

Response of French Bean Cultivars to Plant Spacing Under Agroclimatic Condition of Baffa

Naveed Ahmed¹, Muhammad Razaq², Hasnain Alam³, and Salahuddin²

¹ Department of Horticulture, University of Agriculture Peshawar, Pakistan

² Department of Silviculture, Northeast Forestry University, Harbin 150040, China

³ Department of Bioinformatics and Biotechnology, International Islamic University, Islamabad, Pakistan

Abstract: This experiment was carried out at Mansehra during cropping season of 2013. There were three French bean cultivars and four different plant spacings. The experiment was laid out on a Randomized Complete Block Design (RCBD) with three replications. Different cultivars, plant spacings and their interactions significantly influenced all the parameters studied. Maximum days to flowering (59.33) and seed maturity (97.66) were recorded in cultivar Komal Green grown at 15 cm spacing, while, maximum 100-grain weight (42.20 g) was noted in cultivar Peshawar Local grown at 60 cm spacing. However, maximum fresh pod yield·plant⁻¹ (109.67 g), number of seed·pod⁻¹ (7.99) and seed yield·hm⁻² (1 437.3 kg) were recorded in cultivar Paulista grown at spacing of 45 cm. Whereas, maximum plant height (40.50 cm) was noticed in cultivar Paulista grown at 15 cm plant spacing. While, the least number of days to flowering (50.33) and to seed maturity (85.66) were taken by cultivar Paulista grown at 60 cm plant spacing. Likewise, minimum seed yield (311.9 kg·hm⁻²) was recorded in plants of cultivar Komal Green spaced at 60 cm plant spacing. While, minimum fresh pod weight·plant⁻¹ (67.00 g) and number of seed·pod⁻¹ (4.66) were attained in cultivar Peshawar Local grown at 15 cm plant spacing. Whereas, minimum plant height (27.59 cm) and 100-grain weight (15.60 g) were recorded for cultivar Komal Green grown at 45 and 15 cm, respectively.

Key words: French bean, cultivar, plant spacing

CLC number: S52 **Document code:** A **Article ID:** 1006-8104(2016)-01-0016-04

Introduction

The French bean (*Phaseolus vulgaris* L.) belonging to the family Leguminosae is reported to be a native to central and South America (Swaidar *et al.*, 1992). This crop is widely cultivated in the temperate and subtropical regions and also in many parts of the tropics (Purselove, 1987).

French bean pod is quite nutritious and potential source of protein, carbohydrate and minerals. The mineral matter and crude fiber extract are concentrated in seed, while crude protein and energy are stored in

the cotyledons. It contains about 17.5%-28.7% protein in the dry seeds and about 1.0%-2.5% protein in the green pods, 3.2%-5.0% mineral matter, 4.2%-6.3% crude fiber, 1.2%-2.0% crude fat and 340-450 kcal energy (Singh *et al.*, 1997).

The plants grown in the wider spacing exhibit more horizontal and continuous vegetative growth due to less population pressure·unit⁻¹ area, but they also give less yield·unit⁻¹ area. However, plants grown under normal spacing will have an optimum population density·unit⁻¹ area which provides optimum conditions for luxuriant crop growth and better plant canopy due to maximum light interception, photosynthetic activity,

Received 20 March 2015

Naveed Ahmed. E-mail: naveedahm89@gmail.com

E-mail: xuebaoenglish@neau.edu.cn

assimilation and accumulation of more photosynthates into the plant system and hence plants can produce more fresh pods with quality seeds (Mazumdar *et al.*, 2007).

Systematic efforts are required to increase fresh pods as well as seed production in pod vegetables like French bean. There is a need to develop a suitable seed production technology in French beans by optimizing the plant spacing to get higher seed yield with quality seeds. Practically, a suitable plant spacing and good cultivars are very important in producing higher yield of fresh pods as well as quality seed in French beans.

Materials and Methods

The present study was conducted at Agricultural Research Station Baffa, Mansehra during cropping season of 2013. Three French bean cultivars were tested in four different plants to plant spacing (15, 30, 45 and 60 cm). The experiment was laid out on a randomized complete block design (RCBD). There were 12 treatment combinations replicated three times. Seed of French bean cultivars (Paulista, Komal Green and Peshawar Local) were sown on ridges having length of 3 m with constant row to row distance of 45 cm and plant to plant spacing of 15, 30, 45 and 60 cm, respectively. At the time of sowing experimental plot was ploughed, well prepared and leveled. Phosphorus and potassium were applied in single dose at the rate of 100 and 60 kg·hm⁻², respectively, while, nitrogen was applied at the rate of 120 kg·hm⁻² in three split doses. All other recommended practices and inputs including hoeing and irrigation were kept uniform for all the cultivars/treatments from sowing till harvesting.

Results

Days to 50% flowering

Days to 50% flowering revealed significant differences for different plant spacings and cultivars. Minimum days (50.33) to 50% flowering were taken by cultivar Paulista grown at 60 cm plant spacing,

while maximum days (59.33) were taken by cultivar Komal Green planted at 15 cm plant spacing. Days to flowering whether early, medium or late depicted the nature of a cultivar. Days to 50% flowering varied depending upon the environmental factors and genetic difference of cultivars due to which some cultivars started flowering early and some late. Similar results have been reported by Wallace *et al.* (1991) and Adams *et al.* (1985), who mentioned that days to flowering and length of flowering period varied depending on the cultivars and environmental conditions. Likewise, the results of Neupane *et al.* (2008) also indicated that the days to flowering in bean cultivars varied from 40 to 84 depending on genotype.

Days to seed maturity

Days to seed maturity showed significant differences for cultivar and plant spacing (Table 1). The cultivar Paulista grown at plant spacing of 60 cm showed early seed maturity (85.66 days) followed by Cultivar Paulista grown at plant spacing of 45 cm which took 87.00 days while, cultivar Komal Green grown at 15 cm plant spacing (narrow spacing) showed late maturity (97.66 days). The difference in days to seed maturity might have been due to more judicious uptake and utilization of soil moisture, nutrients as well as solar radiations at wider spacing which caused vigorous growth, early flowering and pod setting and ultimately early seed maturity.

Plant height (cm)

Data regarding to plant height was significantly influenced by different cultivars and plant spacings (Table 1). Maximum plant height (40.50 cm) was found in cultivar Paulista when plants were grown at 15 cm plant spacing (a narrow spacing). While, the minimum plant height (27.59 cm) was noted for cultivar Komal Green at 45 cm plant spacing followed by cultivar Peshawar Local (29.03 cm), at the same plant spacing. The reason for these variations/differences might have been more competition between plants for nutrients, soil moisture as well as

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