Bioefficacy of herbicides on performance of maize and residual effect on succeeding wheat

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The queen of cereals "maize" is an important crop with a very high production potential among cereals. Being a widely spaced crop it gets infested with a variety of weeds and subjected to heavy weed infestation, which often reduces yield varying from 18-85% depending on the type of weed flora, their density and function of crop weed competition (Sunitha and Kalyani 2012). Manual weeding is difficult due to inadequate availability of labour and lack of workable field conditions at critical stages of crop weed competition. In such situation use of herbicides become essential. In southern Rajasthan majority of farmers in the area are unaware about the use of some alternate herbicides except Atrazine for control in this crop. With this background it was felt necessary to explore performance of some other herbicides for effective control of weeds in this crop along with their residual effect on succeeding wheat.

METHODOLOGY

A field experiment on weed control in maize and residual effect thereof on succeeding wheat was conducted consecutively for two years during *Kharif* and *Rabi* seasons of 2012-13 and 2013-14 at Instructional Farm of Agronomy, R.C.A., Udaipur. Experiment consisted of seven treatments viz., 2.5 kg Alachlor/ha, each of sponsor and market product, Atrazine 1.0 kg/ha, 2, 4-D dimethyl amine salt 0.5 kg/ha, weedy check and weed free and double dose sponsor product of Alachlor (5.0 kg/ha). Atrazine and Alachlor were applied as pre emergence while 2, 4-D was applied as early post emergence at 16 days after sowing. Herbicides were sprayed through knapsack sprayer fitted with flat fan nozzle using 500 litres of water per hectare. Soil of the experimental fields was clay loam in texture, slightly alkaline in reaction, medium in available nitrogen and phosphorus and high in potassium. Experiment was conducted in RBD replicated thrice using maize and wheat varieties as PEHM-2 and Raj. 4037 respectively. Weed control efficiency at 60 days after sowing was calculated on the basis of weed dry matter yield of dicot, monocot and total weeds recorded from 1 m^2. Two years data were analysed for various parameters and presented as mean.

RESULTS

Major weeds during the observations recorded were *Commelina benghalensis, Parthenium hysterophorus, Echinochloa crusgalli* and *Cyperus rotundus* and their respective mean contribution in the total density of weeds at 60 DAS was 25.56, 17.92, 46.48 and 10.04. Thus, in the total population of weeds dicot and monocot contribute 43.48 and 56.52 per cent, respectively.

Data in Table 1 indicate that weed control efficiency at 60 DAS under different weed control treatments vary to a great extent. As far as weed control efficiency of dicot weed is concerned it is maximum (40.54%) under 2,4-D 0.5 kg/ha and minimum (23.5%) under Atrazine 1.0 kg/ha. Weed control efficiency of monocot weed is maximum under application of Alachlor irrespective of its dose and product but minimum was recorded fewer than 2,4-D sodium salt followed by Atrazine. Weed control efficiency of total weeds under various treatments vary from minimum of 72.0% in Atrazine to 77.68% in Alachlor 5 kg/ha. Data on mean grain yield under influence of different treatments indicate that all treatments significantly affected maize grain yield compared to weedy check, however, grain yield under all the herbicidal treatments were significantly at par to each other and significantly lower than weed free treatment. The per cent increase in maize grain yield under weed free and Alachlor 2.5 kg/ha sponsor sample was 47.3% and 21.3%, respectively compared weedy check.

Data on wheat grain yield under the influence of different weed control treatments tested in maize could not significantly affect grain yield which indicate that neither of the herbicides at any of the dose could not leave any residual effect that adversely affect grain yield of succeeding wheat crop. Significant increase in maize grain yield under various treatments curtail nutrient uptake by weeds and provided weed free environment to the crop.

Table 1. Effect of weed control treatments in maize and its residual effect on succeeding wheat yield

Treatment	Mean weed control efficiency (%)			Mean grain yield (q/ha)	
	Dicot	Monocot	Total	Maize	Wheat
Alachlor 50% EC 2.5 kg/ha– Sponsor sample	33.53	87.49	76.44	34.05	41.54
Alachlor 50% EC 2.5 kg/ha– Market sample	30.92	87.32	75.33	33.71	43.66
Atrazine 50% WP 1.0 kg/ha	23.53	85.09	72.60	32.42	44.44
2, 4 - D Dimethyl amine salt 58% SL 0.5 kg/ha	40.54	83.80	74.60	32.86	44.05
Alachlor 50% EC 5.0 kg/ha - Sponsor sample	38.81	88.30	77.68	33.23	45.41
Weed free	0	0	0	41.35	44.37
Weedy check	-	-	-	28.06	42.74
LSD (P=0.05)				3.87	NS

CONCLUSION

From two years of results it can be concluded that weed free treatment significantly increased maize grain yield over all the weed control treatments but among herbicide treatments maximum grain yield of maize was obtained under pre emergence application of 2.5 kg Alachlor /ha irrespective of its source without adversely affecting the performance of wheat yield.