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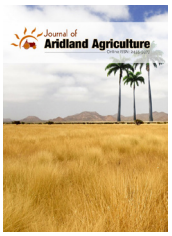
Short Communication



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Comparison of different weed control methods in groundnut (*Arachis hypogaea* L.) under rainfed conditions

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ABSTRACT

The experiment was carried out at Adaptive Research Farm Bhaun Chakwal during Kharif 2014, 2015 and 2016 successive seasons to evaluate the most appropriate method of weed control in groundnut. Three weed control measures were evaluated i.e., pre emergence application of Ipiflour (trifluralin), Stomp (pendimethaline) and hoeing. A weedy check (Control) was also included in the experiment for comparison purpose. The results showed that both chemicals gave significant better yield than hoeing. Stomp as pre emergence weedicides gave significant yield (710.6 kg/ha) during all tested periods and gave maximum net return of Rs. 17919/- with CBR 5.66 followed by ipiflour with net return of Rs.8773.2/- and CBR 3.77. It is concluded from the experiment that the hand hoeing gave reasonable groundnut yield (680kg/ha) but it was uneconomical due to high labor wages. So it is concluded that weedicides application is most appropriate and economical method of weed control in groundnut.

KEYWORDS: Groundnut, weeds, cultural control, chemical control

INTRODUCTION

Peanut or groundnut (*A. hypogaea* L.) occupies a pre-dominant position in cash crops of Pakistan. It is one of the highest oil containing crop and produce good quality of edible oil. It contains about 44 -56% oil and 22-30% protein [1]. The oil is also very desirable for use in making ghee, margarine, shortening and salad oil. The resulting cake after oil extraction is a high protein (55%) meal that is very desirable for human consumption or livestock feed. The meal also contains several essential vitamins and minerals. Numerous weeds are found in peanut plants which is the main factor for its low yield per unit area. It is estimated that weeds reduce groundnut yield up to 75% [2]. Weeds not only compete with crops for water, light and nutrient but also impart physiological disorder to man and livestock and economic resources [3].

The critical period for weed control in groundnut is from three to six weeks after sowing. Generally weed control in groundnut is achieved through hand weeding and herbicide application. Hand weeding is often the expensive control measure to control weeds as it includes high labor cost. Therefore chemical control is an excellent alternative method to obtain better peanut yield [4]. Generally, control of annual grasses and small seeded broadleaf weeds can be achieved with a preplant incorporated (trifluralin, pendimethalin or ethalfluralin. Application of pendimethalin was most effective in checking most of the monocot as well as dicot weeds and ultimately yield was improved [5], [6] and [7]. It is stated that in greenhouse studies, lateral root development was inhibited within bands of 0.5 to 1.0 ppm concentration of soil [8] treated with trifluralin, benefin [N-butyl-Nethyl-2,6-dinitro-4-(trifluoromethyl) benzenamine], and nitralin [4-(methylsulfonyl)-2,6-dinitro-N,N-dipropyl amline].

This experiment was aimed to find out most economical weed control method to control weeds in groundnut and their effect on peanut yield.

MATERIALS AND METHODS

The experiment was carried out at Adaptive Research Farm Bhaun Chakwal during Kharif 2014, 2015 and 2016 successive seasons to evaluate the most economical method for weed

control. The soil in the experimental area was clay loam textured. The experimental design was a randomized complete block with each treatment replicated thrice.The area was prepared and divided to plots, each measuring 22m^2, groundnut variety BARI-2010 was drilled manually within rows at seed rate of 100kg/ha at 45cm inter row spacing. Fertilizer NPK at the rate of 30-62.5-30 kg/ha respectively was applied to fulfill the nutritional requirements of the crop. The following treatments were included:

- Stomp (Pendimethaline) @3.75L/ha (pre emergence)
- Ipiflour (Trifluralin) @3.75L/ha (pre emergence)
- Hoeing (Twice)
- Control (Unweeded check)

All the chemical treatments were applied at pre emergence stage mixed in soil before sowing by planking. Data for weed population were recorded from one square meter, randomly selected from each replication, 40 days after weedicides spray. Crop was harvested in first week of October in all the three seasons. The pod yields per square meter from each experimental plot were weight then the value of kg per ha was calculated. The data pertaining to number of weeds per square meter and yield in kg/ha were analyzed statistically using analyses of variance techniques [9].

RESULTS AND DISCUSSION

Data (Table1) showed that Stomp (Pendimethaline) at recommended rate induced highest effect on number of weeds during all growing seasons and showed minimum weed population of 6.3,7.2 and 5.7 weeds/m^2 during 2014,2015 and 2016 respectively with mortality rate of 76.89%. This was followed by hand hoeing with 67.87% mortality rate. Ipiflour (Trifluraline) had the least effect on weed population and showed 55.09% mortality. Control treatment gave maximum number of weeds (27.7/m^2, average of three seasons) the above findings are coinciding with the results of previous workers [10, 11, 12 and 13].

Table 1: Weed population as affected by different control methods m^2

Treatments	2014	2015	2016	Mean	Mortality (%)
Ipiflour (Trifluraline)	15.3	12.7	9.3	12.44^{ab}	55.09
Stomp (Pendimethaline)	6.3	7.2	5.7	6.4^{b}	76.89
Hand hoeing	10.3	7.3	9.1	8.9^{ab}	67.87
Control (unweeded)	29.7	23.5	20.9	27.7^{a}	---------

Table 2: Average yield of groundnut kg/ha as affected by different control methods

Treatments	2014	2015	2016	Mean	Increase over control(%)
Ipiflour (Trifluraline)	621.6	560.1	431.7	537.8^{ab}	65.37
Stomp (Pendimethaline)	792.5	637.7	601.6	710.6^{a}	118.5
Hand hoeing	680.7	660.5	600.5	680.6^{ab}	109.28
Control (unweeded)	373.7	201.7	400.2	325.2^{b}	-----

Data in Table 2 revealed that all chemical and mechanical treatments increase ground nut yield over control. Stomp (Pendimethaline) gave significant yield during all tested periods and showed average yield of 710.6 kg/ha. These fndings are in full agreement to other scientists [10, 6, 7]. Applications of herbicides reduce competition of weeds with crop resulting in higher crop yield. It might be due to that the herbicidal application prevented the germination of weeds and also reduced their growth by inhibiting the process of photosynthesis as found by [14].The yield of groundnut plot subjected to hoeing though gave desirable yield of 680.6 kg/ha (mean of three years) but statically it showed non significant relation with both Stomp and control. Hoeing conserves the soil moisture by breaking the capillary action and softens the soil due to which peg penetration was more effcient resulting in increased yield. Similar results were found by [15].

Ipiflour gave an average yield of 537.8kg/ha whereas control (unweeded check) showed minimum yield of 325.2kg/ha. The significant reduction in yield in control treatment was due to weed competition which affected various yield component of groundnut.

The economic analysis (Table3) reveals that application of pre emergence weedicides seems to be economical over hand weeding in increasing the ground nut yield. Analysis showed that maximum net return was obtained with application of stomp Rs. 17919/- with CBR 5.66 whereas Ipiflour also showed good performance with CBR 3.77. Hoeing treatment showed minimum net return of Rs. 7418/. The lowest income and cost benefit ratio was recorded in weedy check. These findings are in accordance with the work of other scientists. [16, 17].

CONCLUSION

On the basis of this experiment it is found that hand hoeing treatment gave reasonable groundnut yield of 680kg/ha but it is uneconomical due to high labor charges. So it is concluded that pre emergence application of pendimethalin or trifluralin at recommended rate is most appropriate and economical method of weed control in groundnut.

Table 3: Economic analysis of weed control methods

Treatment	Yield kg/ha	Increase in yield	Value of increase in yield	Expenses of weed control*	Net return over control	CBR
Ipiflour (Trifluraline)	537.8	212.6	11629.2	2856	8773.2	3.07
Stomp (Pendimethaline)	710.6	385.4	21081.3	3062.5	17919	5.66
Hand hoeing	680.6	355	19418.5	12000	7418	1.61
Control (unweeded)	325.2	----	----	----	----	----

*Also include labor cost

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