Journal of AgriSearch, 8 (4): 311-317
An Open Access International Peer Reviewed Quarterly

ISSN : 2348-8808 (Print), 2348-8867 (Online)
https://doi.org/10.21921/jas.v8i04.7746

Evaluation of Atrazine 50% WP Herbicide for Weed Control in Maize of Jhabua Hills Zone of Madhya Pradesh

MAHENDER SINGH[1]*, MANISH KUMAR[1], I S TOMAR[2] AND JAGDEESH MORYA[3]

ABSTRACT

A field experiment was conducted during kharif season of 2015 at Zonal agricultural research station, Jhabua with the objective to assess the bio-efficacy of atrazine herbicide against complex weed flora and yield of maize crop. The experiment consisted of six treatments, was laid out in randomized block design with three replications. Results revealed that all the weed control treatments significantly reduce the weed density and weed dry matter at 30 and 60 DAS. Atrazine 50% WP @ 1 kg/ha significantly reduced the weed count of grassy as well as broadleaved weeds at 30 and 60 DAA and found at par with Atrazine 50% WP @ 1.5 kg/ha and Atrazine 50% WP @ 2.0 kg/ha. However, better efficacy was observed with higher dose of atrazine viz., Atrazine 1.5 kg and 2.0 kg/ha. Hand weeding was also found as an effective tool for controlling the weed biomass at early stage of observation (30 DAS) but on later stage of crop it proves less effective due to emergence of weeds which further reduce the yield. Further, maize yield (43.43 q/ha) was also found significantly superior in Atrazine 1.0 kg/ha as compared to Atrazine 0.5 kg/ha, hand weeding a 20 DAS and control plot and found at par with higher doses of atrazine. Highest net return of Rs 43203/ha and B:C ration of 3.43 was observed in Atrazine 1.5 kg/ha.

KEYWORDS

Atrazine, Maize, Weeds, Weed Control Efficiency, Yield

ARTICLE INFO

Received on	:	01/10/2021
Accepted on	:	21/11/2021
Published online	:	31/12/2021

INTRODUCTION

Maize (Zea mays L.) is one of the most important cereal crops of the world. Globally, maize is known as "Queen" of cereals because of its highest yield potential among cereals. In India, it is cultivated on an area of 9.72 mha with a production of 28.64million tones and productivity of 2945 kg/ha (Yadav *et al*, 2018). In M.P. maize is grown on 1.34 mh area with the productivity of only 2921 kg/ha (Annonymous, 2020). Maize is a very high potential yield crop and when compared to its potential yield, the productivity of state as well as nation is very low. There are number of factors for their low productivity but major factor limiting the productivity is high weed infestation during rainy seasons (Kumar *et al*, 2020).

During rainy season maize suffers with heavy weed completion due to slow initial growth, wider row spacing and adequate soil moisture during rainy season. Maize crop infested with a wide variety of weeds causes yield losses ranging from 28 to 100 per cent and sometimes even more (Patel *et al*, 2006). Timely management of weeds is considered to be an most important factor for achieving higher productivity. Singh *et al* (2015) reported that weeds reduced the yield to the tune of 60-65%. Uncontrolled weed growth may reduce maize yield as much as 90% (Ratta *et al*, 1991). Weeds also pose severe problems for crop husbandry and infest fallow land, reduce soil fertility and moisture conditions and develop a potential threat to the succeeding crops (Khan *et al*, 2003). Hence, timely removal of weeds using a suitable weed control method is very much crucial to obtain the optimum yield of maize during kahrif season. Hand weeding is laborious, time consuming, costly and tedious job (Triveni *et al*, 2017). Furthermore, timely unavailability of labour as well as continous rain do not permit timely hand weeding. Chemical weed control by using pre-emergence application of atrazine is a well-known practice for control of weeds in maize but continuous use of Atrazine may cause concern on their rate of application. Since atrazine is being used from long time weeds may resist from the recommended dose of Atrazine. Hence, the present investigation was done with an objective to study the efficacy of atrazine herbicides and its effect on weed flora, growth and yield of maize.

MATERIALS AND METHODS

A field experiment was conducted during Kharif season of 2015 at Zonal Agricultural Research Station Farm, Jhabua (M.P.). The soil of experimental field was sandy loamy in texture, normal in soil reaction (pH 7.6), low in organic carbon (0.32%) & available nitrogen (209 kg/ha) and medium in available phosphorus (12.5 kg/ha) & potassium (261 kg/ha). The selected site had severe weed infestation with good irrigation

[1] RVSKVV- Krishi Vigyan Kendra, Dewas-455111, Madhya Pradesh, India
[2] Zonal Agricultural Research Station, Jhabua-457661, Madhya Pradesh , India
[3] RVSKVV- Krishi Vigyan Kendra, Jhabua-4576611, Madhya Pradesh , India
*Corresponding author email: msjadon2000@rediffmail.com

facilities.

A total of 618.2 mm rainfall was received during the crop growing season in 2015. The experiment was laid out in Randomized Block Design (RBD) with three replications and six treatments. Treatment consisted of Atrazine 0.5 kg a.i./ha (T_1), Atrazine 1.0 kg a.i./ha (T_2), Atrazine 1.5 kg a.i./ha (T_3), Atrazine 2.0 kg a.i./ha (T_4), Hand weeding (T_5), and Control (T_6). Herbicide was applied as pre- emergence just after of sowing. Volume of water used for dilution was 500 litre for one hectare area and knapsack sprayer with a flat fan nozzle was used for spraying. At the time of herbicide application, the soil had sufficient moisture for good herbicidal activity.

At optimum moisture condition, the land was first ploughed thoroughly cross wise for two times with tractor drawn harrow and final land preparation with mould board plough thoroughly for obtaining good tilth followed by planking. After that, the clods and all stubbles of previous crops were removed from the land. After leveling, the field was laid out properly by making bund in each channel for irrigation as well as drainage. The maize seed was treated with using Carbendazim @ 2 g kg^{-1}seed. The Bio -9637 hybrid maize seeds were sown with a seed rate 20 kg/ha on 24^{th} June, 2015 with spacing 60cm x 25cm.

Well decomposed organic manure was applied in the entire field area at the time of final land preparation. The fertilizers were applied considering 120:60:40 kg of N: P_2O_5: K_2O ha^{-1}as recommended dose. The sources of fertilizers were urea for N; Single super phosphate (SSP) for P and Muriate of potash (MOP) for K. During the land preparation, in maize crop $\frac{1}{2}$ of total N and full dose of P_2O_5 and K_2O were applied to the crop as basal application. The remaining $\frac{1}{2}$ N was top dressed. Observations on vegetative and yield characters were recorded during course of investigation. Harvesting of crop was done on 02 October 2015. Data recorded on each character were analyzed.

In the case of hand weeding, weeds were removed manually at 20 DAS. In case of unwedded check plots weeds are allowed during the whole crop growing season. Weed counts were recorded (species wise) using 50 X 50 cm quadrant from each plot in the peg marked areas and computed to number of weeds per square meter. Data relating to weed density were recorded from a randomly selected area measuring 50 X 50 cm from each plot and then converted to count per square meter. Weed population was recorded species wise at 30 and 60 Days during the experiment season. The counted weeds were removed from the plots and air dried for a few days and kept in hot air oven at 60°C for further drying. Then each dried sample were weighed and recorded in g/m^2. Weed dry matter production was recorded at 30 and 60 Days. The weed population and weed dry matter production data was further subjected to statistical analysis through square root transformation ($\sqrt{x}$+0.5). The weed control efficiency (WCE) was calculated based on weed dry weight recorded at 30 and 60 Days using the following formula:

$$WCE\ (\%) = \frac{DMC - DMT}{DMC} \times 100$$

Where,

DMC =Dry matter of weeds in control plot and

DMT = Dry matter of weeds in treated plot

The grain yield of Maize was recorded plot wise and further converted to quintals per hectare after proper drying and threshing.

RESULTS AND DISCUSSION

Weed Flora

The major weed flora among grassy weeds were Echinocloa colonum, Echinocloa crusgalli, Digitaría sanguinalis, and Eleusine indica while dominated broadleaved weed flora were Commelina benghalensis, Digera arvensis, Amaranthus viridis, Trianthema monogyna, Xanthomonas strumarium, Euphorbia hirta, Cleome viscose, Achyranthus aspera, Celosia argentia, Portulaca oleracea. The average weed population of broadleaves was more in comparison to grassy weed species.

Effect on Weed

Weed Density/population: All the weed control treatments significantly reduce the density of weeds at 30 and 60 DAA. The weed density (Table 1 and Table 2) clearly showed that Atrazine 50% WP @ 1 kg/ha significantly reduced the weed count of grassy as well as broadleaved weeds at 30 and 60 DAA and found at par with Atrazine 50% WP @ 1.5 kg/ha and Atrazine 50% WP @ 2.0 kg/ha. Lower doses of herbicides had little effect on weed population and highest weed recorded in weedy check. Better efficacy was obtained with higher doses of testing herbicides viz., Atrazine 1.5 kg and 2.0 kg/ha but found at par with Atrazine 50% WP @ 1 kg/ha. Hand weeding was also found as an effective tool for controlling the weed biomass at 30 DAS and statistically at par with Atrazine 50% WP @ 1 kg/ha, 1.5 kg/ha and 2.0 kg/ha, but on later stages it proves less effective due to new emergence of weeds. The highest weed population of grassy and broadleaf weeds were observed in control plots. The results are in accordance with the findings of Singh *et al* (2015) who had reported that Atrazine 1.0 kg/ha effectively reduce the density and dry matter of weeds.

Weed Dry Weight per m^2 : Dry matter of grassy and broadleaved weeds were significantly reduced by all weed control treatments at 30 DAA and 60 DAA (Table 3 and Table 4). Atrazine 50% WP @ 1.0 kg/ha significantly reduced the dry matter of weeds at 30 and 60 DAS and found at par with Atrazine 50% WP @ 1.5 kg/ha and Atrazine 50% WP @ 2.0 kg/ha. Better efficacy was observed with increased dose of herbicides. Lower dose had little effect on weed dry matter. The highest weed dry matter of grassy and broadleaf weeds were observed in control plots. Among the herbicidal treatments lower weed dry matter were recorded in higher dose of herbicides viz., Atrazine 50% WP @ 2.0 kg/ha.

Table 1: Effect of weed control treatments on weeds density at 30 DAA (m^{-2})

Treatments	Dosage(kg a.i.ha^{-1})	Grassy weeds	Broadleaf weeds	Total
Atrazine 50% WP	0.5	36.53(6.08)	50.00 (7.10)	86.53 (9.33)
Atrazine 50% WP (X dose)	1.0	13.87 (3.78)	23.40 (4.88)	37.27 (6.14)
Atrazine 50% WP	1.5	12.60 (3.61)	20.57 (4.58)	33.17 (5.79)
Atrazine 50% WP (2X dose)	2.0	11.67 (3.48)	18.07 (4.30)	29.73 (5.50)
Hand weeding (20 DAS)	-	12.33 (3.56)	23.20 (4.86)	35.53 (5.98)
Control	-	50.63 (7.14)	88.17 (9.41)	138.80 (11.79)
SEm±		0.14	0.11	0.13
CD at 5%		**0.43**	**0.36**	**0.42**

*Data presented in parentheses indicate $\sqrt{(x+0.5)}$ transformed values; DAA- Days after application

Table 2: Effect of weed control treatments on weeds density at 60 DAA (m^{-2})

Treatments	Dosage (kg a.i.ha^{-1})	Grassy weeds	Broadleaved weeds	Total
Atrazine 50% WP	0.5	48.37 (6.99)	61.83 (7.86)	110.20 (10.51)
Atrazine 50% WP (X dose)	1.0	23.10 (4.86)	30.50 (5.56)	53.60 (7.35)
Atrazine 50% WP	1.5	19.70 (4.49)	24.63 (5.01)	44.33 (6.69)
Atrazine 50% WP (2X dose)	2.0	18.97 (4.41)	23.47 (4.88)	42.43 (6.55)
Hand weeding (20 DAS)	-	39.57 (6.31)	46.40 (6.84)	85.97 (9.29)
Control	-	65.10 (8.09)	107.53 (10.39)	172.63 (13.15)
SEm±		0.13	0.15	0.13
CD at 5%		**0.41**	**0.47**	**0.42**

*Data presented in parentheses indicate $\sqrt{(x+0.5)}$ transformed values ; DAA- Days after application

However, it is statistically at par with Atrazine 50% WP @ 1.0 kg/ha and Atrazine 50% WP @ 1.5 kg/ha. Hand weeding (20 DAS) proved better at early observation of 30 DAS but later on its become less effective method due to reemergence of weeds. Similar results were earlier observed by Kandasamy (2017) who had concluded that the atrazine at 1.0 kg/ha + one hand weeding at 35 DAS would be better, thus atrazine inhibits the weed germination at initial period of crop growth and aids in weed free conditions for the critical period and reduces the weed dry matter significantly.

Weed Control Efficiency (%)

Weed control efficiency (WCE) indicates the magnitude of reduction in weed biomass over weedy check by different weed control treatments. At 30 DAA, highest weed control efficiency recorded in hand weeding (20 DAA) followed by Atrazine 50% WP @ 2.0 kg/ha, Atrazine 50% WP @ 1.5 kg/ha and Atrazine 50% WP @ 1.0 kg/ha. However, the difference between Atrazine 50% WP @ 2.0 kg/ha, Atrazine 50% WP @ 1.5 kg/ha and Atrazine 50% WP @ 1.0 kg/ha was not more. When we compare the WCE between grassy and broadleaf weeds, it is clear visible that atrazine is efficiently control broadleaf weeds as compared to grassy weeds. WCE in Atrazine 50% WP @ 1.0 kg/ha and in higher concentrations it was more than 70 per cent in broadleaf weeds while the same dose of herbi-

Table 3: Effect of weed control treatments on dry matter(g./m^2)of weeds at 30 DAA

Treatments	Dosage (kg a.i.ha^{-1})	Grassy weeds	Broadleaved weeds	Total
Atrazine 50% WP	0.5	11.87	12.30	24.17
Atrazine 50% WP (X dose)	1.0	8.60	8.43	17.03
Atrazine 50% WP	1.5	7.77	7.57	15.33
Atrazine 50% WP (2X dose)	2.0	7.40	6.93	14.33
Hand weeding (20 DAS)	-	6.20	5.70	11.90
Control	-	22.07	28.40	50.47
SEm±		0.48	0.50	0.61
CD at 5%		**1.52**	**1.59**	**1.92**

Table 4: Effect of weed control treatments on dry matter(g./m^2)of weeds at 60 DAS

Treatments	Dosage (kg a.i.ha^{-1})	Grassy weeds	Broadleaved weeds	Total
Atrazine 50% WP	0.5	22.83	24.87	47.70
Atrazine 50% WP (X dose)	1.0	15.37	14.50	29.87
Atrazine 50% WP	1.5	13.70	13.13	26.83
Atrazine 50% WP (2X dose)	2.0	12.77	12.53	25.30
Hand weeding (20 DAS)	-	16.90	18.90	35.80
Control	-	41.20	51.23	92.43
SEm±		0.90	0.97	1.09
CD at 5%		**2.82**	**3.04**	**3.43**

cides in monocot its weed control efficiency is around 61 to 66 per cent. However, the trend of weed control efficiency was changed at 60 DAA, the highest weed control efficiency was observed in Atrazine 50% WP @ 2.0 kg/ha and found at par with Atrazine 50% WP @ 1.5 kg/ha and Atrazine 50% WP @ 1.0 kg/ha. WCE in hand weeding was significantly reduced to above herbicide doses and found better to control and Atrazine 50% WP @ 0.5 kg/ha only. It might be due to emergence of weeds at later stages and had less effect at the stage of 60 DAS. (Table 5 and Table 6). This results were also corroborate with finding of Patel *et al* (2006),S Shantveerayya and Agasimani (2011) and Gantoli *et al* (2013).

Effect on Crop

All the weed control treatments significantly increase the plant height, cob yield, grain yield and shelling per centage of maize as compared to weedy check control plot. Among the weed control treatments, maximum plant height of 197.0 cm was observed in Atrazine 50% WP @ 2.0 kg/ha and found closely at par with Atrazine 50% WP @ 1.5 kg/ha (195.47 cm) and Atrazine 50% WP @ 1.0 kg/ha (186.77 cm). However, maximum cob yield and grain yield was observed in Atrazine 50% WP @ 1.5 kg/ha. Highest yield of 46.04 q/ha was observed in Atrazine 50% WP @ 1.5 kg/ha and it was found closely at par with Atrazine 50% WP @ 2.0 kg/ha (45.38q/ha) and Atrazine 50% WP @ 1.0 kg/ha (43.43q/ha). Atrazine 50% WP @ 1.5 kg/ha recorded 69.07 per cent higher yield as compared to control plot. Atrazine 50% WP @ 2.0 kg/ha recorded 66.65 per cent increase in yield followed by Atrazine 50% WP @ 1.0 kg/ha (59.49). Highest shelling per centage of 81.12% was also recorded in Atrazine 50% WP @ 1.5 kg/ha. Increase in maize yield in these treatments may be attributed to effective control of weeds and remarkable improvement in crop growth and yield attributes. (Table 7 and Table 8). The highest grain yield obtained under higher dose of atrazine treatments was mainly due to minimum crop-weed competition throughout the crop growth period, thus enabling the crop for maximum utilization of nutrients, moisture, light, and space, which favoured growth and yield components. Similar results have also been observed by Triveni *et al* (2017).

Table 5: Effect of weed control treatments on weed control efficiency (%) at 30 DAS

Treatments	Dosage (kg a.i.ha^{-1})	Grassy weeds	Broadleaved weeds	Total
Atrazine 50% WP	0.5	46.22	56.69	52.11
Atrazine 50% WP (X dose)	1.0	61.03	70.31	66.25
Atrazine 50% WP	1.5	64.80	73.36	69.62
Atrazine 50% WP (2X dose)	2.0	66.47	75.59	71.60
Hand weeding (20 DAS)	-	71.90	79.93	76.42
Control	-			

Table 6: Effect of weed control treatments on weed control efficiency (%) at 60 DAS

Treatments	Dosage (kg a.i.ha^{-1})	Grassy weeds	Broadleaved weeds	Total
Atrazine 50% WP	0.5	44.58	51.46	48.40
Atrazine 50% WP (X dose)	1.0	62.70	71.70	67.69
Atrazine 50% WP	1.5	66.75	74.37	70.97
Atrazine 50% WP (2X dose)	2.0	69.01	75.54	72.63
Hand weeding (20 DAS)	-	58.98	63.11	61.27
Control	-	-	-	-

Table 7: Effect of weed control treatments on plant height and yield attributes

Treatments	Dosage (kg a.i.ha^{-1})	Plant height	Cobs	Shelling%
Atrazine 50% WP	0.5	163.77	43.95	78.37
Atrazine 50% WP (X dose)	1.0	186.77	54.55	79.64
Atrazine 50% WP	1.5	195.47	56.77	81.12
Atrazine 50% WP (2X dose)	2.0	197.00	56.36	80.52
Hand weeding (20 DAS)	-	180.23	45.92	79.62
Control	-	145.93	35.18	77.28
SEm±		**1.38**	**1.08**	**0.35**
CD at 5%		**4.34**	**3.39**	**1.09**

Economics

Economics of different weed control treatments showed that Atrazine 1.5 kg/ha gave the highest net return (Rs 43203/ha) and B:C ratio (3.43) closely followed by Atrazine 2.0 kg/ha (Net return of Rs 42079 and B:C ration of 3.33) and Atrazine 1.0 kg/ha ha (Net return of Rs 39995 and B:C ration of 3.28). Hand weeding at 20 DAS also gave higher net return and B:C ratio but it is far lower than Atrazine 1.0 kg/ha and their higher doses. It might be due to re-emergence of weeds at later stages and higher cost of weeding. Atrazine 1.5 kg a.i./ha found most economical weed management practices. Pandey *et al* (2001) and Singh *et al* (2015) and also concluded that the chemical control of weeds is more economical than hand weeding. Similar results were obtained by Gupta *et al* (2018).

Phytotoxicity on Maize Plants

The level of phytotoxicity was estimated by visual assessment based on Phytotoxicity Rating Scale (PRS), where 0 = No Crop injury and 10 = Heavy injury or complete destruction of test crop. Application of the testing herbicide Atrazine 50% WP at X (@1.0 kg a.i./ha, 2X (@2.0 kg a.i./ha dose levels and untreated control on 1,3,5,7 and 10 days after application of herbicide did not show any kind of phytotoxic symptoms (Maize leaf epinasty or hyponasty, leaf necrosis or chlorosis and wilting or stunting growth) on the Maize plants (Table 10).

Table 8: Effect of weed control treatments on grain and straw yield of maize

Treatments	Dosage (kg a.i.ha^{-1})	Grain yield	Straw yield	% increase in maize grain yield over control
Atrazine 50% WP	0.5	34.43	48.47	26.44
Atrazine 50% WP (X dose)	1.0	43.43	61.40	59.49
Atrazine 50% WP	1.5	46.04	62.12	69.07
Atrazine 50% WP (2X dose)	2.0	45.38	64.44	66.65
Hand weeding (20 DAS)	-	36.55	51.90	34.20
Control	-	27.23	38.81	
SEm±		**0.86**	**1.18**	
CD at 5%		**2.70**	**3.71**	

Table 9: Effect of weed control treatments on economics

Treatments	Dosage (kg a.i.ha^{-1})	Net return	B:C ratio
Atrazine 50% WP	0.5	28320	2.64
Atrazine 50% WP (X dose)	1.0	39995	3.28
Atrazine 50% WP	1.5	43203	3.43
Atrazine 50% WP (2X dose)	2.0	42079	3.33
Hand weeding (20 DAS)	-	28929	2.48
Control	-	19280	2.15

Table 10: Phytotoxicity effect of herbicides on Maize Crop

Treatments	Dose(kg a.i. ha^{1})	Epinasty & Hyponasty					Necrosis or Chlorosis					Wilting & Stunting growth				
		DAA (Days after Application)														
		1	**3**	**5**	**7**	**10**	**1**	**3**	**5**	**7**	**10**	**1**	**3**	**5**	**7**	**10**
Atrazine 50% WP (X dose)	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atrazine 50% WP (2X dose)	2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Control		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CONCLUSION

All the treatments significantly reduced biomass of total weeds compared with weedy Check. Atrazine 50% WP @ 1.0 kg a.i. /ha was significantly effective in reducing the biomass of all categories of weeds and in improving the yield of maize crop. Atrazine 50% WP at 2.0 kg a.i./ha also showed no phytotoxicity. Among all applications of herbicide, Atrazine 50% WP @ 1.0 kg a.i. /ha showed better control of weeds and gave at par results with all its higher doses. The higher doses of Atrazine 50% WP @ 1.5 kg a.i. /ha and 2.0 kg a.i. /ha recorded better grain and stover yield in comparison to lower doses and gave at par results with all its higher doses. No phytotoxicity in Maize was observed in any of the doses of the testing chemical Atrazine 50% WP

REFERENCES

Annonymous 2020. Agricultural Statistical at a Glance. Government of India. Ministry of Agriculture & Farmers Welfare, Department of Agriculture, Cooperation & Farmers Welfare, Directorate of Economics and Statistics (New Delhi) .

Gantoli G, Ayala VR and Gerhards R. 2013. Determination of the critical period for weed control in corn. *Weed Technology* **27**:63-71.

Gupta SK, Gc M and Purushottam. 2018. Efficacy of pre and post-emergence herbicide on weed control in Kharif maize (Zea mays L.). *International Journal of Chemical* .

Kandasamy S. 2017. Effect of Weed Management practices on weed control index, yield and yield components of sweet corn. *Journal of Agricultural Research* **2**(4):1-4.

Khan BM, Khan and Khan IA. 2003. Efficacy of different herbicides on the yield and yield components of maize. *Asian Network for Scientific Information* **3**(2):300-304.

Kumar R, Mishra JS, Kumar S, Rao KK, Hans H, Bhatt BP, Srivastava AK and Singh S. 2020. Evaluation of weed competitiveness of direct-seeded rice (Oryza sativa) genotypes under different weed management practices. *Indian Journal of Agricultural Sciences* **90**(5):914-918.

Pandey AK, Prakash V, Singh RD and Mani VP. 2001. Integrated weed management in mazie (Zea mays). *Indian Journal of Agronomy* **46**(2):260-265.

Patel VJ, Upadhyay PN and Bd P. 2006. Residual effect of herbicide applied as alone and mixture to kharif maize on succeeding Rabi oat and mustard. *Indian Journal of Weed* .

Ratta A, Vanderlip RL, Higgins RA and Feyerherm AM. 1991. Suitability of corn growth models for incorporation of weed and insect stresses. *Agronomy Journal* **83**:757-765.

Shantveerayya H and Agasimani CA. 2011. Effect of herbicides on weed control and productivity of maize (Zea mays L.). *Karnataka Journal of Agriculture Science* **25**(1):137-139.

Singh M, Tomar IS and Dudwe TS. 2015. Growth and yield of maize (Zea mays) as influenced by various weed management practices. *Maize Journal* **4**(1&2):46-49.

Triveni U, Patro SK and Bharathalakshmi M. 2017. Effect of different pre and post emergence herbicides on weed control, productivity and economics of maize. *Indian Journal of Weed Science* **49**(3):231-235.

Yadav RK, Kumawat N, Singh A, Tomar IS, Singh M, Morya J, Kumar R and Upadhyay PK. 2018. Bio-efficacy of new herbicides on weed dynamics, productivity and nutrient uptake in maize (Zea mays) under rainfed condition of Jhabua hills. *Indian Journal of Agricultural Sciences* **88**(7):1123-1128.

Citation:
Singh M, Kumar M, Tomar IS and Morya J. 2021. Evaluation of Atrazine 50% WP Herbicide for Weed Control in Maize of Jhabua Hills Zone of Madhya Pradesh. *Journal of AgriSearch* **8**(4): 311-317