlor 1.0 kgha^{-1} at 15 DAS	1695	25895	49160	23264	0.90
T_8	Metribuzin 0.35 kgha^{-1} at 15 DAS	1950	26150	53814	27663	1.06
T_9	Atrazine 1.0 kgha^{-1} at 15 DAS	2375	26575	50941	24366	0.92
T_{10}	Green manuringfb 2, 4-D 0.625 kg/ha at 30 DAS	4573	28774	46832	18059	0.63
T_{11}	Mechanical weeding at 20 and 40 DAS	3749	27949	61696	33747	1.21
T_{12}	Hand weeding at 20 and 40 DAS	9372	33572	63944	30372	0.91
T_{13}	Weedy check	0	24201	39318	15117	0.63
SEm ±		-	-	5298.00	2273.67	0.08
CD (P=0.05)		-	-	15462.19	6635.69	0.22
CV%		-	-	16.85	14.20	12.60

*Includes cost of weed management practice.

CONCLUSION

Based on the results of present investigation, it can be concluded that application of atrazine 0.5 + pendimethalin 0.5 kgha^{-1} PE can be practiced as an economical weed management practice in maize (*Zea mays* L.) for higher productivity.

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