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EFFECT OF IMAZETHAPYR ON WEED CONTROL IN IRRIGATED GROUNDNUT

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ABSTRACT

Field experiments were carried out to study the effect of imazethapyr on weed control and the yield of groundnut. Four rates of imazethapyr (50, 75, 100 and 150 g ha^{-1}) and two times of applications (pre-emergence and early post-emergence) were studied. pre-emergence application of imazethapyr 100g effectively controlled weeds and recorded the highest pod yield which was 124 per cent higher than unweeded control. It recorded the highest net return and the benefit cost ratio. It was economical to manual weeding. Early post-emergence application was ineffective.

Weeds cause a serious problem in groundnut crop at all stages of its development as it has poor competing ability. The losses in yield of groundnut due to weed infestation have been reported to be more than 50 per cent (Kulkarni et al., 1963; Mani et al., 1969).

The traditional method of hand weeding is time consuming, laborious, uneconomical and sometimes totally impossible owing to scarcity of labour or monsoon rains. These difficulties can be overcome by using herbicides. Many herbicides have been developed and tested but most of them failed to control **Cyperus rotundus**. A newly developed herbicide, imazethapyr [5-ethyl-2-(4-isopropyl-4-methyl-5-oxo-2-imidazolin -2-yl) Nicotinic acid] was reported to be highly selective and efficient in controlling **Cyperus rotundus** in addition to other weeds in groundnut (Wang **et al.**, 1984). Studies were therefore undertaken to evaluate the effectiveness of imazethapyr at various rates and times of applications in comparison with the conventional method of weed control.

MATERIALS AND METHODS

The experiments were conducted in a farmers' field during early **Kharif**, 1988 and at the research farm of Tamil Nadu Agricultural University, Coimbatore during **rabi** 1988 in red sandyloam soils under irrigated condition. The dates of sowing and harvesting were 28.5.1988 and 22.9.1988 for the first season and 12.12.1988 and 6.4.1989 for the second season. The experiments were laid out in a Randomized Block Design with 7 treatments (Table 1) and three replications using JL 24 groundnut variety. The plot size was 4 x 2.5m with a spacing of 30 x 10 cm. Pre-emergence application was given 3 days after sowing (DAS), the seeds and early post-emergence application was given 8 DAS. The data

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TABLE 1. Effect of Imazethapyr and Handweeding on Dry Weight of Weeds.

Treatments			Dry Weight of Weeds (Kg ha^{-1}) at								
			30 DAS			60 DAS			90 DAS		
			Kharif	Rabi	Polled analysis	Kharif	Rabi	Polled analysis	Kharif	Rabi	Pooled analysis
Herbicide	Rate (g ha^{-1})	Time of application									
Imazethapyr	50	Pre-emergence	567	324	455	399	370	384	700	803	751
Imazethapyr	75	Pre-emergence	396	124	260	303	225	264	634	486	560
Imazethapyr	100	Pre-emergence	290	81	185	213	182	197	551	419	485
Imazethapyr	150	Pre-emergence	241	0	120	194	81	137	530	182	356
Imazethapyr	100	Post emergence	567	303	435	381	358	369	689	741	715
Handweeding (20 and 40 DAS)			151	93	122	221	229	225	562	508	535
Unweeded Control			1359	763	1061	952	711	831	1748	1393	1570
SE			18	22	14	8	15	15	11	33	21
CD (5%)			40	48	30	17	33	33	24	73	45

DAS = Days After Sowing

on dry weight of weeds, height of the primary branch at harvest, number of branches per plant, number of matured pods and pod yield were recorded and statistically analysed. Economics of different weed control treatments were worked out.

RESULTS AND DISCUSSION

The weed flora of the experimental fields consisted of 4 species of grasses, 1 species of sedges and 8 species of broad leaved weeds. The perennial sedge weed, **Cyperus rotundus** Linn, was dominant (60.1 per cent) in the first season while the broad leaved weed **Trianthema portulacastrum** was dominant (55 per cent) in the second season.

Both the chemical weed control and the hand weeding significantly reduced the weed-biomass (Table 1) in two experiments. The rate of imazethapyr had direct relationship with weed control efficiency. The efficiency was found to be the highest in imazethapyr 150 g ha^{-1} at all the three stages (88.6, 83.5 and 77.3 per cent at 30, 60 and 90 DAS). Early post-emergence application of imazethapyr 100 g and 50 g ha^{-1} as pre-emergence recorded higher weed dry matter than the other pre-emergence applications due to their ineffectiveness. Ineffectiveness of early post-emergence application was also reported by Cole **et al.** (1987).

The data in Table 2 revealed the effect of weed control treatments on the crop and the yield of groundnut. The height of the primary branch was found to be the highest in the unweeded control due to weed competition.

The number of branches and matured pods per plant and pod yield increased with the increase in dose of imazethapyr. The nutrients taken by weeds were made available to the crop when effective weed management practices were executed. This may be the most pronounced reason for increased pod yield with the increasing does of imazethapyr which controlled all the major weeds effectively. Singh **et al.** (1980) also reported gradual decline in weed dry matter and increase in pod yield with the increase in doses of alachlor. This trend was seen only upto the dose of 100g. Imazethapyr at 150 g. inspite of its higher weed control efficiency as compared to 100 g, has resulted in lower pod yield. This might be due to phytotoxic effect of imazethapyr at 150 g which was reflected through the reduced leaf area and the crop dry matter production.

Pre-emergence application of imazethapyr 100 g. recorded 124.5 per cent increase in pod yield over unweeded control while that of hand weeding was 117 per cent. Early post-emergence application of imazethapyr 100g registered a reduced pod yield 534.5 kg ha^{-1} as compared to pre-emergence application due to weed competition in the former which interfered pod development.

Study on economics of the use of imazethapyr (Table 3) revealed that chemical weed control was economical to manual weeding. The net return and benefit cost ratio were found to be the highest in pre-emergence application of imazethapyr 100 g and this treatment registered higher net return than the conventional method of hand weeding.

TABLE 2. Effect of Imazethapyr and Handweeding on Crop and yield of Groundnut.

Treatments			Height of Primary branch(cm)			Number of branches per plant			Number of matured pods per plant			Pod yield (Kg ha^{-1})		
			Kharif	Rabi	Polled analysis	Kharif	Rabi	Polled analysis	Kharif	Rabi	Pooled analysis	Kharif	Rabi	Pooled analysis
Herbicide	Rate (g ha^{-1})	Time of application												
Imazethapyr	50	Pre-emergence	33.1	31.4	32.3	4.9	4.6	4.8	17.3	15.9	16.6	1455	1265	1360
Imazethapyr	75	Pre-emergence	32.8	29.0	30.9	5.4	5.0	5.2	19.8	18.7	19.3	1582	1524	1553
Imazethapyr	100	Pre-emergence	32.7	28.5	30.6	5.5	5.0	5.3	23.7	20.0	21.9	2184	1625	1904
Imazethapyr	150	Pre-emergence	32.0	22.4	27.2	5.1	4.5	4.8	22.7	15.3	19.0	1964	1194	1579
Imazethapyr	100	Post emergence	37.2	31.2	34.2	4.9	4.7	4.8	17.4	15.9	16.7	1467	1273	1370
Handweeding (20 and 40 DAS)			32.7	29.0	30.9	5.3	5.0	5.2	23.5	18.4	21.0	2181	1498	1839
Unweeded Control			44.4	37.4	40.9	3.4	2.9	3.2	8.6	7.2	7.9	907	907	790
SE			1.10	0.64	0.81	0.08	0.11	0.08	0.59	0.73	0.37	41.9	50.3	28.2
CD (5%)			2.4	1.4	1.8	0.2	0.3	0.2	1.3	1.6	0.8	92	110	61

DAS = Days after sowing

TABLE 3. Effect of Imazethapyr and Handweeding on Economics of Groundnut Production.

Treatments			Cost of weed control (Rs.ha^{-1})	Gross return (Rs.ha^{-1})			Net return (Rs.ha^{-1})			Benefit-Cost ratio		
				Kharif	Rabi	Mean	Kharif	Rabi	Mean	Kharif	Rabi	Mean
Herbicide	Rate (g ha^{-1})	Time of application										
Imazethapyr	50	Pre-emergence	150.0	7775	6825	7300	4125.0	3175.0	3650	2.13	1.87	2.00
Imazethapyr	75	Pre-emergence	187.5	8410	8115	8262	4722.55	4427.5	4575	2.28	2.20	2.24
Imazethapyr	100	Pre-emergence	225.0	11420	8625	10022	7695.0	4900.0	6297	3.07	2.32	2.70
Imazethapyr	150	Pre-emergence	300.0	10320	6470	8395	6520.0	2670.0	4595	2.72	1.70	2.21
Imazethapyr	100	Early Post emergence	25.0	7835	6865	7350	4110.0	3140.0	3625	2.10	1.84	1.97
Handweeding	(20 and 40 DAS)		524.0	11405	7490	9447	7381.0	3466.0	5423	2.83	1.86	2.35
Unweeded Control			-	5035	4450	4742	1535.0	950.0	1242	1.44	1.27	1.36

DAS = Days After Sowing

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COMPATRATIVE STUDY OF CHLOROPHYLL AND SUGAR CONTENTS IN RESISTANT AND SUSCEPTIBLE CULTIVARS OF SORGHUM TO CHARCOAL ROT

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ABSTRACT

Chemical components like total chlorophyll, chlorophyll 'a' Chlorophyll 'b' reducing sugar, non reducing sugar and total sugar in relation to charcoal rot disease across three seasons were estimated and compared in each of the two proven resistant and susceptible sorghum cultivars. It was observed that the lower concentrations of total chlorophyll, chlorophyll 'b' and higher concentration of chlorophyll 'a', reducing sugar, non reducing sugar and total sugars were associated with resistance reaction to charcoal rot whereas the reverse trend was observed in the susceptible cultivars. The relative magnitude of concentrations of chlorophyll 'a', chlorophyll 'b' and total chlorophyll were higher during summer, whereas reducing sugar, non reducing sugar and total sugars were higher in Kharif for all the cultivars. It is further projected that the higher concentrations of chlorophyll