

# Economic analysis of frenchbean + potato inter cropping and uptake of nutrient by different crops as influenced by nitrogen and potassium application

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## ABSTRACT

An experiment was conducted at J.V. College, Baraut, Baghpat during *rabi* 2003-04 and 204-05 on inter cropping of french bean + potato intercropping with deferent rates of N and K application. The economic analysis of results indicated that intercropping system earned maximum of Rs. 55803/ha net profit which was found Rs. 18949 and Rs. 11014/ha more than net from potato pure and french bean pure, respectively. The application of 60 K<sub>2</sub>O/ha earned Rs. 49819/ha maximum profit which has Rs. 8406/ha more over control. As application of 120 kgN/ha earned Rs. 54328/ha net profit and it was found Rs. 23149/ha more over control. The uptake of N was recorded maximum in intercropping system while K – uptake was maximum is sole potato and P-uptake was higher in sole French-bean and intercropping. Uptake of nutrients increased with increasing doses of fertilizers application up to highest does of application.

**Key words :** French bean, Potato-french bean equivalent yield, Gross net income and nutrient uptake.

## INTRODUCTION

French bean (*Phaseolus vulgaris* Linn) is a new introduction in northern plains as grain legume for *rabi* season growing. Unlike other pulses, it responds well to higher inputs, particularly irrigation and nitrogen. It has been found quite competitive for intercropping in high input *rabi* crops like potato. At-IARI, New Delhi, intercropping of french bean and potato in 3:2 row ratio gave highest french bean equivalent yield per hectare (Ahalawat, 1998). Keeping these facts in view, the present investigation was carried out in western part of Uttar Pradesh to find-out the optimum requirement of nitrogen and potassium for french bean and Potato intercropping system.

## MATERIALS AND METHODS

A field experiment was carried out during the winter season of 2003-04 and 2004-05 at Janta Vedic Post Graduate College, Baraut (Baghpat) Uttar Pradesh. The experimental soil was silt loam, having 0.30 and 0.36% organic carbon, 14.50 and 15.00 Kg/ha available P and 275 and 263 Kg/ha available K with pH 7.5 and 7.40 in two years. The treatments consisted of three cropping system viz. sole french bean, sole potato and french bean + potato in 3:2 row ratio, three K-Levels (0, 30 and 60 kg K<sub>2</sub>O/ha), and four levels of nitrogen (0, 60, 120 and 180 Kg N/ha). The combination of cropping systems and K levels were kept in main plot and N-levels in sub plots of split plot design replicated thrice. French bean variety 'Amber', and potato variety 'Khufri chandra mukhi' were sown on 26 October and 30 October with 125 kg/ha. French bean seed and 25q/ha potato seed tuber. A uniform

basal dose of 80 kg P<sub>2</sub>O<sub>5</sub>/ha through single super phosphate was applied as basal. Seeds and N, K fertilizers were used on row basis sown in different treatment plots. Potato crop was dugged on 16.02.2004 and 18.02.2005 while French bean was harvested on 10.03.2004 and 15.03.2005 during two years.

## RESULTS AND DISCUSSION

The economics of intercropping was analysed in term of gross income, net profit and cost : bene ratio, while uptake of N, P and K as estimated in whole system.

### *Economics of treatments :*

#### *Cropping system :*

Intercropping system has earned significantly maximum income, while sole french bean earned minimum. In pooled mean, inter cropping system earned Rs. 11024 or 20.7% and Rs. 18949/ha or 37.3% higher than the gross income earned by sole potato and french bean, respectively (Table 1). Net profit was also obtained maximum from intercropping system, while significantly minimum from sole potato. Pooled data show that inter cropping earned maximum of Rs. 55803/ha higher than the profit earned by sole french bean and potato, respectively. These results are in conformity to those of Sinha *et al.* (1999) and Jha *et al.* (2000).

#### *K levels :*

Application of K at increased rates caused significant increase in comes which maximized at K<sub>60</sub> dose with Rs. 75281/ha. It was found 5.3% and 15% higher than income at K<sub>30</sub> and K<sub>0</sub> levels, respectively. Net profit was also maximized at K<sub>60</sub> level with Rs. 49819/ha which was

**Table 1 : Economic of french bean and potato pure and inter cropping system under different levels of nitrogen and potassium**

Treatments	Frenchbean equivalent yield q/ha			Gross income Rs./ha			Net profit Rs./ha		
	2003-04	2004-05	Pooled	2003-04	2004-05	Pooled	2003-04	2004-05	Pooled
<b>Cropping system</b>									
Sole french bean	24.54	24.26	24.40	61585	59014	60300	45250	44308	44779
Sole potato	30.16	27.84	29.00	75441	70211	72811	39604	34381	36894
French bean + potato	33.05	30.19	31.64	82271	75903	79149	59072	52535	55803
S.E.±	0.32	0.30	0.32	712	1431	1071	1250	845	783
C.D. (P=0.05)	0.68	0.64	0.65	1510	3034	2272	1578	1791	1684
<b>K. Levels Kg/ha Ko</b>									
K <sub>0</sub>	27.22	25.70	23.46	67970	62937	65454	43160	39666	41413
K <sub>30</sub>	29.67	27.52	28.60	74217	68850	71525	49036	43650	46343
K <sub>60</sub>	30.86	29.06	29.63	77081	73340	75281	51730	47908	49819
S.E.±	0.32	0.36	0.32	712	1431	1071	745	845	745
C.D. (P=0.05)	0.68	0.64	0.65	1510	3034	2772	1578	1791	1684
<b>N. Levels Kg/ha NO</b>									
N <sub>0</sub>	23.14	20.57	21.85	57518	52311	54915	33565	28272	30919
N <sub>60</sub>	28.41	26.64	27.52	70914	66702	68808	46151	41843	43626
N <sub>120</sub>	32.50	31.32	31.90	81086	78306	79734	55565	52740	54328
N <sub>180</sub>	32.97	31.18	32.07	82838	76185	79556	56621	52110	54365
S.E.±	0.33	0.29	0.31	632	1660	1146	641	790	716
C.D. (P=0.05)	0.65	0.58	0.63	1268	3327	2297	1285	1584	1434

found 7.8% and 20.3% more over profit at K<sub>30</sub> and K<sub>0</sub> levels, respectively.

#### Nitrogen level :

Gross income increased significantly with increasing N doses upto 120 N Kg/ha., where the maximum income of Rs. 79734/ha was obtained. It was found 15.9 per cent and 45.2% higher than the income at N<sub>60</sub> and N<sub>0</sub> Levels, respectively. Net profit was obtained maximum of Rs. 54328/ha at N<sub>120</sub> and it was computed 24.6% and 75.7 per cent more over net profit at N<sub>60</sub> and N<sub>0</sub> levels, respectively. Sinha *et al.* (1999) also reported the similar results in maize + french bean, system.

#### Uptake of nutrients:

##### Effect of cropping system :

Pooled data show that intercropping system taken up after checking N/ha, which was 15.52 Kg/ha or 12.5% and 19.97 Kg/ha or 16.7 per cent more than sole potato and sole french bean crop, respectively. P uptake was maximum of 20-46 kg/ha under sole french bean and it was 0.15 Kg/ha or 0.74% and 6.34 Kg/ha or 46.46% higher than inter cropping system and sole potato, respectively (Table 2). K uptake was maximum of 159.76 Kg/ha in sole potato, which was 49.29 kg/ha or 44.6% and 114.65 Kg/ha or 254 per cent more than intercropping system and french bean sole, Rathi *et al.* (1973) also

**Table 2 : Nutrients uptake (kg/ha) under different treatment**

Treatments	Total N Uptake Kg/ha			Total P uptake kg/ha			Total K uptake kg/ha		
	2003-04	2004-05	Pooled	2003-04	2004-05	Pooled	2003-04	2004-05	Pooled
<b>Cropping system</b>									
Sole french bean	121.41	118.38	119.90	19.96	20.96	20.46	57.06	33.16	45.11
Patato pure	122.18	126.53	124.35	13.73	14.21	13.97	166.00	143.43	159.76
French bean + potato 3:2	142.03	137.72	139.87	20.51	20.11	20.31	121.48	99.47	110.47
<b>K. Levels Kg/ha</b>									
K <sub>0</sub>	134.95	128.20	131.57	19.59	18.27	18.92	115.95	92.38	104.16
K <sub>30</sub>	141.75	137.00	139.38	19.99	20.57	20.28	119.33	100.49	109.93
K <sub>60</sub>	149.90	147.97	148.62	21.96	21.49	21.22	129.14	105.54	117.34
<b>N. Levels Kg/ha</b>									
N <sub>0</sub>	102.32	98.42	100.37	14.54	14.31	14.42	87.34	68.55	77.95
N <sub>60</sub>	137.72	132.00	134.86	19.22	19.20	19.24	119.27	97.27	108.27
N <sub>120</sub>	159.82	158.23	159.02	23.54	22.76	23.15	136.04	114.24	125.14
N <sub>180</sub>	168.25	162.29	165.25	24.73	24.11	24.42	143.30	117.81	130.55

reported that potato crop drains higher amount of potassium from soil.

*Effect of potassium levels :*

NPK uptake in intercropping system recorded increase with each increase in K dose and maximized at  $K_{60}$  where pooled results show the maximum uptake (Table 2) of 148.62 Kg N, 21.22 Kg P and 117.30 Kg K/ha. These value were calculated – 6.7 Kg and 13.0% higher N, 71 Kg and 14.8% higher P; and 6.7 kg and 12.6% higher K uptake than  $K_{30}$  and  $K_0$  levels, respectively. Similar results have been reported by Sinha (1999).

*Effect of nitrogen level :*

Like Potassium, N, P, K uptake was maximized at highest dose of N 180 where uptake of 165.25 Kg N, 24.42 Kg P and 130.55 Kg K/ha were recorded. These figures remained 3.9, 22.5 and 64.6 higher N; 5.5, 26.9 and 69.3% higher, 20.6 and 67.5% higher K that their uptake at  $N_{120}$ ,  $N_{60}$  and  $N_0$  levels, respectively. These results are in accordance to those of Krishanappa and Giwda (1988).

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