

Effect of pre and post-emergence herbicides on *echinocloa colona* infestation in groundnut (*Arachis hypogaea* L.)

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Abstract

Groundnut is highly susceptible to weed infestation because of its slow growth in the initial stages up to 40 DAS, short plant height and underground pod bearing habit. Unlike other crops, weeds interfere with pegging, pod development and harvesting of groundnut during different stages of crop growth besides competing for essential resources. In view of these facts, present experiment entitled “Effect of pre and post-emergence herbicides on *Echinochloa colona* infestation in groundnut (*Arachis hypogaea* L.)” was carried out at Agronomy Research farm, CCS HAU, Hisar during Kharif season 2019. The experiment comprising sixteen treatments was laid out in randomized block design with three replications. The results of the experiment indicated that any different herbicides either applied as pre or post-emergence showed pod yield was significantly and higher pod yield was obtained under weed free treatment (2490 kg/ha), which was significantly at par with imazethapyr + pendimethalin (RM) 1000 g/ha with one hoeing at 30 DAS (2385 kg /ha) and imazethapyr + pendimethalin (RM) 1500 g/ ha (2370 kg/ ha). Among herbicide, minimum pod yield (1360 kg/ha) was recorded with use of Imazethapyr+quizalofop (70+50) g/ha which was even higher than weedy check.

Key words: Groundnut, herbicides, pod yield, infestation

Introduction

Groundnut or peanut (*Arachis hypogaea* L.) is also known as the ‘king’ of all oil seeds, is one of the supreme food as well as cash crop of our country. Groundnut is well accepted under the name *wonder nut* and *poor men’s cashew nut*. The nut plays a vital role as resource in the dietary requirement of poor women and children. (Naim *et al.*, 2011). It is also known as peanut, earthnut, monkey nut or goobers. The crop is well grown in both tropical, sub-tropical regions and in the continental part of temperate countries. India stands first in terms of area and second in production rate after China. In India, the total area under groundnut crop is of 4.91 m ha with a total production of 9.18 m tonne and productivity of 1868 kg ha⁻¹ (Anonymous, 2018). The major groundnut growing states of India are Gujarat (42.88%), Rajasthan (13.72%), Andhra Pradesh (11.43%), Tamil Nadu (10.61%), Karnataka (6.08%). In terms of area,

more than 80% of groundnut crop is grown in the *kharif* season. It is a rich source of protein (26%) and being an oil seed crop, it constitutes of 40 to 49 % of oil (Saturated 7%, Mono unsaturated 24% and Polyunsaturated 16%), so it is one of the most important crops for producing edible oil. The oil is composed of mixed glycerides and a very high proportion of unsaturated fatty acids, particularly, oleic (50-65%) and linoleic (18-30%) (Naim *et al.* 2010). Moreover, it is also a huge source of calcium, phosphorus, iron, zinc and boron. Groundnut also encompasses two vitamins namely, Vitamin E and Vitamin B. It also serves as a valuable crop for crop rotation and hence, improves the fertility of soil. The crop is also highly valued for its high calorie content (calorific value of 567) Groundnut is highly susceptible to weed infestation because of its slow growth in the initial stages up to 40 DAS, short plant height and

underground pod bearing habit. Unlike other crops, *Echinochloa colona* interfere with pegging, pod development and harvesting of groundnut during different stages of crop growth besides competing for essential resources. Weed infestation is one of the prominent factors for the reduction in crop yield.

Materials and methods

The study was conducted entitled “Effect of pre and post-emergence herbicides on *Echinochloa colona* infestation in groundnut (*Arachis hypogaea* L.)” at main experimental Research farm of Agronomy, CCS Haryana Agriculture University, Hisar under irrigated condition. Sowing was done on 24-06-2019 during *kharif* season 2019. The experiment comprising sixteen treatments was laid out in randomized block design with three replications.

Treatments consisted of weed management viz., were imazethapyr + pendimethalin (RM) at 1000 g/ha, 1250 g/ha, 1500 g/ha and 1000 g/ha with one hoeing at 30 DAS, pendimethalin at 1000 g/ha and 1000 g/ha with one hoeing at 30 DAS, as imazethapyr at 70g/ha and 70g/ha with one hoeing at 30 DAS, imazethapyr + imazamox (RM) at 70g/ha, imazethapyr

+ imazamox (RM) at 70g/ha pre-emergence with one hoeing at 30 DAS and imazethapyr + quizalofop 70+50 g/ha, imazethapyr + imazamox (RM) + quizalofop 70+50 post-emergence, Two hoeing and compared with weed free and weedy checks

Post emergence herbicides were applied at 20 DAS (2-3 leaf stages of weeds) by knapsack sprayer fitted with flat fan nozzle using with 375 liter/ha. Groundnut crop was harvesting on last week in October. Crop was raised according to package of practices of CCS HAU, Hisar. Observation of *echinochloa colona* density were recorded at 30, 60 and 90 DAS by using quadrant of 0.5 x 0.5 m² and then those values were converted to per m².

Results and discussion

Density of *Echinochloa colona* (no./m²):

Weed free plots were an unbroken weed free throughout the crop season so weed density in weed free treatment taken as zero. Weedy check plots recorded the maximum weed density irrespective of the stages of crop growth. All the weed management treatments had considerably reduced the weed population at varied stages of crop growth as compared

Table 1: Effect of different herbicide treatments on density (no./m²) of *Echinochloa colona* at different crop growth stages and Pod yield (kg/ha)

S.No.	Herbicides	Dose (g/ha)	Time of application	Density of <i>Echinachloa colona</i> (no./m ²)			Pod yield (kg/ha)
				30DAS	60DAS	90DAS	
1	Imazethapyr +pendimethalin(RM)	1000	PRE	1.24(0.67)	3.06(8.67)	3.02(8.33)	2265
2	Imazethapyr +pendimethalin (RM)	1250	PRE	1.24(0.67)	2.67(6.33)	2.84(7.33)	2310
3	Imazethapyr + pendimethalin (RM)	1500	PRE	1.00(0.00)	2.49(5.33)	2.83(7.00)	2370
4	Imazethapyr +pend imethalin (RM) <i>fb</i> one hoeing	1000	PRE,30DAS	1.00(0.00)	2.24(4.33)	2.70(6.67)	2385
5	Pendimethalin	1000	PRE	2.99(8.33)	4.55(20.33)	4.58(21.67)	1980
6	Pendimethalin <i>fb</i> one hoeing	1000	PRE,30DAS	1.14(0.33)	3.87(14.33)	4.14(16.33)	2070
7	Imazethapyr	70	PRE	3.12(9.00)	5.44(28.67)	5.12(25.67)	1370
8	Imazethapyr +Imazamox (RM)	70	PRE	3.46(11.00)	5.88(30.33)	5.36(28.00)	1680
9	Imazethapyr <i>fb</i> oneHoeing	70	PRE	1.38(1.00)	3.90(14.67)	4.72(22.33)	1530
10	Imazethapyr+ imaz amox(RM) <i>fb</i> one hoeing	70	PRE,30DAS	1.38(1.00)	3.72(13.67)	4.59(21.33)	1590
11	Imazethapyr +Quizalofop	70	POST	4.92(24.00)	4.16(16.67)	5.40(29.67)	1360
12	Imazethapyr +imaz amox (RM)+quizalofop	70+50	POST	4.97(24.33)	4.24(17.33)	5.20(26.67)	1440
13	Acifluorfen +clodinafop	305	POST	4.81(23.00)	4.11(16.33)	5.13(26.33)	1530
14	Two hoeing		25DAS&45DAS	1.72(2.00)	3.59(12.00)	4.91(23.33)	1860
15	Weed free			1.00(0.00)	1.00(0.00)	1.00(0.00)	2490
16	Weedy check		-	5.00(24.67)	8.33(68.67)	7.11(50.67)	1205
	S.Em±			0.34	0.31	0.43	69.06
	LSD(P=0.05)			0.97	0.90	1.26	200.43

to the weedy check. Density of *Echinochloa colona* was the minimum under all the treatments as compared to weedy check.

The minimum and the maximum density of *E. colona* was reported from weed free and weedy check, respectively at all the growth stages of crop. Among different herbicidal treatments (At 30 DAS), no weed population of *E. colona* was recorded in treatments where imazethapyr + pendimethalin (RM) was applied as pre-emergence @ 1000 g ha⁻¹ fb one hoeing at 30DAS and imazethapyr + pendimethalin (RM) PRE @ 1500 g ha⁻¹ which was significantly at par with imazethapyr + pendimethalin (RM) PRE @ 1000 g ha⁻¹ (0.67 /m²), imazethapyr + pendimethalin (RM) PRE @ 1250 g ha⁻¹ (0.67 /m²), pendimethalin @ 1000 g ha⁻¹ applied as pre fb one hoeing at 30DAS (1.00 /m²) and imazethapyr + imazamox @ 1000 g ha⁻¹ fb one hoeing at 30 DAS (1.00 /m²). At 60 and 90 DAS, the minimum weed density (4.33 and 6.67 /m², respectively) was found in treatment imazethapyr + pendimethalin (RM) was applied as pre-emergence @ 1000 g ha⁻¹ fb one hoeing at 30 DAS which was at par with all the treatments in which imazethapyr + pendimethalin (RM) was applied as pre-emergence (Table 1).

Pod yield (kg/ha):

It is observed from the data that herbicidal treatments on groundnut significantly influenced the pod yield. Significant differences were observed in pod yield of groundnut due to various weed control treatments. Weed free treatment provided a favorable environment registered the maximum pod yield (2490 kg ha⁻¹). An increased pod yield of 1285 kg ha⁻¹ over weedy check was obtained with free. Results revealed that the pod yield (kg ha⁻¹) among various treatments ranged from 1205 to 2490 kg ha⁻¹. The table further indicated that crop grown under weed free conditions had the highest pod yield (2490 kg/ha), though it remained at par with that grown in imazethapyr + pendimethalin (RM) fb one hoeing 1000 g ha⁻¹ (2385 kg ha⁻¹) as pre at 30 DAS and imazethapyr + pendimethalin (RM) 1500 g ha⁻¹ (2370 kg ha⁻¹) as pre

while the lowest pod yield (1360 kg ha⁻¹) was recorded with imazethapyr 70 g ha⁻¹ and imazethapyr+ quizalofop 70+50g ha⁻¹ applied as post i.e. 1370 and 1360 kg ha⁻¹. These results were in close conformity with Mahajan et al. (2020) and Singh et al. (2017).

Conclusion

Thus, it may be concluded that pre-emergence application of imazethapyr + pendimethalin (RM) @ 1000 g ha⁻¹ fb one hoeing at 30 DAS is most effective in control of weed density of *echinochloa colona* and provided the highest pod yield in groundnut.

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