

Original Research Article

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Effect of Intercropping of Frenchbean on Growth, Yield and Quality Parameters of Capsicum. (*Capsicum frutescens* L.) var Nishat-1

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ABSTRACT

Keywords

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The present investigation was conducted during year *Kharif* 2018 and *Kharief* 2019 at experimental field of Division of Vegetable Sciences, SKUAST-Kashmir to assess the response of growth, yield and quality of capsicum (*Capsicum frutescens* L.) var Nishat-1 with intercropping of frenchbean under temperate conditions of Kashmir valley. It was found that intercropping of Frenchbean has improved various growth, yield and quality parameters of Capsicum. Pooled result of two years (*Kharief*-2018 and *Kharief*-2019) revealed that treatment T₂ (1 line of French bean:2 lines of Capsicum) recorded maximum values of plant height (61.67 cm), no of secondary branches plant⁻¹(7.94), plant spread (40.71cms), no. of fruit plant⁻¹ (12.74), average fruit weight (80.91gms), fruit Length (7.35cm), fruit diameter (7.33 cm),fruit yield plant⁻¹(206.62 q ha⁻¹), T.S.S Brix⁰ (4.91), vitamin C content (172.57 mg100⁻¹g) and total chorophyll content (73.27 mg100⁻¹g) where the values were significant in most of the parameters showing beneficial effect of intercrop.

Introduction

Capsicum (*Capsicum annum* L.) also known as sweet pepper or bell pepper is one of the most popular vegetable crops grown in India as well as in several other parts of the world. It is believed to be the native of tropical South America (Shoemaker and Tesky, 1995). In India, capsicum occupies an area of 24,000 hectares with an estimated production of 33,000 metric tones. (NHB, 2016-17). The productivity of capsicum is very low in India. Capsicum under open field cultivation yields between 20-40 tha⁻¹, where as in a greenhouse the yield

ranges from 100 to 120 t/ha. Bell pepper (*Capsicum annum*) is among the most grown vegetables in greenhouses worldwide. From a nutritional prospective, bell pepper is rich in vitamins; chiefly, Vitamin C and provitamin A. 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).

Also, it is one of the valuable medicinal plants in pharmaceutical industries, owing to high amounts of health promoting substances, particularly antioxidant, capsaicin and capsanthin (Aminifard *et al.*, 2012). Greenhouse bell pepper cultivars are hybrids that have bellshaped or blocky-type fruits with varied colors. While green is the most favored color in bell peppers, red and yellow are also preferred with higher price in fresh market. Market shares in USA are about 80%, 10%, and 8% for the three colors, respectively (Frank *et al.*, 2001). Such hybrid cultivars are characterized for high productivity and quality traits. The farmers generally prefer the intercropping system because it produces higher total crop yield area⁻¹, provides insurance against total crop failure, and also reduces incidences of pests and diseases (Lyocks *et al.*, 2013). The advantages of intercropping are risk minimization, effective use of available resources, efficient use of labour, increased crop productivity, erosion control and food security (Addo-quaye *et al.*, 2011). Yield advantage occurs because growth resources such as light, water, and nutrients are more completely absorbed and converted to crop biomass by the intercrop over time and space as a result of differences in competitive ability for growth resources between the component crops, which exploit the variation of the mixed crops in characteristics such as rates of canopy development, final canopy size (width and height), photosynthetic adaptation of canopies to irradiance conditions, and rooting depth. Careful planning is required when selecting the component crops of a mixture, taking into account the environmental conditions of an area and the available crops or varieties. It was shown by many researchers that intercropping of different vegetable crops provided important advantages as well as higher profitability than vegetables grown as sole crops (Nursima, 2009). Moreover, because inorganic fertilizers have contributed

to environmental damage such as nitrate pollution, legumes grown in intercropping are regarded as an alternative and sustainable way of introducing N into lower input agro ecosystems (Fustec *et al.*, 2010).

Materials and Methods

A field experiment was carried out at experimental field Division of Vegetable Sciences, SKUAST-Kashmir during Kharief 2018 and Kharief 2019 laid out in Randomized Block Design with three replications. The experiment was laid out in RBD design with 6 treatments replicated thrice. The Capsicum seeds were sown in poly house during April and transplanted at a distance of 60×45 cm during May in open conditions. French was sown directly in fields during the last week of may. Treatments include T₁ = 1:1, T₂ = 1:2, T₃ = 1:3, T₄ = 1:4, T₅ = 1:5 and T₆ = (Sole sowing of Capsicum) . Recommended dose of fertilizers were applied as per recommended packages of practices of SKUAST-KASHMIR for both crops in the form of urea, diammonium phosphate and muriate of potash, respectively along with 20 tonnes of FYM. Before final land preparation, 50% of nitrogen and entire quantity of phosphorus and potash were applied as basal dos. The plant protection measures were taken up to control pest and diseases as and when required along with intercultural operations. In each plot 10 plants were tagged for taking all observations. Harvesting of capsicum was done in pickings. Plant height was recorded at final pickings in cms with the help of measuring scale. Fruit parameters were taken after harvesting. Number of secondary branches was taken during full vegetative stage. Plant spread was measured with the help of measuring scale. Number of fruits per plant were calculated by adding total number of fruits in each picking. Average fruit weight (gms) was taken on weighing balance and taken on average of 10

tagged plants. Fruit length and fruit diameter were taken with the help of vernier caliper in centimetres. Total fruit yield was taken on plot basis and then converted into quintals per hectare. Chemical analysis was done using the standard procedures. T.S.S⁰ Brix was recorded with Digital Refractometers, Ascorbic acid (mg100g⁻¹) content of clove from each treatment was determined by 2,6 dichlorophenol indophenols visual titration method suggested by A.O.A.C (1975) and expressed in milligram per 100 g of fresh weight for all the treatment combinations in all replications. Total chlorophyll was estimated using procedure of Lorenzen. C. J. 1967. Data recorded was tabulated, pooled and statistically analysed as per Gomez and Gomez, 1984 Significant difference between treatment means was tested through ‘F’ test and critical difference (CD) was worked out wherever ‘F’ value was found to be significant for treatment effect.

Results and Discussion

Effect of intercropping on growth, yield and quality of capsicum

As per tables –(1) pooled data of two years khariief-2018 and khariief-2019 revealed that treatment T₂ (2 capsicum lines:1 french bean line) recorded maximum values of plant height, (61.67 cm), no. of secondary branches plant⁻¹ (7.94), plant spread (40.71 cm)

followed by treatment T₃ (3capsicum lines:1frenchbean line) which was significantly superior to all treatments in case of plant height and plant spread but at par with treatment T₃ (3 capsicum lines:1frenchbean line) in case of no. of secondary branches per plant⁻¹(table-1).

From table-2 it was depicted that treatment T₂ (2 capsicum lines:1 french bean line) maximum values of number of fruits plant⁻¹ (12.74), average fruit weight (80.91), fruit length (7.35 cm), fruit diameter (7.33 cm) and fruit yield (206.62 q ha⁻¹) followed by treatment T₃ (3 capsicum lines:1frenchbean line) where the values were significantly superior to all other treatments in case of fruit length, fruit diameter, fruit yield per hectare but at par to treatments T₁, T₃ in case of no. of fruits per hectare, and to treatment T₃ in case of average fruit weight (table -2).

From table-3 it was revealed that treatment T₂ (2 capsicum lines:1 french bean line) recorded maximum values of quality parameters viz., T.S.S. (4.91)Brix⁰, Vitamin C content (172.57 mg 100⁻¹g) and chorophyll content (73.27 mg 100⁻¹g) followed by treatment T₃ (3 capsicum lines:1frenchbean line) which was significantly superior to all other treatments in case of vitamin c content but at par with treatment T₂, T₃, T₄, T₅, and T₆ in case of T.S.S.(Brix)⁰ and to treatment T₃ and T₆ in case of chlorophyll content (table -3).

Table.1 Influence of intercropping effect of Frenchbean on growth parameters of capsicum

Treatment details	Plant Height cms	No. of Secondary branches	Plant Spread cms
T ₁ = 1:1	52.53	6.88	36.68
T ₂ = 2:1	61.67	7.94	40.71
T ₃ = 3:1	54.78	7.71	37.35
T ₄ = 4:1	50.94	6.67	33.87
T ₅ = 5:1	47.18	6.87	33.84
T ₆ = (Sole sowing of Capsicum) .	50.09	6.76	36.00
C.D≤0.5	3.77	0.40	2.61

Table.2 Influence of intercropping effect of Frenchbean on fruit yield and yield attributes of capsicum

Treatment details	No. of Fruits Plant ⁻¹	Average Fruit Weight (gms)	Fruit Length (cm)	Fruit Diameter (cm)	Fruit Yield q ha ⁻¹
T ₁ = 1:1	12.13	74.37	6.17	6.21	177.10
T ₂ = 2:1	12.74	80.91	7.35	7.33	206.62
T ₃ = 3:1	12.53	77.78	6.97	6.87	187.33
T ₄ = 4:1	10.32	75.50	6.91	6.87	178.27
T ₅ = 5:1	10.52	71.04	6.79	6.85	179.05
T ₆ =(Sole sowing of Capsicum)	10.66	74.50	6.60	6.45	188.95
C.D≤0.5	1.24	4.55	0.37	0.38	7.82

Table.3 Influence of intercropping effect of Frenchbean on quality parameters of capsicum

Treatment Details	T.S.S Brix ⁰	Vitamin C mg100 ⁻¹ g	Total Chorophyll mg100 ⁻¹ g
T ₁ = 1:1	4.26	155.00	67.81
T ₂ = 2:1	4.91	172.57	73.27
T ₃ = 3:1	4.80	162.25	70.42
T ₄ = 4:1	4.73	155.46	68.23
T ₅ = 5:1	4.56	149.27	68.56
T ₆ = (Sole sowing of Capsicum)	4.65	148.04	69.62
C.D≤0.5	0.36	7.27	4.21

The higher values of growth, yield and quality parameters with treatment T₂ as compared to all other treatment including T₆ treatment (sole sowing of capsicum) could be due to the competition between chilli and frenchbean for resources is much less probably because chilli is a transplanted crop and frenchbean is a direct sown crop. Similar results were reported by Olasantan (1991). Nutrient uptake of pure crop of chilli was 30, 27 and 21 per cent less than the respective N, P and K uptake by intercropped chilli in chilli-french bean system. Similar reports were given by M.A.Abd EL-Gaid *et al.*, (2014) in tomato. Similar reports were found in different

vegetable crops by Shen and Chu 2004., Javanmard *et al.*, 2009, Dharmar deh *et al.*, 2010, Addo-Quaye *et al.*, 2011) and also by P. Choudhuri and J. C. Jana 2016 in okra reported same results. Positive effects of legumes on other vegetable crops could be due to nitrogen fixing ability of legumes.

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