

Quantitative Study of Proteins, Sugar, RNA, DNA and Amino Acid in a relation to the effect of Gibberellin, Tannic Acid, Resorcinol And Salicylic Acid and Effect of Length of Photo Period in *Chenopodium Album*



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Abstract

Quantitative changes in Protein, Sugar, RNA, DNA and amino acid has been measured in leaves and stems of *Chenopodium album* separately and periodic collection were made. Folin-cicolteu reagent were used for the estimates of Proteins, Water and acid soluble sugars were estimation by using glucose as standard, RNAs were estimated by using different concentrations of ribose. Colorimetric method was used for estimation of DNA and photometric ninhydrin method was used for amino acid in the quantitative experiments. Contents in the leaves were higher than that in stem and though it was more under LD conditions than under SD conditions. Phenolic contents in the plants receiving 1 to 5 treatments under LD cycles was more as compared to control plants under the same number of LD cycles. However the plants receiving 20 treatments and 40 LD cycles have Lower amount of phenol than control. There was decrease in the content of free amino acid under SD cycles but an increase in amount of protein was concluding the role of more proteins in the floral bud initiation. Under both long and short day. 40 cycles and 20 treatments there was an increase in amount of free amino acid under inductive photoperiod, the amount of RNA, DNA as well as the amount of sugar content was found higher than the non inductive (24hrs.) conditions.

Keywords: *Chenopodium Album*, Photoperiod, Tannic Acid, Resorcinol, Salicylic Acid, DNA sugar, Phenol.

Introduction

The change from vegetative to reproductive condition has been investigated in recent years by means of biochemical, histochemical, autoradiographic and electromicroscopical methods (Evans, 1969; Bernier, 1970). These studies, as well as experiments indicate that there is an increase in the activity of polyphenol oxidase and is also showing its role in the floral bud initiation.

Chenopodium album was selected for to know the relation of amino acid, RNA, DNA, Sugar and Protein in changing the vegetative meristematic tissue to reproductive meristems. There was a decrease in number of leaves and when plants shows enhancement in the height and further producing floral buds, the same was reported by many workers like Nanda and Krishnamurthy, Zeevaart 1971, Sharma and Nanda 1976.

Objectives of the Study

The main of the work is to findout the effect of Gibberellin, Tannic Acid, Resorcinol and Salicylic Acid on the length of photoperiod in *Chenopodium album* with reference to Quantitative study of proteins, sugar, RNA, DNA and Amino Acid.

Materials and Methods

Growth Condition

It start with uniform healthy seeds of *Chenopodium album* were taken and were sown in petridishes (15cm in diameter) in which moist filter

paper was placed after germination seedling established transferred in earthen pots. In such a way that there is five plants in each pot at equal distance. In different conditions plants grow under following way

1. For normal days pots were grown under continuous illumination in day and remained undisturbed in the night.
2. For short day conditions plants were covered by canvas black sheet, daily aeration from 5PM to 9 AM.
3. For LD photoperiods the plants were kept under natural sunlight for eight hrs then subjected to artificial light given by fluorescent 40w tubes (Numbering Six).

These were then divided into 6 groups each and were given 1, 6, 9, 15, 24 and 40 short day cycles and after that plants were again transferred to continuous light. The leaves and stem of these plants were separated and quantitatively analysed separately.

Observations

Effect of photoperiods, GA₃ and Resorcinol on Quantitative changes in Proteins, Amino acid, RNA, DNA Sugar and Phenols

It was observed that plants receiving 1 to 9 long day cycles along with GA₃, Resorcinol and GA₃ + Resorcinol treatments didn't show significant enhancement in proteins as compared to those under short day cycle. The amount of amino acid were decreased as under long day conditions. However, when treatments with these chemical increased beyond 30 along with 35 to 40 or even more short day cycles the amount of amino acid was found enhanced surprisingly, the amount of RNA and DNA went as increasing and increasing with the increase in number of short photoperiod and also by increasing the treatments with GA₃ and Resorcinol. There was quantitative increase in Sugar content under long day conditions as compared to under short day conditions. Phenolic content of stem part in comparison to leaves was found to be low under both long day and short day cycles.

Effect of photoperiods GA₃, Tannic and on quantitative changes of proteins, Amino acid, RNA, DNA Sugars and Phenols

In the experiments it was observed that no change in protein contents of control plant under on 24 hrs (LD) photoperiods was noticed but the amount increased under 6 to 9 photoperiods and suddenly amount decreased up to 15 long day periods. Surprisingly with more than 15 LD periods the amount of increased results were found when plants were treated with GA₃ but as far as tannic acid is concerned the amount of protein decreased with increase in long day cycles but there was increase in amount of proteins with the treatment of short day cycles from 15 to 40 & GA₃+tannic acid from 20 to 30. In comparison to long day condition of one short day cycles along with one treatment of GA₃ or tannic acid or GA₃+tannic acid decreased. It is surprising to known that there was sudden increase in amount of amino acid just near the end of experiment i.e. 30 treatment and 40 short day cycles.

As far as RNA and DNA concerned the amount of RNA was highest is stem given 30 treatments either with GA₃ or tannic acid or GA₃+ tannic acid with 40 short day cycles the amount of DNA was less when compared to RNA when given same treatments. In our experiment it was clear that amount of sugar was more in plants when treated with GA₃, or tannic acid, GA₃+ tannic acid when amount of phenols in stem and leaves noted it was found that when plants were given 1 to 5 treatments with either of three chemicals along with 1 to 9 long day cycles the amount of phenol was much high in comparison to control plants. Surprisingly, it was opposite as when the plants were given 20 to 30 treatments with either of three chemicals along with 40 long day cycles the amount of phenols were lower than the control plant.

Effect of photoperiod, GA₃ and Salicylic acid on quantitative changes in Proteins, Amino acid, RNA, DNA Sugar and Phenols

In the experiments it was found that the amount of proteins was enhanced under lesser number. of short day cycles, when treated with Salicylic acid as compared to plants under non inductive photoperiods, when treated with Salicylic acid required higher number. of treatments i.e. more than 20 salicylic acid and more than 40 LD (24hrs.) cycles. In both the long day and short day treated plants it was noticed that amino acid content were higher in the treated plants in comparison to the control plants. In general it was noted that more the number. of long day cycles (24hrs.) were required to increase the amount of RNA than the short day cycles i.e. 8hrs.

It was found that increase in salicylic acid treatments along with increase in short day cycles, the amount of DNA went on increasing but it was found to be in decreasing side. There was increasing trends in acid soluble sugar with the treatments of GA₃ but there was no significant changes in plant receiving salicylic acid treatments. Total sugar content was increased when treated with either of three chemicals.

Conclusion

There was increase in protein content in stem and leaves under the short day condition and it may be due to increased incorporations of these proteins relating to floral induction. According to Tiwari, (1975) increased in the protein content was noticed with 2 short day cycles. In our experiments there was increase in RNA amount in plants getting treatments with either GA₃ or resorcinol or tannic acid, salicylic acid or GA₃+Resorcinol or GA₃ + tannic acid or GA₃ + Salicylic acid along with the LD cycles when compared with the control plants. It is related to forming floral stimulus. This increase in amount of RNA went on increasing up to the end of experiment. It is on same line as that given by Millar and Lyndon (1977) who reported 25% enhancement in RNA in the *Silencecoelli-rosa* under the SD condition than the LD condition the amount of DNA also increased when provided 1 to 6 SD cycles supports the facts that there was high rate in meristematic activity before the induction of floral buds. This results is the same line as reported by Driss-Ecole (1979), according to him there was slow increase in number of 4C nuclei under

the 16hrs. Photoperiods and number of 4C nuclei speedy increased under 8hrs. in *Celosia cristata*.

As there was requirement of more RNA, DNA and amino acid for the change of vegetative meristematic tissue to the floral tissue, similarly more amount of sugar is also needed to provide energy for various metabolic activities. Pryke and Bernier (1978a) for also of the view that the increase in sugar content is associated with the transition from vegetative to floral stage and may be due to an increase in activity of invertase. According to Sawhney et. al., (1970 a, 1972 a, and 1979) and Kumar and Nanda (1981), the energy required for transition from vegetative to floral form is provided with an increase in the activity of hydrolyzing and oxidising enzymes. It was found in our experiments that leaves have more amount of phenols as compared to that in the stem of *Chenopodium*. This amount of phenol were not increased in the control plant and there was no induction of floral bud.

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