Short communication

Influence of growing environment on growth characters of cucumber *(Cucumis sativus)*

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Abstract

Cucumber *(Cucumis sativus*) is one of the most important cucurbitaceous vegetable crops grown extensively in tropical and sub-tropical parts of India. It is considered as the fourth most important vegetable crop after tomato, cabbage and onion. A field experiment was conducted at the Agricultural Research Station, Mannuthy, Thrissur, Kerala during 2014-2015. The study was conducted in polyhouse, rain shelter and open field simultaneously in a split plot design with 3 replications with six dates of planting i.e., 15th, 25th January and 5th February 2015 and 1st, 10th and 20th of June 2015. Higher plant height (272.7cm), leaf area index (2.77) and biomass at the time of last harvest (1.4 Mg ha^{-1}) were recorded inside the polyhouse crop compared to open field and rain shelter.

Keywords: Biomass at the time of last harvest, Growing environment, Leaf area index, Plant height

India is the second largest producer of vegetables in the world. Cucumber *(Cucumis sativus*) is one of the most important cucurbitaceous vegetable crops grown extensively in tropical and sub-tropical parts of the country. It is considered as the fourth most important vegetable crop after tomato, cabbage and onion. Cucumber is a thermophilic and frost susceptible crop species, growing best at a temperature above 20°C. It is grown for its tender fruits, which are consumed either raw as salad, cooked as vegetable or as pickling cucumber in its immature stage.

Protected cultivation of vegetables could be used to improve their yield, quantity and quality (Singh et al., 2012; Ganesan, 2004). The productivity and quality of cucumber grown under open field conditions is generally low. Cucumber under open fields is grown in two seasons: in summer and in rainy season. During winter season, it cannot be grown under open field conditions. Keeping in view the abiotic stresses in changing climate under open field, production technology of cucumber has been developed and standardized for cultivation under polyhouse and rain shelter. The yield of cucumber in protected structures can be increased manifold as compared to their open field cultivation.

The demand for fresh salad varieties of cucumber is increasing day by day and growing this crop under protected conditions is becoming a profitable proposition. The production technology of parthenocarpic cucumber has been developed and standardized for its cultivation under polyhouse conditions. The protected cultivation could solve the problem of low productivity during extreme weather conditions. Therefore, in the present scenario of perpetual demand for vegetables and drastically shrinking land holdings, protected cultivation of vegetable crops suitable for domestic as well as export purposes is the best alternative for using land and other resources more efficiently.

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The present investigation was carried out in Department of Agricultural Meteorology, College of Horticulture, Vellanikkara during 2015-16 to determine the the effect of growing environment on growth characters of cucumber. The study was conducted in polyhouse, rain shelter and open field simultaneously in a split plot design with six dates of planting i.e., 15th and 25th January and 5th February 2015, and 1st, 10th and 20th of June 2015 and three replications. The variety used for the experiment was Kafka which is a parthenocarpic variety with duration of 90-100 days. The plot size was 20 m^2 and spacing was 1.5 m x 0.5 m. The package of practices recommendations were followed under non-limiting water conditions. Urea, 19:19:19, MAP and potassium nitrate were the source materials for supplying the nutrients N, P_2O_5 and K_2O respectively. 150:75:75 kg NPK ha^{-1} were applied during the cropping period. Observations like plant height, leaf area index and biomass at the time of last harvest were recorded at different stages of development of the crop. Statistical software like Microsoft – excel and SPSS were used in the study for various statistical analysis.

As is evident from Table 1, the dates of transplanting and the growing environment had a significant effect on height of plants. Among the different treatments, irrespective of the date of transplanting, the highest values for height were recorded in the crops grown in the polyhouse. Greatest height was recorded in the crop transplanted inside the polyhouse on 1 June 2015 (278.7 cm), whereas the least height was observed in the crop transplanted in the open field on 05 February 2015 (113.3 cm). This was due to lower light intensities within the rain shelter and polyhouse which retarded the destruction of auxin (IAA) and thus promoted cell division and cell expansion in the apical portion, leading to greater heights. These results were supported by the findings of El-Aidy et al. (1988) and Abou Habid et al. (1994).

From the table, it can be clearly observed that the dates of transplanting and growing environment had a significant effect on the LAI. The highest LAI (2.72) was recorded by the crop transplanted inside the polyhouse on 25 January 2015. The lowest LAI (1.88) was observed by the crop under the open field

Table 1. Effect of micro climate on growth characters of cucumber in different growing environment

Date of Transplanting	Growing environment	Greatest height(cm)	Highest leaf area	Biomass at the time of last harvest (Mg ha^{-1})
15 January 2015	Polyhouse	246.3	2.69	1.40
	Rain Shelter	154.0	2.30	1.15
	Open field	126.0	1.88	1.10
25 January 2015	Polyhouse	221.7	2.72	1.18
	Rain Shelter	142.0	2.46	1.09
	Open field	130.3	2.06	0.99
05 February 2015	Polyhouse	213.0	2.50	1.31
	Rain Shelter	135.0	2.08	1.13
	Open field	113.3	2.14	0.98
01 June 2015	Polyhouse	278.7	2.61	1.35
	Rain Shelter	236.0	2.28	1.07
	Open field	219.3	2.08	1.07
10 June 2015	Polyhouse	199.7	2.66	1.36
	Rain Shelter	170.7	2.51	1.22
	Open field	145.7	2.34	0.96
20 June 2015	Polyhouse	185.7	2.62	1.29
	Rain Shelter	176.7	2.44	1.14
	Open field	145.7	2.26	0.95
	CD 5%	12.1	0.28	0.18

conditions transplanted on 15 January 2015. Higher LAI for the crops in the rain shelter and polyhouse was due to lower solar radiation within the structures. Lower solar radiation throughout the different growth stages promoted leaf expansion which is needed for better light interception this was in agreement with findings of Watson (1952). The highest biomass at the end of crop growth was observed in the crop transplanted inside the polyhouse (1.4 Mg ha^{-1}) on 25 January 2015. Irrespective of dates of transplanting the highest biomass was recorded inside the polyhouse, followed by the crop inside rain shelter. The crop grown under open field condition recorded the least biomass. Lower solar radiation within the polyhouse and rain shelter was the most important factor that influenced height and LAI in the crops transplanted within these structures and this led to greater vegetative vigour and increased biomass production when compared to the crops in the open field. This is in confirmation with the report of Heuvelink (1999).

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