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Original Research Article

Effect of Pruning and Micronutrients on Growth, Quality and Chlorophyll Content in Sweet Pepper

S. D. Patil*, V. N. Shinde, M. B. Maher and K. A. Dahatonde

Horticulture Section, College of Agriculture, Parbhani, India

**Corresponding author*

A B S T R A C T

An experiment to study the effect of pruning and micronutrients on growth, quality and chlorophyll content of Sweet pepper was carried out during *Kharif* season of the year 2019-2020 at Department of Horticulture, College of Agriculture, Parbhani. A field experiment comprised with Factorial Randomized Block Design having two factor the Factor A consisted six levels of micronutrients viz. M_1 chelated Zn 0.2%, M_2 chelated Fe 0.2%, M_3 chelated Bo 0.1%, M_4 chelated Cu 0.1%, M_5 chelated Mn 0.2%. M_6 chelated Mix 0.2% and Factor B consisted two levels of pruning viz. P_1 pruning 20 DAT, P_2 pruning 30 DAT. The result of the present investigation indicated that, significantly maximum plant height, leaf area were recorded with the treatment combination of M_1P_2 (Chelated Zinc 0.2% + Pruning at 30 days after transplanting). Whereas, quality parameter viz., vitamin C were recorded higher with the treatment combination of M_1P_2 (Chelated Zinc 0.2% + Pruning at 30 days after transplanting). In respect of chlorophyll content in leaves in Sweet pepper were recorded to be minimum under the treatment of M_1P_1 (Chelated Zinc 0.2% + Pruning at 20 days after transplanting).

Keywords

Micronutrient, Pruning, Growth, Chlorophyll, quality, Sweet papper

Introduction

Capsicum (*Capsicum annuum*) belongs to the genus Capsicum and family Solanaceae which is grown in several part of the world and is believed to be native of Tropical South America (Shoemaker and Teskey, 1995). China is the major producer of capsicum and contributes 36 per cent of the worlds cultivated area with a production of 15.03 million tones. India contributes average annual production of 327 thousand tonnes from an area 46 thousand with a productivity of 7108.70 kg per hectare (Anonymous 2018).

China aster (*Callistephus chinensis* L.) is to be considered as one of the important commercial flower crops belonging to the family Asteraceae. It is native to

Concentrations of vitamin C is ranged from 63 to 243 (mg 100 g-1) depending on fruit colour (Howard *et al.*, 1994). In a survey on content of vitamin C in fruits and vegetables, bell peppers represented the highest fourth out of 42 choices (Frank *et al.*, 2001). A 100 g of edible portion of pepper provides 24 Kcal of energy, 1.3 g of protein, 4.3 g of carbohydrates and 0.3 g of fat (Zende, 2008).

Micronutrient plays vital roles in the growth and development of plants, due to their stimulatory and catalytic on metabolic processes and ultimately on flower yield and

quality. Pruning is effective in improving air circulation which reduces relative humidity and limits the spread of diseases (Esiyok *et al.,* 1994). Pruning methods vary with different branching habits of Capsicum cvs. and under different plant densities (Dasgan and Abak, 2003; Maniutiu *et al.,* 2010). The prime objective of the pruning practice is obtaining proper balance between fruit number and fruit size by improved canopy management.

Materials and Methods

The present investigation was carried out during *Kharif* season of the year 2019-2020 at Department of Horticulture, College of Agriculture, Parbhani to study the effect of pruning and micronutrients on growth, quality and chlorophyll content of Sweet pepper. The research was carried out on the variety Raja. A field experiment was laid out with Factorial Randomized Block Design having two factor the Factor A consisted six levels of micronutrients viz. M_1 chelated Zn 0.2%, M_2 chelated Fe 0.2%, M_3 chelated Bo 0.1%, M_4 chelated Cu 0.1%, M_5 chelated Mn 0.2%. M_6 chelated Mix 0.2% and Factor B consisted two levels of pruning viz. P_1 pruning 20 DAT. P_2 pruning 30 DAT.

The treatments were replicated three times in a Factorial Randomized Block Design. The seedlings were prepared in protray in shadenet of Horticulture Department, Parbhani. The protrays were watered regularly still transplanting of seedling in the field. Seedlings were allowed to grow up to 30 days and then transplanting was done in the experimental plot. The uniform size, healthy and 30 days old seedlings were selected for transplanting. The seedlings were transplanted on raised bed by planting of one healthy seedling hill^{-1} at the spacing of 50 cm x 40 cm distance. The recommended dose of fertilizer (100: 50: 50 kg NPK ha^{-1}) was applied to all the plots in the form of urea, single super phosphate and muriate of potash. Out of this, full dose of P and K and 1/2 dose of nitrogen was applied at the time of transplanting. The remaining 1/2 dose of nitrogen was applied at 30 days after transplanting.

Micronutrients were applied as per treatment. For each treatment 0.1% and 0.2% were sprayed on the foliage of the plants during vegetative stage, flower initiation stage and 2 times at blooming by a mini hand sprayer. Pruning operation was carried out at 20 days after transplanting (DAT). And 30 after transplanting (DAT) shoot pruning was done with remaining four shoot in a plant with a sharp knife and in case of no pruning it was allowed normal growth of a plant.

Observations on growth parameters *viz.,* plant height were recorded at 90 DAT, and leaf area were recorded also chlorophyll content in leaves and quality parameters *viz.,* vitamin C content of Sweet pepper.

Results and Discussions

Growth parameters

The data presented in table 1 revealed that, at 90 DAT, significantly maximum plant height was recorded with the treatment (M_1P_2) Chelated Zinc 0.2% + Pruning at 30 days after transplanting (130.66 cm) which was found to be statistically at par with treatment (M_5P_2) Chelated Mn 0.2% + Pruning at 30 days after transplanting (73.08 cm). However, minimum plant height was recorded with the treatment (M_6P_2) Chelated Mix 0.2% + Pruning at 30 days after transplanting (100.56 cm). Increase in plant height and branches per plant may be due to the involvement of zinc in chlorophyll formation, which might have helped to influence cell division, meristematic activity in apical tissue, expansion of cell and formation of cell wall, development and

differentiation of vascular tissue formation and lignification of cell wall, protein synthesis, organic acid metabolism and they are involved in photosynthesis. Above finding supported by Natesh *et al.,* (2005) in chilli.

Leaf area (107.52 cm^2) had recorded significantly maximum with the treatment combination (M_2P_2) Chelated Fe 0.2% + Pruning at 30 days after transplanting. The effect of interaction of different pruning configuration systems and bell pepper cultivars had been significant on leaf area. The plants trained to two shoot produced substantially larger leaf area as compared to other treatment combinations. This may be due to development and differentiation of vascular tissue formation and lightificatin of cell wall, protein synthesis, organic acid metabolism and they are involved in photosynthesis. Above finding were confirmed by Ismeet Singh *et al.,* (2018) in capsicum and Natesh *et al.,* (2005) in chilli who reported that Zn 0.2 % spray recorded significantly higher plant height (130.66 cm) in Sweet pepper. Thus, the treatment of Fe 0.2% noted maximum leaf area in Sweet pepper. Leaf area is an important variable for most physiological and agronomic studies involving plant growth, light interception, photosynthetic efficiency, evapotranspiration and response to fertilizers and irrigation. This significant increase may be due to dynamics of uptake of soil nutrients and soil physical conditions and have a major effect on plant growth and essential role of boron in the growth and development. These results were in conformation with the Singh, Madhu *et al.,* (2017) in capsicum.

Chlorophyll content in leaves

Data regarding chlorophyll content in leaves are presented in table 1. The treatment (M_1P_1) Chelated Zn 0.2 % + Pruning at 20 days after transplanting took significantly minimum chlorophyll content in leaves (58.30 mg). The increase in plant height under zinc sulfate might be due to the fact that zinc in addition to its role in chlorophyll synthesis it also influenced the cell division, meristamatic activity of tissue, expansion of cell and formation of cell wall. Foliar application of zinc increased the photosynthetic activity, which ultimately resulted in improving the plant growth.

The similar result was also reported by Pandav *et al.,* (2016) in brinjal.

Quality parameters

The data presented in table 1 revealed that, the treatment (M_1P_2) Chelated Zn 0.2 % + Pruning at 30 days after transplanting noted significantly the maximum vitamin C (27.27 mg/100 ml of fresh fruit) and it was found to be at par with the treatments (M_6P_2), Chelated Mix 0.2 % + Pruning at 30 days after transplanting (25.84 mg/100 ml of fresh fruit (M_4P_2), Chelated Cu 0.1 % + Pruning at 30 days after transplanting (25.10 mg/100 ml of fresh fruit Whereas, significantly minimum vitamin C(23.62) was recorded with the treatment (M_6P_1) Chelated Mix 0.2 % + Pruning at 20 days after transplanting.

The increase in ascorbic acid content may be due to good growth of plants resulting from higher assimilation of the micronutrients which are made available to the plant due to decompose organic matter.

The increased activity of ascorbic acid oxidase enzyme in presence of micronutrients may be concerned to another reason for increase in ascorbic acid content. The similar result was also notified by Kumari, Sarika *et al.,* (2017) in capsicum.

Table.1 Growth, quality and chlorophyll parameters influenced by pruning and micronutrient

Treatments Factor - A (Micronutrient)	Plant Height at 90 DAT(cm)	Leaf area (cm^2)	Chlorophyll content in leaves (mg)	Vitamin C (mg/ 100 ml fresh fruit)
M1	124.767	95.157	58.373	25.655
M2	116.30	96.017	62.107	25.285
M3	118.167	90.557	62.497	24.498
M4	109.88	70.078	63.143	24.443
M5	119.70	73.563	62.05	24.660
M6	103.36	59.433	63.522	24.735
SE +_	**3.753**	**0.168**	**1.113**	**0.225**
CD at 5% level	**11.078**	**0.496**	**3.284**	**0.665**
Factor- B (Pruning)				
P1	113.376	75.750	62.161	24.231
P2	117.349	85.852	61.736	25.528
SE +_	**2.167**	**0.097**	**0.642**	**0.13**
CD at 5% level	**NS**	**0.287**	**NS**	**0.384**
Interaction (M X P)				
M1P1	118.867	91.940	58.307	24.040
M1P2	130.667	98.373	58.440	27.270
M2P1	117.133	84.513	63.013	24.770
M2P2	115.467	107.520	61.200	25.800
M3P1	113.867	81.013	62.987	24.100
M3P2	122.467	100.100	62.007	24.897
M4P1	106.293	58.140	62.647	23.783
M4P2	113.467	82.017	63.640	25.103
M5P1	117.933	75.707	62.573	25.070
M5P2	121.467	71.420	61.527	24.250
M6P1	106.160	63.187	63.44	23.623
M6P2	100.560	55.680	63.603	25.847
SE +_	**5.308**	**0.238**	**1.573**	**0.318**
CD at 5% level	**NS**	**0.702**	**NS**	**0.94**

M_1 - Chelated Zn (0.2%), M_2 - Chelated Fe (0.2%), M_3- Chelated Bo (0.1%), M_4- Chelated Cu(0.1%), M_5-Chelated Mn(0.2%), M_6 – Chelated Mix (0.2%), P_1 – (Pruning 20 DAT), P_2 – (Pruning 30 DAT)

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