

**AIMS AND OBJECTIVES
OF THE PRESENT WORK**

1.3. AIMS AND OBJECTIVES OF THE PRESENT WORK :

Chayote (*Sechium edule* Sw), is a highly nutritive and promising green vegetable crop to the hilly people of India. Economically, chayote is important as all parts of the plant are consumed by human beings as different table items. The fruit is very rich in carbohydrate, protein and some essential amino acids. The underground tuberous part is delicious and is a good source of starch-rich carbohydrate and some vitamins. The young shoots including the tendrils are rich source of vitamin A and C. (The Wealth of India, 1972) Besides its economic values for a number of yield attributes, it has also some agricultural plus points for cultivation which include :

1. Minimum cost of maintenance in the field. It is often called a zero management crop.
2. Least susceptibility towards fatal diseases and high resistance capacity against some animal pests which appear during flowering. Cook (1901) mentioned that chayote is an exceptionally safe crop.
3. Considerably higher productivity even in fallow land,
4. Considerable food value in all plant parts (fruits, tuberous roots and leafy young shoots).
5. Higher storage potential of fruits at ambient storage conditions for a long period,
6. Insignificant dormancy and negligible storage deterioration of fruits and tuberous roots even under adverse climatic conditions.
7. Higher adaptability of the plant towards various climatic hazards like extremely high relative humidity, temperature fluctuation and frosty weather of Darjeeling hills.

In spite of many positive points for its cultivation there are some problems which impair higher productivity of this plant. Firstly, strong apical dominance and excessive plant vigour cause to induce maximum vegetative growth resulting in impairment of reproductive growth and crop yield. Secondly, in all the varieties, higher number of male flowers than the female ones per plant cause to lower the number of fruits for plant. Thirdly, in many varieties early senescence of contributory leaves results in reduction of assimilate supply to the reproductive sinks i.e., growing fruits at their final maturation phase and the consequence is the production of small sized of fruits as well as reduction of crop yield.

Considering the above mentioned problems, in the present investigation an attempt was made to overcome these deleterious features of the crop by using some plant growth regulators of the retardant class and the promoter class namely, chlormequat or chlorocholine chloride (CCC), Na-dikegulac (trade names Atrinal), maleic hydrazide (MH), kinetin, gibberellin (GA_3) and indole acetic acid (IAA). Strategies to obviate the deleterious features also include selection of the optimum concentrations of the chemical manipulative agents as well as selection of the ideal stage of the plant development for application of the chemicals for obtaining the most covetable response.

To get rid of the first deleterious feature of the plant, i.e. undesired profuse vegetative growth, the selected growth retardants like CCC, Na-dikegulac and MH are supposed to act as the preferred instrument. There are ample reports in the literature that a number of growth retarding chemicals (including the present ones) can successfully check unwanted excess plant vigour causing subdued plant growth (Knypl, 1979; Monselise, 1974; Bhattacharjee, 1984). The efficacy of the retardants on lowering plant vigour was determined by analysing the growth and metabolic status of the chayote plant.

For obviation of the second problem, i.e. occurrence of exceptionally high male : female flowers per plant, an attempt was made to increase the number of female flowers per plant by foliar application of kinetin, GA_3 and IAA which are supposed to have some role on flowering as well as on sex expression in many cucurbits (Leopold and Kriedemann, 1975; Ghosh and Basu, 1983).

The third deleterious feature, i.e. the onset of earlier senescence of the active assimilate transporter leaves, was tried to overcome by using senescence deferral agents like IAA, kinetin, and growth retardants which are reported to keep the foliage green even before preharvest stage of many monocarpic crops (Halevy, 1975; Bocion *et al.*, 1975; Nooden and Leopold, 1978). The efficacy of these chemical manipulants was analysed through several established and reliable physiological and biochemical senescence evaluation indices. Thus, the prime objective of the present investigation was to obtain an ideotypic chayote plant after possible obviation of the deleterious features, as mentioned, by chemical manipulative methods.

Before undertaking the detailed studies of this investigation, a preliminary survey was made to get acquaintance with the different varieties of chayote plant available in Darjeeling hills and their characteristic features. Subsequently, a selected variety of the plant was grown on experimental field (type C, vide table-1.2) and the phenology of this particular variety was studied to determine the important phases of plant development as well as duration of the individual phases in the entire life cycle of the plant. Table 1.3) Using this plant type as the experimental material for further investigation, the following studies have been undertaken :

- a) Analyses of the effects of growth retardants, treated at sprouting fruit, sapling and preflowering, stages of chayote, on the modification of plant metabolism determined by changes of a number of biochemical parameters.
- b) Analyses of the effects of growth retardants, treated at sprouting fruit, sapling and preflowering, stages of chayote, on modification of plant growth and vigour.
- c) Analyses of the effects of growth retardants, treated at sprouting fruit, sapling and preflowering, stages of chayote, on modification of crop yield and other yield attributes.
- d) Analyses of the effects of growth retardants treated at sprouting fruit, sapling and preflowering, stages on the changes in onset of leaf senescence (Days of plant age).
- e) Analyses of the effects of combined doses of growth retardants, treated at a preflowering stage, and growth promoters, treated at flowering stage on modification of growth, metabolism, flowering, senescence and crop yield of chayote plant.

Thus, the thorough investigation and detailed observation on the aspects mentioned above could permit to judge the practical feasibility of using the plant growth regulators on achieving our objective towards desirable modification of growth, metabolism and yield of the himalayan vegetable crop. Results obtained from this investigation, could also point out some newer avenues of research in this field.