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# STUDIES ON WEEDS ASSOCIATED WITH TWO LEGUMINOUS CROPS

**Dr. B. M. Rathor**

Department of Botany, Jaysingpur College, Jaysingpur,

Affiliated to Shivaji University, Kolhapur, MS, India.

**ABSTRACT:** In the agriculture, the decrease in yield due to presence of weeds is of more concern. Any plant in an agricultural field apart from the crop plant is called as weed. Weeds are the plants which grow where there are not desired. When these plants grow in the agricultural land along with the crop plant they compete with the crop plants for water and nutrients in the soil, space, light etc., and reduce the yield of crop plants. It is further speculated that the presence of weed in small quantity in agricultural land may increase the performance of crop plant due to competition provided the weeds are not allelopathic. However, this speculation need further well planned experimentation with specific weeds.

***Corresponding Author: Dr. Rathor B. M.** Ph. D.

Department of Botany, Jaysingpur College, Jaysingpur, MS, India

E-mail address :bmrathor.rathor@gmail.com

## 1.INTRODUCTION

In addition to the competition, some of the weeds harbor pathogens in the form of insects, pest and microorganism like bacteria and fungi.Certain weeds secret toxic substances through their roots, which restricts the growth of crop plants. In addition to this, they increase the total expenditure due to the cost for their removal, cause difficulty in cultivation of crop plants and adversely affect the quality of agricultural produce (Vaidya *et al.,* 1972).Most of the weeds are associated in a particular region irrespective of the crop under cultivation. On the other hand, some weeds are specific to the crop plants and they always get associated with them (Sabnis and Pathak, 1961; Rolia and Kanodi, 1963; Bajpai and Verma, 1964; Satyanarayan *et al.,* 1964). Such weeds are normally parasitic weeds. In order to prevent the losses due to the weeds in agriculture, it is imperative to reduce weed

population from a given agricultural land (Asana, 1951; Kaul, 1951; Deshpande, 1954; Verma and Bhardwaj, 1959). This can be done by prevention, control or eradication. The prevention includes modification in agricultural practice, to prevent the entry of weeds into agricultural land. Control includes regulation in the growth and spread of the weeds associated with the crop plant with the help of mechanical methods or by using weed killing chemicals called as herbicides (Verma and Bhardwaj, 1965; Mani and Bhardwaj, 1957). Lastly eradication includes complete removal of the weeds from the agricultural field by uprooting them or mowing due to which they are destroyed. Leguminous crop plants, due to their ability to fix their nitrogen are more sustainable and resistant to the adverse effects by weeds. However, many weed invade agricultural land comprising leguminous crop plants resulting in their low productivity and reduced quality. Taking in this consideration attempts were made during present investigation to observe the effect of weeds associated with groundnut (*Arachis hypogaea* L.) and soybean (*Glycine max* (L.). Merr) on their performance and yield potential. For this purpose, these two crops were cultivated in the field and the weeds associated with them were either partially or completely eradicated.

## 2.MATERIAL S AND METHODS

The results obtained due to eradication of weed were compared with the crops cultivated under the influence of weeds wherein no attempts were made to control them.

EXPERIMENTAL

Two field experiments were undertaken one each with groundnut and soybean in the Botanical Garden of Dr. Babasaheb Ambedkar Marathwada University, Aurangabad during June 2006 to October, 2006 adopting following procedures.

### Agronomy

A piece of land from Northern area of the Botanical Garden was ploughed to make it suitable for cultivation. For each experiment 12 plots were laid down in three blocks of four plots each. Size of the plot was $9.03m^2$. Farm Yard Manure (FYM) was applied to each plot at a rate of 1200 kg/ha. Nine rows were laid down at a distance of 30.5 cm in each plot in North East direction. The sowing was done in the rows by dibbling the seeds of groundnut on June 19, 2006 and that of soybean on June 18, 2006. The crops were allowed to grow under irrigated condition without using any chemical fertilizer treatment. Use of insecticides or pesticides was avoided as it was not found necessary.

There were in all four treatments, each replicated three times in randomized block design (RBD). The treatments were as follows:

I. Complete weeding: The weeds were hand weeded 4 to 5 times at an interval of 15 to 20 days and to keep land free from weed.

II. 50% weeding (1:1): The hand weeding was done as above from the alternate space between two rows.

III. 50% weeding (2:2): The hand weeding was done similarly with two successive alternative spaces between two rows.

IV. No weeding: The plots remained free from weed control wherein the weeds were allowed to grow.

**Sampling**

The groundnut was ready for harvesting 84 days after sowing, while soybean 82 days after sowing. Prior to the harvesting each plot was screened to note down the species of weeds growing in association with each crop. On the day of harvesting the plants of groundnut were uprooted and kept aside. The total biomass obtained per plot was measured. The below ground portion of the plants comprising of pods was cut and washed with water to remove adhering soil particles. Them the pods were separated from the roots, amount measured and the samples were kept for drying. Aerial leafy portion of groundnut along with remaining underground foliage were measured and samples were kept for drying in oven at 95℃ till weight.After harvesting soybean similar procedure was followed. However, for this crop only above ground biomass was considered as the pods were aerial.The dry weight of the samples were considered for calculating dry weight of biomass, pods, shells and seeds as well as weed biomass as kg/ha considering net area of the plot harvested. The data obtained were statistically analysed for ANOVA and C.D following Panse and Sukhatme (1978) and Mungkiar (1977, 2003).

**3. RESULTS AND DISCUSSION**

**Groundnut** (From June 19, 2006 to October 2006.)

The crop of Groundnut grew well in all the plots.Table 1 gives information about the fresh and dry matter (DM) yields of crop as well as weeds. The total biomass of groundnut was 3036 kg/ha on plots where the weeds were completely removed. The yield decreased within the range of 2266 kg/ha due to either or partial weeding. However, the decrease in the yield of groundnut biomass was statistically non-significant as was indicated by the values obtained for its critical difference (C.D) and variance ratio (F).The fresh weight of pods was 1342 kg/ha on the plots where weeding was done, which decreased to 1079, 892, and 1058 kg/ha respectively on the plots with 50 per cent weeding and no weeding respectively (Table 1). Thus there was significant decrease in the yield of fresh pods per unit area of land. The fresh weight of weed biomass was 875 kg/ha on plots where weeding was done. The biomass significantly increased within the range of 1448 and 2669 kg/ha due to partial or no weeding. The results obtained on fresh biomass indicated that the presence of weeds significantly decreased, the yield of fresh pods without affecting crop biomass.The dry weight of groundnut biomass was 582 kg/ha on the plots with complete weed control. It decreased to less than 456 upto 401 kg/ha due to either partial or complete weeding, however, the decrease in the yield of dry biomass of groundnut was statistically non-significant. The yield of dry pods was 671 kg/ha on the plots where the weeds were eradicated. The yield of pods decreased within the range of 455 to 582 kg/ha due to

full of partial weeding, however, the decrease was statistically non-significant. Similar trends was observed with the yield of seeds as well as shells. The dry weight of weeds biomass increased from 455 kg/ha on the plots with complete weeding to 747 on the plots with full weeding. There was no difference in seed to shell ratio of the pods due to weeding (Fig. 1).

The results obtained thus indicated that though either partial or full weed control affected the yield of fresh pods, it had non-significant influence on dry biomass as well as the yields of pods as well as seeds. During present investigation eleven weeds were found associated with groundnut. These were *Amaranthus tricolor* L., *Commelina benghalensis* L., *Cynodon dactylon* (L.) pers., Dactyloctenium *sindicum* bioss., *Digitaria longiflora* (Reta.) pers. *Euphorbia hirta* L., *Launaea procumbens* (Roxb.) Ramayya and Rajgopal., *Parthenium hysterophorus* L., *Phyllanthus amarus* Schumach and Thonn *Portulaca oleracea* L., *Tridax procumbens* L., out of these alost all weeds were non-leguminous. All those weeds were not found much effective in significantly affecting the crop of groundnut, though the yields slightly decreased.

**Soybean**:

The crops of soybean showed favorable growth in presence as well as absence of the weeds (Table 2). However, the plants were dark green, fresh, healthy, and with numerous pods on the plots wherein weeds were completely removed. The yield of fresh above ground biomass of soybean was 733 kg/ha on the plots with complete weeding. It was within the range of 622 to 763 kg/ha on the plots where full or partial weeding was done.The yield of fresh pods was 381 kg/ha with complete weeding which decreased within the range of 202 to 277 kg/ha due to partial weeding, however, the decreased in the yield in fresh pods was statistically non-significant.The fresh weed biomass was 728 kg/ha when hand weeding was adopted. The yield of weed biomass significantly increased from 1635 to 2549 kg/ha due to weeding (Table 2).On the plots wherein complete weeding was done, the yield of dry pods were 229 kg/ha which significantly decreased to 44 kg/ha due to no weeding treatment. Similar trend was observed with respect to the yield of shell and seeds, however, significant decrease the yields of dry pods and seeds was experienced with no weeding while the decrease was statistically non significantly due to partial weeding (50%).As experience with the yield of fresh weed biomass the yield of dry weed biomass also significantly increased due to either nil or partial weeding (Fig. 2).There was marked increase in seed to shell ratio due to weeding. The seed to shell ratio was 1: 0.71 on the plots where weeds were completely removed. It increased to 1:1.33 due to 50% weeding, while 1:2.14 where weeding operation was not done. Thus presence of weeds along with soybean not only decreased the seed yield, but it also altered the quality of pods with more accumulation of dry matter in the shell rather than in the seeds. (Table. 2)In addition to eleven weeds observed in groundnut field *Datura inoxia* Mill., and *Argemone Mexicana* L., were recorded with soybean.

## 4. CONCLUSION

The overall results obtained with groundnut as well as soybean clearly indicated adverse effect of weeds in decreasing the productivity of these two crop plants. However, a careful observation at the field, as well as the data obtained on the yield and statistical parameters, it appears that the adverse effect of weeds was statistically non-significant with partial weed control i.e. on the plots with 50% weed control. The author feels that though complete weed control is beneficial for higher productivity of crop plant the presence of few weed plants here and there may not alter the performance of crop. It is further speculated that the presence of weed in small quantity in agricultural land may increase the performance of crop plant due to competition provided the weeds are not allelopathic. However, this speculation need further well planned experimentation with specific weeds.

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**Table 1: Effect of partial and complete weeding on performance of groundnut**

| Treatment | Fresh Weight (kg/ha.) | | | Dry Weight (kg/ha.) | | | | | Seed: Shell ratio |
|---|---|---|---|---|---|---|---|---|---|
| | Groundnut Biomass | Pods | Weed Biomass | Groundnut Biomass | Pods | Shells | Seeds | Weed Biomass | |
| Complete Weeding | 3636 | 1342 | 875 | 582 | 671 | 187 | 484 | 455 | 1:0.38 |
| 50% Weeding (1:1) | 2469 | 1079 | 2115 | 444 | 582 | 150 | 432 | 592 | 1:0.34 |
| 50% Weeding (2:2) | 2281 | 892 | 1448 | 456 | 455 | 142 | 313 | 550 | 1:0.46 |
| No Weeding | 2266 | 1058 | 2669 | 401 | 582 | 158 | 424 | 747 | 1:0.37 |
| C.D. (P= 0.05) | 1741 | 285 | 107 | 317 | 150 | 40 | 174 | 203 | |
| 'F' Treatments | NS | 5.96* | 17.8* | NS | NS | NS | NS | NS | |
| Replicates | NS | NS | NS | NS | NS | NS | NS | NS | |

**Table 2: Effect of partial and complete weeding on performance of soybean**

| Treatment | Fresh Weight (kg/ha.) | | | Dry Weight (kg/ha.) | | | | | Seed: Shell ratio |
|---|---|---|---|---|---|---|---|---|---|
| | Soybean Biomass | Pods | Weed Biomass | Soybean Biomass | Pods | Shells | Seeds | Weed Biomass | |
| Complete Weeding | 733 | 381 | 728 | 271 | 229 | 95 | 134 | 189 | 1:0.71 |
| 50% Weeding (1:1) | 763 | 277 | 1635 | 229 | 97 | 55 | 42 | 458 | 1:0.33 |
| 50% Weeding (2:2) | 622 | 262 | 2231 | 180 | 123 | 65 | 58 | 937 | 1:1.33 |
| No Weeding | 658 | 202 | 2549 | 185 | 44 | 30 | 14 | 1122 | 1:2.14 |
| C.D. (P= 0.05) | 444 | 278 | 775 | 145 | 142 | 65 | 77 | 362 | |
| 'F' Treatments | NS | NS | 12.80* | NS | NS | NS | 5.19 | 16.80** | |
| Replicates | NS | NS | NS | NS | NS | NS | NS | NS | |