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Productivity and Profitability of Field Pea and Baby Corn Intercrops as Affected by Weed Management and Planting Patterns

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ABSTRACT

A field experiment was conducted during summer season of 2012 at Experimental Farm, Faculty of Agriculture, Annamalai University to find out the effect of planting pattern and weed management practices on yields, and nutrient content and uptake of field pea and baby corn in field pea (Pant P-13) + baby corn (Surya) intercropping system. The experiment was laid-out in split-plot design keeping four planting patterns as main-plot and four weed management practices as sub plot with three replications. Sole planting of field pea recorded significantly higher grain (2264 and 1434 kg ha^{-1}) and straw yields (3263 and 2540 kg ha^{-1}) during 2011-12 and 2012-2013 than yield obtained as a component crop in paired planting of maize (30/60 cm) + field pea (2:2) and planting of maize + field pea (1:1). Baby corn yield was similar in sole, paired (2:2) and 1:1 planting, but significantly higher stover yield of baby corn (3576 kg ha^{-1} and 3533 kg ha^{-1}, was obtained from sole crop than other planting methods during both years. Sole planting of either field pea or baby corn recorded significantly higher total nitrogen, phosphorus and potassium uptake than planting of maize + field pea (1:1) and paired planting of maize (30/60 cm) + field pea (2:2) during both the years. Hand weeding (HW) at 30 days after sowing (DAS), pre emergence application of pendimethalin 1 kg ha^{-1} and post emergence application of imazethapyr 50 g ha^{-1} (30 DAS) improved yields of field pea and baby corn than weedy check. Hand weeding (30 DAS) and pre-emergence application of pendimethalin 1 kg ha^{-1} resulted in higher total nitrogen, phosphorus and potassium uptake by field pea and baby corn as compared to post emergence application of imazethapyr 50 g ha^{-1} (30 DAS) and weedy check during both the years.

Key words: *Baby corn, Field pea, Planting pattern, Uptake, Weed management and Yield Components.*

INTRODUCTION

Intercropping of cereals with pulses is an age old practice. There are evidences that intercropping of short growing grain legumes with tall cereals conserves resources and gives higher productivity than corresponding sole crops[17,7]. Field pea (*Pisum sativum*), one of the important pulse crop of winter season has great potential to contribute to the pulse basket in India.

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Maize, the queen of cereals, is cultivated worldwide round the year. During the recent past, it has been used as vegetable where unfertilized cob is used for cooking purpose, popularly known as baby corn (*Zea mays* L.)[3]. Introduction of baby corn during off season (winter months), because of its photo and thermo insensitiveness will promote nutritive dish of the people and also fetch additional income to farming community. Normally, baby corn is planted in wider rows and a considerable portion of the incident solar radiation remains un-intercepted due to poor canopy development because of its slow growth during winter season. Slow crop growth during winter months provide ample opportunity to the growth of weeds. Maintenance of adequate crop cover turns the competition in favour of crop. Intercropping itself has been found helpful in limiting weed population by way of cutting light to them. So field pea may be introduced between the rows of baby corn. Intercropping of legumes with maize has been found to give yield advantage owing to efficient utilization of growth resources and maintenance of soil health[20]. Mishra[15] reported that maize + field pea intercropping system resulted an extra advantage of 85.6 per cent in terms of maize equivalent yield over sole maize. Weed suppression in intercropping through more efficient use of environmental resources by component crops has also been reported by Mashingaizde *et al.*[14].

Development of feasible and economically viable intercropping system depends largely on adoption of proper planting pattern as well as weed management. Planting pattern alters the space available to individual plant; hence the degree of competition for natural resources becomes variable between component crops. Appropriation of suitable planting pattern is thus, necessary to bring the competition to the minimum level. Chaika and Nepalia[5] at Navsari, Gujarat indicated that when soybean and cowpea were intercropped with maize in 2:1 row ratio, there was marked reduction in weed density and dry weight compared to sole maize. Weeds are one of the major obstacles that severely affect the productivity and quality of the component crops. Weeds compete with the crop plants for nutrients, moisture and light and thus, reduce the yield considerably. Keeping the above points in view, the experiment was conducted to see the response of weeds, field pea and baby corn to planting pattern and weed management on field pea + baby corn intercropping system.

MATERIAL AND METHODS

The experiment was conducted during 2012 at Experimental Farm, Annamalai University. Soil was sandy loam in texture, high in organic carbon (0.79%), low in available nitrogen (210.6 kg N ha^{-1}) and medium in available phosphorus (16.5 kg P ha^{-1}) and potassium contents (184.7 kg K ha^{-1}) and neutral in soil reaction (pH 7.3). The experiment was laid-out in a split-plot design with three replications. Main-plot consisted of four planting patterns viz. field pea sole (30 cm), baby corn sole (45 cm), planting of maize + field pea (1:1) and paired planting of maize (30/60 cm) + field pea (2:2) and sub-plot consisted of four weed management practices viz. weedy check, hand weeding (HW) at 30 days after sowing (DAS), pre emergence (PE) application of pendimethalin 1 kg ha^{-1} and post emergence (POE) application of imazethapyr 50 g ha^{-1} at 30 DAS. Maize crop was fertilized with 120, 60 and 40 kg ha^{-1} of N, P_2O_5 and K_2O through urea, single super phosphate and muriate of potash respectively. Half dose of N and full dose of P_2O. and K_2O were applied as basal in all the plots and remaining dose of N was applied at knee high stage of the crop as top dressing. A dose of 18 kg N, 48 kg P_2O_5 and 24 kg K_2O ha^{-1} was applied to field pea sole through NPK mixture (12:32:16) applied @150 kg ha^{-1} as basal. No additional dose of fertilizer to pea was given to intercropping system.

The field pea was harvested manually with sickle when more than 80 per cent pods in all plots turned completely brown in colour. After threshing, grains were separated by winnowing and grain yield was recorded.

Three days after silking of the cobs baby corn cobs were picked and total weight was calculated by summing up to fresh baby corn bobs per plot. Nitrogen, phosphorus and potassium content in grain and straw/stover of field pea and baby corn was estimated at maturity. Total nitrogen, phosphorus and potassium contents were estimated by modified Kjeldahl method, Vanado-molybdo yellow phosphoric spectrophotometric and flame photometric methods respectively[10]. The nutrient uptake by grain and straw/stover of field pea and baby corn for each plot was calculated as follows:

$$\text{Nutrient uptake (kg ha}^{-1}) = \frac{Nutrient\ content\ (\%)\ x\ Yield\ (kg\ ha{-}1)}{100}$$

The data collected for various parameters were subjected to the analysis by using standard Statistics procedures.

RESULTS AND DISCUSSION

Grain yield of field pea : Sole planting of field pea (30 cm) produced the significant higher grain yield (2264 kg ha^{-1}) which was followed by paired planting of maize (30/60 cm) + field pea (2:2) (1528 kg ha^{-1}) and planting of maize + field pea (1:1) (1108 kg ha^{-1}) (Table 1). Field pea sole (30 cm) produced significantly higher grain yield (1435 kg ha^{-1}) than planting of maize + field pea (1:1) (888 kg ha^{-1}) and paired planting of maize (30/60 cm) + field pea (2:2) (764 kg ha^{-1}). The difference between planting of maize + field pea (1:1) and paired planting of maize (30/60 cm) + field pea (2:2) was non-significant. On an average, sole planting of field pea yielded 85.3 and 61.4 per cent more grain yield over planting of maize + field pea (1:1) and paired planting of maize (30/ 60 cm) + field pea (2:2) respectively. Higher yield of field pea in the treatments where it was grown alone might be due to higher growth and yield attributing parameter. The lower grain yield of field pea grown in association with baby corn was probably the result of inter-specific competition between corn and field pea plants for below and above ground growth factors *i.e.* soil moisture.

Table1. Effect of planting patterns and weed management practices on grain and straw yields of field pea and baby corn and stover yield of baby corn

Treatment	Field pea yield (kg ha^{-1})						Baby corn (kg ha^{-1})					
	Grain			Straw			Baby corn			Stover		
	2011-2012	2012-2013	Mean	2011-2012	2012-2013	Mean	2011-2012	2012- Mean 2013		2011-2012	2012-2013 Mean	
Planting pattern Field pea sole (30 cm)	2264	1434	1849	3263	2540	2902						
Baby corn sole (45 cm)	-	-		-	-		812	810	811	3576	3533	3555
Planting of maize + field pea (1:1)	1108	888	998	2885	2032	2459	792	733	763	1615	1572	1594
Paired planting of maize (30/60 cm) + field	1528	764	1146	2592	1946	2269	807	746	777	1823	1780	1802
pea (2:2)												
S.Em.±	58	43	-	80	62	-	19	23	-	35	71	-
CD at 5%	229	168	-	312	242	-	NS	NS	-	136	278	-
Weed management Weedy	1268	835	1052	2754	2047	2401	684	387	536	1968	1925	1947
Hand weeding (30 DAS)	1947	1225	1586	3108	2298	2703	952	896	924	2616	2573	2595
Pendimethalin 1 kg ha^{-1} (PE)	1700	1068	1384	2849	2194	2522	801	990	896	2731	2688	2710
Imazethapyr 50 g ha^{-1} (POE, 30 DAS)	1620	987	1304	2943	2152	2548	778	780	779	2037	1994	2016
S.Em.±	38	36	-	62	34	-	23	8	-	69	44	-
CD at 5%	113	106	-	184	102	-	69	25	-	206	130	-

Nutrient, space and solar radiation The results of present investigation are in conformity with those of Carruthers *et al.*[4], Banik *et al.*[1] and Das *et al.*[6] who reported the higher grain yield of soybean under sole planting. Hand weeding (30 DAS) recorded significantly higher grain yield than remaining weed management practices during both the years. The difference

in grain yield obtained from PE application of pendimethalin 1 kg ha^{-1}, POE application of imazethapyr 50 g ha^{-1} (30 DAS) was non-significant. Both these treatments had significantly higher grain yield than weedy check. On an average, hand weeding (30 DAS), PE application of pendimethalin 1 kg ha^{-1} and POE application of imazethapyr 50 g ha^{-1} (30 DAS) yielded 50.8, 31.6 and 24.0 per cent higher yield over weedy check respectively. The higher grain yield in these treatments could be attributed to improvement in growth and yield components which was the result of lower crop-weed competition, which shifted the balance in favor of crop in the utilization of nutrients, moisture, light and space. Similar findings were reported by Mundra *et al.*[16]. The increased yield during 2011-12 than in 2012-13 growing season could be attributed to the greater competitive ability of field pea during that growing season as a result of the favorable weather condition. During 2012-13, there was frost in the month of January-February thereby extending the cold period which resulted in yield reduction.

Straw yield of field pea: Sole planting of field pea (30 cm) produced significantly higher straw yield than planting of maize + field pea (1:1) and paired planting of maize (30/60 cm) + field pea (2:2) during both the years (Table 1). On an average, increased in straw yield in sole planting of field pea than planting of maize + field pea (1:1) and paired planting of maize (30/60 cm) + field pea (2:2) was 18.0 and 27.9 per cent respectively. This was mainly due to higher plant population in sole planting of field pea. Similar results were reported by Mandal *et al.*[13] who reported significantly lower straw yield of intercropped soybean and groundnut than in monocropping. During 2011-12, hand weeding (30 DAS) being at par with POE application of imazethapyr 50 g ha^{-1} (30 DAS) produced significantly higher straw yield than PE application of pendimethalin 1 kg ha^{-1} and weedy check. During 2012-13, hand weeding (30 DAS) produced significantly higher straw yield than remaining weed management practices. On an average, hand weeding (30 DAS), pre emergence application of pendimethalin 1 kg ha^{-1} and post emergence application of imaze-thapyr 50 g ha^{-1} (30 DAS) yielded 12.6, 5.0 and 6.1 per cent higher straw yield over weedy check respectively.

***Baby com yield*:** The yield of baby corn under different planting patterns did not differ significantly during both the years (Table 1). During 2011-12, hand weeding (30 DAS) produced significantly higher baby corn yield than remaining weed management practices. PE application of pendimethalin 1 kg ha^{-1} produced statistically similar baby corn yield as POE application of imazethapyr 50 g ha^{-1} (30 DAS) both had significantly higher baby corn yield than weedy. During 2012-13, the maximum baby corn yield was obtained in PE application of pendimethalin 1 kg ha^{-1} (990 kg ha^{-1}) which was followed by hand weeding (30 DAS) (896 kg ha^{-1}), POE application of imazethapyr 50 g ha^{-1} (30 DAS) (780 kg ha^{1}) and weedy check (387 kg ha^{-1}). On an average, hand weeding (30 DAS), PE application of pendimethalin 1 kg ha$^{–1}$ and POE application of imazethapyr 50 g ha^{-1} (30 DAS) yielded 72.6, 67.2 and 45.5 per cent higher baby corn yield over weedy check respectively. The higher baby corn yield in hand weeding (30 DAS) and herbicide treated plots were due to better growth and development of baby corn plants as a result of less competition from weeds for light, water, nutrients, carbon dioxide etc. as a result of better control of weeds as indicated by low weed density. The efficiency of chemicals and other weed control practices in increasing grain yield had also been demonstrated by Dixit[8], Shinde *et al.*[19], Khan *et al.*[12] and Khan and Haq[11].

Stover yield of baby corn : The highest stover yield was found in baby corn sole (45 cm) which was followed by paired planting of maize (30/ 60 cm) + field pea (2:2) and planting of maize + field pea (1:1) during 2011-12 (Table 1). During 2012 -13, baby corn sole (45 cm) had significantly higher stover yield than paired planting of maize (30/60 cm) + field pea (2:2) and planting of maize + field pea (1:1). The difference between paired planting of maize (30/60 cm) +

field pea (2:2) and planting of maize + field pea (1:1) was nonsignificant. On an average, sole planting of baby corn yielded 123.1 and 97.3 per cent more stover yield over planting of maize + field pea (1:1) and paired planting of maize (30/60 cm) + field pea (2:2) respectively. This was mainly due to better growth and dry matter accumulation in sole planting of baby corn. Similar results were reported by Mandal *et al.* (2014[-1]) who reported that sole maize produced significantly higher stover yield than all other intercropping treatments with groundnut. Among the weed management practices, PE application of pendimethalin 1 kg ha^{-1} had statistically similar stover yield as hand weeding (30 DAS), both had significantly higher stover yield than POE application of imazethapyr 50 g ha^{-1} (30 DAS) and weedy check during both the years. On an average, hand weeding (30 DAS), PE application of pendimethalin 1 kg ha^{-1} and POE application of imazethapyr 50 g ha^{-1} (30 DAS) yielded 33.3, 39.2 and 3.5 per cent higher stover yield over weedy check respectively. More stover yield in weed control treatments than weedy check was due to less weed density and better growth and development of baby corn plant.

Macromitrient content and uptake by field pea **Nitrogen content and uptake by grain and straiv:** Planting patterns and weed management practices had no significant effect on nitrogen content in grain and straw of field pea during both the years (Table 2). Field pea sole (30 cm) computed significantly higher nitrogen uptake by grain and straw than paired planting of maize (30/60 cm) + field pea (2:2) and planting of maize + field pea (1:1) during both the years. Among the weed management practices, hand weeding (30 DAS) computed the highest nutrient uptake by both grain and straw of field pea as compared to remaining weed management practices.

Table 2: Effect of planting patterns and weed management practices on nitrogen content, uptake and total uptake of field pea during 2011-12 and 2012-13

Treatment	Nitrogen content (%)				Nitrogen uptake (kg ha^{-1})				Total uptake (kg ha^{-1})	
	2011-12		2012-13		2011-12		2012-13		2011-12	2012-13
	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw		
Planting pattern										
Field pea sole (30 cm)	3.01	0.98	3.32	1.00	51.68	24.17	35.45	19.18	75.85	54.63
Planting of maize +	2.99	0.95	3.34	0.97	24.94	20.67	22.27	14.88	45.61	37.15
field pea (1:1)										
Paired planting of maize	2.97	0.92	3.39	0.94	34.23	17.99	19.42	13.76	52.22	33.18
(30/60 cm)+ field pea (2:2)										
S.Em.±	0.10	0.03	0.09	0.01	2.72	0.44	0.90	0.55	3.08	1.13
CD at 5%	NS	NS	NS	NS	10.65	1.74	3.53	2.16	12.06	4.44
Weed management										
Weedy	2.97	0.92	3.27	0.94	28.54	19.16	20.27	14.56	47.70	34.83
Hand weeding (30 DAS)	3.02	0.99	3.45	1.01	44.55	23.35	28.10	17.55	67.90	45.64
Pendimethalin 1 kg ha^{-1} (PE)	2.99	0.97	3.33	0.99	38.57	20.80	29.91	16.42	59.37	46.33
Imazethapyr 50 g ha^{-1}	2.96	0.92	3.35	0.94	36.13	20.46	24.56	15.24	56.59	39.81
(POE, 30 DAS)										
S.Em.±	0.08	0.02	0.09	0.02	0.96	0.46	0.98	0.37	1.17	1.08
CD at 5%	NS	NS	NS	NS	2.85	1.37	2.93	1.12	3.49	3.22

The results are in conformity with the result obtained by Barod and Shiva Dhar[2].

Total nitrogen uptake by the produce**:** Field pea sole (30 cm) recorded significantly higher total nitrogen uptake than planting of maize + field pea (1:1) and paired planting of maize (30/ 60 cm) + field pea (2:2) during both the years (Table 2). Mandal *et al.*[13] also reported

that the monocropping of legumes proved superior over intercropping systems with maize with respect to the N uptake. Hand weeding (30 DAS), PE application of pendimethalin 1 kg ha^{-1} and POE application of imazethapyr 50 g ha^{-1} (30 DAS) had significantly higher total nitrogen uptake than weedy check during both the years.

***Phosphorus content and uptake by grain and straw*:** Phosphorus content in grain and straw of field pea was not significantly affected by planting patterns and weed management practices during both the years (Table 3). Sole planting of field pea (30 cm) recorded significantly higher phosphorus uptake by grain and straw than paired planting of maize (30/60 cm) + field pea (2:2) and planting of maize + field pea (1:1) during both the years. Among the weed management practices, hand weeding (30 DAS) and PE application of pendimethalin 1 kg ha^{-1} computed higher phosphorus uptake by grain and straw as compared to POE application of imazethapyr 50 g ha^{-1} (30 DAS) and weedy check during both the years.

***Total phosphorus uptake by the produce*:** Field pea sole (30 cm) had significantly higher total phosphorus uptake than paired planting of maize (30/60 cm) + field pea (2:2) and planting of maize + field pea (1:1) during both the years (Table 3). Hand weeding (30 DAS) and PE application of pendimethalin 1 kg ha^{-1} computed significantly higher phosphorus uptake than POE application of imazethapyr 50 g ha^{-1} (30 DAS) and weedy check during both the years.

Potassium content and uptake by grain and straw: Planting patterns and weed management practices had no significant effect on potassium content in grain and straw of field pea during both the years (Table 4).

Table 3: Effect of planting patterns and weed management practices on phosphorus content, uptake and total uptake of field pea during 2011-12 and 2012-13

	2011-12		2012-13		2011-12		2012-13		2011-12	2012-13
	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw		
Planting pattern										
Field pea sole (30 cm)	0.80	0.34	0.81	0.34	13.70	8.34	8.70	6.57	22.05	15.27
Normal planting of maize	0.76	0.33	0.78	0.33	6.36	7.20	5.19	5.10	13.56	10.30
+ field pea (1:1)										
Paired planting of maize	0.76	0.32	0.77	0.32	8.74	6.31	4.44	4.73	15.05	9.16
(30/60 cm) + field pea (2:2)										
S.Em.±	0.04	0.01	0.01	0.01	0.63	0.18	0.13	0.13	0.73	0.31
CD at 5%	NS	NS	NS	NS	2.49	0.66	0.51	0.45	2.86	1.22
Weed management										
Weedy	0.74	0.34	0.76	0.34	7.12	7.09	4.78	5.29	14.21	10.07
Hand weeding (30 DAS)	0.81	0.32	0.83	0.32	12.05	7.51	6.77	5.59	19.56	12.36
Pendimethalin 1 kg ha^{-1} (PE)	0.79	0.35	0.81	0.35	10.21	7.45	7.34	5.74	17.66	13.08
Imazethapyr 50 g ha^{-1}	0.74	0.32	0.75	0.32	9.03	7.09	5.55	5.25	16.11	10.80
(POE, 30 DAS)										
S.Em.±	0.03	0.01	0.03	0.01	0.29	0.16	0.21	0.11	0.36	0.32
CD at 5%	NS	NS	NS	NS	0.87	NS	0.63	0.33	1.07	0.97

Field pea sole (30 cm) recorded the highest potassium uptake by grain and straw of field pea as compared to paired planting of maize (30/60 cm) + field pea (2:2) and planting of maize + field pea (1:1). Hand weeding (30 DAS), PE application of pendimethalin 1 kg ha^{-1} and POE application of imazethapyr 50 g ha^{-1} T30 DAS) computed significantly higher potassium uptake by grain as well as straw than weedy check during both the years.

Total potassium uptake by the produce: Field pea sole (30 cm) recorded significantly higher total potassium uptake than planting of maize + field pea (1:1) and paired planting of maize (30/ 60 cm) + field pea (2:2) during both the years (Table 4). The difference between the latter two treatments was non-significant. Hand weeding (30 DAS), PE application of pendimethalin 1 kg ha^{-1} 'and POE application of imazethapyr 50 g ha^{-1} (30 DAS) had significantly higher total potassium uptake than weedy check during both the years.

Macronutrient content and uptake by baby com

Nitrogen content and uptake by grain and stover: Planting patterns and weed management practices did not significantly affect the nitrogen content in grain and stover of baby corn during both the years (Table 5). Planting patterns had no significant effect on nitrogen uptake by grain of baby corn but baby corn sole (45 cm) computed significantly higher nitrogen uptake by stover than both the intercropping systems. Hand weeding (30 DAS), PE application of pendimethalin 1 kg ha"'and POE application of imazethapyr 50 g ha^{-1} (30 DAS) had significantly higher nitrogen uptake by grain and stover than weedy check during both the years.

Total nitrogen uptake in the produce: The total nitrogen uptake by baby corn was found in sole crop (45 cm) which was significantly higher than both the intercropping systems during both the years (Table 5). More uptake of nitrogen by sole baby corn plant might Rave occurred due to more spacing, lack of competition with the intercrop, more root growth etc. Sangakkara et *al.*[18] and Mandal *et al.*[13]. The lowest nitrogen uptake under maize with legume intercropping system may be due to higher plant population which might have resulted in less accessibility of available N. Hand weeding (30 DAS) and PE application of pendimethalin 1 kg ha^{-1} computed significantly higher total nitrogen uptake than POE application of imazethapyr 50 g ha^{-1} (30 DAS) and weedy check.

Phosphorus content and uptake by grain and stover: Planting patterns and weed management practices had no significant effect on phosphorus content in grain and stover of baby corn during both the years (Table 6). Planting patterns had no significant effect on phosphorus uptake by grain of baby corn but baby corn sole (45 cm) computed significantly higher phosphorus uptake by stover than both the intercropping systems. Hand weeding (30 DAS) and PE application of pendimethalin 1 kg ha^{-1} computed significantly higher phosphorus uptake than POE application of imazethapyr 50 g ha^{-1} (30 DAS) and weedy check.

Total phosphorus uptake by the produce: Sole planting of baby corn (45 cm) recorded significantly higher total phosphorus uptake than both the intercropping systems (Table 6). The difference between the intercropping systems was non-significant during both the years. Hand weeding (30 DAS) and PE application of pendimethalin 1 kg ha 'had significantly higher total phosphorus uptake than POE application of imazethapyr 50 g ha^{-1} (30 DAS) and weedy check.

Potassium content and uptake by grain and stover: Planting patterns and weed management practices had no significant effect on potassium content in grain and stover of baby corn during both the years (Table 7). Paired planting of maize (30/60 cm) + field pea (2:2) recorded the highest potassium uptake by baby corn which was followed by planting of maize + field pea (1:1) and baby corn sole (45 cm) during 2011-12. All these treatments differed significantly from one another. Baby corn sole (45 cm) had significantly higher potassium uptake by stover than paired.

Table 4: Effect of planting patterns and weed management practices on potassium content, uptake and total uptake of field pea during 2011-12 and 2012-13

Treatment	Phosphorus content (%)				Phosphorus uptake (kg ha^{-1})				Total uptake (kg ha^{-1})	
	2011-12		2012-13		2011-12		2012-13		2011-12	2012-13
	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw		
Planting pattern										
Field pea sole (30 cm)	0.94	1.12	0.96	1.11	16.08	27.55	10.22	21.24	43.63	31.47
Planting of maize	0.91	1.07	0.92	1.06	7.58	23.24	6.14	16.22	30.82	22.36
+ field pea (1:1)										
Paired planting of maize	0.89	1.05	0.90	1.03	10.22	20.38	5.18	15.11	30.59	20.28
(30/60 cm) + field pea (2:2)										
S.Em.±	0.03	0.04	0.02	0.02	0.54	0.27	0.23	0.82	0.59	0.74
CD at 5%	NS	NS	NS	NS	2.11	1.08	0.91	3.21	2.31	2.90
Weed management										
Weedy	0.91	1.03	0.92	1.02	8.71	21.32	5.82	15.69	30.03	21.51
Hand weeding (30 DAS)	0.93	1.14	0.94	1.13	13.69	26.83	7.71	19.59	40.52	27.30
Pendimethalin 1 kg ha^{-1} (PE)	0.91	1.09	0.93	1.08	11.71	23.32	8.40	17.84	35.03	26.24
Imazethapyr 50 g ha^{-1}	0.90	1.06	0.92	1.05	11.06	23.41	6.79	16.97	34.47	23.77
(POE, 30 DAS)										
S.Em.±	0.02	0.03	0.02	0.05	0.32	0.49	0.24	0.36	0.68	0.45
CD at 5%	NS	NS	NS	NS	0.95	1.47	0.73	1.07	2.02	1.36

Table 5: Effect of planting patterns and weed management practices on nitrogen content, uptake and total uptake of baby com during 2011-12 and 2012-13

Treatment	Nitrogen content (%)				Nitrogen uptake (kg ha^{-1})				Total uptake (kg ha^{-1})	
	2011-	-12	2012-13		2011-12		2012-13		2011-12	2012-13
	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover		
Planting pattern										
Baby corn sole (45 cm)	1.39	0.73	1.41	0.74	3.40	19.70	3.44	19.70	23.10	23.14
Planting of maize	1.42	0.76	1.44	0.77	3.38	9.27	3.18	9.12	12.65	12.30
+ field pea (1:1)										
Paired planting of maize	1.45	0.77	1.47	0.78	3.51	10.56	3.30	10.47	14.07	13.76
(30/60 cm)+ field pea (2:2)										
S.Em.±	0.02	0.01	0.04	0.02	0.05	0.63	0.10	0.61	0.71	0.57
CD at 5%	NS	NS	NS	NS	NS	2.49	NS	2.40	2.78	2.26
Weed management										
Weedy	1.41	0.75	1.43	0.76	2.89	10.99	1.67	10.87	13.88	12.54
Hand weeding (30 DAS)	1.45	0.77	1.47	0.78	4.13	15.01	3.93	14.95	19.15	18.87
Pendimethalin 1 kg ha^{-1} (PE)	1.43	0.76	1.45	0.77	3.43	15.53	4.31	15.49	18.96	19.80
Imazethapyr 50 g ha^{-1}	1.40	0.74	1.42	0.75	3.27	11.18	3.32	11.08	14.45	14.39
(POE, 30 DAS)										
S.Em.±	0.03	0.01	0.07	0.02	0.09	0.48	0.06	0.39	0.45	0.38
CD at 5%	NS	NS	NS	NS	0.29	1.43	0.19	1.16	1.34	1.15

Table 6: Effect of planting patterns and weed management practices on phosphorus content, uptake and total uptake of baby com during 2011-12 and 2012-13

Treatment		Phosphorus content (%)			Phosphorus uptake (kg ha^{-1})				Total uptake (kg ha^{-1})	
	2011-12		2012-13		2011-12		2012-13		2011-12	2012-13
	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Straw		
Planting pattern										
Baby corn sole (45 cm)	0.39	0.12	0.38	0.12	0.95	3.28	0.95	3.27	4.22	4.21
Planting of maize	0.41	0.12	0.42	0.12	0.98	1.44	0.92	1.40	2.42	2.32
+ field pea (1:1)										
Paired planting of maize	0.40	0.12	0.40	0.12	0.98	1.63	0.91	1.61	2.61	2.52
(30/60 cm)+ field pea (2:2)										
S.Em.±	0.01	0.00	0.01	0.00	0.02	0.11	0.01	0.08	0.15	0.22
CD at 5%	NS	NS	NS	NS	NS	0.46	NS	0.32	0.59	0.88
Weed management										
Weedy	0.39	0.11	0.39	0.11	0.81	1.71	0.45	1.64	2.52	2.09
Hand weeding (30 DAS)	0.41	0.13	0.42	0.14	1.18	2.67	1.12	2.68	3.85	3.80
Pendimethalin 1 kg ha^{-1} (PE)	0.41	0.12	0.42	0.13	0.99	2.52	1.25	2.53	3.51	3.78
Imazethapyr 50 g ha	0.38	0.10	0.37	0.10	0.89	1.57	0.87	1.52	2.45	2.39
(POE, 30 DAS) S.Em.±	0.01	0.01	0.01	0.01	0.02	0.10	0.01	0.06	0.11	0.11
CD at 5%	NS	NS	NS	NS	0.08	0.30	0.05	0.19	0.32	0.32

Table 7: Effect of planting patterns and weed management practices on potassium content, uptake and total uptake of baby com during 2011-12 and 2012-13

Treatment		Potassium content (%)			Potassium uptake (kg ha^{-1})				Total uptake (kg ha^{-1})	
	2011-12		2012-13		2011	-12	2012-13		2011-12	2012-13
	Grain	Stover	Grain	Stover	Grain	Stover	Grain	Stover		
Planting pattern										
Baby corn sole (45 cm)	0.36	1.59	0.35	1.58	0.88	42.89	0.87	41.95	43.77	42.82
Planting of maize	0.39	1.56	0.39	1.57	0.91	18.90	0.85	18.48	19.81	19.32
+ field pea (1:1)										
Paired planting of maize	0.40	1.55	0.39	1.57	0.97	21.22	0.88	21.02	22.19	21.90
(30/60 cm) + field pea (2:2)										
S.Em.±	0.01	0.01	0.02	0.01	0.007	1.30	0.02	1.21	1.33	1.20
CD at 5%	NS	NS	NS	NS	0.03	5.11	NS	4.76	5.23	4.70
Weed management										
Weedy	0.38	1.56	0.38	1.56	0.78	23.21	0.44	22.61	23.98	23.05
Hand weeding (30 DAS)	0.40	1.59	0.40	1.60	1.15	31.37	1.06	31.13	32.52	32.20
Pendimethalin 1 kg ha-1 (PE)	0.38	1.57	0.37	1.58	0.91	32.39	1.11	31.62	33.30	32.73
Imazethapyr 50 g ha^{-1}	0.37	1.55	0.36	1.55	0.86	23.71	0.84	23.23	24.57	24.07
(POE, 30 DAS)										
S.Em.±	0.01	0.02	0.01	0.04	0.02	0.87	0.02	1.50	0.87	1.49
CD at 5%	NS	NS	NS	NS	0.07	2.60	0.06	4.47	2.59	4.44

planting of maize (30/60 cm) + field pea (2:2) and planting of maize + field pea (1:1) during both the years. The difference between the intercropping treatments was non-significant. Hand weeding (30 DAS) and PE application of pendimethalin 1 kg ha'had significantly higher

potassium uptake by grain and stover of baby corn than POE application of imazethapyr 50 g ha^{-1} (30 DAS) and weedy check during both the years.

Total potassium uptake by the produce: Baby corn sole (45 cm) computed significantly higher total potassium uptake than paired planting of maize (30/60 cm) + field pea (2:2) and planting of maize + field pea (1:1) during both the years (Table 7). The difference between the intercropping treatments was non-significant. Pre emergence application of pendimethalin 1 kg ha^{-1} 'had statistically similar total potassium uptake as hand weeding (30 DAS), both these treatments had significantly higher total potassium uptake than POE application of imazethapyr 50 g ha^{-1} (30 DAS) and weedy check during both the years.

CONCLUSION

In the light of the two years experimental results, it may be concluded that sole planting of either field pea or baby corn results in more crop yield and total nutrient uptake by the produce. Hand weeding at 30 DAS proved more efficient as compared to PE application of pendimethalin 1 kg ha^{-1}, POE application of imazethapyr 50 g $ha"^{1}$ (30 DAS) and weedy check in terms of yield and nutrient uptake.

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