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Pradeep Prasad
Ph.D., Scholar, Department of Agronomy, SHUATS, Allahabad, Uttar Pradesh, India

Rajesh Singh
Assistant Professor, Department of Agronomy, SHUATS, Allahabad, Uttar Pradesh, India

Corresponding Author:
Pradeep Prasad
Ph.D., Scholar, Department of Agronomy, SHUATS, Allahabad, Uttar Pradesh, India

Effect of nitrogen levels, row ratio and row direction on growth, yield attributes and yield of pigeon pea (C*ajanus cajan* L.)

Pradeep Prasad and Rajesh Singh

Abstract
A field experiment was conducted at Crop Research Farm, Department of Agronomy, SHUATS, Allahabad (UP) during Kharif season of 2015 and 2016 to study the ”Effect of nitrogen levels, row ratio and row direction on growth, yield attributes and yield of pigeon pea (C*ajanus cajan* L.). The experiment was laid out in FRBD with 18 treatments each replicated thrice. A perusal of the pooled data of both the years revealed that treatment T_{13} (Pigeon pea +baby corn in 2:2 ratio+100% RDN to pigeon pea+75% RDN to baby corn in East-West direction gave maximum values of growth and yield of pigeon pea *viz.* Plant height (165.71cm), and post-harvest observation *viz.* number of pods/plant (122.99), grain yield (18.04q/ha) and harvest index (30.04%) while dry weight/plant (157.34g), number of nodules (11.23), total no. of branches /plant (45.00), no. of grains/pod (3.63), test weight (72.48g), stalk yield (45.63q/ha) and protein content in grain (23.26%) was recorded in treatment T_4-(Pigeon pea +baby corn (1:1) +100% RDN to both crops +East-West row direction).

Keywords: Pigeon pea, nitrogen levels, row ratio, row direction, paired row, protein content

Introduction

Pigeon pea (C*ajanus cajan* L.) is one of the most important *Kharif* pulse crop grown in the country under varied climatic conditions. It is also an important crop of dry land agriculture due to its ability to produce economic yield under limited moisture conditions. It occupies an area of 3.80m ha with a total production of 2.9mt and average productivity of 751kg/ha (Agriculture Statistics at a Glance, Ministry of Agriculture, GOI. 2014). Pigeon pea being the 2nd most important pulse crop next to chick pea is widely cultivated in India (Vanaja *et al*., 2010) [23]. In India, it occupies an area of 4.37 m ha with production of 2.86 m t and yield of 7.80q/ha. It is a legume crop used for food, fodder, soil fertility enhancement, soil erosion control and also as fuel. It is the 6th most important legume crop globally and is grown in about 5m ha land (Varshney *et al*. 2011) [24]. Higher yield of pigeon pea per unit area per unit time can be assured by newly released short duration varieties having high yielding potential and improved management practices (Telgote and Tamgadge 2010) [21]. To increase the productivity of pulses per unit area in moisture stress conditions intercropping of short duration crops seems an alternative (Kumawat *et al*. 2012) [6]. The nitrogen nutrition of pigeon pea is dependent upon effectiveness of symbiosis to a great extent. The efficiency of symbiosis can vary not only depending upon the strains of nodule bacteria but also with the variation in soil conditions including soil fertility which would affect both macro symbiont (Pulses) and micro symbiont (Rhizobium). Thus, application of nitrogen plays a key role in increasing food grain production in the country and will continue to do so in future (*Prasad et al.* 2011) [12]. Globally, over a billion people in 82 countries relay on pigeon pea as a main source of protein and it is grown as a cash crop by small farmers of India and ranks 1st in its pigeon pea production as almost 90% of its production is produced in our country. Nitrogen is the most deficient primary nutrient in Indian soil and varies from State to State (Srikawth *et al*., 2009) [20]. The use efficiency of applied nitrogen is only about 30 to 40% in Indian soil (Parthipan, 2000). Nitrogen being an essential constituent of all living matter and an essential constituent of chlorophyll, protoplasm and protein. Nitrogen is also an essential component of amino acids, nucleic acids, enzymes, coenzymes and alkaloids. Nitrogen being a component of chlorophyll pigments, have greater role in photosynthesis and is also a constituent of respiratory-energy carrier, Adenosine tri-phosphate (ATP). This ATP allows cells to conserve and use the energy released in metabolism. Nitrogen constitutes about 10% plant weight contributed by compounds containing nitrogen which are both inorganic and organic in nature. It imparts green colour to plants and tends to encourage above ground vegetative growth.

It also acts like regulator to utilization of phosphorus and potassium. Nitrogen is also present in plant metabolism like nucleotides, phosphotides, enzymes, hormones, vitamins etc. A pulse crop on an average removes 80-100kg N/ha whereas, removal of nitrogen in some dominant pulse based cropping systems ranges between 219 Kilogram/hectare (pigeon pea-wheat system). Due to high mobility of nitrogen in plants, its deficiency symptoms first appear on the older leaves and making them light green to pale yellow in colouration. Stunted growth is also the manifestation of nitrogen deficiency and under severe condition gradually entire foliage turns yellow and ends with leaf shedding. A general recommendation of nitrogen to pulse crop is based on providing a starter dose to the plant for their establishment before root nodules are formed. Thus, a starter dose of 20kg/ ha is recommended for pulses like chick pea, field pea, lentil and pigeon pea. Row orientation and planting configuration are two management practices which can be varied without substantially increasing production cost. These types of plant manipulations is apparently increasing because recently a popular farm magazine have suggested that corn and soybean yield can be increased by planting narrow strips using a North- South orientation. Row orientation and configuration (also defined as planting geometry) can influence natural bio-regulation of plant morphogenesis and interception of photo synthetically active incident solar radiation. Changes in row direction or plant density have been shown to change spectral light quality and influence maize growth and development. Similar findings were also reported by Varshney *et al*. (2011) [24] on soybean crop in North- South direction which developed longer internodes and fewer branches than plant in East - West rows. Crop row orientation is an important factor in regulating crop/weed competitive relationships, growth and yields. Crop row orientated at the near right angle to sun direction may suppress weed growth by creating a partial shade on weeds, however, such effects have rarely been observed in many parts of the world (Pathan *et al*., 2006) [11]. As the information on nitrogen levels, row ratio and row direction on growth and yield of pigeon pea is meagre hence this experiment entitled “Effect of row ratio, row direction and nitrogen levels in intercropping of baby corn in pigeon pea” was conducted.

Material and Methods

An experiment was conducted during *Kharif* season of 2014 and 2016 at Crop Research Farm, Department of Agronomy, SHUATS, Allahabad (U.P.) which is located between 25° 24’ N latitude, 81° 50’ E Longitude and at an altitude of 98m above the mean sea level. The soil of the experimental field was sandy loam in texture medium in organic carbon (0.60%), low in available nitrogen (145.1kg/ha, medium in available phosphorus (29kg/ha) and high (160kg/ha) in available potassium. The pH of the soil was 6.5.The maximum temperature ranged between 40 ºC and 44 ºC while minimum temperature ranged between 3 to 4 ºC during 2014 and 2016 respectively. The experiment was laid out in Factorial Randomized Block Design (FRBD) with 18 treatments each replicated thrice. The treatments comprised of three nitrogen levels *viz*. F_1-100% RDN to both crops, F_2-100% RDN to pigeon pea +75% RDN to baby corn, F_3-75% RDN to pigeon pea +100% RDN to baby corn. The two row ratios *viz.* C_1-1:1 and C_2-2:2 and three row direction *viz.* D_1-North-South row direction, D_2-East-West row direction and D_3- conventional row direction. Three sole crop stands *viz.* S_1-Sole pigeon pea, S_2- Pigeon pea (PR) and S_3-Sole baby corn were also taken for comparison. Full dose of phosphorus and potassium was applied to both crops. The date of sowing in the research experiment was 30th June 2014 and 2ndJuly 2016 respectively. All other cultural practices were similar in each treatment.

Results and Discussion

An appraisal of the pooled data in interaction table (Table -1) clearly reveals that at harvest significantly highest plant height (165.71cm) was recorded in treatment T_{13}-(Pigeon pea +baby corn (2:2) +100% RDN to both crops +East-West row direction) and followed by treatment T_{14}-(Pigeon pea +baby corn (2:2) +100% RDN to pigeon pea +75% RDN to baby corn +East-West row direction) which was found to be statistically at par to treatment T_{13}-(Pigeon pea +baby corn (2:2) +100% RDN to both crops +East-West row direction). The probable reason for highest plant height in treatment T_{13}-(Pigeon pea +baby corn (2:2) +100% RDN to both crops +East-West row direction) may be due to the fact that higher plant density at closer crop geometry leading to severe competition for light and higher intra and inter row competition for nutrients and water by plants, coupled with optimum sowing time, suitable growth period and favourable climatic conditions especially temperature might have resulted in maximum plant height in East- West orientation. The other reason may be due to the fact that the increase in plant height due to close spacing and higher nitrogen levels might have resulted towards beneficial effect on root proliferation and accelerating effect of phosphorous (applied as basal dose) in the synthesis of protoplasm there by plants grew taller. As plant height is the function of cell multiplication and elongation is greatly influenced by nitrogen uptake. Nitrogen being a compound of amino acids, nucleotides, nucleic acid and a number of coenzymes *viz.* auxin and cytokinins can induce cell elongation, cell enlargement and cell division resulting into higher plant height. The other reason may be due to congenial environment that ensured proper utilization of nutrients, moisture and solar radiation in East-West row direction which resulted in better photosynthesis and also due to greater competition between plants in 2:2 row ratios, ultimately leading to taller plants. These results are in close conformity with the findings of Bali *et al*. (2009) [1], Padhi *et al*. (2010) [9], Gaikwad *et al*. (2015) [3] and Mamathashree *et al*. (2019) [8].

The interaction table 1, also reveals that interaction of row ratio, nitrogen levels and row direction differed significantly with respect to dry weight of pigeon pea and significantly higher dry matter (157.34g) was recorded in treatment T_4-(Pigeon pea +baby corn (1:1) +100% RDN to both crops +East-West row direction) but none of the other treatment combination was found to be at par to treatment T_4- (Pigeon pea +baby corn (1:1) +100% RDN to both crops +East-West row direction). The probable reason for higher dry matter may be due to higher number of branches and better vegetative growth. The other reason may be that higher value of different growth parameter might be due to increased rate of energy metabolism, root proliferation, nodulation and accelerating effect on synthesis of protoplasm thus, the plants grew taller, higher pace of dry matter production and higher no. of branches. Another reason may be due to the fact that crop geometry is one of the most important factors to harvest maximum solar radiation and utilize the soil resources effectively and in turn better photosynthates formation leading to more dry weight accumulation. These findings are in close conformity to those reported by Govil *et al*. (2000), Deshbhratar *et al*. (2010) [2] and Lavanya *et al*. (2018) [7].

A perusal of interaction table-1, revealed that row ratio, nitrogen levels and row direction differed significantly with respect to number of nodules/plant. The significantly higher number of nodules/plant (on a declining note) was recorded in treatment T_4- (Pigeon pea +baby corn (1:1) +100% RDN to both crops +East-West row direction) as 11.23 and no other treatment combination was at par to treatment T_4- (Pigeon pea +baby corn (1:1) +100% RDN to both crops +East-West row direction). The probable reason of higher no. of nodules can be attributed to additional supply of nitrogen and synchronous supply of nutrients, moisture and better interception of light throughout the vegetative and reproductive phase of pigeon pea. The reduction of number of nodules /plant at 90 DAS is due to the fact that the plant under goes to reproductive stage from vegetative stage and more energy is required in development of lateral buds and seed developing resulting in degeneration of nodules. These findings are in accordance with the findings of Tripathi *et al*. (2009) [22] and Kaur *et al*. (2017).

An appraisal of the table-1, clearly reveals that row ratio, nitrogen levels and row direction differed significantly with respect to total number of branches/plant. The significantly maximum number of branches/plant (45.00) was recorded in treatment T_4- (Pigeon pea +baby corn (1:1) +100% RDN to both crops +East-West row direction) and closely followed by treatment T_5- (Pigeon pea +baby corn (1:1) +100% RDN to pigeon pea +75% RDN to baby corn +East-West row direction) but was not at par to treatment T_4-(Pigeon pea +baby corn (1:1) +100% RDN to both crops +East-West row direction).

The probable reasons for attaining significantly maximum total no. of branches/plant may be due to wider spacing which provided uniform spreading of pigeon pea plants because of less competition for space, nutrients, moisture and light ultimately resulted into maximum no. of branches/plant. It may also be due to better crop establishment, greater plant height and more no. of branches/plant which may also be due to genetic characteristics and environmental adoptability. Similar results were also reported by Murugan *et al*. (2011) and Samant (2014).

A critical review of the table-2, clearly reveals that row ratio, nitrogen levels and row direction differed significantly with respect to number of pods/plant. The significantly higher no. of pods/plant (123.00) was recorded in treatment T_{13}-(Pigeon pea +baby corn (2:2) +100% RDN to both crops +East-West row direction) and least was recorded in treatment T_9- (Pigeon pea +baby corn (1:1) +75% RDN to pigeon pea +100% RDN to baby corn +conventional row direction) as 94.83 pods/plant. The probable reason for increase in number of pods/plant may be ascribed to increase in no. of branches/plant and better balance between the vegetative and reproductive phases. It may also be due to adequate supply of nutrients, moisture and space after harvest of baby corn and interception of sun light for longer duration in East- West row direction which ultimately resulted in higher number of pods/plant. Nitrogen being a constituent of chlorophyll, helped in better photosynthesis which led to better photosynthate formation leading to more number of pods/plant. These results are alike the findings of Rani and Reddy (2010) [15], Saritha *et al*. (2012) [16] and Singh *et al*. (2016) [18].

A critical review of the table -2 clearly reveals that row ratio, nitrogen levels and row direction differed significantly with respect to number of grains/pod in pigeon pea. The significantly higher number of grains/pod (3.63) was recorded in treatment T_4-(Pigeon pea +baby corn (1:1) +100% RDN to both crops +East-West row direction) and none of the other treatment combination was found to be at par to treatment T_4-(Pigeon pea +baby corn (1:1) +100% RDN to both crops +East-West row direction). The probable reason may be due to availability of additional amount of nutrient, adequate moisture better crop growth rate and better development of roots and enhanced rate of photosynthesis resulted in higher values of yield components as number of grains/pod under wider row spacing. Number of seeds/pod was maximum when sown in wider spacing might also be ascribed to least inter plant competition and greater availability of growth resources *viz*. light, moisture, nutrients and space for each plant. The other reason may be because of genetic characteristics of the variety. These findings are in close conformity with those reported by Rajesh *et al*. (2015) [14] and Waghmare *et al*. (2016) [25].

A perusal of table -2 clearly reveals that all the three factors in the study and their interaction differed significantly with respect to test weight. The significantly higher 1000 grain weight (72.48 g) was recorded in treatment T_4-(Pigeon pea +baby corn (1:1) +100% RDN to both crops +East-West row direction) and none of the other treatment combination was found to be at par to treatment T_4-(Pigeon pea +baby corn (1:1) +100% RDN to both crops +East-West row direction). The probable reason for attaining maximum test weight can also be attributed to synchronous supply of nutrients, moisture throughout the vegetative and reproductive phases in pigeon pea resulting in bold grains ultimately resulting in higher test weight. These results are in accordance with the findings of Singh *et al*. (2016) [18], Lavanya *et al*. (2018) [7] and Mamathashree *et al*. (2019) [8].

A perusal of table-2 reveals that row ratio. Nitrogen levels and row direction differed significantly with respect to grain yield of pigeon pea. The significantly higher grain yield (18.04q/ha) was recorded in treatment T_{13}- (Pigeon pea +baby corn (2:2) +100% RDN to both crops +East-West row direction) in pooled and none of the other treatment combination were found to be at par to treatment T_{13}-(Pigeon pea +baby corn (2:2) +100% RDN to both crops +East-West row direction). The reason for higher seed/grain yield may be attributed to LAI as well as high PAR interception and absorption, leading to higher dry matter accumulation before attaining reproductive stage by the pigeon pea crop. The other reason for grain yield increase/hectare in 2:2 row ratios in paired row may be ascribed to increased plant population pressure which facilitated uptake of nutrients, moisture and better interception of light which might had increased leaf area and ultimately resulted in efficient translocation of photosynthates and finally increased grain yield of pigeon pea. Higher grain yield may also be attributed to better crop growth rate, dry matter accumulation as well as translocation of photosynthates from source to sink. These results are in conformity with those reported by Lavanya *et al*. (2018) [7] and Mamathasree *et al*. (2019) [8].

An appraisal of table-2 reveals that interaction of row ratio, nitrogen levels and row direction differed significantly with respect to stalk yield of pigeon pea. The significantly higher stalk yield (45.63q/ha) was recorded in treatment T_{13}-(Pigeon pea +baby corn (2:2) +100% RDN to both crops +East-West row direction) and closely followed by treatment T_{14}-(Pigeon pea +baby corn (2:2) +100% RDN to pigeon pea +75% RDN to baby corn +East-West row direction) but was not at par to treatment T_{13}- (Pigeon pea +baby corn (2:2) +100% RDN to both crops +East-West row direction). The probable reason attaining maximum stalk yield of pigeon pea was recorded in dense planting. This might be attributed to higher growth rate of pigeon pea under dense planting, whose planting geometry helped for better light interception by crop coupled with high plant population. This indicated that higher plant population with better crop geometry harvested maximum sun light, space and nutrients resulted in higher growth and more dry matter accumulation resulting in maximum stalk yield. These findings are in conformity to those reported by Giramallappa *et al*. (2012) [4] Sonawane *et al*. (2015) [19] and Lavanya *et al*. (2018) [7].

A perusal of table-2 reveals that row ratio, nitrogen levels and row direction differed significantly with respect to harvest index of pigeon pea. The significantly higher harvest index (30.04%) was recorded in treatment T_{13}- (Pigeon pea +baby corn (2:2) +100% RDN to both crops +East-West row direction) and followed by treatment T_{14}-(Pigeon pea +baby corn (2:2) +100% RDN to pigeon pea +75% RDN to baby corn +East-West row direction which was found to be statistically at par to treatment T_{13}-(Pigeon pea +baby corn (2:2) +100% RDN to both crops +East-West row direction). Harvest index is a measure of physiological productivity potential of crop cultivars. Harvest index is the ability of a plant to convert the dry matter into economic yield (Islam *et al*. (2008). Maximum harvest index may be ascribed to higher dry matter accumulation which improved the source sink relationship by enhancing the diversion by photosynthates from vegetative parts to reproductive parts. These results are in conformity to those reported by Tripathi *et al*. (2009) [22] and Saritha *et al*. (2012) [16].

Table 1: Interaction effect of row ratios, levels of nitrogen and row direction on growth parameter of pigeon pea

T. No.	Treatment combination	Plant height (cm)	Dry weight (g)	Number of nodules	Number of branches
T_1	Pigeon pea +baby corn (1:1) +100% RDN to both crop +N-S row direction	143.00	138.41	9.77	42.40
T_2	Pigeon pea +baby corn (1:1) +100% RDN to pigeon pea +75% RDN to baby corn +N-S row direction	151.29	147.31	9.37	41.53
T_3	Pigeon pea +baby corn (1:1) +75% RDN to pigeon pea +100% RDN to baby corn +N-S row direction	147.67	151.21	9.20	40.20
T_4	Pigeon pea +baby corn (1:1) +100% RDN to both crop +E-W row direction	157.96	157.34	11.23	45.00
T_5	Pigeon pea +baby corn (1:1) +100% RDN to pigeon pea +75% RDN to baby corn +E-W row direction	140.52	147.98	10.43	43.63
T_6	Pigeon pea +baby corn (1:1) +75% RDN to pigeon pea +100% RDN to baby corn +E-W row direction	151.63	146.35	9.77	42.50
T_7	Pigeon pea +baby corn (1:1) +100% RDN to pigeon pea and baby corn +conventional row direction	146.82	144.25	9.17	38.80
T_8	Pigeon pea +baby corn (1:1) +100% RDN to pigeon pea +75% RDN to baby corn +conventional row direction	150.98	145.27	8.93	37.83
T_9	Pigeon pea +baby corn (1:1) +75% RDN to pigeon pea +100% RDN to baby corn +conventional row direction	140.00	132.97	8.43	36.97
T_{10}	Pigeon pea +baby corn (2:2) +100% RDN to both crop +N-S row direction	156.94	147.42	9.15	35.40
T_{11}	Pigeon pea +baby corn (2:2) +100% RDN to pigeon pea +75% RDN to baby corn +N-S row direction	156.07	142.77	8.80	34.63
T_{12}	Pigeon pea +baby corn (2:2) +75% RDN to pigeon pea +100% RDN to baby corn +N-S row direction	156.42	130.38	8.57	33.53
T_{13}	Pigeon pea +baby corn (2:2) +100% RDN to both crop +E-W row direction	165.71	135.41	10.13	40.13
T_{14}	Pigeon pea +baby corn (2:2) +100% RDN to pigeon pea +75% RDN to baby corn +E-W row direction	162.38	143.61	9.27	38.90
T_{15}	Pigeon pea +baby corn (2:2) +75% RDN to pigeon pea +100% RDN to baby corn +E-W row direction	157.20	141.48	9.03	38.27
T_{16}	Pigeon pea +baby corn (2:2) +100% RDN to both crop +conventional row direction	160.99	140.43	8.57	35.17
T_{17}	Pigeon pea +baby corn (2:2) +100% RDN to pigeon pea +75% RDN to baby corn +conventional row direction	141.71	145.26	8.40	34.27
T_{18}	Pigeon pea +baby corn (2:2) +75% RDN to pigeon pea +100% RDN to baby corn +conventional row direction	151.97	134.35	8.07	33.37
F test		S	S	S	S
SEd (±)		1.64	0.74	0.08	0.33
CD (P=0.05)		3.37	1.53	0.16	0.67

Table 2: Interaction effect of row ratio, levels of nitrogen and row direction on yield attributes and yield of pigeon pea.

Treat.	Treatment combination	No. of pods/plant	No. of grains/pod	Test weight (g)	Grain yield (q/ha)	Stalk yield (q/ha)	Harvest Index (%)
T_1	Pigeon pea +baby corn (1:1) +100% RDN to both crop +N-S row direction	116.57	3.37	70.49	16.02	44.39	26.62
T_2	Pigeon pea +baby corn (1:1) +100% RDN to pigeon pea +75%	115.40	3.17	68.66	15.53	43.76	26.20

	RDN to baby corn +N-S row direction						
T_3	Pigeon pea +baby corn (1:1) +75% RDN to pigeon pea +100% RDN to baby corn +N-S row direction	113.23	2.70	68.02	15.25	41.88	26.69
T_4	Pigeon pea +baby corn (1:1) +100% RDN to both crop +E-W row direction	119.50	3.63	72.48	17.15	42.01	27.44
T_5	Pigeon pea +baby corn (1:1) +100% RDN to pigeon pea +75% RDN to baby corn +E-W row direction	116.33	3.37	70.86	16.52	41.34	26.86
T_6	Pigeon pea +baby corn (1:1) +75% RDN to pigeon pea +100% RDN to baby corn +E-W row direction	112.17	3.17	70.44	16.13	44.47	26.63
T_7	Pigeon pea +baby corn (1:1) +100% RDN to pigeon pea and baby corn +conventional row direction	104.33	2.93	67.72	15.79	42.15	27.34
T_8	Pigeon pea +baby corn (1:1) +100% RDN to pigeon pea +75% RDN to baby corn +conventional row direction	101.83	2.73	67.46	15.26	41.35	26.98
T_9	Pigeon pea +baby corn (1:1) +75% RDN to pigeon pea +100% RDN to baby corn +conventional row direction	94.83	2.57	67.51	14.86	40.43	26.86
T_{10}	Pigeon pea +baby corn (2:2) +100% RDN to both crop +N-S row direction	118.00	2.97	68.35	17.19	41.08	29.50
T_{11}	Pigeon pea +baby corn (2:2) +100% RDN to pigeon pea +75% RDN to baby corn +N-S row direction	116.83	2.60	67.74	16.62	40.26	29.21
T_{12}	Pigeon pea +baby corn (2:2) +75% RDN to pigeon pea +100% RDN to baby corn +N-S row direction	114.67	2.47	66.95	16.55	39.74	29.41
T_{13}	Pigeon pea +baby corn (2:2) +100% RDN to both crop +E-W row direction	123.00	3.27	69.82	18.03	45.63	30.03
T_{14}	Pigeon pea +baby corn (2:2) +100% RDN to pigeon pea +75% RDN to baby corn +E-W row direction	121.17	3.20	69.13	17.60	45.00	29.85
T_{15}	Pigeon pea +baby corn (2:2) +75% RDN to pigeon pea +100% RDN to baby corn +E-W row direction	117.17	3.07	67.85	17.04	40.89	29.42
T_{16}	Pigeon pea +baby corn (2:2) +100% RDN to both crop +conventional row direction	109.17	2.90	68.30	16.50	39.94	29.24
T_{17}	Pigeon pea +baby corn (2:2) +100% RDN to pigeon pea +75% RDN to baby corn +conventional row direction	106.50	2.67	67.72	15.91	39.54	28.70
T_{18}	Pigeon pea +baby corn (2:2) +75% RDN to pigeon pea +100% RDN to baby corn +conventional row direction	104.00	2.47	66.17	15.53	39.02	28.44
F test		S	S	S	S	S	S
SEd (±)		0.65	0.05	0.57	0.11	0.23	0.18
CD (P=0.05)		1.34	0.11	1.17	0.23	0.47	0.38

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