

## The effects of gibberellin and phenols on morphology in relation to different photoperiod of *Chenopodium album* plants.

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### ABSTRACT

*Chenopodium album* is a qualitative short day plant were grown in earthen pots in different conditions. The stock solutions of GA<sub>3</sub> Resorcinol, Tannic acid and salicylic acid were made by dissolving 100mg of each of the two in very little quantity of ethanol.

The effect of different number of treatments with GA<sub>3</sub>, Resorcinol, Tannic acid, Salicylic acid singly and each of these phenols in combination with GA<sub>3</sub> on growth and flowering of *C. album* a short day plant. The Height of plants were more under SD conditions then under LD condition but number of Leaves were more under LD condition than under SD condition.

For floral bud initiation the time taken by the plants was less when treated with GA<sub>3</sub> and the time taken was more when plants were treated with either of three phenols.

In the quantitative experiments contents in the leaves was higher than that in stem that though it was more under LD conditions then under SD conditions

### INTRODUCTION

#### Materials and Methods :-

*Chenopodium album* qualitative (short day plant) are suitable objects for studying effects of Gibberellins and Phenols on morphology of *chenopodium album* Garner and Allard (1920, 1923) were the first to demonstrate the paramount role of the duration of light in flowering of plants. The photoperiodic responses of plant have since been reviewed from time to time (Zeevaart, 1962; Lang 1965; Searle 1965; Chailakhyan, 1967, 1968, Evan 1969, Chailakhyan 1970, Wareing and Phillips, 1970; Evan, 1971; Chailakhyan 1975; Vince Prue 1975; Zeevaart, 1976, 1978, Chailakhyan 1977, 1979)

According to chialkhyan 1977, (1979) the floral buds are induced by Anthasin and Gibberellin and according to him in the long day plant Anthasin are present inside whereas Gibberellin are to be applied. However, in the case of short day plants it is the GA<sub>3</sub> which are already present in the plant and in

this case Anthasin are to be provided from outside. Thus GA<sub>3</sub> according to him can not induced floral bud in short day plants but under long day condition.

The present study was done to investigate the effect of number of treatments with the phenols like Resorcinol, Tannic acid and Salicylic acid and GA<sub>3</sub> on vegetative growth as well as flowering in *Chenopodium album* along the number of treatments under short day and long day conditions.

#### Observations :

#### Effect of photoperiod GA<sub>3</sub> Resorcinol on the morphology of *C. album*:-

By experiment it was observed that the plants which received only one treatment with GA<sub>3</sub> were found to be dwarf as compared to the plants receiving different treatments up to 24 days and after that the height increased with the GA<sub>3</sub> treatments. At the end of experiment those plants which were given 12 to 20 treatments with GA<sub>3</sub> were found tallest and those

which received only one treatment were found to be shortest.

As far as the height of the plant in relation to the treatment with Resorcinol alone and GA<sub>3</sub> + Resorcinol is concerned it was found that the plants which received only GA<sub>3</sub> were lesser in height as compared to those which received GA<sub>3</sub> + Resorcinol, though in both the cases the height of the plant increased.

1 to 8 hrs As far as effect of short day cycle are concerned it was observed that with the increase in number of short day cycle height of the plant also enhanced.

Those plants were lesser in height which were given only the short day cycles when compared with the height of those which received GA<sub>3</sub> + Resorcinol alone with similar no. of short day cycles.

It was further observed that the plant which were provided 1 to 3 treatments of GA<sub>3</sub> + Resorcinol were shorter as compared to those which received from 10 to 20 treatments.

Plants receiving only 1 to 2 Resorcinol treatments or 1 to 2 GA<sub>3</sub> + Resorcinol treatments produced more no. of leaves as compared to those which received 20 or more treatments with both. As far as floral buds are concerned. The plants receiving long day conditions (20 hrs) required to the 10 to 12 treatments of GA<sub>3</sub>, for the bud initiation and the number was more in comparison to the plants receiving 15 to 20 treatments of Resorcinol. The number of buds increased with the same number of treatments but with the combination of GA<sub>3</sub> + Resorcinol.

### **Effect of Photoperiod, GA<sub>3</sub>, Tannic acid on the morphology of *C. album*:-**

By the experiments it was observed that effect on height under 24hrs when plants were treated with one and more than one GA<sub>3</sub> treatment height enhanced when combination of GA<sub>3</sub> + Tannic acid was applied plant gain height with increase in number of treatments. But if compared themselves there was no significant difference in height under 1

to 8 hrs treatment effect of GA<sub>3</sub> + Tannic acid no doubt was in the same line as with GA<sub>3</sub> or Tannic acid alone but the height was found to be comparatively more in plants receiving GA<sub>3</sub> + tannic acid. Thus it was found that the increase in heights in the plant was less with tannic acid but taller in the GA<sub>3</sub> and maximum height in GA<sub>3</sub> + Tannic acid.

In the case of long day photoperiod the number of leaves found to be increased with the passage of time. However, the same plants treated with either GA<sub>3</sub> or Tannic acid or GA<sub>3</sub> + Tannic acid behaved no differently if compared with plants received different number of long photoperiod.

In case of short-day condition at the end of experiment plant receiving only 1 to 3 GA<sub>3</sub> treatment along with 1 to 3 short day cycles were found to be having highest number of leaves in comparison to those receiving 12 to 20 treatments with GA<sub>3</sub>. Long day conditions plants were higher number of leaves in comparison to short day condition plants.

Long day cycles of 24 hrs. did not initiate floral buds but when plants were treated with more than 5 treatments with GA<sub>3</sub> or Tannic acid or with the combination of two bud initiation was noticed. But the percentage of floral buds was only 50% in 24 hrs cycles as compared to 80% or more under 1-8 hrs. photoperiod under short day cycles 1 to 3 cycles along with 1-3 treatments with tannic acid has no effect with tannic acid but floral bud initiation was noticed under same number of GA<sub>3</sub> treatments.

Number of floral buds increased with increased in number of short day cycles but up to limit of 15 short day cycles beyond which no further effect was noticed. Number of floral buds were more under 5 to 8 GA<sub>3</sub> + Tannic acid as 6 to 9 short day cycles under in comparison to when under same number of short day cycles with GA<sub>3</sub> treatment is provided.

A number of other qualitative short day plants are now known in which gibberellins are able to induce flowering under strictly non inductive photoperiods. They include *Chrysanthemum morifolium* (Pharis, 1972) *Zinnia elegans* (Sawhney and Sawhney, 1976), *Panicum miliaceum* and

*Panicum miliare* (Kumar, et al. 1978) GA<sub>3</sub> is also reported to hasten the emergence of ears in *Setaria italica* under both inductive and non inductive conditions (Kumar et al. 1977)

## Effect of Photoperiod, GA<sub>3</sub> Salicylic acid on the morphology of *C. album*

As far as the height of the plant is concerned it was seen that under long day (24 hrs) photoperiods effect of GA<sub>3</sub> alone as well in combination of GA<sub>3</sub> + Salicylic acid was the same. Under SD (1 to 8) photoperiods the effect was lesser under the combination in comparison of GA<sub>3</sub> alone. The height of plant was more under 24hrs. Photoperiods in comparison to the height of the plant under short day condition alone.

Plants under long day photoperiod and were given treatments with salicylic acid with GA<sub>3</sub> produced more the number of leaves as compared to those treated under short day condition. As far as those plants which got 24hrs. photoperiod did not show any floral bud initiation. However but initiation was noticed when such plants were treated with high no. of GA<sub>3</sub> or salicylic acid alone or the combination of the two.

In long short day plants, gibberellin replace the LD but not the SD part of the dual photoperiodic requirement (Lang, 1965; Purohit and Nanda 1967, Zeevaart 1969, 1978; Gaskin et al. 1973. While in *Scabiosa succisa*, a short long day plant, gibberellins replaced only the short day requirement (Chouard, 1957). In another short long day plant *Coreopsis grandiflora*, GA<sub>3</sub> is reported to replace the requirement for long day (Ketelsperger and Barbaro 1966)

## Conclusion :

There is initiation of floral buds by the polyphenol (Tannic Acid), monophenol (Salicylic Acid) the *Chenopodium* under the 24 hrs. photoperiod. Moreover, their effect is further enhanced when the treatment is by GA<sub>3</sub> + Tannic acid or GA<sub>3</sub> + Salicylic acid. However, interestingly it was found that increase in the amount of diphenol ie "Resorcinol has

not enhanced the floral bud induction with the increase in its concentration and there was no effect of Resorcinol in initiating the floral bud and LD condition especially in higher concentration.

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