The Pharma Innovation Journal 2021; SP-10(7): 132-136

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; SP-10(7): 132-136

www.thepharmajournal.com
Received: 01-05-2021
Accepted: 03-06-2021

JK Kutariye
Department of Natural Resource Management, Faculty of Agriculture, Mahatma Gandhi Chitrakoot Gramodaya Vishwa Vidyalaya, Chitrakoot, Satna, Madhya Pradesh, India

HS Kushwaha
Department of Natural Resource Management, Faculty of Agriculture, Mahatma Gandhi Chitrakoot Gramodaya Vishwa Vidyalaya, Chitrakoot, Satna, Madhya Pradesh, India

ML Kewat
Department of Agronomy, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh, India

Corresponding Author:
JK Kutariye
Department of Natural Resource Management, Faculty of Agriculture, Mahatma Gandhi Chitrakoot Gramodaya Vishwa Vidyalaya, Chitrakoot, Satna, Madhya Pradesh, India

Weed flora associated in soybean (*Glycine max* (L.) Merr.) under Kymore Plateau and Satpura hills of Madhya Pradesh

JK Kutariye, HS Kushwaha and ML Kewat

Abstract
A field experiment was conducted during *kharif* 2016 and 2017 at the Research Farm, Department of Agronomy, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.). The investigation was aimed to study of various weed flora found in soybean under Kymore Plateau & Satpura Hills Zone of Madhya Pradesh. The ten weed control treatments comprising of four doses of propaquizafop + imazethapyr mixture (47+66, 50+70, 53+74, 56+78 g/ha), sodium acifluorfen + clodinofop- propargyl mixture (165+80 g/ha), alone application of propaquizafop (75 g/ha) and imazethapyr (100 g/ha) as post emergence, hand weeding twice at 20 and 40 DAS, weed free and weedy check, were laid out in randomized block design with four replications. Different weed flora observed in experimental field were classified as monocot like *Echinochloa colona*, *Dinebra retroflexa*, *Cyperus rotundus*, *Cynodon dactylon* and dicots like *Eclipta alba*, *Mollugo pentaphylla*, *Alternanthera philoxeroides*. The study also indicated that the infestation was maximum by monocot weeds (74.62 and 75.12%) in comparison to dicot weeds (25.38 and 24.88%) in soybean. The higher relative density (33.09 and 33.46%) was reported in case of *Echinochloa colona* followed by *Dinebra retroflexa* (23.04 and 23.25%) respectively, which had highest among other weeds under Kymore Plateau & Satpura Hills Zone of Madhya Pradesh. Application of propaquizafop + imazethapyr mixture at 56+78 g/ha as post-emergence recorded lower dry weight of monocot weed (5.99 and 4.71 g/m2) and dicot weeds (2.77 and 2.35 g/m2) with 95.20 and 95.92% weed control efficiency being statistically at par with hand weeding twice and weed free plots during both *kharif* season 2016 and 2017.

Keywords: present status, soybean, weed flora, weed density, WCE

Introduction
Soybean is an important oilseed crop and plays a vital role in sustaining the oilseed production in India. Madhya Pradesh is known as soybean bowl of India, contributing about 65-70% of total soybean production in India. In the cultivation of crop, losses due to weeds are one of the major limiting factors. Weed compete with crop for light, moisture and nutrients during critical period of crop weed competition. Soybean is found very sensitive to early weed competition. First 30 days after sowing of soybean is critical with their respect to weed-crop competition. Soybean being a rainy season crop is heavily infested with many grasses and broad leaf weeds. It suffers a lot from a number of weeds such as *Trianthema portulacastrum*, *Digera arvensis*, *Digiteria sanguinalis*, *Echinochloa colona*, *Dactyloctenium aegyptium* (Kewat, 1998) [6]. Panda *et al.* (2015) [10] reported from Jabalpur that Grassy weeds were predominant (76.25%) in the experimental field as compared with broad leaved weeds (23.75%) however, *Echinochloa colona* (33.90%) and *Dinebra retroflexa* (23.90%) were predominant in soybean. The other weeds (*Cyperus rotundus*, *Cynodon dactylon*, *Alternanthera philoxeroides*, *Eclipta alba* and *Mollugo pentaphylla* were also present. Lal *et al.* (2017) [8] observed that experimental field of soybean was infested with monocot weeds like *Echinochloa colona* (29.28%), *Dinebra retroflexa* (35.85%), *Cyperus iria* (1.65%) and dicot weeds like *Euphorbia geniculata* (24.67%), *Phyllanthus niruri* (8.53%) and *Commelina benghalensis* (2.63%). If weed are not control in time, they caused yield reduction in the ranged of 58 to 85 per cent, depending upon the types and intensity of weeds (Kewat et al., 2000) [7]. Whereas, Gidesa and Kebede (2018) [4] recorded maximum seed yield reduction due to weed infestations (78.50%) in soybean. Due to change in climate and shift in agricultural practices, new species of weeds are also emerging as a threat for cultivation of soybean. Therefore, the present experiment was conducted to know the present status of weed flora in soybean under Jabalpur district of Kymore Plateau and Satpura Hills Zone of Madhya Pradesh.

Materials and Methods

A field experiment was conducted during *kharif* season of 2016 and 2017 at the Research Farm, Department of Agronomy, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.). The farm is situated under Kymore Plateau and Satpura hills of Northern Madhya Pradesh (23010' North latitude and 79056' East longitude at an altitude of 411.78 meters above mean sea level). Agro- ecological Jabalpur is characterized by humid and sub-tropical climate. The total amount of rainfall received during crop season of 2016-17 and 2017-18 was 1192.20 and 886.30 mm, respectively and it was equally distributed in 55 and 36 rainy days rainfall during two consecutive crop season. The soil of experimental field was Vertisol with neutral pH (7.1 and 7.3), medium in organic carbon
(0.60 and 0.62) and medium in available nitrogen (368 and 367 kg/ha) and medium in available phosphorus (15.64 and 15.72 kg/ha) and medium in available potassium (323.05 and 323.35 kg/ha). The experiment consisted 10 treatment replicated four times in Randomized Block Design. The treatment were four doses of Propaquizafop + Imazethapyr mixture (47+66, 50+70, 53+74, 56+78 g/ha), sodium acifluorfen + clodinofop-propargyl mixture (165+80 g/ha), alone application of propaquizafop (75 g/ha) and imazethapyr (100 g/ha) as post emergence, hand weeding twice at 20 and 40 DAS, weedy check and weed free. The recommended dose of fertilizer (RDF) for soybean was 20:60:20 kg N:P2O5 :K2O /ha which supplied through urea, single super phosphate and muriate of potash. The entire quantity of nitrogen, phosphorus and potassium were applied as basal in the furrow uniformly in all the treatments. Sowing of soybean variety JS 97-52 was done manually at the rate of 80 kg/ha using normal package of practices for soybean. Weeds were allowed to grow with Soybean. The observations on weeds were recorded species wise at 15 DAS which is the most critical period for crop weed competition. The observations on weeds were taken manually by using quadrat of 0.25 square meter (0.5 m x 0.5 m). Quadrat was randomly placed at four places in weed infested plots to calculate the weed indices. The different weed indices were worked out as per the formulas suggested by Walia (2009) [16]. Along with the relative density of individual weed was worked out as per formula proposed by Maszura *et al.* (2018) [9].

$$\text{Density/m}^2 = \frac{\text{Total number of individuals of species in all the quadrates}}{\text{Total number of weeds in quadrats plotted}}$$

The quadrat size 0.5 × 0.5 m2 is used, then value is multiply by 4 to get density/m2.

$$\text{Relative Density (\%)} = \frac{\text{Number of individuals of the same species}}{\text{Number of individuals of all species}} \times 100$$

Table 1: Status of weed flora associated with soybean at different years

Weed flora	Bhan and Kewat (2003) [1]	Singh and Rajkumar (2008) [14]	Upadhyay *et al.* (2012) [15]	Dubey *et al.* (2013) [3]	Panda *et al.* (2015) [10]	Sandil *et al.* (2015) [13]	Patidar *et al.* (2019) [12]	Patel *et al.* (2019) [11]
Echinochloa colona	-	+	+	+	+	+	+	+
Echinochloa crusgalli	+	-	-	-	-	-	-	-
Dinebra retroflexa	-	+	+	+	+	-	-	+
Cyperus iria	-	-	+	+	-	-	+	-
Cyperus rotundus	+	+	-	-	+	+	-	+
Cynodon dactylon	+	-	-	-	+	-	-	-
Eclipta alba	+	-	+	-	+	+	+	-
Commelina benghalensis	-	-	-	+	-	+	-	-
Commelina communis	+	-	-	-	-	-	-	-
Alternanthera philoxeroides	-	-	+	+	+	+	-	-
Ageratum conyzoides	+	-	-	-	-	-	-	-
Mollugo pentaphylla	-	+	-	-	+	-	+	+
Cyanotis auxiliaries	+	-	-	-	-	-	-	-
Cichorium intybus	+	-	-	-	-	-	+	-
Phyllanthus niruri	+	-	-	-	-	-	-	-
Phyllanthus urinaria	-	-	-	-	-	-	+	-
Parthenium hysterophorus	+	-	-	-	-	-	-	-
Lindernia ciliate	-	+	-	-	-	-	-	+

***** **+** sign denotes weed present and - sign denotes weed absent

Weed control efficiency (WCE) was calculated with the help of formula suggested by Das (2008) [2] and expressed in percentage:

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

Where, DMC is the dry matter of weeds in control plot and DMT is the dry matter of weeds in treated plot.

The data obtained during course of investigation were subjected to statistical analysis as outlined by Gomez and Gomez (1984) [5]

The treatment after mean were tested by using 'F' test and critical differences 5% probability.

Results and Discussion

Status of weed flora

Weed flora in experimental field, monocot weeds like *Echinochloa colona, Dinebra retroflexa, Cyperus rotundus, Cynodon dactylon* and dicot weeds like *Eclipta alba, Mollugo pentaphylla, Alternanthera philoxeroides* were observed at Jabalpur district of Kymore Plateau & Satpura Hills Zone of Madhya Pradesh.

Density and Relative density of weed

It is obvious from the data that the density (215.34 and 206.00 no./m2) and relative density (74.62 and 75.12%) of monocot weeds was higher in comparison to the dicot weeds (73.25 and 68.24 no./m2) and (25.38 and 24.88%) in soybean at Jabalpur district during both *kharif* season 2016 and 2017, respectively. However, the monocot weeds, *Echinochloa colona* (95.50 and 91.75 no./m2) and (33.09 and 33.46%) along with *Dinebra retroflexa* (66.50 and 63.75 no./m2) and (23.04 and 23.25%) were predominant in soybean. The other monocot weeds like *Cyperus rotundus* (35.17 and 33.00 no./m2) and (12.19 and 12.03%), *Cynodon dactylon* (18.17 and 17.50 no./m2) and (6.30 and 6.38%) along with dicot weeds like *Mollugo pentaphylla* (27.58 and 25.00 no./m2) and (9.56 and 9.12%), *Eclipta alba* (23.50 and 22.91 no./m2) and (8.14 and 8.35%) and *Alternanthera philoxeroides* (22.17 and 20.33 no./m2) and (7.68 and 7.41%) also marked their presence in lesser numbers during both *kharif* season in soybean
(Table 2). The similar results were also reported by Panda *et al.* (2015) [10].

Weed dry weight

Weed dry weight at 15 days after application (DAA) was recorded significantly lower in all the herbicidal treatments as compared to weedy check (control plot). Maximum dry weight of monocot weeds viz., *Echinochloa colona, Dinebra retroflexa, Cyperus rotundus, Cynodon dactylon* (157.87 and 150.04 g/m2) *fb* broad-leaf weeds like- *Eclipta alba, Alternanthera philoxeroides, Mollugo pentaphylla*
and 22.92 g/m2) were recoded under control plot, where weeds did not controlled by any means. But, there was identical reduction in the dry weight of weeds, when weed control treatments were adopted. Post-emergence application of the lowest dose of pre-mixture propaquizafop + imazethapyr (47+66 g/ha) caused appreciable reduction in dry weight of monocot weeds (21.99 and 19.69 g/m2) along
with dicot weeds (9.87 and 7.71 g/m2) as compared to sodium acifluorfen + clodinofop-propargyl (165+80 g/ha), propaquizafop (75 g/ha) and imazethapyr (100 g/ha) during both the years (Table 3). However, the dry weight of weeds was further arrested with corresponding increase in dose being lower monocot weeds (5.99 and 4.71 g/m2) and dicot weeds (2.77 and 2.35 g/m2) when it was applied at higher rate 56+78 g/ha and proved significantly superior over propaquizafop + imazethapyr (53+74 and 50+70 g/ha), sodium acifluorfen + clodinofop-propargyl (165+80 g/ha), propaquizafop (75 g/ha) and imazethapyr (100 g/ha) being at par to weed free and hand weeded plots during both the years (Table 3). The similar views were also endorsed by Panda *et al.* (2015) [10].

Table 2: Density and relative density of weeds in soybean during both *Kharif* season 2016 and 2017.

Weed flora	Density of weeds (no./m2)		Relative density (%)	
	2016	2017	2016	2017
Monocot weeds				
Echinochloa colona	95.50	91.75	33.09	33.46
Dinebra retroflexa	66.50	63.75	23.04	23.25
Cyperus rotundus	35.17	33.00	12.19	12.03
Cynodon dactylon	18.17	17.50	6.30	6.38
Sub-total	215.34	206.00	74.62	75.12
Dicot weeds				
Eclipta alba	23.50	22.91	8.14	8.35
Mollugo pentaphylla	27.58	25.00	9.56	9.12
Alternanthera philoxeroides	22.17	20.33	7.68	7.41
Sub-total	73.25	68.24	25.38	24.88
Total	288.59	274.24	100.00	100.00

Weed control efficiency

The weed control efficiency (82.55 and 84.16%) recorded when propaquizafop + imazethapyr was applied at the lowest dose (47+66 g/ha) caused significant increase during both the year. But, it was further increased with increase in dose of propaquizafop + imazethapyr at 50+70 g/ha (88.03 and 89.36%) being higher when it was applied propaquizafop + imazethapyr at 53+74 g/ha (92.04 and 93.19%) than sodium acifluorfen + clodinofop-propargyl mixture applied at 165+80 g/ha (80.23 and 81.87%) and alone application of imazethapyr at 100 g/ha (85.89 and 86.74%) along with propaquizafop at 75 g/ha (79.47 and 81.11%) in comparison to propaquizafop + imazethapyr mixture due to poor activity against weeds. However, application of propaquizafop + imazethapyr at its higher dose (56+78 g/ha) recorded higher weed control efficiency (95.20 and 95.92%) and found at par with hand weeding twice because it curbed the growth of monocot and dicot weeds and it was proved significantly superior

Table 3: Effect of weed control treatments on dry weight weeds and weed control efficiency during *kharif* 2016 and 2017.

Treatment	Dose(g/ha)	Monocot		*Dry weight of weeds (g/m2) at 15 DAA				WCE (%)	
				Dicot		Total weeds			
		2016	2017	2016	2017	2016	2017	2016	2017
T1 Propaquizafop + Imazethapyr	47+66	4.74 (21.99)	4.49 (19.69)	3.22 (9.87)	2.87 (7.71)	5.69 (31.85)	5.28 (27.40)	82.55	84.16
T2 Propaquizafop + Imazethapyr	50+70	3.92 (14.88)	3.66 (12.89)	2.73 (6.96)	2.45 (5.52)	4.73 (21.84)	4.35 (18.41)	88.03	89.36
T3 Propaquizafop + Imazethapyr	53+74	3.21 (9.81)	2.89 (7.83)	2.28 (4.71)	2.11 (3.95)	3.88 (14.52)	3.50 (11.78)	92.04	93.19
T4 Propaquizafop + Imazethapyr	56+78	2.55 (5.99)	2.28 (4.71)	1.81 (2.77)	1.69 (2.35)	3.04 (8.76)	2.75 (7.06)	95.20	95.92
T5 Sodium-acifluorfen + Clodinofop- propargyl	165+80	5.37 (28.35)	5.05 (24.98)	2.87 (7.72)	2.62 (6.38)	6.05 (36.07)	5.64 (31.36)	80.23	81.87
T6 Propaquizafop	75	4.42 (19.06)	4.12 (16.45)	4.35 (18.40)	4.09 (16.22)	6.16 (37.46)	5.76 (32.67)	79.47	81.11
T7 Imazethapyr	100	4.64 (20.99)	4.38 (18.68)	2.29 (4.76)	2.18 (4.25)	5.12 (25.75)	4.84 (22.93)	85.89	86.74
T8 Hand Weeding	20 & 40 DAS	1.03 (0.56)	0.95 (0.40)	0.92 (0.35)	0.81 (0.15)	1.19 (0.91)	1.02 (0.55)	99.50	99.68
T9 Weedy check	-	12.58 (157.87)	12.27 (150.04)	5.01 (24.61)	4.84 (22.92)	13.53 (182.48)	13.17 (172.96)	0.00	0.00
T10 Weed free	-	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	100.00	100.00
CD (p=0.05)	-	0.59	0.73	0.30		0.24	0.60	-	-

* Figures in parenthesis are the original values, DAA = Days after application

to all the herbicidal treatments as compared to weed free and two hand weeded plots, during both the years (Table 3). Excellent reduction in dry matter production of grassy, sedge and broad leaves weeds under former treatments could be assigned the reason for higher weed control efficiency under the former treatments. The similar results were also reported by Panda *et al.* (2015) [10] and Patel *et al.* (2019) [11].

Hence, the weed flora differed from the previously reported species as mention above. During the studies, it was also noticed that due to changing climatic conditions and alteration of agricultural practices, the weed flora once considered as minor are becoming major threat in the profitable cultivation of soybean. The dominance of weed flora over a crop after a certain period of time may adversely affect the crop as well as the environment.

Conclusion

It was concluded that *Echinochloa colona* was found as the most dominating weed in soybean followed by *Dinebra retroflexa* in Kymore Plateau & Satpura Hills Zone of Madhya Pradesh.

Acknowledgement

Authors greatly acknowledge, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh, India to provide all necessary facilities to conduct research trail.

References

1. Bhan M, Kewat ML. Activity and persistence of pendimethalin applied pre emergence to soybean in Vertisol. Annals of Agricultural Research 2003;24(4):970-972.
2. Das TK. Weed Science: Basics and Applications. Jain Brothers Publishers, New Delhi, India 2008.
3. Dubey M. Herbicidal weed management in soybean under Kymore Plateau and Satpura Hills Zone of Madhya Pradesh, India. World Research Journal of Tropical Agriculture. 2013;1(1):27-29.
4. Gidesa A, Kebede M. Integration effects of herbicide and hand weeding on grain yield of soybean (*Glycine max* (L.) Merr.) In Assosa, Western Ethiopia. Advances in Crop Science and Technology. 2018;6(5):400-445.
5. Gomez KA, Gomez AA. Statistical Procedures for Agricultural Research. John Wiley & Sons, New York, 1984.
6. Kewat ML. Direct and residual effect of herbicides on soybean-wheat sequence. Ph.D. thesis, Indian Agricultural Research Institute, New Delhi 1998, 173.
7. Kewat ML, Pandey J, Yaduraju NT, Kulshreshtha G. Economic and eco-friendly weed management in soybean. Indian Journal of Weed Science 2000;32(3-4):135-139.
8. Lal S, Dubey RP, Das GK, Suryavanshi T. Effect of sequential application of pre and post- emergence herbicides on weeds and productivity of soybean. In: Proceedings of Biennial Conference on "Doubling Farmers' Income by 2022: The role of Weed Science", 1-3 March, 2017, Udaipur. Indian Society of Weed Science, Jabalpur, India 2017, 126.
9. Maszura CM, Karim SMR, Norhafizah MZ, Kayat F, Arifulla M. Distribution, density and abundance of parthenium weed at Kuala Muda, Malaysia. International Journal of Agronomy, 2018, 8 pages, Article ID 1046214. https://doi.org/10.1155/2018/1046214
10. Panda S, Lal S, Kewat ML, Sharma JK, Saini MK. Weed control in soybean with propaquizafop alone and in mixture with imazethapyr. Indian Journal of Weed Science. 2015; 47(1):31-33.
11. Patel A, Spare N, Malgaya G. Bio-Efficacy of Post Emergence Herbicides against Weed control in Soybean. International Journal of Current Microbiology and Applied Sciences 2019;8(4):1964-1974.
12. Patidar Jitendra, Kewat ML, Jha AK. Present status of weed flora in soybean crop in Jabalpur district of Kymore Plateau and Satpura Hills Zone of Madhya Pradesh, India. The Pharma Innovation Journal 2019;8(7):717-

720.
13. Sandil MK, Sharma JK, Sanodiya P, Pandey A. Bio-efficacy on tank-mixed propaquizafop and imazethapyr against weeds in soybean. Indian Journal of Weed Science 2015;47(2):158-162.
14. Singh P, Rajkumar. Agro-Economic Feasibility of weed management in soybean grown in South-Eastern Rajasthan. Indian Journal of Weed Science 2008;40(1-2):62-64.
15. Upadhyay VB, Singh A, Rawat A. Efficacy of early post-emergence herbicides against associated weeds in soybean. Indian Journal of Weed Science 2012;44(4):73–75.
16. Walia US. Practical manual for agronomy-524s: Principles of weed control. Department of Agronomy, PAU, Ludhiana 2009, 18.