

A NEW HERBICIDE TO COUNTERACT WEED COMPETITION IN SOYBEAN (*GLYCINE MAX. L. MERRIL*) CULTIVATION

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Improvement in growth and yield characters of soybean viz., plant height, DMP, number of branches per plant, number of pods per plant, grain yield and fodder yield were significantly influenced by various weed management practices. Metolachlor spraying with one hand weeding at 30 DAS improved the growth and yield characters and was comparable with the same herbicide applied by sand mix and farmers practice (HW twice). *Echinochloa colonum* and *Cynodon dactylon* in grasses, *Cyperus rotundus* and *Cyperus difformis* in sedges and *Trianthema portulacastrum*, *Phyllanthus niruri* and *Eclipta alba* in broad leaved weeds were the major weed flora in the experimental site. Application of Metolachlor spray @ 1 Kg ha⁻¹ with one hand weeding was more effective in controlling all categories of weed viz., grasses, sedges and broad leaved weeds in rice fallow soybean raised after advance Kar rice.

Keywords : Herbicide; Soybean; Weed management.

Soybean is an important pulse cum oilseed crop which contains 40 per cent high quality protein and 20 per cent oil. One of the major constraints in soybean cultivation is weed infestation. Losses due to weeds to the extent of 20-77 per cent have been observed depending upon the density and nature of weed infestation¹. Natarajan *et al.*² observed that the dominant weeds in soybean were *Echinochloa colonum* (54%), *Cyperus rotundus* (28%), *Eleusine indica* (8%), *Trianthema portulacastrum* (7%) and *Celosia argentea* (3%) at Annamalai University farm in clay soil. Weed competition during the early stages of growth adversely affected the soybean productivity. The advantages of keeping the crop in a weed free condition from sowing to 30 DAS helped the crop to grow better³. Adoption of hand weeding only is in vogue at present and it is not sufficient to control the weed more effectively at the early stages under this situation. Keeping these significant aspects in mind, the present study was undertaken by using herbicides with or without hand weeding to assess their effectiveness in controlling weeds on soybean yield under rice fallow condition.

The field experiment was conducted under rice fallow condition at Agricultural College and Research Institute, Killikulam after the advance Kar season (July to August) of 1998-99. The experimental site is situated

in the Southern zone of Tamil Nadu lies at 8° 46' North latitude and 77° 42' East latitude. The soil of the experimental field is sandy clay loam. The cultivar Co 1 soybean was used as a test crop. The duration is 85 days. Three herbicides were used for this experiment viz., metolachlor, alachlor and fluchloralin. The experiment was laid out in randomized block design with 12 treatments involving weed management, practices and herbicide application methods and the treatments were replicated thrice. Net plot size was 3.3 X 3.2m. Five plants in each plot were selected at random and tagged for recording biometric observations. T₁ - Unweeded Control; T₂ - HW twice on 15 and 30 DAS; T₃ - Ala @ 1.25 kg ai ha⁻¹ (Sand mix); T₄ - Ala @ 1.25 kg ai ha⁻¹ (Sand mix) + one HW on 30 DAS; T₅ - Flu @ 1.00 kg ai ha⁻¹ (Spray); T₆ - Flu @ 1.00 kg ai ha⁻¹ (Spray + one HW on 30DAS); T₇ - Flue @ 1.00 kg ai ha⁻¹ (Sand mix); T₈ - Flu @ 1.00 kg ai ha⁻¹ (Sand mix) + one HW on 30DAS; T₉ - Met @ 1.00 kg ai ha⁻¹ (Spray); T₁₀ - Met @ 1.00kg ai ha⁻¹ (Spray) + one HW on 30DAS; T₁₁ - Met @ 1.00 kg ai ha⁻¹ (Sand mix); T₁₂ - Met @ 1.00 kg ai ha⁻¹ (Sand mix) + one HW on 30DAS.

The studies revealed that grass weeds dominated among the weed flora in the experimental site. *Echinochloa colonum* and *Cynodon dactylon* in grasses. *Cyperus rotundus* and *Cyperus difformis* in sedges and *Trianthema portulacastrum*,

Table 1. Effect of different weed control methods on plant height (cm).

Treatment No.	30 DAS	60 DAS	At harvest
T ₁	24.17	31.37	34.61
T ₂	29.66	56.77	58.25
T ₃	28.17	51.74	53.68
T ₄	29.37	57.25	58.31
T ₅	29.53	53.17	54.94
T ₆	29.59	58.51	59.88
T ₇	27.43	55.64	55.96
T ₈	28.16	55.92	57.55
T ₉	32.70	52.31	54.82
T ₁₀	33.08	59.49	61.12
T ₁₁	30.23	53.49	55.03
T ₁₂	30.20	58.78	60.41
SED	0.85	2.08	2.38
CD	1.77	4.31	4.93

Table 2. Influence of different weed control methods on number of pods plant⁻¹, Number of seed pod⁻¹, and 100 grain weight (g).

Treatment No.	No. of pods plant ⁻¹	No. of seeds pod ⁻¹	100 grain weight (g)
T ₁	16.30	2.46	9.89
T ₂	34.13	2.50	10.46
T ₃	24.80	2.48	9.90
T ₄	35.43	2.50	10.48
T ₅	27.13	2.49	10.14
T ₆	35.67	2.51	10.64
T ₇	30.00	2.50	10.27
T ₈	31.87	2.50	10.44
T ₉	27.13	2.49	9.97
T ₁₀	41.13	2.51	10.97
T ₁₁	27.73	2.50	10.15
T ₁₂	40.06	2.51	10.65
SED	2.30	0.02	0.34
CD	4.76	NS	NS

Table 3. Influence of different weed control methods on grain and haulm yield (kg ha⁻¹).

Treatment No.	Grain yield (kg ha ⁻¹)	Haulm yield (kg ha ⁻¹)
T ₁	330	704
T ₂	695	1177
T ₃	540	940
T ₄	699	1184
T ₅	580	1020
T ₆	743	1210
T ₇	629	1115
T ₈	637	1149
T ₉	572	967
T ₁₀	798	1247
T ₁₁	611	1084
T ₁₂	767	1212
SED	18.43	19.57
CD (P=0.5)	38.22	40.58

Phyllanthus niruri and *Eclipta alba* in broad leaved weeds were the major weed flora in the experimental site. Application of metolachlor by spraying with one hand weeding on 30 DAS was more effective in controlling all categories of weeds viz., grasses, sedges and broad leaved weeds in rice fallow soybean raised after advance Kar rice.

The improvement in growth and yield attributes due to weed control was also of larger magnitude with spraying of Metolachlor followed by one hand weeding at 30 DAS than other weed management practices and was comparable with the same herbicide applied by sand mix and farmer's methods.

Among the yield attributes of soybean, number of pods per plant was significantly influenced by different weed control treatments. But no significant variation was found in seeds per pod and grain weight. Similar results were reported by Kamalabai and Nanjappa⁴ and Pramila Rani and Kodanda Ramaiah⁵.

Higher grain yield was recorded with spray application of Metolachlor with one hand weeding (798 kg ha⁻¹) followed by

the same herbicide applied through sand mix plus one hand weeding (767 kg ha⁻¹). Grain yield in unweeded check was low (330 kg ha⁻¹). Metalochlor spray 1.00 kg ha⁻¹ followed by one late hand weeding recorded the highest net return and return per rupee invested.

Considering the above aspects, it can be recommended that application of Metolachlor either as spray or sand mix at 1.00 kg ha⁻¹ followed by one hand weeding on 30 DAS was an effective and economic weed management practice for rice fallow soybean raised after advance Kar rice Tamiraparani Command Area. Though the method of application (sand mix or spray) are comparable with each other, the sand mix application found to be the easier method and time saving for adoption than spray method.

References

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