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(Received : 2-1-1995 Revised : December 1996)

Madras Agric. J., 83(11): 681-683 November 1996
https://doi.org/10.29321/MAJ.10.A01082

EFFECT OF MODIFIED ENVIRONMENTS ON PLANT GROWTH AND FLOWERING PRODUCTION OF GERBERA

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ABSTRACT

Twenty four weeks old seedlings of gerbera, *Gerbera jamesonii*L. were maintained under Rambo-plastic nets permitting 85% and 75% natural - light intensity from May 15,1991 to October 15, 1991. The significant differences among plants grown under reduced light intensities were observed for leaf number, leaf area, flower number and flower quality as compared to the plants grown under 100% natural light intensity. Plants grown under plastic nets produced double the number of leaves (37) and flowers (10) with better stem length and flower diameter, as compared to plants grown under uninterrupted natural light intensity. The chlorophyll content of leaves was maximum (2,417 mg/g of fresh weight) from the plants grown under net permitting 75% of natural light intensity and was minimum (1.551 mg/g of fresh weight) from plants grown under natural conditions throughout the growing period. It is concluded that increased rate of plant growth and flower production is the result of reduced light intensity only, because air temperature under nets did not differ from the open due to free movement of air through nets. In the second experiment, 72, weeks old seedlings were covered with plastic cover (as complete cover, overhead cover, without cover for control) from November 1990 to February, 1991. The highest number of flowers (32/plant) was produced by the plants maintained under completely covered plastic film but the difference in flower yield and flower quality was only numerically significant.

KEY WORDS : Gerbera, Growth, Flower Production, Modified Environments

Number of studies especially related to green-house environments have been attempted on the production media, nutrition of plants and requirements of light and temperature for the optimum growth and flower production in various countries of temperate region. Flower yield in gerbera, *Gerbera jamesonii*L., depends on the production of lateral shoots by the plants which (Leffring, 1975) is promoted by 13°C night and 17°C day temperature under short day conditions of 8 h. In Europe, production of flowers of gerbera got reduced in winter when planted under glass-house due to poor light transmission and low temperature. As the amount of light increased after mid-February, the flower production also increased (Leffring, 1981). Both flower yield and stem length in some gerbera cultivars were substantially increased by root-zone warming (Tsujita, and Dutton, 1987). Berninger (1979) observed that the appearance of new buds, length of maturation period of flower and stem length elongation rate were influenced both by air and soil temperature. Pohly and Goldsberry (1989) observed that flowering was enhanced by 5-8 days and overall flower production was 12 per cent higher in heated green-houses (12°C night) than in unheated in three gerbera cultivars. The present paper presents data on the [illegible]

reduced light intensity and increased temperature on the growth and flower production of gerbera plants under sub-tropical environments of Punjab.

MATERIALS AND METHODS

In the first experiment, shading was provided over the seedling beds (24 weeks old) from May 15, 1991 using Rambo-plastic-nets permitting natural light and light intensity reduced by 25 per cent and 15 per cent. No shading was provided over the beds under control. The observations were recorded on leaf number, leaf area, flower number, flower quality and chlorophyll contents.

In the second experiment, 72 weeks old seedlings were covered with clear plastic film, from November 1990 to February 1991, as complete cover, overhead cover and no cover under control. Observations were recorded on flower yield and flower quality. Leaf area was measured by the method of Lal and Rao (1950) and Chlorophyll was estimated by the method of Anderson and Boardman (1964). There were three treatments in a randomised block design with four replications.

RESULTS AND DISCUSSION

Effect of summer shading on plant growth and flowering of Gerbera

There were significant differences among the plants grown under three light intensities for leaf and flower number, leaf area and flower quality (Table 1). Plants maintained under shading nets permitting 85 per cent and 75 per cent natural light intensities for a period of 20 weeks produced not only double the number of leaves (i.e. 22.95 and 37.12 respectively) but also leaf area more than double (i.e. 98.08 and 110.64 sq.cm. respectively) as compared with plants maintained under 100 per cent nautral light intensity throughout the period. Similarly number of flowers harvested from plants grown under 85 per cent and 75 per cent of natural light intensities were 7.92 and 10.12 which was significantly higher than that of the flower yield in open (*i.e.* 3/plant). Flower quality in terms of stem length and diameter of flower was also better from plants under shading nets.

The chlorophyll content of leaves was maximum when the natural light intensity was reduced by 25 per cent and minimum when the natural light was 100 per cent. This shows that reduced light intensity is conducive to higher chlorophyll content (Table 2).

Effect of plastic cover in Gerbera flower production during winter

Gerbera plants were maintained under plastic cover from November, 1990 to February, 1991 and the observations recorded on flower yield, stem length and diameter of flowers revealed that the higher number of 32.5 flowers per plant were produced by the plants fully covered with plastic film. The differences were statistically not significant. As such, there were no significant differences in flower-stalk length/flower diameter of 34.2 cm/7.3 cm, 28.5 cm/7.6 cm and 28.3 cm/7.5 cm for fully covered, overhead covered and uncovered plants, respectively.

Plants maintained under reduced natural light intensity produced more leaves with larger leaf area and more flowers with better quality. Application of shading components in green houses is a common practice in Europe which is primarily done to reduce light intensity by 45 per cent during summer. It also helps to reduce the temperature inside the green houses, making it favourable for

Table 1. Effect of shading nets permittingdifferent intensity of light on plant growth and flower production of gerbera during May, 1990 to October, 1991

Percentage of natural light intensity	Number of leaves per plant	Leaf area (sq.cm)	Number of flowers per plant	Stem length (cm)	Flower diameter (cm)
100	17.25	48.00	3.00	23.0	6.3
85	22.95	110.64	7.92	27.3	7.7
75	37.12	98.08	10.12	33.3	7.3
C.D.at 5%	14.87	25.86	2.34	4.74	0.086
C.D.at 1%	22.52	39.16	3.56	7.16	0.13

Table 2. The chlorophyll content in leaves of gerbera plant grown under shading nets permitting different intensity of light

Percentage of natural light intensity	Chlorophyll 'a' (mg/g)	Chlorophyll 'b' (mg/g)	Total Chlorophyll (mg/g)
100	0.826	0.725	1.551
85	1.057	1.034	2.091
75	1.123	1.294	2.417

plant growth and flower. In the present investigation, air temperature under shade did not differ from the open conditions because of free movement of air through the nets. It is therefore, logical to conclude that increased rate of plant growth and flower production could be the result of reduction in the intensity of natural light reaching on the plant. This observation derives support from the fact that plants under the shade had more chlorophyll than those grown in open. Destruction of chloroplast by very high intensity of light in some species of plants is a well known fact (Nelson, 1985).

No significant difference in the yield of flowers and their quality was observed from the plants, whether they were under complete cover, top cover or without cover. Normally day temperature inside the complete plastic cover remained comparatively higher than the open but no such difference was observed in the night temperature. Therefore, during the night period, growth activity of crown remained retarded irrespective of cover. The night temperature during this period dropped to 5°C-7°C and thus all the treatments failed to maintain the critical temperature of about 12°C (which is considered optimum for flower production by Leffring (1975) and Goldsberry (1989) and consequently resulted in reduced growth activity of crown.

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(Received : April 1995 Revised : October 1996).

Madras Agric. J., 83(11): 683-687 November 1996

CHARACTER ASSOCIATION AND PATH COEFFICIENT ANALYSIS OF COMPONENTS OF SEED YIELD IN SESAME

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ABSTRACT

Studies on association analysis revealed that seed yield per plant in sesame (*Sesamum indicum* L.) was positively correlated with number of capsules on branches, total dry matter production, plant height, oil content, capsule bearing portion of main stem, first capsule bearing node, harvest index, 1000 seed weight, and capsule length and possessed positive direct effect and positive indirect effect via other characters on seed yield.

KEY WORDS : Sesame, Genotypic Correlation, Path Coefficient Analysis, Seed Yield