SUMMARY AND CONCLUSIONS

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From antiquity, man has strived to produce new and improved crop plants, and the desire for higher yield and more efficient crop productivity has intensified in parallel with the advancement of scientific knowledge. In the past 25 years, several lines of research have been developed which aim to increase yield through direct modification of a wide range of plant types, and from such research it appears that a large potential exists for the control of crop growth and development using plant growth regulators. The use of synthetic plant growth regulators offers a new and potentially powerful cultural practice for the modification of plant growth and development in desired directions leading to increased yields (Archer *et al*. 1982).

Recent studies show that application of gibberellic acid that induces pronounced stem elongation in pea and soybean plants also produces marked reduction in N_2 fixation. Results of some preliminary studies indicate that the diversion of carbohydrate into the production of increased stem growth occurs at the expense of root growth and, perhaps, the development of root nodules. These observation suggest that dwarfism in legumes may benefit N_2 fixation. In garden pea dwarfing genes are known to control the biosynthesis of gibberellins. Pea cultivars that possess the dwarf gene have retarded stem elongation and are of reduced stature.

Dwarf cultivars, in contrast to their tall counterpart, might then have more carbohydrates available for the production of root nodules necessary for nitrogen fixation. (2-chloroethyl) trimethyl ammonium chloride (CCC) is an inhibitor of gibberellin biosynthesis. It is known to induce dwarfing in plants. Reports of experiments on the use of CCC as an antilodging agent have often contained references to consistent yield increases in cereal crops in the absence of lodging (Korenteng and Matthews, 1982).

Mung bean (Green gram) is an important legume in India and is spread all over the country (2.5 million hectares) with an annual production of only 0.8 million tonnes. Mung bean (Vigna radiata) like other pulses provide the much needed protein to our predominantly cereal based diet. Malnutrition due to protein deficiency amongst millions of Indian infants and young children is a matter of grave concern. Increasing the production of pulses is the least expensive and most immediate practical way of diminishing the intellectual dwarfism caused by malnutrition due to protein deficiency in the under developed nations at present.

The present studies have been taken up with a view to examining the effect of (2-chloroethyl) trimethyl ammonium chloride (CCC) on growth, yield and N_2 fixing ability of mung bean.

The effect of CCC (500, 1000 and 1500 ppm) on the growth and yield of mung bean has been studied for a period of 70 days by growing the plants in pots. Plants sprayed with 500 ppm CCC did not register any appreciable difference over the control in the extension growth, fresh and dry weights of the shoot and root systems. However, application of CCC at 1000 and 1500 ppm significantly reduced the extension growth of the shoot system. Fresh and dry weights of both shoot and root systems of plants sprayed with 1000 ppm CCC registered marked increase over the control plants. But CCC at 500 and 1500 ppm failed to increase the fresh and dry weights of shoot and root systems. The amount of total dry matter accumulated in plants treated with 1000 ppm CCC was 15% more than that of the control. Administration of CCC at 1000 ppm significantly increased root/shoot weight ratio, circumference of the stem, total chlorophyll content, total leaf area, leaf area index, net assimilation rate, net primary productivity and the contents of starch, total soluble and reducing sugars, total nitrogen, protein and ureides. Treatment with CCC at 1000 ppm also increased significantly the number of nodules and nodule mass per plant and enhanced nitrogenase activity (acetylene reduction). A similar significant increase in the activity of amylase and invertase of the source leaf (subtending leaf) has also been recorded as a result of treatment with CCC at 1000 ppm. The area, contents of total chlorophyll, total soluble and reducing sugars of the source leaf were also increased remarkably due to the application of CCC (1000 ppm). A significant increase in the dry weight, starch, total nitrogen and protein contents of the source leaf and their pods has also been recorded following CCC administration. Similarly, the application of CCC at 1000 ppm significantly increased the number of pods per plant as well as number of seeds per pod. These results suggest that the induction of dwarfism by CCC could be profitably exploited for improving the yield of mung bean.

It may be concluded from the present studies that CCC enhances growth (biomass) and yield of mung bean by

1. reducing shoot extension growth and enhancing root growth (dry weight)
2. improving root/shoot weight ratio
3. increasing leaf area and leaf area index (LAI) and total chlorophyll content resulting in an increase in net assimilation rate (NAR) and net primary productivity (N.P.P.) as evidenced by a significant increase in dry matter production.
4. improving nitrogen fixing ability as evidenced by the increased number of nodules per plant and nitrogenase activity resulting in more nitrogen and protein content.
5. promoting the production of flowers as evidenced by the increased number of pods per plant.
6. improving the translocation of photosynthates from the source to the sink.