

Effect of Intercropping System and Fertility Levels on Productivity of Ridge-Planted Pigeonpea

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Abstract

A field experiment was conducted during rainy season of 2006-07 to study the effect of intercropping system and fertility levels on productivity of ridge-planted pigeonpea. The results showed that the pigeonpea sole crop was produced maximum values of growth attributes viz. taller plants (226.1 cm), maximum number of primary branches (17.3), dry matter/plant (206.4 g), yield attributes viz. pods/plants (139.1), grains/pod(3.5) and test weight (108.4 g), yields viz. grain yield (1757 kg/ha) , pigeonpea equivalent yield (8,960 kg/ha). However, values of all these characters of pigeonpea when intercropped with either mung in side or spill being statistically at par with those recorded in sole stands and significantly higher than when intercropped with either maize in side or spill. Pigeonpea equivalent yield was recorded to be significantly higher when pigeonpea intercropped with either mung in side or spill than when pigeonpea intercropped with either maize in side or spill, and in sole stands. Among the fertility levels, 100% RDF + 5 t/ha FYM produced significantly taller plants (211.3 cm), maximum number of branches / plant (16.2), dry matter/ plant (205.8 g), pods / plant (146.9), grains / pod (3.4), test weight (102.9 g), grain yield (1636 kg/ha) and pigeonpea equivalent yield (1,892 kg/ha) than other fertility levels.

Key words : Intercropping, Fertility, Pigeonpea, Productivity.

Long duration (250—260 days) pigeonpea grows on marginal lands in mono/mixed cropping system without any fertilizer under rainfed conditions of eastern Uttar Pradesh. The productivity of the crop is low of 700 kg/ha compared to the potential yield of 2,800 kg/ha as recorded in the different part of the country. This wide yield gap may be minimized through adequate and balanced fertilization. The ridge planting of pigeonpea and intercrops in side of ridges were found to be more productive over spill planting (1). The ridge planting of pigeonpea under recommended fertility level increased the yield of pigeonpea upto 32% over flat bed planting system (2). Thus, the present study was undertaken to assess the effect of intercropping system and fertility levels on productivity of ridge-planted pigeonpea.

Methods

The experiment was conducted during rainy season of 2006-07 at the research farm, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi in a sandy clay loam soil. The experimental soil was poor in organic carbon (0.42%) and available N (147.0 kg/ha), medium in available P (17.9 kg/ha) and K

(194.5kg/ha). The experiment was laid out in factorial randomized block design keeping 15 treatment combinations of five intercroppings (sole pigeonpea, pigeonpea + mung side, pigeonpea + mung spill, pigeonpea + maize side and pigeonpea + maize spill) and three fertility levels (100% RDF : 20 kg N + 60 kg P₂O₅ + 20 kg K₂O, 100% RDF + 5 t FYM/ha and 50% RDF5 t FYM/ha). The treatments were replicated three times. Nitrogen, phosphorus and potassium were given through urea, single super phosphate and mutriate of potash. All fertilizers and FYM were applied before ridge formation. Sowing of long duration pigeonpea variety Bahar and intercrops (mung : HUM 12 and maize : Bio 9681) were done on July 26, 2006. Pigeonpea was sown on the top and middle of the ridges and the intercrops were sown in side of ridge. Another method of sowing of intercrop was spill in which the seeds of of intercrops were sown between intra row spacing of pigeonpea. The crop was harvested on 30 March, 2007. The experiment was conducted under rainfed condition.

Results and Discussion

Effect on Growth and Yield Attributes

The significantly higher plant height, primary

Table 1. Growth, yield attributes and yield of pigeonpea and equivalent yield as influenced by intercropping and fertility levels. RDF = Recommended dose of fertilizers, FYM = Farm yard manures.

Treatments	Growth attributes			Yield attributes			Yield (kg/ha)	
	Plant height (cm)	Primary branches/plant	Dry matter/plant (g)	Pods/plant	Grains/pod	Test weight (g)	Grain yield	Equivalent yield
Intercropping system								
Sole pigeonpea	226.1	17.3	206.4	139.1	3.5	108.4	1757	1757
Pigeonpea + mung side	221.4	16.1	206.0	135.8	3.4	101.6	1648	2114
Pigeonpea + mung spill	210.7	15.2	203.6	132.7	3.3	93.9	1635	2044
Pigeonpea + maize side	181.6	13.2	195.7	130.4	2.8	90.2	1351	1769
Pigeonpea + maize spill	180.1	13.2	193.3	130.2	2.5	87.0	1247	1613
CD ($P=0.05$)	3.16	0.27	0.70	1.61	0.25	1.24	198.7	267.5
Fertility Levels (kg/ha)								
100% RDF	194.9	14.4	198.5	129.0	2.8	94.0	1451	1685
100% RDF + 5 t FYM	211.3	16.2	205.8	146.9	3.4	102.9	1636	1892
50% RDF + 5 t FYM	193.4	14.5	198.8	129.4	2.6	94.0	1495	1725
CD ($P=0.05$)	2.45	0.21	0.54	1.24	0.20	0.96	131.5	185.8

branches, dry matter/plant with sole pigeonpea were followed by pigeonpea + mung side. The pigeonpea + maize side intercropping system gave higher growth and yield attributing characters of pigeonpea than spill planting system but it was significantly inferior to pigeonpea + mung side planting. This might be due to less competition exerted for water, nutrients, space and light in sole planting of pigeonpea and intercropped stands with either shorter mung side or spill planted rather than taller maize side or spill planted.

Among the fertility levels, growth and yield attributes of pigeonpea were recorded with 100% RDF + 5 t FYM. This might be due to balanced nutrition through inorganic along with organic sources that improve the physical and biological properties of soil in addition to supply of almost all essential nutrients for growth and development of plant. The 100% RDF and 50% RDF + 5 t FYM were at par to each other might be due to growing crops with addition of only primary nutrients causing depletion of other essential micro-nutrients which might become limiting factor corrected by adding FYM. These findings are confirmed by Singh (3) and Ramesh et al. (4).

Effect on Grain Yield

The maximum grain of pigeonpea was recorded with sole pigeonpea which might be due to better

growth and yield attributes under sole planting. Side planting of mung gave more yield of mung than spill planting might be due to more shading cause by pigeonpea over mung in spill planting system. The pigeonpea + maize either side or spill gave significantly inferior growth and yield attributes of pigeonpea than pigeonpea + mung either side or spill because maize shaded to pigeonpea and pigeonpea shaded to mung when intercropped. Pigeonpea equivalent yield was maximum with pigeonpea + mung side might be due to higher yield of both component crops.

Application of 100% RDF + 5t FYM improved the nutrient availability, resulting into greater uptake which might have increased the photosynthesis and then and then translocated to different parts for promoting meristematic development in potential apical buds and intercalary meristems and hence, increased the growth parameters of the crop. During later stages, the more assimilates are produced than used in growth and development and excess assimilates are diverted to storage compounds resulting into increased pigeonpea and pigeonpea equivalent yield. This finding is confirmed by Patil and Padmani (5).

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