

SUMMARY AND CONCLUSIONS

Soybean is the prominent rainy season cash crop in central India and 3rd important oil seed crop in the country. Its cultivation is being preferred by the farmers due to low input requirement of labour and nitrogenous fertilizers and wider adaptability to climate as well as soil and comparative tolerance to drought and excessive moisture. Over and above, instant market at remunerative price has played important role in rapid spread of soybean in the country.

At present this noble crop suffering a lot by insect pest attack, fungal, bacterial and viral diseases and ultimately leading to severe loss in crop production. Consequently, new approaches to major problems are being pursued.

Soybean which is widely cultivated in Western Maharashtra is facing the biotic stresses. Since there is close relationship between phenol metabolism and defence mechanism in plants against biotic stresses and as such polyphenols play an important role in developing defence mechanism in plants against biotic and abiotic stresses, resistance to several fungal plant pathogens has been ascribed to higher concentrations of phenolic substances and their oxidation products to increase polyphenol oxidase which generally, but invariably, results from infection (Mehrotra, 1980). In Maharashtra the soybean greatly suffer from rust infection which leads to complete destruction of crop at flowering stage. This has prompted to undertake the research pertaining to polyphenol metabolism in relation to plant age and/or plastochron index. It is hoped that the study will provide a time shedule for the use of agrochemicals to overcome biotic stress effect and hence it is thought worthwhile to

study the endogenous level of polyphenols in Soybean with respect to plastochron index.

Thus the subject matter of the dissertation includes study of the parameters such as total polyphenols, separation and quantification of phenolic compounds and enzymes involved in phenol metabolism *viz.* phenylalanine ammonia lyase, polyphenol oxidase and IAA oxidase in relation to plant age and/or plastochron index. The study is also coupled with the other parameters such as total chlorophylls, carotenoids, nitrogen and protein content. The methodology adopted for studying the above parameters is of standard nature and is scrupulously followed.

All these aspects have been studied and discussed by referring recent and up-to-date literature. The dissertation has been splitted into three main chapters comprising review of literature, material and method and results and discussion. The extensive literature survey carried out by referring recent journals, review articles, books and monographs is listed at the end of dissertation in the bibliography. The conclusions based on the findings are listed bellow.

Conclusions :

1. Higher value of leaf plastochron index in MACS-13 indicates that MACS-13 has a capability to grow fast than that of JS-335.
2. MACS-13 exhibit more Chlorophyll content at all the stages of plant growth/ plastochron index than that of JS-335, maximum at medium mature stage of growth.

3. Chlorophyll and carotenoid pigments gradually increase upto medium mature stage and then decline as the onset of maturity.
4. The reduction in nitrogen level after medium mature stage or beyond 20 LPI is quite natural in view of metabolic role of leaves because at seed filling stage one can notice a decline in nitrogen level in the leaves which can be attributed to the translocation of nitrogen to the developing seeds.
5. The reduction in protein nitrogen content is probably due to the accelerated proteolytic activity which may result in complete breakdown and/or alteration of some proteins.
6. Both the varieties of soybean exhibit more amount of polyphenol content in the root.
7. Susceptibility of JS-335 and MACS-13 to rust infection can be attributed to the fluctuating level of polyphenols in the soybean at different growth stages.
8. The activity of polyphenol oxidase changes with ontogeny of plant.
9. Phenylalanine ammonia lyase activity remains in higher gear at medium mature and mature growth stage as compared to young and old stage of growth.
10. The low activity of IAA oxidase may be due to stimulated activity of polyphenol oxidase.

11. The phenolic compounds identified in JS-335 includes proanthocyanodins, coumaric acid, khellin, catechin, D-catechin, quercetin derivatives, tannic acid, catechol, quinic acid, caffeic acid, ferulic acid. Out of these phenolic compounds quercetin derivatives, tannic acid, catechol + quinic acid, caffeic acid and ferulic acid are not seen at medium mature stage in JS-335 but the other compounds such as myricetin benzoquinone, kaempferol + ellagic acid, 4-hydroxyl betaphenyl coumarin acetate are noticed.
12. The concentration of these phenolic compounds is low at young, higher at medium mature and become less at mature growth stage.

Thus the data presented in the dissertation finally led us to conclude that the metabolic processes in soybean changes with ontogeny of the plant. The role of individual phenolic compounds their biosynthesis and metabolism with respect to plant age in soybean will certainly throw a light on defence mechanism against disease development. From the present work it can be said that the susceptibility of both the varieties to rust infection observed in past few years in Maharashtra is possibly be due to lower concentration of phenolic compounds at early stage of growth. The further research on this line to trigger the phenylalanine ammonia lyase activity for the induction of polyphenol biocynthesis to develop biochemical defence in soybean

var. JS-335 and MACS-13 is necessary. Looking to the polyphenol level in the leaf tissue it appears that the stage between vegetative and flower initiation in case of JS-335 and flower initiation stage of MACS-13 may be ideal for employing foliar application of better suited agrochemical.