CHAPTER 6

SUMMARY AND CONCLUSIONS

For the present study *Raphanus sativus* L. Var. Pusareshmi, a member of Cruciferae family was selected to analyse the effects of vernalization and gibberellic acid treatment under three photoperiodic regimes. Radish is a vegetable crop, native of western Asia and cultivated very extensively in western part of India especially in Gujarat state during winter season. The basis for the approach has been described in the "introduction" part.

Vernalization treatment was given to seedlings (24h.old) for a particular period i.e. 5 weeks. Seedlings of morphologically same size grown in dark condition were considered as control. Metabolic and hormonal changes and qualitative change in soluble proteins were investigated at weekly intervals in seedlings. 2, 3 and 4 weeks vernalized and GA₃ treated seedlings were made to grow in earthenware pots under three different photoperiods to study the growth behaviour. The influence of vernalization and photoperiod on the metabolic status of the leaves (inductive process) and the shoot apex (evocation process) were studied. The influence of these factors on growth indices and yield components were also recorded. Application of GA₃ proved to be unsuccessful
Standard biochemical and histochemical techniques and statistical methods were employed in the present study. The results obtained and the conclusions drawn from these are as follows.

1. Process involved in growth, development and differentiation are highly interrelated with one another.

2. The decrease in protein content of control and vernalized seedlings with the concomitant increase in amino acid content is indicative of protein hydrolysis associated with germination.

3. The accumulated proline content in the vernalized seedlings might be a reflection of the acquired cold tolerance of the radish plant as suggested by Levitt (1972).

4. The activated nucleic acid synthesis at the early growth stage during vernalization might play an important role in further floral differentiation. The period of two weeks vernalization treatment corresponded to the minimum period required to complete the vernalization effect of the present
cv. Pusareshmi of radish.

5. The higher peroxidase activity in vernalized seedlings might be due to the higher rate of respiration in order to provide the energy required for growth and differentiation processes.

6. Electrophoretic study of soluble proteins reveals that the higher molecular weight soluble proteins are in continuous turn over.

7. Vernalization caused decrease in phenol content may be due to the inhibitor level of phenol which causes the increase in the hormonal level. Phenols were at lower level in top two leaves of vernalized plants just before flowering.

8. Endogenous GA-like and cytokinin-like substances might have played a vital role on early flowering of vernalized plants. Vernalized seedlings exhibited more endogenous hormones at particular Rf positions. In the present study low rate of growth during the period of vernalization is positively correlated to auxin content.
9. Vernalization caused early flowering in radish, irrespective of photoperiods to which plants were subjected after chilling. Vernalization treatment of about 14 days given to seedlings was found to be stable in radish.

10. Photoperiodic studies revealed the fact that the plant can flower under all photoperiodic regimes, but earlier under long days, is a character typical of a quantitative long day plant.

11. Exogenous application of GA₃ did not show any effect on flowering, but it caused stem elongation of plants in all the 3 photoperiods. The absence of the floral inductive effect of GA₃ in contrast to its positive action on stem elongation offers the instance that floral induction and stem elongation can be separate processes or phenomena. It also proposes that a cold-inducible path way is present in radish for flowering.

12. Higher levels of RNA, protein and insoluble polysaccharides were observed in the vernalized shoot apices before transplantation and at the time of transition. These metabolites are associated with the process of transition.
13. Under long day condition stem elongation was initiated much earlier and the final height was reached quite earlier than in plants under ND and SD conditions. Higher net assimilation rate in vernalized plants resulted into the production of more pods/plant and seed weight/plant. Thus photosynthetic rate or net assimilation rate is an important internal factor governing the process of development.

14. Alterations in the rate of developmental processes brought about as a result of vernalization and GA₃ application had changed the complete growth pattern of the plant. The acceleration of development, however, leads to an overall reduction in yield due to the shorter vegetative period.

15. Longer the vegetative period the higher the dry matter production. In vernalized and GA₃ treated plants the root development was very poor. Here, a greater proportion of assimilates might have been utilized by plants for the production of flowers, pods and seeds rather than roots. ND condition during November to December were found to be suitable for the development of roots followed by LD and SD
16. Yield in terms of pod weight/plant exhibited an insignificant correlation to vernalization period and GA<sub>3</sub> concentration under all three photoperiods. This suggests that either the extension of cold treatment or the increase in GA<sub>3</sub> concentration do not have any marked influence on yield.

17. Though GA<sub>3</sub> is not the flowering hormone in case of radish, it can be a part of that hypothetical stimulus since it has a positive effect on stem elongation.