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EFFECT OF READY MIX POST EMERGENCE HERBICIDES ON THE GROWTH AND YIELD OF RABI GROUNDNUT

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ABSTRACT

A field experiment was conducted to study the effect of ready mix post emergence herbicides on weed growth, yield and economics of groundnut at Tirupati campus of Acharya N.G. Ranga Agricultural University during *rabi,* 2022-23. Among different weed management practices tried, the wide-spectrum of weed control with higher plant height, leaf area index, pods plant^{-1}, pod yield, haulm yield and kernel yield were noticed in hand weeding twice at 20 and 40 DAS which was comparable withpre emergence application of pendimethalin 1.0 kg ha^{-1} *fb* hand weeding at 30 DAS, post emergence application of ready mix herbicides of imazethapyr + imazamox @ 70 g ha^{-1}, propaquizafop + imazethapyr @ 125 g ha^{-1} and quizalofop-p-ethyl + imazethapyr @ 98.43 g ha^{-1}.

KEYWORDS: Groundnut, Post emergence, Pre emergence, Ready mix.

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is known as "king of vegetable oilseed crops" and plays an important role in meeting the demand of edible oil across the world, which belongs to the family Fabaceae. Among the oilseed crops, groundnut is the 4th most predominant oilseed crop and 13th crucial food crop of the world. The groundnut seed contains 47-53% oil and 26% protein and 11.5% starch. As a legume, it fixes atmospheric nitrogen in the root nodules to the tune of 200 kg nitrogen per hectare. It is grown in almost all the tropical and sub-tropical countries. China and India are the huge producers of groundnut, accounting for 41% and 18% of total world's production, respectively (Mishra, 2020). India is one of the leading groundnut producing country as it accounts for 39.31% of world's groundnut area and approximately 27.3% of production. In India, it is cultivated over an area of 4.9 m ha with a production of 9.25 M T and an average productivity of 1893 kg ha^{-1}. Andhra Pradesh occupies an area of 0.87 m ha producing 0.78 m t with a productivity of 894 kg ha^{-1}. (Directorate of Economics and Statistics, Andhra Pradesh.2020-21). Among different constraints associated in groundnut cultivation, weed menace is one of the serious bottlenecks (Chaitanya *et al*., 2012) which pose a severe competition for all the growth factors such as nutrients, light, moisture and space when they are limited. They can remove about 30-40 % of applied nutrients (Divyamani *et al*., 2018). Due to short stature and initial slow growth, groundnut is highly prone to weed preponderance (Das *et al*., 2015). Weeds impede with pegging, pod development and harvesting of groundnut besides competing for vital resources. Yield losses in peanut due to weeds have been estimated as high as 24 to 70%. Hence, weed management should be given priority to increase groundnut yield and productivity. As a part of weed management, weeds are generally controlled through hand weeding and hand hoeing which are common methods adopted for the control of weeds in groundnut crop. Due to escalating labour wages, may be unavailability of labour, hand weeding is not economically viable, so pre emergence and post emergence herbicides are the alternative source for effective weed control, even though pre emergence application of pendimethalin controls weeds at initial stages, later emerged weeds are not controlled. Post emergence application of single group of herbicides with similar mode of action year after year and season after season, leads to shift in weed flora and herbicide resistance. To overcome this problem new generation ready mix herbicides available in the market with combination of different group of herbicides having different mode of action need to be evaluated for attaining wide spectrum of weed control in groundnut crop.

MATERIAL AND METHODS

The field experiment was conducted at S.V. Agricultural College, Tirupati campus of Acharya N. G. Ranga Agricultural University, Andhra Pradesh during *rabi*, 2022-23. The soil of experimental field was sandy loam in texture, neutral in reaction, low in organic carbon (0.21%), available nitrogen (224 kg ha^{-1})

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Table 1. Effect of ready mix post emergence herbicides on plant height (cm), leaf area index, pods plant^{-1} and yield of groundnut

Treatments	Plant height (cm)	Leaf area index	Pods plant^{-1}	Pod yield (kg ha^{-1})	Haulm yield (kg ha^{-1})	Kernel yield (kg ha^{-1})
T_1 : Pre-emergence application of pendimethalin 1.0 kg ha^{-1} *fb* by one hand weeding at 30 DAS	43.00	2.66	18.30	3584	2652	1276
T_2 : Post-emergence application of quizalofop-p-ethyl + imazethapyr (Ready mix) 98.43 g *a.i* ha^{-1}	41.80	2.59	17.10	3411	2462	1165
T_3 : Post-emergence application of fomesafen + quizalofop-p-ethyl (Ready mix) 225 g *a.i* ha^{-1}	34.10	2.24	13.29	2678	1856	853
T_4 : Post-emergence application of oxyfluorfen + quizalofop-p-ethyl (Ready mix) 100 g *a.i* ha^{-1}	31.67	2.20	10.60	2135	1409	642
T_5 : Post-emergence application of propaquizafop + imazethapyr (Ready mix) 125 g *a.i* ha^{-1}	42.20	2.63	17.43	3460	2519	1200
T_6 : Post-emergence application of sodium acifluorfen + clodinafop propargyl (Ready mix) 245 g *a.i* ha^{-1}	35.93	2.31	14.00	2754	1924	897
T_7 : Post-emergence application of fomesafen + fluazifop-p-butyl (Ready mix) 222 g *a.i* ha^{-1}	34.50	2.29	13.67	2718	1894	878
T_8 : Post-emergence application of imazethapyr + imazamox (Ready mix) 70 g *a.i* ha^{-1}	42.50	2.65	17.60	3570	2630	1256
T_9 : Hand weeding twice at 20 and 40 DAS	43.83	2.68	18.70	3696	2744	1323
T_{10} : Weedy check	24.00	1.92	8.10	1580	995	453
S Em ±	1.606	0.072	0.720	167.9	168.6	120.5
CD (P = 0.05)	4.80	0.22	2.30	501	504	363

and available phosphorus (23.4 kg ha^{-1}) and medium in available potassium (289 kg ha^{-1}). The experiment was laid out in randomized block design and replicated thrice. The treatments consisted of pre emergence application of pendimethalin 1.0 kg ha^{-1}*fb* hand weeding at 30 DAS (T_1), post emergence (PoE) application of quizalofop-p-ethyl + imazethapyr (Ready-mix) 98.43 g ha^{-1} (T_2), PoE application of fomesafen + quizalofop-p-ethyl (Ready-mix) 225 g ha^{-1} (T_3), PoE application of oxyfluorfen + quizalofop-p-ethyl (Ready-mix) 100 g ha^{-1} (T_4), PoE application of propaquizafop + imazethapyr (Ready-mix) 125 g ha^{-1} (T_5), PoE application of sodium acifluorfen + clodinafop propargyl (Ready-mix) 245 g ha^{-1} (T_6), PoE application of fomesafen + fluazifop-p-butyl (Ready-mix) 222 g ha^{-1} (T_7), PoE application of imazethapyr + imazamox (Ready-mix) 70 g ha^{-1} (T_8), hand weeding twice at 20 and 40 DAS (T_9) and weedy check (T_{10}). Pre emergence herbicide was sprayed immediately after sowing and postemergence herbicides were applied at 20 DAS by using battery operated knapsack sprayer fitted with flat-fan nozzle with spray fluid of 500 l ha^{-1}. The crop was supplied with recommended nutrient dose of 20 kg N, 40 kg P and 50 kg K ha^{-1}in the form of urea, single super phosphate and muriate of potash, respectively to all the plots as basal. Top dressing of 10 kg of N was applied in form of urea at 25 DAS. The rest of the package of practices were adopted as per Acharya N. G. Ranga Agricultural University. The weedy check plots were allowed to remain infested with weeds till harvesting of the crop. Density and dry weight of weeds were recorded at harvest and transformed to square root transformation (square root of x + 0.5) to normalize their distribution. The number of filled pods plant^{-1}, pod and haulm yields of groundnut were recorded at harvest.

RESULTS AND DISCUSSION

The predominant weed species observed in the experiment field were *Digitaria sanguinalis*, *Boerhavia erecta, Borreria hispida* L., *Dactyloctenium aegyptium, Celosia argentea, Euphorbia hirta* L., *Trichodesma indicum, Tridax procumbens and Cyperus rotundus.*

Higher pod yield, haulm yield and kernel yield were recorded in hand weeding twice at 20 and 40 DAS which was statistically at par with pre emergence (PE) application of pendimethalin 1.0 kg ha^{-1} *fb* hand weeding at 30 DAS. Among ready mix PoE herbicides studied, application of imazethapyr + imazamox @ 70 gha^{-1} or propaquizafop + imazethapyr @ 125 gha^{-1} and quizalofop-p-ethyl + imazethapyr @ 98.43 gha^{-1} recorded higher pod yield, haulm yield and kernel yield. This might be due to increase in plant height, leaf area index and pods plant^{-1} as a result of efficient control of sedges, broad leaved and grassy weeds which provided congenial conditions for higher accumulation and transfer of photosynthates from source to sink leading to higher yields. These results are in line with Virk *et al.* (2018) who found that the application of imazethapyr + imazamox at 3 WAS recorded significantly higher seed yield, due to better control of the weeds leading to lower weed dry weight. Application of propaquizafop + imazethapyr (Ready mix) @ 125 g *a.i.* ha^{-1} controlled broad spectrum of weeds effectively for a longer period providing congenial environment for growth and development as evident from increase in plant height, leaf area index resulted in increased pod yield, haulm yield and kernel yield. These results were corroborating the findings of Komal *et al.* (2015), Sachin *et al.* (2018) and Jitendra *et al*. (2022). The lowest pod, kernel and oil yield were recorded with weedy check (T_{10}), due to more weed growth there by less nutrient uptake, which in turn resulted in lower kernel and oil yield in groundnut. These results are in agreement with findings of Sharma *et al.* (2015).

The present investigation concluded that among ready mix post emergence herbicides studied, application of imazethapyr + imazamox @ 70 g ha^{-1} or propaquizafop + imazethapyr @ 125 g ha^{-1} or quizalofop-p-ethyl + imazethapyr @ 98.43 g ha^{-1} recorded higher yields which were statistically at par with hand weeding twice at 20 and 40 DAS and pre emergence application of pendimethalin 1.0 kg ha^{-1} *fb* hand weeding at 30 DAS.

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