SUMMARY
AND
WISHES

With increasing human population and biotic pressures for fuel, fodder, small timber and other tree products, the cultivation of trees with agricultural crops in agroforestry and on denuded lands or wastelands in social forestry is practised worldwide and this leads to several types of interactions between trees and crops adjoining and/or weeds etc. To optimise the productivity of crop components and to develop suitable management techniques, a deeper understanding of these interactions is a necessity in such mixed land use systems.

Allelopathy as defined by Rice (1974) is any direct or indirect, harmful or beneficial effect by one plant on another through the production of chemical compounds that escape into the environment. These effects include intereference in germination, growth and establishment, flowering and fruiting. The known allelochemics include wide spectrum of organic compounds important among them are being secondary metabolites like phenolic acids and flavonoids which have been proved to interfere with the plant growth.

Gujarat ranks first among India to implement social forestry programme, wherein a large number of fast growing, multipurpose trees are planted in every available vacant space. The need of a detailed study on allelopathic compatibility of these trees with crops and weeds is essential prior to recommending any tree species for Agro/Social forestry programme. Therefore in the present study two trees of social forestry Cassia siamea and Pongamia pinnata were selected to assess their allelopathic influence on crops like wheat and rice and weeds like Cassia tora and C. occidentalis.

The results of phytochemical screening showed C. siamea to be a rich source of phenolics like isoflavones, flavones like acacetin and luteolin, quinones and phenolic acids like vanillic, syringic, *p*-hydroxybenzoic acids besides saponins, steroids, polysaccharides. Similarly Pongamia contained flavonoids (furanoflavones), flavonols like desmethoxykanugin, kanugin, besides pongachromene and phenolic acids like vanillic, syringic, *p*-OH benzoic, ferulic and anthocyanins such as delphinidin and petunidin.

The results of allelopathic studies showed that the test crops and weeds tolerate C. siamea better in comparison to P. pinnata in that the effects of C. siamea is less pronounced while P. pinnata exhibited strong inhibitory effect in most of the treatments with test species.

C. siamea inhibited the germination and dry weight of wheat. Germination was adversely influenced by extracts of plant parts like leaf, stem wood, root wood and seed while dry weight showed inhibitory effect for leaf, stem wood and root wood. Shoot length remained undisturbed by all the treatments at all the concentrations. Leaf and seed extracts promoted the growth of seedlings in general.

C.siamea was proved favourable for rice seedlings with almost all the treatments at all the concentations. But germination was inhibited with leaf, root wood and seed extracts. Promotory effects on shoot length and root length were observed. Increase in dry weight also was seen except for leaf and root wood extracts.

C.occidentalis was found inhibited by C.siamea in all the parameters studied. Germination was reduced throughout in almost all the treatments at all the concentrations except for root wood and seed at lower concentrations. Shoot length was inhibited by all the treatments except stem bark and root bark where it did not exert any effect. Leaf was found to exert maximum inhibitory effect followed by seed. Root length was inhibited throughout in almost all the treatments at all the concentrations. Here leaf was highly inhibitory and pod extract was found slightly promotory. Dry weight was not affected by all the treatments except for leaf and seed extracts which were found promotory in effect.

Germination of C.tora was reduced by all the extracts of C.siamea except stem bark and seed extract at lower concentration wherein promotion was observed. Shoot length definitely showed concentration effect in all the treatments. Leaf extract, root wood and seed extract at 10% concentration promoted the shoot length. Other concentrations did not produce any effect and 60% concentration was found inhibitory for stem, root, pod and seed extracts. In general, root length was inhibited with root bark and pod as exceptions. Dry weight was not much effected.

Pongamia pinnata showed strong phytotoxic responses in test plants. This tree inhibited the germination of wheat seeds for all the treatments. Root wood extract, however, promoted the germination at lower concentrations. Similar results were seen with shoot length where higher concentrations were inhibitory and lower concentrations were promotory in effect. Root length, however, got inhibited by all the treatments at all the

concentrations. Maximum inhibitory potential being observed with leaf and seed extract. Dry weight was in general found promoted by almost all the treatments.

Germination of rice seeds were not affected by various extracts of P. pinnata except for the stem bark, root wood and seed extracts at higher concentrations. Shoot length was found promoted by almost all treatments and at all concentrations. A gradual increase in length being observed with a simultaneous increase in concentration in almost all the treatments. Root length also got promoted at all treatments in all concentrations. Dry weight increased for all the treatments except for root wood and seed extract at higher concentrations.

Various extracts of P.glabra shows inhibition of germination of C. occidentalis at all the concentrations except for stem bark and pod extract where promotion was observed. Leaf showed maximum inhibitory potential. Shoot length was however inhibited throughout, leaf extract followed by seed extract showed maximum inhibitory potential in treatments. Root length was found highly inhibited by leaf, root and seed extract to a significant level. Dry weight also decreased in almost all the treatments except for pod extract.

There was absolute inhibition of germination irrespective of concentration of C. tora upon treatment with extracts of P.pinnata. One or two seedlings which germinated did not survive the test period, hence, proving its excellant herbicidal property against the selected weed.

The highlights of the present investigation are the following :

1. Both the tree are found to exert strong allelopathic influences.

2. Between the crops, rice is found more tolerant to both the trees. Wheat was inhibited in many aspects.

3. Both the weeds were found inhibited by the trees, C.siamea and P.pinnata, though, the effect of latter was highly pronounced on C.tora.

4. Leaf, root wood and seeds were found to be rich sources of allelochemics.

5. There is a definite concentration effect of these allelochemics, where, in some cases lower concentrations are found to be promotory in effect and higher concentration are inhibitory.

6. Since all the plant parts exerting allelopathic influence contain flavonoids and phenolic acids, these compounds in all possibility forms the allelochemics of the plants.

7. P.pinnata and C.siamea are not suitable in Agroforestry programmes involving wheat, while the latter tree may be planted near rice fields.

8. P.pinnata is found to exert a strong herbicidal action on both the weeds which is to be followed up by further studies. C. siamea exert a comparatively lesser herbicidal action on the weeds.