INTRODUCTION

Impatiens balsamina L., cv. Rose, commonly known as balsam (vern. Gulmehndi), is an ornamental herb belonging to the family Balsaminaceae.

It is a qualitative short day plant (Nanda and Kumar, 1966) that requires 2–3 short day cycles for floral buds to be initiated and 6–8 such cycles for them to develop into flowers (Nanda and Krishnamoorthy, 1967; Sood and Nanda, 1973), the critical period being 15½ hr. The plant is indeterminate in nature although microsurgical removal of floral buds immediately after their appearance, results in the transformation of the apical growing point from vegetative to the reproductive state under inductive photoperiods making the plant thereby, determinate in nature (Nanda and Purohit, 1967). This plant does not attain a state of permanent induction as floral buds on the upper part revert to vegetative growth when the plant is transferred to non-inductive
photoperiods even after receiving as many as 90 SD cycles. This transformation occurs in basipetal order and can take place even after the formation of placentas with ovules (Krishnamoorthy and Nanda, 1968). The inductive effect of short day cycles can be effectively summated when intercalated by as many as 16 long days (Krishnamoorthy and Nanda, 1967). In fact, such intercalated non-inductive cycles, hasten the initiation of floral buds as well as their development into flowers (Toky and Nanda, 1969). The non-inductive photoperiods, each consisting of 4 or more hours of dark, are able to substitute partially for the photoperiodic requirement of this plant (Sawhney et al., 1972b). The existence of a rhythm in the flowering response of this plant to photoperiod has also been demonstrated (Nanda et al., 1969).

Gibberellins A\textsubscript{3}, A\textsubscript{4}+7, A\textsubscript{1}3 and even (-)-kaurene induce floral buds in this plant under strictly non-inductive photoperiods (Nanda et al., 1969), although gibberellic acid as a rule does not induce flowering of short day plants (see Lang, 1965). The effectiveness of GA\textsubscript{3} in inducing floral buds under non-inductive photoperiods, however, varies with the prevailing temperature conditions (Nanda et al., 1970) and the extent of vegetative growth (Nanda et al., 1972).

The metabolic drifts in carbohydrate, nitrogen, protein and nucleic acid contents during induction have also been studied and it has been found that there is gearing up of the general metabolic machinery during transformation of the
meristem from vegetative to reproductive state. Amylase
and catalase activities also increase to cause enhanced
mobilization of food materials to meet the higher demand due
to an increase in the number of growth centres which in this
case, are represented by axillary floral meristems (Sawhney

Gantzer (1960), Vendraš and Buffel (1961), Wain and
taylor (1965) and Cleland and Ajami (1974) have shown that
phenolic compounds act as analogues of growth hormones. They
affect dormancy and germination (Phillips, 1961), growth
(Gantzer, 1960; Henderson and Nitsch, 1962; Miminoshvili et
al., 1973; Michniewicz and Galoch, 1974; Marigo and Boudet,
1975), flowering (Zucker et al., 1965; Umemoto, 1971; Pryce,
1972; Sheen, 1973; Cleland and Ajami, 1974; Otto, 1975;
Pieterse and Muller, 1977; Pieterse, 1978a,b; Watanabe and
Takimoto, 1973) and other physiological functions (Tomaszewski,
1964). It has also been reported that the action of phenolic
compounds on growth and differentiation is mediated through
changes in IAA-oxidase activity (Rabin and Klein, 1957;
Gortner and Kent, 1958; Henderson and Nitsch, 1962; Fedl and
Hartmann, 1967; Basu, 1972; Haissig, 1974). More recently,
Nanda et al., (1976), Nanda and Kumar (1977) and Sood and
Nanda (1979) have shown that flowering in Impatiens balsamina
is induced by some phenolic compounds under non-inductive
photoperiods. It has also been reported that phenols synergise
the effect of GA\textsubscript{3} not only in accelerating the initiation of floral buds and flowers but also in increasing the production of floral buds. The phenolic compounds thus play a significant role in morphogenetic phenomena. The results of some biochemical aspects related to flowering caused by some monophenols have already been reported from this laboratory. It was considered of interest to undertake studies on the effect of di- and polyphenols on growth and flowering of this plant in order to shed some light on the mechanism of action of these phenols. The work presented in this thesis relates to the study of the effect of varying numbers of treatments with GA\textsubscript{3}, Resorcinol (Reso and Tannic acid (TA), each alone and a phenol in combination with GA\textsubscript{3} on growth and development of \textit{Lepatens balsamica} under varying numbers of inductive and non-inductive photoperiodic cycles. It also includes the results of the effect of tannic acid (TA) and gibberellic acid (GA\textsubscript{3}), singly and together accompanying varying numbers of long and short day cycles on (i) quantitative and qualitative changes in endogenous level of phenols (ii) changes in protein-, free amino acid-, RNA-, DNA- and sugar- contents (iii) changes in the activities of peroxidase, IAA oxidase and polyphenol oxidase and their isoenzymes patterns.