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Floristic composition of weeds as influenced by sowing time and herbicides in berseem

Pushpendra Singh Yadav*, M.L. Kewat, A.K. Jha, M.P. Sahu, Badal Verma, and Oscar Toppo

Department of Agronomy, College of Agriculture, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur 482 004, M.P., India

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ABSTRACT

The experiment conducted during *Rabi* season of 2020-2021 and 2021-2022at AICRP on Forage Crops, Department of Agronomy, College of Agriculture, Jabalpur (MP). The soil of the experimental field is sandy clay loam in texture, medium in organic carbon (0.61%), available nitrogen (365.20 kg N/ha) and phosphorus (17.97 kg P_2O_5/ha) but high in available potassium (308.12 kg K_2O/ha). The soil was nearly neutral in reaction (7.24 pH) and concentration of soluble salts (0.35 ds/m) is below to the harmful limit. Twenty treatments comprising of four dates of sowing viz., October 15th, October 30th, November 15th and November 30th as a main plots treatments and these were superimposed with five herbicidal weed control, i.e. Pyroxasulfone 125 g/ha as pre emergence, Pyroxasulfone 125 g/ha at 14 DAS, Oxyfluorfen 100 g/ha + Imazethapyr 15 g/ha after first cutting, Oxyfluorfen 100 g/ha + Imazethapyr 15 g/ha after first and second cutting and control as a sub plot treatments and laid out in a split plot design with three replications. Among the dicot weeds, *Medicagotruncatula* (37.48%), *Cichoriumintybus* (27.74%) were predominant. However, others weeds like *Cyprus rotundus* (13.79%), *Anagallisarvensis* (11.21%) *Chenopodium album* (9.78%) and *Cuscutarflexa* (5.59%)were present in Jabalpur.

***Key words**: Berseem, Herbicides, Relative density, Sowing time, Weed control*

Introduction

Berseem(*Trifolium alexandrinum* L.) is a one of the most important winter season leguminous fodder crop in India known as king of the fodder crop. It is well known green forage crop to stimulate milk production in dairy animals. Due to its excellent and quick re-growing ability and long durational nutritious green fodder availability (November to April), the crop is grown under irrigated condition (Kauthale *et al*., 2016). After Egypt and Pakistan, India is having the highest area under berseem cultivation (Muhammad *et al*., 2014). In India, it is grown in approximately 2 million hectares area (Pandey and Roy, 2011). The crop cultivated under irrigated condition provides highly palatable, succulent and nutritious green fodder (800-850 q/ha) in 5-6cuttings. It contains about 62 % total digestible nutrients and about 20-21% crude protein (Yadav *et al*., 2015). Fodder crops like berseem also affected by weeds, especially during early growth. Due to slow growth of crop, weeds adversely affect the crop growth and yield in berseem. Weeds compete with main crop for essential plant nutrients, light, moisture and space. They not only deteriorate fodder quality but also decrease fodder and seed yield. Weeds infestation decreases yields of fresh fodder and seed to the tune of 20 to 30% and 13 to 37% respectively (Vijay *et al*., 2017; Tyagi *et al*., 2018). Berseem suffers from strong crop weed competition at

initial 30-40 DAS, or at the time up to 1st cutting and resulted in low quality fodder. At later cuttings, the weeds are smothered by heavy branching and faster growth of berseem. Apart from these weeds like *Cichoriumintybus, Rumexdentatus* and *Sonchusasper* pose problems in harvesting of the berseem crop for seed. It is the major challenge to control the berseem weeds for enhancement of productivity and quality of fodder and seed yield. The problem of weeds in berseem is very much severe due tolack of appropriate weed control method. Therefore, It is utmost important to control the berseem weeds for enhancement of fodder and seed yield.

Materials and Methods

The experiment conducted during *Rabi* season of 2020-2021 and 2021-2022 at AICRP on Forage Crops, Department of Agronomy, College of Agriculture, Jabalpur (MP). The soil of the experimental field is sandy clay loam in texture, medium in organic carbon (0.61%), available nitrogen (365.20 kg N/ha) and phosphorus (17.97 kg P_2O_5/ha) but high in available potassium (308.12 kg K_2O/ha). The soil was nearly neutral in reaction (7.24 pH) and concentration of soluble salts (0.35 ds/m) is below to the harmful limit. Twenty treatments comprising of four dates of sowing viz., D1-October 15th, D2-October 30th, D3-November 15th and D4-November 30th as a main plots treatments and these were superimposed with five herbicidal weed control, i.e. W1-Pyroxasulfone 125 g/ha as pre emergence, W2-Pyroxasulfone 125 g/ha at 14 DAS, W3-Oxyfluorfen 100 g/ha + Imazethapyr 15 g/ha after first cutting, W4-Oxyfluorfen 100 g/ha + Imazethapyr 15 g/ha after first and second cutting and W5-control as a sub plot treatments and laid out in a split plot design with three replications. Berseem variety JB 05-9 was sown in the experimental field with recommended package of practices. Full doses of nitrogen (20 kg/ha), P_2O_5 (80 kg/ha) and K_2O (40 kg/ha) was applied as basal through urea, single super phosphate and muriate of potash. Different observations on weeds and crop parameters were recorded during the course of investigation. Dominant weed flora, species wise weed density and their dry weight was recorded under all the treatments at 30, 60 and 90 DAS. From this data the total weeds density and relative density was calculated

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

Results and Dscussion

Floristic composition

The dominant weeds in the experimental field were mainly comprised of weeds viz., *Chenopodium album, Cichoriumintybus*, *Medicagotruncatula*, *Cyprus rotundus*, *Anagallisarvensis* and *Cuscutareflexa*. It was evident from the mean data averaged over two seasons that there was predominance of dicot weeds as compared to monocot weed in berseem at Jabalpur (M.P.). Almost similar weed flora associated with berseem was also reported by Wasnik *et al*., 2020; Jha *et al*., 2014 and Kewat *et al*., 2005. Weeds observed during investigation were given in Table 1.

Weed density

Weed density of monocot as well as dicot weeds in weedy check plots at 30, 60 and 90 DAS is presented in Table 2. Among the dicot weeds, *Medicagotruncatula* (42.01/m^2) and *Cichoriumintybus* (31.10/m^2) were predominant as they presented in higher number in the experimental field. However, other weeds like *Cyprus rotundus, Anagallisarvensis, Chenopodium album* and *Cuscutareflexa* marked their presence in good numbers (15.46, 12.57, 10.96 and 6.63/m^2, respectively). These findings are in agreement with the findings of Gondal *et al*., 2021; Sahu and Tiwari, 2021 and Priyanka *et al*., 2017.

Relative density of weeds

Chenopodium album

The mean data of seasons (*Rabi* 2020-21 and 2021-22)

Table 1. Common weeds under experimental field

S. No.	Scientific Name	English Name	Family
1.	*Chenopodium album* L.	Common lambsquarter	Chenopodiaceae
2.	*Medicagotruncatula* Gaertn.	Barrel Clover	Fabaceae
3.	*Cyprus rotundus* L.	Purple nutsedge/ Mutha	Cyperaceae
4.	*Anagallisarvensis* L.	Scarlet pimpernel/ Krishnaneel	Primulaceae
5.	*Cuscutareflexa* Roxb.	Dodder/ Amar Bel	Cuscutaceae

pertaining to density of *Chenopodium album* as affected by different dates of sowing and weed control treatments at 60 DAS are depicted through Fig. 1. Among all dates of sowing, significantly minimum density of *Chenopodium album* was recorded when sowing was done on 15th October (8%) as compared to 30th October (11%), 15th November (12%) and 30th November (14%) at 30 DAS. The application of Oxyfluorfen 100 g/ha + Imazethapyr 15 g/ha applied after first cutting (55 DAS) significantly reduced the density of *Chenopodium album* (8%); also similar to Oxyfluorfen 100 g/ha + Imazethapyr 15 g/ha after first and second cutting (8%), it was statistically superior over the Pyroxasulfone 125 g/ha as early post emergence (10%), Pyroxasulfone 125 g/ha as pre emergence (14 %) and control treatment (15%).

Cihoriumintybus

The average of two seasons (*Rabi* 2020-21 and 2021-22) validate to density of *Cichoriumintybus* as affected by different dates of sowing and weed control treatments at 60 DAS are depicted through Figure 2. Among all dates of sowing, significantly minimum density of *Cichoriumintybus* was recorded when sowing was done on 15th October (12 %) as compared to delayed sowing 30th October (11 %), 15th November (11 %) and 30th November (11 %). The application of Oxyfluorfen 100 g/ha + Imazethapyr 15 g/ha after first and second cutting significantly reduced the density of *Cichoriumintybus* (12%), it gives similar results to Oxyfluorfen 100 g/ha + Imazethapyr 15 g/ha after first cutting (11%), but found significantly superior over Pyroxasulfone 125 g/ha as early post emergence (10%), Pyroxasulfone 125 g/ha as pre emergence (11%) and control plots (11%).

Medicagotruncatula

The average of two seasons (*Rabi* 2020-21 and 2021-22) validate to density of *Medicagotruncatula* as affected by different dates of sowing and weed control treatments at 60 DAS are depicted through Figure 3. Among all dates of sowing, significantly minimum

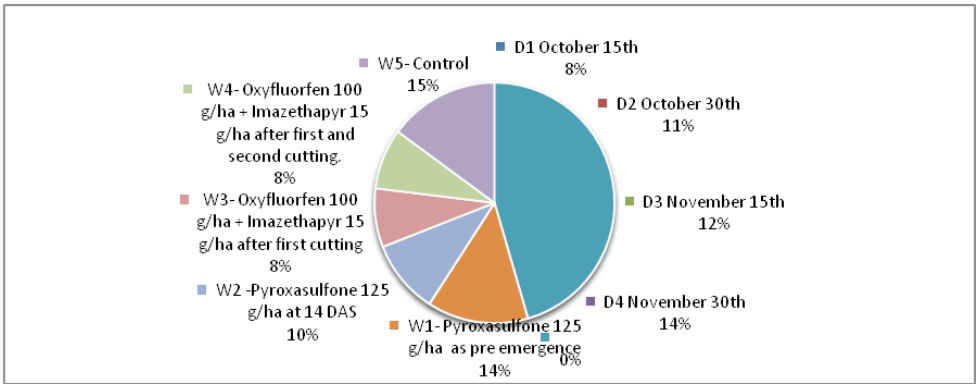

Fig. 1. Relative density of *Chenopodium album* at 60 DAS

Table 2. Weed density in weedy check plots at 30, 60 and 90 DAS in berseem (Mean data of two years)

	Weed density (no./m²)			
Weed flora	30 DAS	60 DAS	90 DAS	Mean
Monocot weds				
cyprusrotundus	8.96	17.74	19.69	15.46
Sub Total				15.46
Dicot weeds				
Chenopodium album	6.71	11.15	15.02	10.96
Cichoriumintybus	17.74	32.11	43.46	31.10
Medicagotruncatula	25.15	45.32	55.57	42.01
Cuscutareflexa (threads)	0.00	7.46	12.44	6.63
Anagallisarvensis L.	5.92	14.23	17.55	12.57
Sub Total				103.27
Grand Total				118.74

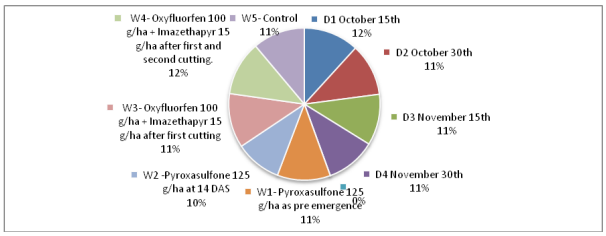

Fig. 2. Relative density of *Cichoriumintybus* at 60 DAS

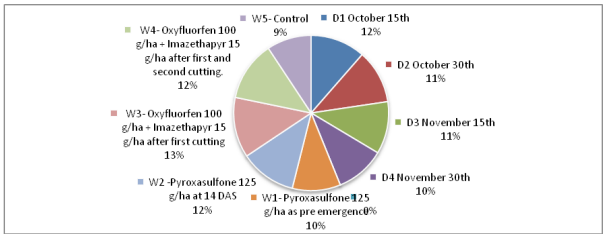

Fig. 3. Relative density of *Medicagotruncatula* at 60 DAS

density of *Medicagotruncatula* was recorded when sowing was done on 15th October (12%) as compared to delayed sowing 30th October (11%), 15thNovember (11%) and 30th November (10%). The application of Oxyfluorfen 100 g/ha + Imazethapyr 15 g/ha after first and second cutting significantly reduced the density of *Cichoriumintybus* (12%), it gives similar results to Oxyfluorfen 100 g/ha + Imazethapyr 15 g/ha after first cutting (13%), but found significantly superior over Pyroxasulfone 125 g/ha as early post emergence (12%), Pyroxasulfone 125 g/ha as pre emergence (10 %) and control plots (9 %).

Cyprus rotundus

The average of two seasons (*Rabi* 2020-21 and 2021-22) validate to density of *Cyprus rotundus* as affected by different dates of sowing and weed control treatments at 60 DAS are depicted through Figure 4. Among all dates of sowing, significantly minimum density of *Cyprus rotundus* was recorded when sowing was done on 15th October (15%) as compared to delayed sowing 30th October (12%), 15thNovember (11%) and 30th November (11%). The application of Oxyfluorfen 100 g/ha + Imazethapyr 15 g/ha after first and second cutting significantly reduced the density of *Cichoriumintybus* (12%), it gives similar results to Oxyfluorfen 100 g/ha + Imazethapyr 15 g/ha after first cutting (11%), but found significantly superior over Pyroxasulfone 125 g/ha as early post emergence (11%), Pyroxasulfone 125 g/ha pre emergence (10%) and control plots (11%).

Anagalisarvensis

The average of two seasons (*Rabi* 2020-21 and 2021-22) validate to density of *Anagalisarvensis* as affected by different dates of sowing and weed control treatments at 60 DAS are depicted through **Figure 5**. Among all dates of sowing, significantly minimum density of *Anagalisarvensis* was recorded when sowing was done on 15th October (11%) as compared to delayed sowing 30th October (11%), 15thNovember (11%) and 30th November (12%). The application of Oxyfluorfen 100 g/ha + Imazethapyr 15 g/ha after first and second cutting significantly reduced the density of *Cichoriumintybus* (9%), it gives similar results to Oxyfluorfen 100 g/ha + Imazethapyr 15 g/ha after first cutting (9%), but found significantly superior over Pyroxasulfone 125 g/ha as early post emergence (13%), Pyroxasulfone 125 g/ha as pre emergence (12%) and control plots (12 %).

Cuscutareflexa (threads)

The average of two seasons (*Rabi* 2020-21 and 2021-

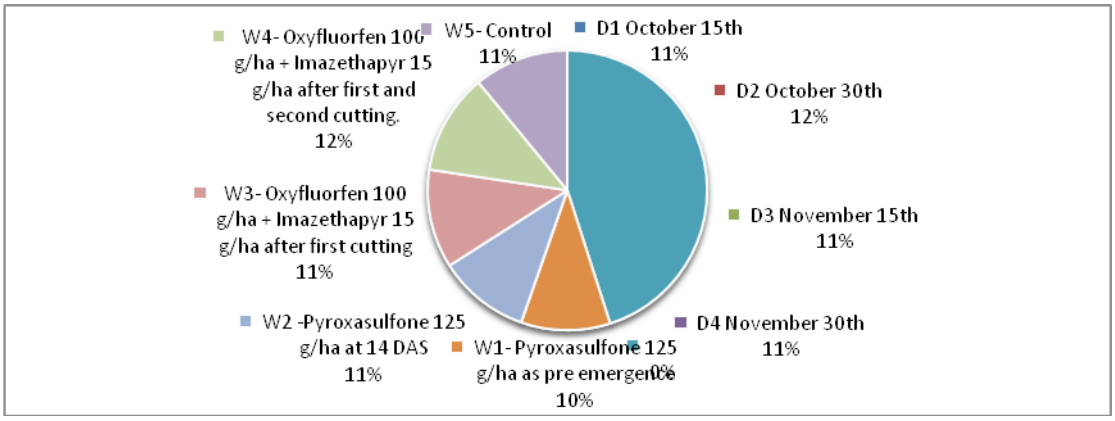

Fig. 4. Relative density of *Cyprus rotundus* at 60 DAS

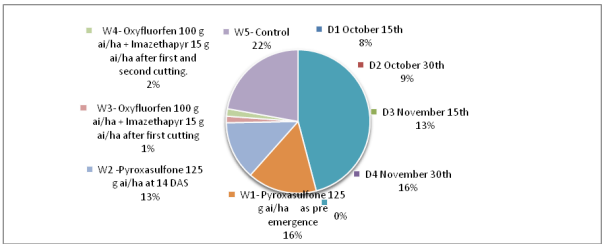

Fig. 6. Relative density of *Cuscutareflexa* at 60 DAS

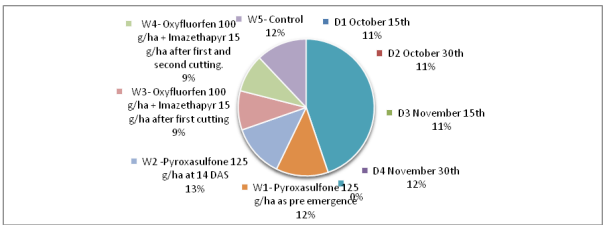

Fig. 5. Relative density of *Anagalisarvensis* at 60 DAS

22) validate to density of *Cuscutareflexa* (threads) as affected by different dates of sowing and weed control treatments at 60 DAS are depicted through Figure 6. Among all dates of sowing, significantly minimum density of *Cuscutareflexa* (threads) was recorded when sowing was done on 15th October (8%) as compared to delayed sowing 30th October (9%), 15th November (13%) and 30th November (16%). The application of Oxyfluorfen 100 g/ha + Imazethapyr 15 g/ha after first and second cutting significantly reduced the density of *Cichoriumintybus* (2%), it gives similar results to Oxyfluorfen 100 g/ha + Imazethapyr 15 g/ha after first cutting (1%), but found significantly superior over Pyroxasulfone 125 g/ha as early post emergence (13%), Pyroxasulfone 125 g/ha as pre emergence (16%) and control plots (22%).

Conclusion

It was concluded that 15th October sowing time and application of herbicidal application of oxyfluorfen 100 g/ha + imazethapyr 15 g/ha applied after first cutting is most suitable for the effective control of monocot as well as dicot weeds with the higher growth and productivity in berseem crop.

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