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Effect of Weed Management in Summer Groundnut (*Arachis hypogaea*) and Residual Effect on Succeeding Rice (*Oryza sativa*)

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Summer groundnut crop is generally sown in the month of January. Due to low atmospheric temperature, its growth is very slow upto 45 days after sowing. Therefore, this crop is severely affected by weeds. Rice is one of the important crops grown after summer groundnut in irrigated commands of Orissa. Mechanical control of weeds becomes difficult due to increased cost of operation and scarcity of labour (Guggari *et al.*, 1995). The pre-emergence application of herbicides may not be sufficient to control weeds in irrigated commands. Hence, the present experiment was conducted to study the efficacy of pre-emergence and post-emergence application of herbicides and interculture operations in controlling weeds of summer groundnut and its carry-over effects on succeeding rice crop.

The field studies were conducted during summer and rainy seasons of 2001-02 and 2002-03 at the Balidiha Irrigation Project of Mayurbhanj. The soil was sandy loam, medium in available nitrogen (245 kg ha^{-1}), phosphorus (13.5 kg ha^{-1}) and available potassium (190 kg ha^{-1}) with pH 7.1. The treatments consisted of 11 weed management practices for groundnut (Table 1) and laid out in randomized block design with three replications. The experimental site remained unchanged during both the years. Alachlor was applied at 2.0 and fluchloralin and pendimethalin each at 1.0 kg ha^{-1}.

The recommended packages of practices were followed for cultivation of groundnut and rice. The groundnut (cv. JL 24) was sown at a spacing of 30 x 10 cm during second week of January and the rice (cv. Lalata) was transplanted in 20 x 10 cm in second week of July of both the years. Dry weights of weeds were recorded at harvest of the crop.

The major weeds in groundnut were : *Cyperus rotundus* (23.7%), *Celosia argentea* (28.3%), *Echinochloa colona* (12.1%), *Amaranthus viridis* (13.0%), *Parthenium hysterophorus* (7.6%), *Trianthema portulacastrum* (6.5%), *Portulaca oleracea* (3.4%) and *Cleome viscosa* (2.5%). Pre-emergence application of herbicides significantly reduced the weed population compared to farmer's practice of hoeing and weeding at 20 days after sowing (Table 1). One interculture at 20 days alter sowing alongwith the pre-emergence application of herbicides was not beneficial over pre-emergence application of herbicide alone in controlling the weeds. However, when application of herbicides at one day after interculture was supplemented with pre-emergence application, the population of weeds was significantly reduced. A similar trend was also observed with regard to dry weight of weeds at harvest of the crop. Pre-emergence application of alachlor at 2.0 kg ha^{-1} at one day after sowing, followed by application of fluchloralin 1.0 kg ha^{-1} on the following day of interculture at 20 days after sowing was found the best in controlling the weed population and its dry weight. Weed management in pre-emergence application of alachlor at 2.0 kg ha^{-1} at one day after sowing followed by post-emergence application of fluchloralin at 1.0 kg ha^{-1} at one day after interculture recorded the highest weed control efficiency.

Pre-emergence application of herbicides helped in reducing the weed growth at the early phase of crop growth. As the growth of groundnut crop was very slow upto 45 days after sowing, the weeds took upper hand and competed with the crop and hence more weed dry matter was recorded at harvest stage of groundnut. Application of herbicides after interculture at 20 days after sowing might have checked the weed germination and growth resulting in higher weed control efficiency.

Pre-emergence application of alachlor followed

Table 1. Effect of treatments on weeds on groundnut and succeeding rice crop

Treatment	Stage (DAS)	Weeds (No. m^{-2})	Weed dry weight (g m^{-2})	Pod yield (kg ha^{-1})	Net return (Rs. ha^{-1})	Weed control efficiency in rice (%)	Grain yield in rice (kg ha^{-1})
Weedy	-	1258	388	1215	1660	-	2050
Hoeing fb weeding	20	536	174	1875	9004	51.9	2720
Alachlor	1	298	109	2100	11619	59.9	3140
Alachlor fb IC	1 fb 20	235	81	2130	11271	70.8	3190
Alachlor fb IC fb fluchloralin	1 fb 20 fb 21	160	59	2370	13987	76.4	3310
Pendimethalin	1	293	104	1980	10011	65.5	2800
Pendimethalin fb IC	1 fb 20	278	102	2040	10065	67.1	2880
Pendimethalin fb IC fb fluchloralin	1 fb 20 fb 21	172	70	2295	12982	72.3	3250
Fluchloralin	PPI	329	108	1950	9609	59.9	2800
Fluchloralin fb IC	PPI fb 20	280	93	2025	9864	68.3	2830
Fluchloralin fb IC fb fluchloralin	PPI fb 20 fb 21	196	68	2310	13183	75.5	3290
LSD		68.2	24.5	195	867		320

IC–Interculture.

by application of fluchloralin at one day after interculture recorded the highest pod yield which was at par with pre-emergence application of fluchloralin followed by application of same herbicide at one day after interculture and pre-emergence application of pendimethalin followed by application of fluchloralin one day after interculture.

The highest monetary return (Rs. 13987 ha^{-1}) was observed due to alachlor fb interculture fb fluchloralin, which was at par with fluchloralin fb interculture fb fluchloralin. Farmer's practice recorded a net return of Rs. 9004 ha^{-1}.

The major weeds in rice were : *Cyperus difformis, Fimbristylis dichotoma, Echinochloa crusgalli, Echinocloa colona, Commelina benghalensis* and *Caesulia auxilaris*. The residual effect of herbicides on succeeding rice was found significant. Pre-emergence application of alachlor at 2.0 kg ha^{-1} followed by application of fluchloralin at 1.0 kg ha^{-1} on the following day of interculture at 20 days after sowing to groundnut reduced the population and dry weight of weeds in rice significantly, indicating its increased carry-over effect in suppressing weed population with significant increase in yields (3310 kg ha^{-1}) of rice (Table 1). Application of fluchloralin and pendimethalin at 1.0 kg ha^{-1}, followed by application of fluchloralin and interculture at 20 days after sowing in groundnut also recorded the lower weed population and higher yield in succeeding rice.

REFERENCE

Guggari, A. K., K. Manjappa, B. K. Desai and H. T. Chandranath, 1995. Integrated weed management in groundnut. *J. Oilseeds Res.* **12** : 65-68.