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Production Potential of Potato and Maize Inter-cropping as Influenced by Spacing, Planting Pattern and Staggered Sowing of Maize

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ABSTRACT

A field experiment was conducted during winter season of 2007-08 and 2008-09 at Central Potato Research Station, Patna on sandy loam soil under irrigated condition in factorial randomized block design with three replications to find the suitable planting geometry for maize intercropped with potato (1:1) in additive series having 100 percent population of both the crops. The experiment consisted of 14 treatments including 12 intercropping treatments having combination of 2 row spacing of potato planting, three dates of staggered sowing of maize and two methods of maize establishment along with two sole crop treatments of potato and maize. The tuber yield of potato and grain and stover yield of maize was significantly higher under sole cropping. Although intercropping reduced the potato tuber yield, maize grain and stover yield by 11.49, 12.41 and 12.61% respectively, however, maize grain equivalent yield and net return improved by 63.68 & 69.08% and 24.51 & 35.19 % over sole maize and sole potato respectively. In intercropping system, growth and yield attributes of potato, tuber yield of potato, growth and yield attributes of maize and grain and stover yield of maize differed significantly due to row spacing and staggered sowing of maize. Row spacing of 67.5 cm resulted in significantly higher values of potato tuber yield (25.8 t/ha), maize grain (6.09 t/ha) and stover yield (7.21 t/ha), Maize grain equivalent yield (18.26 t/ha), net return (Rs. 55549/ha), benefit: cost ratio (1.7). Maize sown 25 days after potato planting at the time of earthing up of potato recorded significantly higher yield of large and medium grade tuber, total tuber and minimum cut and green tuber percentage. Simultaneous sowing of maize in potato + maize intercropping system produced highest maize grain and stover yield, Maize grain equivalent yield, net return and benefit: cost ratio.

Keywords: Potato, Maize, Intercropping, planting geometry, row spacing, staggered sowing.

INTRODUCTION

Potato and maize are two important *rabi* crops of eastern Indo-Gangetic plains of Bihar. Intercropping of potato and maize is economically more viable as compared to sole potato or sole maize (Singh *et al.*, 2002 and Singh and Lal, 2012). Potato crop in the intercropping system offers high return whereas maize provides insurance against risks involved in potato crop. Intercropping of potato and maize is becoming popular in potato growing areas of north Bihar district (Jha *et al.*, 2000). Besides, potato being a short duration crop with shallow root system leaves significant residual nutrients and other *inputs which get utilised by the long duration inter-crops* (Singh *et al.*, 2003) thereby increasing environmental sustainability. The crop geometry of the intercropping system needs special attention so as to explore the possibility of designing suitable, appropriate and conducive pattern of planting of potato and sowing of maize, which may provide higher yield and return. Intercropping of crops with two different natures may be boon for all practical purposes, if adequate labour is available (Singh and Singh 2014; Singh *et al.*, 2013). The spatial and temporal complimentarity of the potato+ maize intercropping system can be manipulated further by resorting to staggered sowing of maize crop. Since there is practically no information available on these aspects of intercropping in potato, hence, field experiment was conducted to find the suitable

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planting geometry for maize intercropped with potato (1:1) in additive series by resorting to combination of row spacing, staggered sowing and methods of maize establishment in the intercropping system.

MATERIALS AND METHODS

A field experiment was conducted during winter season of 2007-08 and 2008-09 at Central Potato Research Station, Patna, Bihar, under irrigated condition on sandy loam soil having pH 7.2 , low organic carbon (0.46%) and medium in available nitrogen (N) (232.6 kg/ha), phosphorus (P) (21.5 kg/ha) and potassium (K) (260 kg/ha). The experiment consisting of twelve intercropping treatments and two sole crop treatments (sole potato and sole maize for comparison) was laid out in factorial Randomized block design with 3 replications. The intercropping treatments consisted of combinations of 2 row spacing of potato planting (S_1 = 60 cm and S_2 = 67.5 cm), three dates of staggered sowing of maize (D_1 = maize sown on the same date as potato, D_2 = maize sown 10 days after potato planting and D_3 = maize sown 25 days after potato planting at the time of earthing up of potato) and two methods of maize establishment (M_1 = maize sown at the bottom on one side of each potato ridge, M_2 = maize sown in the centre of each furrow) The ridge and furrow system of potato planting was followed in both sole and intercropping systems. Maize was intercropped with potato in additive series in 1:1 row ratio. Well sprouted whole tuber having size 40-50g of potato cultivar Kufri Ashok were planted on 4 and 7 November, 2007 and 2008 respectively. Maize hybrid variety "Pinnacle was sown @ 20 kg/ha on the same day as potato in the sole crop and as per the treatments in the intercropping system. Maize and potato were planted at a uniform row distance of 60 cm in sole cropping. In sole potato earthing up was done after hoeing and top dressing of nitrogen at 25 days of planting. In the inter cropping potato tubers were planted in furrows open by small type of hoe, maintaining row spacing as per the treatment and plant to plant spacing of 20 cm . The planted tubers were earthen up by making the ridge of about 20-25 cm height at the time of planting in the ridge and furrow system. Thereafter, additive rows of maize in the intercropped situation were sown as per the treatment either at the bottom of each potato ridge or in each of the furrow maintaining 30 cm plant to plant spacing. Fertilizers were applied using recommended dose of 150 kg N, 26.2 kg P and 83 kg K/ha for potato and was120 kg N, 26.2 kg P and 66.4 kg K/ha for maize in both sole and intercropping systems. In potato ½ dose of N and full dose of P and K were applied basal on the demarcated furrows opened for potato planting and thoroughly mixed with soil before preparation of ridges at the time of potato planting. The Remaining ½ of N of potato was top-dressed by the side of the crop rows on the ridges at 25 days after planting. In maize ½ dose of N and full dose of P & K were applied as basal prior to sowing in furrows opened just by the side and dipper than the seed furrows. The rest ½ of N of maize was side dressed in maize rows in two equal splits, ¼ at knee high stage and rest at tasselling stage. The sources of N, P and K were urea, single super phosphate and muriate of potash. Irrigation was provided as and when required and timely plant protection measures were taken. The other management practices were adopted as per the recommendations of the crop. Potato crop was harvested 85 days after planting in the last week of January and maize crop was harvested at full maturity during last week of April during both the years.

Observations on growth were recorded at different growth stages and yield attributes at maturity of the crops, from 5 randomly selected plants, whereas, the tuber yield and maize grain yield were assessed on the basis of the produced recorded from the net plot. During both the years of experimentation meteorological parameters were more or less same and the crops were normal. The two year experimental data were pooled and subjected to statistical analysis as described by Gomez and Gomez (1984). The yields of crops were converted to Maize grain equivalent yield (MGEY) as suggested by Tomar and Tiwari (1990) on the basis of the existing market prices of the crops. Gross and net returns were computed using prevailing rates of produce and agro inputs. Price of different commodities taken for economics are; maize grain (Rs7.0/kg), maize stalk (Rs 100/q), potato tuber (Rs3.30/kg), potato seed @ Rs 1000/q, Maize seed @ Rs 150/kg, N @ Rs10.92/kg, P @ Rs 49.47/kg, K @ Rs 9.30 /kg and other cultivation charge @ Rs 30,000/ha for potato Rs. 22,000/ha for maize and Rs14, 000/ha for intercropped maize.

RESULTS AND DISCUSSION

Growth and yield of potato

The effect of cropping system on plant height, number of stems/hill, number of leaves/plant of potato was not observed. The effect of intercrop might have been offset by the ability of the plants to grow taller under the impact of shade. On the other hand stems/hills were decided at the initial stage of crop growth when the impact of intercrop was absent. In the intercropping system, the highest LAI was recorded in the staggered sowing of

maize on D_3; however, it was of the same statistical order compared to D_2 and D_1. The variation in LAI might be because of variation level of intercrop interference. These results support those reported by Rana *et al.* (2001) and Singh (2003). The tuber yield of potato was highest in sole stands due to absence of intercrop competition for space, light, moisture and nutrient. Intercropping of maize in potato reduced the potato tuber yield by 11.48 %. The reduction in tuber yield of intercropped potato could be attributed to competition offered by the intercrop for various growth resources as growth attributes of potato viz. plant height, LAI showed decreasing trend under intercropping system. Similar, decrease in tuber yield due to maize intercropping was reported by Bharti *et al.* (2007) and Singh and Lal (2012). In the intercropping system tuber yield of potato was influenced significantly due to staggered sowing of intercropped maize and row spacing (Table 1). The highest tuber yield of potato in the intercropping was recorded with maize sown on D_3 (maize sown 25 at the time of potato earthing up) which was at par with D_2 (maize sown 10 days after potato planting) but significantly higher than D_1 (maize sown on same day of potato planting). The spatial and temporal competition for growth factors for prolonged period and their susceptibility to shading effect resulted in decreased yield of potato in D_1. Rana *et al.* (2001) also observed the highest tuber yield of potato with staggered sowing of Brassicas in the intercropping system. On pooled data basis 6.04% increase in tuber yield was observed with 67.5 cm row spacing of potato over 60 cm row spacing. The increase in tuber yield of potato sown at 67.5 cm in the intercropping system being the result of over all improvement in growth and yield attributes due to less intercrop competition with wider spacing. However, sole potato planted at 60 cm row spacing produced 7.69 and 12.95 % higher tuber yield

Table 1: Effect of staggered sowing, row spacing and method of establishment of maize on growth and yield attributes of potato in potato + maize intercropping system

Treatment	Plant height	Stems/ plant	LAI	Tuber yield (t/ha)			Green tuber (%)	Cut tuber (%)
				Large (>75 g)	Medium (30-75g)	Small (<30g)		
Date of Maize sowing								
D1	51.9	5.8	3.29	6.64	13.90	3.78	7.0	8.6
D2	50.3	5.7	3.54	7.00	14.76	3.43	8.1	7.4
D3	50.3	5.7	3.71	7.49	15.73	2.48	5.2	5.3
SEm ±	3.92	0.49	0.50	0.37	0.67	0.36	0.7	0.8
CD(P=0.05)	NS	NS	NS	0.76	1.38	0.75	1.5	1.6
Row Spacing								
S1	51.4	5.5	3.33	6.42	14.04	3.87	7.9	7.9
S2	50.2	5.9	3.70	7.67	15.55	2.59	5.6	6.3
SEm ±	3.2	0.4	0.41	0.30	0.55	0.30	0.58	0.6
CD(P=0.05)	NS	NS	NS	0.62	1.13	0.61	1.2	1.3
Method of maize establishment								
P1	51.2	5.7	3.51	7.05	14.76	3.21	6.7	7.7
P2	50.4	5.8	3.52	7.04	14.83	3.25	6.8	6.5
SEm ±	3.2	0.4	0.41	0.35	0.55	0.30	0.6	0.6
CD(P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS
Sole vs rest								
Sole potato	52.3	5.4	3.73	8.48	16.80	2.67	4.4	4.3
Intercropped potato	50.8	5.7	3.51	7.04	14.79	3.23	6.7	7.1
SEm ±	5.77	0.72	0.74	0.54	0.86	0.54	1.1	1.1
CD(P=0.05)	NS	NS	NS	1.11	1.76	NS	2.2	2.3

S_1 = Row spacing of potato at 60 cm; S_2 = Row spacing of potato at 67.5 cm; D^1 = Maize sown on the same date as potato; D2 = Maize sown 10 days after potato planting; D_3 = Maize sown 25 days after potato planting at the time of earthing up of potato; M_1 = Maize sown at the bottom on one side of each potato ridge, M_2 = Maize sown in the centre of each furrow in the ridge and furrow system of potato planting

as compared to potato in the intercropping system with row spacing of 67.5 cm and 60 cm, respectively.

There was significant interaction effect of staggered sowing of maize and row spacing on potato tuber yield (Table 2). Though tuber yield of potato increased with staggered sowing of intercropped maize at both row spacing, however, the increase was significantly higher only at 60 cm row spacing. These differences may be due to the wider spaced rows utilize more natural resources than narrowly spaced one and consequently little competition in plants. Considering date of maize sowing, at D_1 the tuber yield of potato was significantly higher at row spacing of 67.5cm over 60cm, while at D_2 and D_3 there was no significant increase in tuber yield due to potato sown at 67.5 cm over 60cm. The different methods of establishment of intercrop maize did not influence the tuber yield of potato significantly.

Table 2: Interaction Effect of staggered sowing of maize and row spacing on potato tuber yield, maize grain yield and grains per cob of maize in potato + maize intercropping system

Treatments	Tuber Yield (t/ha)		Maize Grain yield (t/ha)		Grains per cob	
	S1	S2	S1	S2	S1	S2
D_1	23.27	25.40	5.92	6.52	307.5	325.0
D_2	24.44	25.90	5.40	6.19	293.0	316.5
D_3	25.29	26.10	4.26	5.57	269.5	301.0
SEm ±	0.96		0.30		15.36	
CD(P=0.05)	1.97		0.62		31.52	

S_1 = Row spacing of potato at 60 cm; S_2 = Row spacing of potato at 67.5 cm; D^1 = Maize sown on the same date as potato; D2 = Maize sown 10 days after potato planting; D_3 = Maize sown 25 days after potato planting at the time of earthing up of potato; M_1 = Maize sown at the bottom on one side of each potato ridge, M_2 = Maize sown in the centre of each furrow in the ridge and furrow system of potato planting

Grade wise tuber yield of potato

Sole crop of potato recorded significantly higher yield of large (>75g) and medium (30-75g) grade tubers as compared to intercropped potato while that of small grade (<30g) tuber was less in sole cropped potato than intercropped potato (Table 1). These results are in close conformity with the findings of Sinha and Singh (1999) and Singh (2003). Grade wise tuber yield of potato was influenced by staggered sowing of intercropped maize and row spacing. Irrespective of method of maize establishment, staggered sowing gave significant higher tuber yield of large and the medium size tuber over simultaneous sowing. A significant decline in small size tuber was noted due to staggered sowing of maize in potato. Tuber yield of large and medium grade tuber was 12.77 and 12.80% higher in staggeredly sown maize (D_3) as compared to simultaneous sowing of maize (D_1) in potato + maize cropping system. This behavior of grade wise tuber yield may be ascribed to low growth profile of maize due to low temperature as a result of shifting of sowing 25 days in staggeredly sown maize, which did not offer intensive competition during the bulking stage. Rana *et al.* (2001) also obtained higher yield of large and medium grade tuber due to staggered sowing of intercrop Brassicas. Similarly, potato planted at row spacing of 67.5cm produced significantly higher yield of large and medium size tubers as compared to row spacing of 60cm. A significant decline in small size tubers was noted due to row spacing of 67.5cm. This may be attributed to better nourishment of the tubers in terms of photosynthates and nutrient at wide spacing due to decreased intercrop competition as a result more yield of larger and medium size tuber were produced. Kumar *et al.* (2001) and Suman *et al.* (2003) have also reported higher yield of large and medium grade tuber due to wider spacing. Influence of methods of maize establishment on grade wise tuber yield of potato was not visible. Both the method of maize establishment produced similar yield of different grades of potato tuber.

Green and cut tubers of potato

The percent green and cut tubers were significantly higher in intercropping system as compared to sole crop. In the sole cropping second earthing up done at 25 days after sowing covered the ridges and stolons properly and reduced the chances of green tubers. In the intercropping system a single earthing up was done at the time of planting which might got eroded due to irrigation and growth of maize crop as a result tuber got exposed and become green. Rana *et al.* (2001) also reported higher green tuber in intercropping of potato. There was ease in harvesting of sole potato crop due to non interference of any standing intercrop that resulted in less percentage of cut tubers during harvesting. In the intercropping system, significantly more percentage of green and cut tubers was obtained in D_2 followed by D_1 and minimum in D_3. This might be explained on the basis of differentiating shading caused by staggered sowing of maize due to variation in their growth rhythm. There was less green and cut tuber in row spacing of 67.5cm as compared to 60 cm. Wider and thicker ridges at wider spacing allowed fewer tubers to get exposed and become green besides wider spacing facilitated greater ease in harvesting.

Growth and yield of maize

Pooled data of two years indicated that grain and stover yield of maize was significantly higher under sole cropping (6.34 and 7.86 t/ha, respectively) than intercropping system (5.64 and 6.98 t/ha respectively). There were 11.04 and 11.20% decrease in grain and and stover yield of maize, respectively due to intercropping of potato. The reduction in grain and stover yield of maize could be attributed to competition offered by the intercrop of potato for various growth resources as growth and yield attributes of maize viz., plant height, plant girth, grain/cob and test weight showed decreasing trend under intercropping system. Similar decrease in grain and straw yield of maize due to potato intercropping was reported by Jha *et al.* (2000) and Sinha *et al.* (1999). Maize grain yield was significantly affected by staggered sowing. The highest grain yield of maize was recorded with maize sown on D_1 and was at par with D_2. Both these dates of maize sowing were found significantly superior to D_3. On pooled data basis 26.42 and 17.89% increase in grain yield was observed with D_1 and D_2 over D_3 dates of maize sowing, respectively. Delayed sowing had more depressing effect on maize grain yield as all the growth and yield parameters of maize recorded significantly lower values in D_3 (Table 3).Further, the grain and Stover yield of maize increased significantly at 67.5cm row spacing over 60cm. Maize rows at 67.5 cm increased the mean grain and Stover yield by 17.34 and 6.97 % respectively over row spacing of 60cm. This might be due to the vigorous and enhanced plant growth of maize as a result of reduced inter row specific competition for solar radiation and plant nutrient resulted in increase in the values of the yield attributes viz. cobs/plants, gains/cob and test weight with wider spacing. Singh *et al.* (2002) also reported such effects of inter row arrangement on yield of maize under

Table 3: Effect of staggered sowing, row spacing and method of establishment of maize on growth and yield attributes of maize in potato + maize intercropping system

Treatment	Plant height at potato harvest (cm)	Plant height at harvest (cm)	Stem girth (cm)	Cobs/ plant	Grains/ cob	Test weight (g)
Date of Maze sowing						
D1	110.5	197.5	19.5	1.86	318.3	192.7
D2	96.5	178.3	18.6	1.71	304.8	190.0
D3	80.3	159.8	16.1	1.49	283.3	183.7
SEm ±	5.9	8.9	1.1	0.97	10.9	4.0
CD (P=0.05)	12.2	18.4	2.2	NS	22.3	8.10
Row Spacing						
S1	96.3	177.5	16.7	1.59	290.0	186.1
S2	95.2	179.5	19.4	1.79	314.2	191.5
SEm ±	4.9	7.4	0.8	0.79	8.9	3.2
CD(P=0.05)	NS	NS	1.7	NS	18.3	NS
Method of maize establishment						
M1	96.7	178.8	18.2	1.69	304.5	189.2
M2	94.8	178.2	17.9	1.69	299.7	188.4
SEm ±	4.9	7.4	0.8	0.79	8.9	3.2
CD(P=0.05)	NS	NS	NS	NS	NS	NS
Sole vs rest						
Sole maize	112.6	214.4	19.4	1.88	335.6	193.3
Intercropped maize	95.8	178.5	18.1	1.69	302.1	188.8
SEm ±	8.8	13.2	1.5	1.42	15.9	5.8
CD(P=0.05)	NS	27.1	NS	NS	32.8	NS

S_1 = Row spacing of potato at 60 cm; S_2 = Row spacing of potato at 67.5 cm; D^1 = Maize sown on the same date as potato; D2 = Maize sown 10 days after potato planting; D_3 = Maize sown 25 days after potato planting at the time of earthing up of potato; M_1 = Maize sown at the bottom on one side of each potato ridge, M_2 = Maize sown in the centre of each furrow in the ridge and furrow system of potato planting

maize + potato intercropping system. The interaction effect of dates of sowing and row spacing of intercrop maize were observed on maize grain yield and grains/cob (Table 4). The maize grain yield obtained with row spacing 60 cm (S_1) at D_1 and D_2 date of maize sowing were at par among themselves but significantly superior than D_3. At row spacing of 67.5 cm (S_2), D_2 was at par to both D_1 and D_3 while D_1 was significantly superior to D_3. Considering row spacing under dates of maize sowing, it was found that at D_1, treatments S_1 and S_2 were similar while at D_2 and D_3 dates of maize sowing, treatment S_2 was significantly superior over treatment S_1. Similarly, there was significant decrease in number of grains/cob due to staggered sowing in treatment S_1 only while in treatment S_2 there was no difference. Considering row spacing under dates of maize sowing, it was found that at both D_1 and D_2 dates of maize sowing, treatments S_1 and S_2 were similar while at D_3, treatment S_2 showed superiority over treatment S_1. Grain and Stover yield of maize was not affected by method of maize establishment. Maize gain and Stover yield was similar in both the methods of maize establishment as maize sown either at the bottom of the ridge (M_1) or in the furrow (M_2) produced Similar maize grain and Stover yield. Singh *et al.* (2002) also observed similar results.

Maize grain equivalent yield

The maize grain equivalent yield (MGEY) differed significantly due to cropping system (Table 3) and it was significantly higher with maize+ potato inter cropping (17.46 t/ha) than sole crop of potato (13.18 t/ha) and maize (6.34 t/ha). The results corroborate the findings of Jha *et al.* (2000) and Singh *et al.* (2002). High MGEY owing to maize+ potato intercropping system is attributed to high gross income obtained because of

Table 4: Effect of staggered sowing, row spacing and method of establishment of maize on tuber yield, grain yield, Maize equivalent yield, net return and benefit: cost ratio in potato + maize intercropping system

Treatment	Tuber yield (t/ha)	Maize grain yield (t/ha)	Maize stover yield (t/ha)	Maize grain equivalent yield (t/ha)	Net return (Rs/ha)	Benefit : cost ratio
Date of Maze sowing						
D_1	24.32	6.22	7.42	17.68	51723	1.65
D_2	25.18	5.80	7.05	17.67	51265	1.65
D_3	25.70	4.92	6.46	17.03	46230	1.58
SEm ±	0.56	0.21	0.29	0.96	-	-
CD(P=0.05)	1.15	0.44	0.59	NS	-	-
Row Spacing						
S_1	24.33	5.19	6.74	16.66	43929	1.55
S_2	25.80	6.09	7.21	18.26	55549	1.70
SEm ±	0.46	0.18	0.23	0.71	-	-
CD(P=0.05)	0.94	0.36	0.48	1.45	-	-
Method of maize establishment						
P_1	25.01	5.66	7.00	17.46	49719	1.63
P_2	25.12	5.62	6.96	17.47	49759	1.63
SEm ±	0.46	0.18	0.23	0.71	-	-
CD(P=0.05)	NS	NS	NS	NS	-	-
Sole vs rest						
Sole potato	27.95	-	-	13.18	32235	1.54
Sole maize	-	6.34	7.86	6.34	15380	1.53
Intercropping	25.07	5.64	6.98	17.46	49739	1.63
SEm ±	0.83	0.32	0.42	1.41	-	-
CD(P=0.05)	1.70	0.65	0.87	2.90	-	-

S_1 = Row spacing of potato at 60 cm; S_2 = Row spacing of potato at 67.5 cm; D^1 = Maize sown on the same date as potato; D2 = Maize sown 10 days after potato planting; D_3 = Maize sown 25 days after potato planting at the time of earthing up of potato; M_1 = Maize sown at the bottom on one side of each potato ridge, M_2 = Maize sown in the centre of each furrow in the ridge and furrow system of potato planting

combined additional yield of maize and potato. All the three dates of maize sowing produced statistically at par MGEY in the intercropping system. However, D_1 date of intercropped maize sowing recorded 3.4% higher MGEY over D_3. An improvement in MGEY in D_1 date of maize sowing in potato + maize intercropping was mainly owing to production of higher yield of maize crops. Further, among the row spacing, the highest MGEY was observed in 67.5 cm (18.26 t/ha) row spacing which was significantly superior to 60 cm (16.66 t/ha). Row spacing of 67.5 cm increased the MGEY by 9.60 % over 60 cm. This was due to significantly higher potato and maize grain yield obtained with 67.5 cm row spacing as compared to 60 cm. The method of maize establishment did not influence significantly the MGEY.

Economics

Both the net monetary return and benefit: cost (B: C) ratio were significantly higher with maize + potato intercropping (Rs 49739 /ha and 1.63, respectively) compared to sole crop of maize (Rs15380 /ha and 1.53, respectively) and potato (Rs 32235 /ha and 1.54, respectively). This was attributed to higher gross return realized because of additional yield of potato/maize which also fetched higher price in the market. The result confirms the findings reported by Singh and Lal (2012). Bharti *et al*. (2007) also reported higher monetary return and benefit: cost ratio with maize+ potato inter cropping over sole cropping of maize or potato. The net return and benefit: cost ratio was significantly affected by various intercropping treatments. Highest net return and B: C ratio was recorded under D_1 date of maize sowing (Table 4). On pooled data basis 11.88% increase in net return and 4.43% increase in B: C ratio at D_1 was observed over D_3 date. An improvement in economic indices was mainly because of higher yield of maize under study. Further, the net return and B: C ratio significantly increased due to row spacing of 67.5 cm. On pooled data basis 26.45% higher net return and 9.67% higher B: C ratio was recorded with 67.5 cm over 60 cm row spacing. There was no significant difference in B: C ratio and net return due to method of maize establishment.

CONCLUSION

Based on the results of two years it was concluded that Intercropping of maize in potato was highly remunerative. In potato + maize intercropping system the row spacing of 67.5 cm for potato and maize crop produced higher yield and net return. The maize crop sown either simultaneously or within 10 days of potato planting produced higher maize grain equivalent yield, net return and B: C ratio. Since there is no significant difference in yield and return due to method of maize establishment, maize crop may be sown either at the bottom on one side of the potato ridge or in the furrow of the ridge in ridge and furrow system of potato planting in the intercropping system.

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