

## Intercropping systems and weed management practices on yield and nutrient uptake of crops and weeds in irrigated sorghum

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**Abstract :** Field experiments were conducted during summer and rabi 1995 on CO 26 sorghum at Agricultural College and Research Institute, Killikulam to find out the effect of intercropping systems and weed control methods on yield and nutrient uptake of sorghum and weeds. The results revealed that sole sorghum recorded higher nutrient uptake than sorghum in intercropping system. Metolachlor @ 1.0 kg ha<sup>-1</sup> + one hoeing on 40 DAS caused lowest uptake of nutrients by weeds and highest yields and uptake of nutrients by sorghum. Intercropping system of sorghum + blackgram recorded higher sorghum grain yield than sorghum + cowpea intercropping system. (*Key Words : Sorghum, Blackgram, Cowpea, Intercropping, Nutrient uptake*)

Intercropping in sorghum is a common agronomic practice to get higher returns without affecting the main crop. The nutrient availability and their uptake by plants are controlled by the intercropping. Control of weeds is important to increase the efficiency of the applied fertilizers. Yadav *et al.* (1986) reported that the nutrient availability to crop can be increased by timely and effective control of weeds. The present study was conducted to assess the influence of inter cropping systems and weed control practices on nutrient uptake by sorghum and weeds and yield of crops.

### Materials and Methods

Field experiments were conducted at the Agricultural College and Research Institute, Killikulam during summer and rabi 1995 to evaluate the suitable weed management practices for sorghum in pure stand and under intercropping situation. The soil of the experimental field was sandy clay loam in texture with natural pH (7.6), low in nitrogen (153 kg ha<sup>-1</sup>), medium in phosphorus (7.1 kg ha<sup>-1</sup>) and high in potassium (173 kg ha<sup>-1</sup>) content during both the season of cropping. The experiment was laid out in split plot design with three replications. Three cropping systems (I<sub>1</sub> : Sole Sorghum, I<sub>2</sub> : Sorghum + Blackgram and I<sub>3</sub> : Sorghum + Cowpea) were allotted to main plots. Weed control treatments viz., W<sub>1</sub> : Unweeded control, W<sub>2</sub> : Hand hoeing on 20 and 40 DAS, W<sub>3</sub> : Butachlor 1.0 kg ha<sup>-1</sup> + hand hoeing (40 DAS), W<sub>4</sub> : Fluchloralin 1.0 kg ha<sup>-1</sup> + hand hoeing (40 DAS), W<sub>5</sub> : Pendimethalin 1.0 kg ha<sup>-1</sup> + hand hoeing (40 DAS), W<sub>6</sub> : Metolachlor 1.0 kg ha<sup>-1</sup> + hand hoeing (40 DAS) were taken in sub-plots during summer season. An additional treatment of Isoproturon 0.60 kg ha<sup>-1</sup> + hand hoeing (40 DAS) (W<sub>7</sub>) was included in rabi season. The intercrops were sown in paired row planting in 2:1 ratio. The

herbicides were applied as pre-emergence spray on third day after sowing. The nutrient content of crop and weeds such as total N (Humpries, 1956), total P and total K (Jackson 1973) were estimated on 90 DAS and 40 DAS respectively.

### Results and Discussion

The nutrient removal by sorghum crop and by weeds and yield of component crops are given in Table 1 and 2. The nutrient removal by weeds was significantly influenced by the intercropping systems. The nitrogen, phosphorus and potassium uptake by weeds was significantly lower in sorghum + cowpea intercropping than sorghum + blackgram intercropping and sole sorghum. This was in agreement with the findings of Tiwari and Kawatra (1990).

All the weed control treatments recorded reduced nutrient uptake by weeds which was significantly superior to unweeded check. Pre-emergence application of metolachlor @ 1.0 kg ha<sup>-1</sup> + one hand hoeing on 40 DAS (W<sub>6</sub>) recorded significantly lower nutrient uptake by weeds irrespective of the seasons and found significantly superior to rest of the weed control treatments.

With regard to nutrient uptake by sorghum, sole sorghum recorded significantly higher nutrient uptake over sorghum under intercropping systems. All the weed control treatments recorded increased nutrient uptake by sorghum over unweeded control. Weed control through metolachlor 1.0 kg ha<sup>-1</sup> + one hand hoeing on 40 DAS had caused higher N, P and K uptake by sorghum in both seasons. The interaction effect on nutrient uptake due to treatments varied significantly. Irrespective of intercropping system, metolachlor 1.0 kg ha<sup>-1</sup> + hand hoeing on 40 DAS improved nutrient uptake by sorghum in both the seasons.



Intercropping of cowpea with sorghum caused a significant reduction in the grain yield of sorghum. However, the effect of intercropping of blackgram on sorghum yield was less severe. Unweeded check recorded the lowest grain yield of sorghum during two seasons. Metolachlor @ 1.0 kg ha<sup>-1</sup> + one hoeing on 40 DAS resulted in higher yield of sorghum. This may be due to increased nutrient uptake by crop and lower nutrient uptake by weeds. Similar findings were also made by Gangwar (1993). Pre emergence application of Metolachlor @ 1.0 kg ha<sup>-1</sup> + hand hoeing on 40 DAS registered maximum intercrop yields which was comparable with pre-emergence application of Pendimethalin 1.0 kg ha<sup>-1</sup> during summer season and Isoproturon @ 0.60 kg ha<sup>-1</sup> during rabi season.

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## Inheritance of seed characters in Indian mustard (*Brassica juncea*(L.) Czerm and Coss)

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**Abstract :** Combining ability studies using 9 x 9 half diallel cross over four environments for two seed characters in Indian Mustard, revealed that additive gene effects were predominant for 1000-seed weight while non-additive gene actions were more important for oil content. The best general combiners were NDR-8501 and BHUR-5 for 1000-seed weight and PR-16 and NDR-8501 for oil content. Difference among environments as well as both general combining ability (gca) x environment and specific combining ability (sca) x environment interaction were significant. Non-additive x environment interaction components were higher magnitude than the additive x environment interaction components. (*Key Words : Indian mustard, Combining ability, Gene effects*)

The information on the nature of gene action controlling inheritance of various characters is very essential to evaluate the usefulness of parents while formulating any breeding programme. As environment plays an important role in the expression of a character and greatly influences combining ability estimates, the study in a single environment may not provide reliable information. The present study was therefore undertaken to determine the mechanism of gene action involved in the inheritance of two important seed characters viz., 1000 seed weight and oil content in Indian mustard over four environments.

#### Materials and Methods

The materials comprised of a 9 x 9 diallel set of crosses (excluding reciprocals) involving 9 inbreds i.e., RLM-619, Rohini, IC-73229, PR-16, NC-57354, NDR-8501, BHUR-5, RW 85-59 and Sita. All the 36 F<sub>1</sub>s along with 9 parents were sown in two different dates first as normal (21st October) and second as late (9th November) in the rabi season of two consecutive years 1992-93 and 1993-94 in a randomized block design with three replication at the 'C' Block District Seed Farm, Kalyani (W.B.) of Bidhan Chandra Krishi