Short Day Effects on a Long Day Plant Solanum Lycopersicum

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Abstract:- Photoperiod is one of the most important environmental factors which affect the plant growth and development. Understanding physical requirements of a plant is essential for getting better yields. An attempt was made to study the effect of photoperiodism on different growth characteristics of Solanum lycopersicum. The study helps to identify the most suitable light period for a plant for getting better yield. By understanding the growth characteristics of a plant, they can be modified by using biotechnological techniques enabling them to be grown under a wide variety of environmental conditions. Results can provide theoretical basis for variety breeding and cultivation practice improvement in tomatoes.

I. INTRODUCTION

The phenomenon of photoperiodism was first discovered by Gardner and Allard. Relative length of day and night is called photoperiod. Plants are

Classified in to three categories on the basis of photoperiod:

- Short day plants
- Long day plants
- Day neutral plants

Short day plants: These plants require a relatively short day light period (8-10 hours) and a continuous dark period of 14-16 hours for subsequent flowering. The dark period is critical and must be continuous in short day plants. If the dark period is interrupted even with a brief exposure of red light, the short day plant will not flower.

Long day plants: These plants require a longer light period usually 14-16 hours for subsequent flowering. In long day plants the light period is critical. A brief exposure in the dark period or prolongation of the light period stimulates flowering in long day plants.

Day neutral plants: These plants flower in all photoperiods ranging from 6-24 hours continuous exposure. Long day plants require long periods of sunlight exposure for its growth. If such a plant does not get adequate sunlight an alternation in the photosynthetic rate occurs and ultimately and ultimately affecting plant growth.

This study focuses on how the short day photoperiod affects a long day plant Solanum lycopersicum. The importance of the study is emphasized in the field of agriculture. Understanding physical requirements of a plant is essential for getting better yields. The physical requirements of plants are different. Every plant varieties could not be grown in every season as there are variations in light, moisture, rainfall and temperature. Knowledge on the photoperiodic requirements of plants can be effectively utilized in the field of agriculture and biotechnology, for developing genetically modified plants. Also aids in improving cultivation practices.

II. OBJECTIVES

To study the change in various growth characteristics

- Length of the stem
- No: of leaves
- Thickness of the stem

On Solanum lycopersicum subjected to short day treatments.

III. METHOD

Pure experimental method was used in the present study. Test and control plants were grown separately at different photoperiodic ranges and by the end of experimental period of 2 months growth characteristics of the plant was measured and recorded. The length of the plant and thickness of the plant was measured with the help of a thread and a graduated measuring tape. The number of leaves was recorded by counting the total number of leaves in each plant.

For the first four weeks they are grown under normal sunlight. The plants after the four week period are divided in to three groups including two test groups and a control group. The control group was grown under normal sunlight; whereas the experimental group was subjected to two different photoperiods viz; 8LD ± 16 SD and 6LD ± 18 SD.

During the experiment dark photoperiod treatments were set up by sheltering the seedlings with opaque cloth during the daytime. The experiment was continued for another 4 weeks and the growth characteristics such as plant height, number of leaves, thickness of stem and flowering pattern are

noted. The 8 hour photoperiod treatments was started at 8:00am and terminated at 3:00 pm, whereas the 6 hour photoperiod duration from 8:00 am and terminated at 1:00 pm.

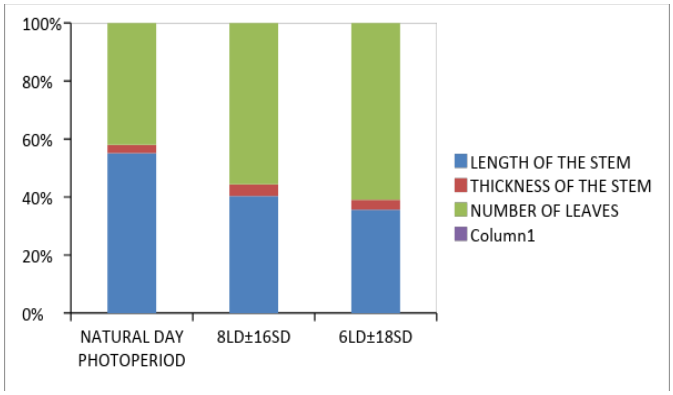
IV. RESULTS AND DISCUSSION

The process of evaluating data using analytical and logical reasoning to examine each component of the data provided. This form of analysis is just one of the many steps that must be completed when conducting research experiment. Data from the various sources is gathered, reviewed and then analyzed to form some sort of finding or conclusion.

There was a significant difference in the growth characteristics of controlled and experimental set of plants. The results are given below.

Treatment	Length of the stem	No: of leaves	Thickness of stem
Natural day photoperiod	70.9 ± 0.74	54 ± 3	3.6 ± 0.12
8LD ± 16SD	18.12 ± 5	44 ± 2	3.25 ± 0.25
6LD ± 18SD	31.9 ± 0.7	31± 1	1.75 ± 0.18

Fig 1:- showing differences in growth characteristics in Solanum lycopersicum after short day treatment



The experimental results showed a significant difference between the test group and controlled group. The flowering was not observed in the case when the light period was reduced to 6 hours. But in the case of plant treated with 10 hours light period, flowering was observed, but premature fall of flowers was noted. Endogenous hormones play an important role in regulating the plant development and flowering process under varied photoperiods. Photoperiod acts as one of the important factors in affecting the plant flowering initiation and determining the plant flowering time in the photoperiod sensitive plants.

On comparing the experimental set with the controlled set the, the plants begin to fruit by the end of 6th week. Leaves were darker on short day treated plants. Shading can increase chlorophyll content but decreased photosynthetic and transpiration rate .SD photoperiod treatment with 10 h displayed much more notable effects in promoting the plant flowering than the SD photoperiod treatment with 6h. Relative longer photoperiods can provide more photosynthetic products to the shoot apex to help the flower bud differentiation.

V. CONCLUSION

This study on Solanum lycopersicum, which is a long day plant showed a marked difference in growth characteristics such as stem length, thickness of the stem, number of leaves and flowering patter when their natural photoperiod is altered. The natural photoperiod required for the plant Solanum lycopersicum is 14 light hours and 10 dark periods for its normal growth and development. When the photoperiod is altered to 8 -6 light hours, changes in growth characteristics were observed. The plant subjected to 6 hour photoperiod does not flower at all, and in plant subjected to 8 hours light duration premature falling of flowers were observed, so the fruit formation does not occurred in such plants.

The experiment is conducted only in Solanum lycopersicum, only for a short duration of 2 months. If the study could be done on other long day plants a basic pattern in growth characteristics of long day plants when subjected to short day photoperiods could be understood. The study can also be extended to understand the photosynthetic rate and hormonal changes in long day plants when subjected to short day treatments.

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