

EXECUTIVE SUMMARY

Project Title: **Studies on Allelopathic Effects of Aqueous Extracts of Weeds on Wheat (*Triticum aestivum*) and Moong (*Vigna radiata*)**

NEHA NANGIA :PI

The objectives of the study were to study the Allelopathic effect of some weeds on Moong (*Vigna radiata*) and wheat (*Triticum aestivum*) and to study the effect on growth and biochemical parameter of the above experiments. Aqueous extracts of leaves of *Hyptis suaveolens* (L.), *Ricinus communis* (L.), *Alternanthera sessilis* (L.), *Ipomoea carnea* (Jacq), *Malachra capitata* (L.) and *Cymbopogon citratus* (Stapf), were studied for their effects on seed germination on *Triticum aestivum* L. var k9 and *Vigna radiata* L.

The experiments was conducted at Department of Botany, Rizvi College of Arts, Science & Commerce, Bandra, (Mumbai, India.) situated at 19°04'' (N) latitude and 72°49'' (E) longitude.

1) There are three parts to the work, Studies on allelopathy by petridish methods and establishing a bioassay for the same. 1%, 2%, 3% & 5% aqueous leaf extracts were prepared and exposed to the seeds of the crops. Various morphological parameters were studied like length of radical, length of plumule, seed vigor index, total proteins and total chlorophyll.

A marked reduction in all the parameters were observed when compared with the control maintained. *Alternanthera sessile* affected the crops the most with other plant species also showing inhibitory effects at various levels of the study. Aqueous extracts of *Alternanthera* and *Hyptis* affected seed vigor the most at 5% concentrations. *Ipomoea* and *Ricinus* affected the least on *Vigna radiata* its seed vigor index. Extracts of all the weeds above 3% and 5% on wheat showed inhibitory effect on Seed Vigor Index. *Alternanthera* affected the most followed by *Cymbopogon*. *Ipomoea carnea*, *Ricinus communis* and *Malachra capitata* extracts severely affected the total proteins in seedlings of vigna after 7 days of germination.

Apart form *Cymbopogon*, the aqueous extracts of all the weeds under study showed a gradual decrease in total proteins content of 7 day old seedlings of wheat. *Alternanthera* and *Ricinus communis* were affecting the most.

All the weed extract showed a different trend for total chlorophylls. There was a gradual increase in Total Chlorophylls as the concentrations of weed extracts increased, with the exception of *Malachra* and *Alternanthera* weed extracts.

2) Study of Allelopathic Interaction of Wheat (*Triticum aestivum* L.) and *Vigna radiata* (Moong) using Equal-Compartment-Agar Method (ECAM). The Sandwich Method involves the placing of pre-weighed samples of dried plant material into the wells of a six well plate. Each well has an M96 area of 10 cm², so that when 10 or 50mg of leaf material is placed in each well, as specified in this protocol, this is equivalent to litter deposition rates of 10 gm⁻² and 50 gm⁻²; which lies at the low and high ends of natural litter deposition rates mentioned previously. Each well volume is close to 10 ml so the equivalent concentrations of 10 mg and 50 mg leaf material were therefore 1 mg ml⁻¹ and 5 mg ml⁻¹ that is 1 g l⁻¹ and 5 g l⁻¹ respectively. In cases where allelopathic effects are pronounced at the lower concentration of plant material, the plant can be said to be highly allelopathic. An equivalent effect at the higher concentrations would be less indicative of notable allelopathic effects.

Four seeds of respective plant species were placed horizontally on the surface of the agar in each well. The 2 plant species were tested for the effects of weed litter on their growth. A concept called Overall Allelopathic Potential (OAP) was used to compare the allelopathic potential. From the OAP it can be seen that the weeds affected *Triticum aestivum* more than *Vigna radiata*. *Alternanthera* affected *Triticum* and *Vigna radiata* and had severe allelopathic reactions.

3) Allelopathic Studies in nursery tray method: Seeds of the crops were sown in 20 gms of garden soil in trays containing 5gms of the powdered leaf litter. 4 seeds were sown in each tray and several replicates were maintained. The plants were harvested after 7 days to measure the length of plumule and the weight of the seedlings. A separate control was maintained with garden soil. The readings are average of 50 seedlings in each case. *Ricinus* and *Hyptis* affected the growth of the seedling the most. All the weeds litter showed more than 40% inhibition in the growth of the plumule of *Vigna radiata*. All the weeds showed a decrease in the weight of seedlings after 7 days in comparison to control with an inhibition of more than 75%. *Ipomoea* and *Ricinus communis* affected the seedling weight the most.

All the weeds showed marked inhibitory effect on the length of the hypocotyl of wheat when exposed to 5mg of leaf litter of wheat. There was more than 75% decrease in the length of the plumule in comparison with control. The leaf litter of *Ipomoea* and *Malachra* affected the most.

The weight of the seedling showed more than 50% inhibitory effect when leaf litter of weeds were present in the soil. *Malachra* and *Hyptis* affected the weight of the seedling the most.