

ALLELOPATHIC EFFECTS OF WEEDS IN SOYBEAN, GROUNDNUT AND GREENGRAM

S. P. TIWARI, S. S. BHADAURIA,
M. A. VADDORIA and DEVI DAYAL

National Research Centre for Groundnut (I.C.A.R.),
Junagadh 362015, India.

ALLELOPATHY, a synonym for phytotoxicity, is defined by Rice¹ as a direct or indirect harmful effect of one plant (including micro-organisms) on another through the production of chemical compounds that escape into the environment. The existence of allelopathic effects had been reported in oilseeds and legumes by employing aqueous extracts of oven-dried plant-parts, residues and seed leachates of weeds²⁻⁷. However, little information is available on the effects of root secretions of weeds on legumes and oilseeds. Patchy and stunted growth in these crops could be due to several factors including the presence of weeds. The present investigation was undertaken to estimate the allelopathic effects of root secretions of weeds on seed germination and early seedling growth in legumes.

Ten weeds belonging to eight botanical families (table 1), collected from the N.R.C.G. fields in Junagadh, were uprooted and the soil adhering to roots was shaken off. The roots of these weeds were washed in distilled water (1 g to 5 ml) and the washings were filtered. Three legumes *viz* soybean cv G.S. 2, groundnut cv. JL-24 and greengram cv. G-2 were selected for the experiment. Out of these three, the former two are oilseeds. One hundred seeds of each of the three legumes in each of the 39 treatment combinations were germinated in petri-plates using root washings of the weeds. Control for each of the three legumes were also maintained using distilled water. Observations were recorded on seed germination, root length and hypocotyl length. Relative values, expressed as per cent of control, were computed for comparisons across the legumes, characters and weeds. Correlation co-efficients r were computed to test the inter-dependence of the allelopathic effects within each legume.

Root washings obtained from weeds caused, in general, a detrimental effect on germination and early growth of the three legumes (table 1). However, the magnitude of these effects varied with the weed, the legume and the character concerned. Root length in greengram was the most affected character (54.06% of control) whereas germination in groundnut was the least affected character (90.33% of control). Seed

germination was the least affected character within each individual legume also. Greengram exhibited more pronounced and consistent vulnerability to most of the weeds and in case of all the characters when compared with groundnut and soybean.

Based on their average effects, the weeds were ranked from I (most potent) to XII (least potent). *C. arvensis*, exhibiting a value of 61.23% of control, was ranked I closely followed by *A. indicum*. Juxtaposingly *D. arvensis* and *A. riandra* (young) were found to be the least potent weeds giving a value of about 80% of control. A range of allelopathic effect from 39.32% of control in case of hypocotyl length in greengram and upto 100% of control (no effect) in case of germination and root length in groundnut was obtained by *C. album* and *S. glauca* respectively. This showed the presence of a high degree of interaction between weeds, legumes and characters concerned.

Significant associations of some allelopathic effects *viz* germination *vs* root length ($r = 0.59$) and germination *vs* hypocotyl length ($r = 0.83$) were observed in case of groundnut only. Associations among other characters were non-significant. The allelopathic effects in soybean and greengram were independent of each other.

The present investigation thus led to the conclusion that the secretions of roots of the weeds, allowed to stand for entire or partial duration of the main crop, could be a serious impediment in the early establishment of legumes and oilseeds and thereby could limit the absolute realisation of potential yields in these crops of utmost national importance. Weed control measures especially those prescribing an economic threshold amount of the presence of weeds, should ensure the consideration of allelopathy also rather than that of mere competition for light, water and nutrition.

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