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EVALUATION OF DOSES OF NEW HERBICIDE FLUAZIFOP-P-BUTYL 13.4 EC FOR GRASSY WEEDS MANAGEMENT IN IRRIGATED GROUNDNUT

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ABSTRACT
An experiment was conducted to study the effect of new graminicides fluazifop-p-butyl 13.4 EC and quizalofop-p-butyl on growth and yield of groundnut in relation to unsprayed control, hand weeding, pendimethalin and imazethapyr. The new graminicides fluazifop-p-butyl at 134 g, 167 g ai/ha and quizalofop-p-butyl 50 g ai/ha (at 20 DAS) lowered the density and growth of grasses (6.3, 4.3 and 6.0 number/m^2) considerably as compared to other treatments. All herbicide treatments recorded the significantly higher nutrient uptake in groundnut as compared to unweeded control whereas, unweeded control lowered the nutrient uptake of groundnut by 44% as compared to hand weeding. The total dry matter production per plant found highest in the treatments Fluazifop-p-butyl 167 g ai/ha (23.5 g) and imazethapyr 100 g ai/ha @ 20 DAS (22.8 g) as compared to other treatments.Fluazifop-p-butyl 134 and 167 g ai/ha gave pod yield (1681 and 1542 kg/ha) similar to that of hand weeding (1655 kg/ha) and was on par with imazethapyr 100 g ai/ha @ 20 DAS (1577 kg/ha), pendimethalin 750 g ai/ha @ 3 DAS (1528 kg/ha) and quizalofop-p-ethyl 50 g ai/ha (1485 kg/ha). Unweeded control lowered the pod yield by 56% (720 kg/ha) as compared to hand weeding. The net return and B: C ratio were higher in fluazifop-p-butyl 167 g ai/ha (Rs. 37,350 and Rs. 1.25) than hand weeding (Rs. 33,010 and Rs. 0.99). for management of weeds in groundnut, the new post-emergence herbicides namely fluazifop-p-butyl 13.4 EC at 134 g ai/ha, quizalofop-p-ethyl 5 EC at 50 g ai/ha (both graminicide at 20 DAS for control of grasses) and imazethapyr 10 SL at 100 g ai/ha (20 DAS, for broad spectrum weed control) appeared good from the point of yield and economics.

INTRODUCTION

Groundnut is an important oilseed cum leguminous crop in India, but its yield is unpredictable (Bhan and Sing 1993) and it has indeterminate growth habit, hence growth and development of reproductive and vegetative organs overlap, this causes low fruiting efficiency due to inter-organ competition for photo-assimilates and other metabolites(Pushp Sharma AND Virender Sardana, 2012) along with this weed competition for growth factors drastically reduces the yield of groundnut. One of the major factors responsible for low productivity of groundnut is the improper management of weeds. Groundnut is grown extensively during *Kharif* season under rainfed condition, where it encounters severe weed infestation especially in the early stages. Weeds–the essential component of agro-ecosystems, interfere with crops and lead to enormous crop losses (). The critical period of weed competition is found to be the first four to eight weeks after sowing (Subbaiah *et al*., 1997 and Jat *et al*., 2011). Groundnut crop is highly susceptible to weed infestation particularly grasses because of its slow growth in the initial stages up to 40 days (Senthil Kumar 2004), short plant height and underground pod bearing habit. Uncontrolled weed growth reduce groundnut yield to the tune of 76% (Gnanamurthy and Balasubramaniyan, 1998). In agriculture, labour component is becoming scarce, not available at time and prohibitive cost. Chemical control of weeds forms an excellent alternative to manual weeding. However, pre-emergence application of herbicide may allow the emergence of weeds especially grasses after 25-30 days (Jat *et al*., 2011). At present, many farmers demand post-emergence herbicides for managing weeds, after seeing their menace and other methods could not limit the weeds' growth. Hence, the present study was, initiated during *Kharif* 2011 at Hebbal, Bangalore to evaluate the performance of graminicides in relation to pre-emergent Herbicides.

MATERIALS AND METHODS

A field study was conducted during *Kharif* 2011, on red sandy loam soil of Hebbal, Bengaluru coming under Eastern Dry Zone of University of Agricultural Sciences, Bengaluru. The soil type was sandy loam with pH of 6.60, average fertility status of 0.65% OC, available N of 228.0 kg/ha, available P_2O_5 of 24.3 kg/ha and K_2O of 170.0 kg/ha. The experiment was laid out with eight treatments replicated four times in a randomized block design. The weed management practices evaluated were fluazifop-p-butyl 13.4 EC 100 to 167 g ai/ha, imazethapyr 10 SL 100 g ai/ha, quizalofop-p-ethyl 5 EC at 50 g ai/ha (all applied at 20 DAS), pendimethalin 750 g ai/ha (3 DAS), hand weeding (20 and 35 DAS) and unweeded control. The groundnut cv. TMV-2 was sown at a spacing of 30 cm X

15 cm on 31st of July. Pendimethalin was applied three days after sowing, where as fluazifop-p-butyl, imazethapyr and quizalofop-p-ethyl were applied 20 DAS. Pre-emergent herbicides was sprayed on three days after sowing using a spray volume of 750 litre/ha, while post-emergent herbicides were sprayed on 20 DAS coinciding with 2 to 3 leaf stage of grasses using a spray volume of 500 lit/ha.

RESULTS AND DISCUSSION

Grassy weed flora, growth and Nutrient uptake

Major grassy weed flora observed in the experimental plots were *Echinochloa colona, Digitaria marginata, Eleusine indica, Dactyloctenium aegyptium and Cynodon dactylon*. Application of fluazifop-p-butyl at 100 g to 167 g ai/ha @ 20 DAS lowered the grassy weeds' density from 40 DAS till harvest and compared similarly to quizalofop-p-ethyl 50 g ai/ha and post-emergence imazethapyr 100 g ai/ha @ 20 DAS. All these herbicides compared similar to pre-emergence herbicide, pendimethalin 750 g ai/ha from the initial stage as also reported by Dubey *et al*. (1988), Vinthicks *et al*. (1990) and Maurya *et al*. (1990). Use of fluazifop-p-butyl at 167 g ai/ha @ 20 DAS lowered the density and dry weight of grassy weeds (Table 2) throughout crop growth stages indicating its selective effectiveness on the grasses especially *Digitaria marginata, Dactyloctenium aegyptium, Cynodon dactylon* and *Eleusine indica*. The effectiveness of fluazifop-p-butyl at 134 to 167 g ai/ha @ 20 DAS was relatively better in lowering the density of *C. dactylon* and *D. marginata* during initial stage up to 55 DAS as compared to quizalofop-p-ethyl 50 g ai/ha @ 20 DAS. However, both graminicides behaved similarly in managing grassy weeds subsequently. Similar results were also reported by Kavani *et al*. (1986), Girichar and Boswell (1989), Shishodia *et al*. (1988), Jayaram (2001) and Jat *et al*. (2011).

Total nutrient uptake of nitrogen, phosphorus and potassium was significantly higher (1.6 to 1.8 times higher) in hand weeding as compared to unweeded control, but it was on par with fluazifop-p-butyl at 167 g ai/ha, fluazifop-p-butyl at 134 to 167 g ai/ha and imazethapyr 100 g ai/ha . The higher nutrient uptake by crop in these treatments was due to lower weed population and dry weight which helped the crop to grow luxuriantly in weed free environment and absorb more nutrients from the soil. The results of this study are confirmed by the earlier studies of Jat *et al*. (2011) in groundnut. The significantly higher nutrient uptake by weeds was noticed in unweeded control (N, P_2O_5, K_2O) due to more weeds' density and dry weight (Table 2). Similarly, increase in nutrient uptake by weeds due to increase in weed population was also reported by Murthy *et al*. (1992) and Nimje (1992) in groundnut, confirming the present study.

Yield and Economics

Use of fluazifop-p-butyl 134 to 167 g ai/ha @ 20 DAS gave pod yield (1542 to 1681 kg/ha) similar to that of hand weeding (1655 kg/ha), and was on par with imazethapyr 100 g ai/ha @ 20 DAS (1577 kg/ha), pendimethalin 750 g ai/ha @ 3 DAS (1528 kg/ha) and quizalofop-p-ethyl 50 g ai/ha @ 20 DAS (1485 kg/ha). All growth components leaf area index, total dry matter/plant and yield components number of pods/plant were higher in herbicides treatments due to lowered weeds' density

Table 1: Influence of weed management practices on Grassy weeds' density (No. /m²), dry weight (g/m²) and Yield of groundnut

Weed management practices, g ai/ha	Grassy weed density (No/m²)		Grassy weed dry weight (No/m²)		Pod yield (kg/ha)	LAI	Filled pods/ plant	Total dry weight / plant (g)At harvest
	22 DAS	75 DAS	22 DAS	75 DAS				
T1: Fluazifop-p-butyl 13.4 EC at 100 g-20 DAS	1.41 (28.0)#	1.14 (12.0)#	1.40 (23.3)#	0.83 (4.9)#	1273	2.45	20.8	18.0
T2 : Fluazifop-p-butyl 13.4 EC at 134 g -20 DAS	1.40 (30.7)	0.92 (6.3)	1.44 (25.9)	0.54 (1.4)	1542	2.90	23.5	21.0
T3: Fluazifop-p-butyl 13.4 EC at 167 g -20 DAS	1.57 (37.3)	0.79 (4.3)	1.52 (31.8)	0.50 (1.2)	1681	3.16	25.0	23.5
T4 : Imazethapyr 10 SL at 100 g -20 DAS	1.86 (72.0)	1.05 (9.3)	1.65 (43.9)	0.74 (3.7)	1577	2.97	23.7	22.8
T5 : Pendimethalin 30 EC at 750 g -3 DAS	1.09 (11.7)	1.15 (12.3)	0.77 (3.9)	0.82 (4.7)	1528	2.07	21.9	20.9
T6 : Quizalofop-p-ethyl 5 EC at 50 g -20 DAS	1.32 (27.3)	0.89 (6.0)	1.38 (22.5)	0.87 (5.5)	1485	2.87	21.0	19.9
T7 : Hand weeding (20 and 35 DAS)	0.84 (5.3)	0.82 (4.7)	0.60 (2.1)	0.57 (1.7)	1655	3.31	27.3	23.2
T 8: Unweeded control	1.70 (48.7)	1.55 (34.0)	1.59 (38.2)	1.74 (53.7)	720	2.01	10.1	12.9
SEm ±	0.11	0.05	0.06	0.04	106.94	0.23	1.6	3.5
CD at 5 %	0.32	0.14	0.19	0.12	324.4	0.69	4.9	1.1

- Data within parentheses are original values; data analyzed using log(x+2) transformation , NA- Not analysed, DAS - Days after sowing

Table 2: Nutrient uptake by plants and weeds and economics as influenced by weed management practices

Weed management practices, g ai/ha	Uptake by groundnut crop (kg/ha)			Uptake by weeds (kg/ha)			Net return (Rs/ha)	B:C ratio
	N	P_2O_5	K_2O	N	P_2O_5	K_2O		
T1: Fluazifop-p-butyl 13.4 EC at 100 g -20 DAS	72.4	11.3	30.9	16.4	6.2	16.4	22,030	0.76
T2 : Fluazifop-p-butyl 13.4 EC at 134 g -20 DAS	78.0	13.9	33.2	14.1	5.8	14.1	32,290	1.10
T3: Fluazifop-p-butyl 13.4 EC at 167 g -20 DAS	79.8	14.7	35.1	13.5	4.6	13.9	37,350	1.25
T4 : Imazethapyr 10 SL at 100 g -20 DAS	78.9	14.1	35.2	13.0	4.4	13.5	33,465	1.13
T5 : Pendimethalin 30 EC at 750 g -3 DAS	77.5	13.4	32.9	15.1	5.7	14.6	32,605	1.14
T6 : Quizalofop-p-ethyl 5 EC at 50 g -20 DAS	75.1	12.1	31.5	15.6	6.1	15.8	29,544	0.99
T7 : Hand weeding (20 and 35 DAS)	80.7	15.1	35.8	10.6	2.7	10.9	33,010	0.99
T 8: Unweeded control	43.2	8.4	20.3	28.5	10.1	28.6	1,660	0.06
SEm ±	1.2	0.4	0.9	0.8	0.5	0.8	NA	NA
CD at 5 %	3.5	1.2	2.7	2.4	1.6	2.3		

and dry weight. Unchecked weed growth lowered the leaf area/plant which consequently lowered dry matter production/ plant, number of filled pods/plant, pod yield/plant (Table 1) thus weed competition lowered seed yield by 56% as compared to hand weeding due to reduced plant growth and yield components, lowered nutrient uptake by the crop, as also revealed by Chandolia *et al*. (2010) and Jayaram Reddy (1995).

The net return and B: C ratio were higher in fluazifop-p-butyl 167 g ai/ha- 20 DAS (Rs. 37,350/ha and Rs. 1.25/rupee investment) than hand weeding (Rs. 33,010/ha and Rs. 0.99/ rupee investment) (Table 2). This clearly suggested that use of herbicides with good weed control will be cheaper as compared to manual weeding, which is expensive as also reported by Anon. (2011) in groundnut.

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