

5. Conclusion

The Major outcome drawn from the results obtained to examine allelopathic potential of medicinal plants on legumes and weeds are presented here. **Five medicinal plants**-*Artemisia annua* L.,*Swertiachirata*Buch – Ham, *Tridax procumbens* L., *Tephrosiapurpurea* (L.)Pers.,*Ocimumsanctum* (L.).**ten legumes**-*Cicerarietinum*L.(CA – chick pea), *Vignaaconitifolia*(Jacq.) marechal.(BG- Black Gram), *Dolichos lablab* L.(LB – Lablab bean),*Pisumsativum*L.(GP – Green Pea),*Vignamungo*L.Heeper. (MB – Moth Bean), *Lens esculenta*Moench.(LE – Lentil),*Cajanuscajan*L.(PP – Pigeon Pea),*Vignaunguiculata*L.Walp.(CP – Cow Pea),*Vignaradiata*L. R.Wilczek.(GG – Green Gram),*Cyamopsistetragonolobus*L. (FB – French Bean) and **five weeds**-*Parthenium hysterophorus* L.,*Dichanthiummannulatum*(Forssk.) Stapf.,*Amaranthusspinosus* L.*Chloris barbata* Sw. and*Acalyphaindica*L.were selected for the study. Results were obtained by conducting different experiments, using different concentrations of medicinal plants to check their allelopathic effect. Study was conducted in four stages, progressing from laboratory study to field implication .Dissipation of allelochemicals in different form and in different media was checked. Brief description with significant outcome for each stage are given here.

✂ **Stage 1** -Primary screening was conducted using dry leaf aqueous extract of all the five medicinal plants. Effect of this aqueous decoction with 1%,5% and 10% w/v concentration was examined in petriplates to see the response of legume and weed seed germination and seedling growth. During the study all legume seeds responded differently to treatments. At this level utmost inhibition was found with *Artemisia* and *Tridax* 5 %and 10% concentration. Throughout the study most resistant legumes were Green gram Black gram and Cow pea with all treatments. Least inhibitory impact was recorded for these legume seed germination and seedling growth as

compared to other legumes. Maximum inhibition was observed in case of Lablab bean, Lentil and Green pea. Maximum resistance was found in Green Gram.

Following the results of this study, primary screening of weeds was done using 1% w/v concentration of all five medicinal plants as at this concentration legumes were not affected. Major concern of the present study was to suggest a combination of crop and medicinal plants to suppress the weeds with no harm to crop. Weeds were suppressed at the low dosage of medicinal plants. Inhibitory effect was very high with *Artemisia*, *Tridax* and *Swertia* 1% treatment, so next stage study was conducted with these medicinal plants to obtain minimum inhibitory dosage response to legume crop i.e. green gram. *Parthenium* and *Chloris* were selected for the study on weeds.

✧ **Stage 2** - study was conducted using Sandwich method in petriplates with Dry Leaf mulch of *Artemisia*, *Tridax* and *Swertia* in neutral medium, agar agar. Concentration of leaf mulch was 0.5%, 1% and 5% initially as here the medium was different from the primary study. Green Gram seeds were resistant to all three plant treatments at lower concentration (0.5 and 1%). Mean time of Green gram germination, fresh weight and Seedling growth were inhibited at 5% w/w concentration of selected three plants. Further study in same media was conducted using lower concentration from 0.2% - 0.8% w/w. with Green Gram to find out least affecting dosage. Here Green gram germination was not showing any inhibition with all treatment. Maximum resistance observed with seedling growth and biomass accumulation was between 0.2-0.4% w/w treatments.

Sandwich method study was conducted with *Parthenium* and *Chloris* seeds using 0.1% - 0.5% w/w concentration of *Artemisia*, *Swertia* and *Tridax* leaf mulch. Maximum inhibition of *Parthenium* and *Chloris* was observed at 0.25% and 0.5%

concentration. *Artemisia* and *Tridax* were responding positively to inhibit *Parthenium* seed germination as compared to *Chloris* seeds.

Taking this in account HPTLC fingerprinting analysis was conducted using 0.5% w/w concentration of *Artemisia*, *Tridax* and *Swertia* leaf mulch. Significant result were found here in peak variation of treated Legume radicle with *Artemisiaterpenoid*, legume hypocotyl and Radicle with *Swertia*Phenolics and Legume radicle with *Tridax*phenolic and Terpenoid contents.

✧ **Stage 3** Pot study was conducted after lab experiments. This study was conducted using *Artemisia* and *Tridax* dry leaf mulch (0.3% - 1.6% w/w concentration) with soil to see the effect on Green gram and *Parthenium* seeds. Percentage was taken in this range as the medium to grow seeds changed from neutral agar medium to Soil. *Parthenium* seeds did not show germination in any treated pot so here results were presented only for Green gram. Initial response was inhibitory for green gram seed at more than 1% concentration. But later on growth was not affected, there was no decline in chlorophyll content too as compared to control. Further study was conducted using low concentration (0.06% - 0.26% w/w). Green Gram was showing stimulatory effect in shoot biomass with *Artemisia*, and root biomass with *Tridax* treatment.

✧ **Stage 4** Final study was conducted as field trials using two combination of *Artemisia* and *Tridax* leaf mulch. Experiment was set up using green gram as crop and *Parthenium* as weed. Study was conducted at four different stages till 80DAS. There was no remarkable inhibition observed on legume seed germination, plant growth or biomass accumulation. Similar results were obtained with Chlorophyll and Protein estimation of the green gram. No difference in Qualitative analysis of protein was observed during Electrophoretic study for both treated and untreated plants. Rf

value in analysis of both the peak remained similar. There was no change in growth and yield parameters such as number of Pods, Number of seeds, weight of the seeds, Number of flowers and leaves. Significant results were obtained for *Parthenium*. During both experiment plant started emerging comparatively late in treated plots. Though number of plant grown in plot were considerably high in low concentration treatment (i.e T1), number of leaf and its chlorophyll content were reduced.. Most effective combination was of *Artemisia* – **Green gram** and *Parthenium* where *Parthenium* growth was considerably reduced in higher treatment and green gram remained unaffected. Life cycle got shorter in higher concentration where flowering were induced before 7-8 days as compared to control and other treatment. *Artemisia* treatment with 20gm / plot was also inhibitory to germination of monocots grown in the plot.

✧ To conclude the study, it can be recommended that in addition to speculative interest practical application of allelopathy-introducing medicinal plants may be utilized successfully in future for establishment of bio herbicides, which is now be considered as a promising field of research in applied allelopathy science. They can also be suggested as cover crop which can give dual benefit to the farmers in terms of double crop yield at the same time.