



INTEGRATED NUTRIENT MANAGEMENT IN GARDEN PEA (*Pisum sativum* var. *hortense*)

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ABSTRACT: An experiment was conducted to find out the effect of integrated nutrient management in garden pea (*Pisum sativum* var. *hortense*). The results indicated that application of vermicompost @ 1 t ha⁻¹ + rest PK (50:25 kg ha⁻¹) through chemical fertilizers with variety Azad Pea-3 resulted maximum height of plant (59.40 cm), number of pods plant⁻¹ (8.46), weight of pods plant⁻¹ (41.22g), shelling percentage (50.66%) and yield of green pod (126.54 qha⁻¹). On the basis of cost of cultivation, maximum net return of Rs. 44392/ ha and C.B. ratio (1:2.93) was recorded under Azad Pea-3 with the application of vermicompost @ 1 t ha⁻¹ + rest PK (50:25 kg ha⁻¹) and next best treatment was FYM @ 3 t ha⁻¹ + rest PK (48:10 kg ha⁻¹) in the same variety which gave Rs. 41796/ ha with C:B ratio 1:2.57.

Keywords : Garden pea, INM, vermicompost, shelling per cent, C:B ratio.

Garden pea is one of the popular vegetable and it is also largely cultivated throughout the world for fresh and processed forms. India is the highest vegetable pea producing country in the world. It occupies 3.03 lakh hectare area with annual production around 20.38 lakh metric tonnes (NHB, 3). The share of peas was 2.3 % in total production of vegetables in 2001-02 (Rai and Panday, 5). In India, Uttar Pradesh is major pea growing state and it alone produces 61.75% more than half of total production of pea. Besides this, Madhya Pradesh, Bihar, Punjab, Haryana and Rajasthan are also major pea producing states (Subrahmanyam and Gaganana, 6). In India, pea is commercially grown for its green pods in *Rabi* season in the plains of Northern India. While in hilly areas, it is successfully grown during summer season. Research on effect of Integrated Nutrient Management in garden pea (*Pisum sativum* var. *hortense*) is meager in U.P. and particularly at Faizabad conditions. The present investigation was, therefore, carried out to see the effect of integrated nutrient management on height of plant, yield attributes, yield and economics of garden pea.

MATERIALS AND METHODS

The present experiment “Integrated Nutrient

Management in Garden Pea (*Pisum sativum* var. *hortense*)” was conducted during *Rabi* season 2007-08 at Main Experimental Station, Department of Vegetable Science, Narendra Deva University of Agriculture & Technology, Narendra Nagar (Kumarganj), Faizabad (U.P.). The treatments comprised of three varieties of pea i.e. Arkel (V₁), Azad Pea-3 (V₂), NDVP – 6 (V₃) and twenty four treatment combinations with the various INM treatments i.e. F₁: Control, F₂: Recommended dose of NPK (30:60:40 kg/ha) through chemical fertilizers, F₃: FYM @ 3 t/ha + rest PK (48:10 kg/ha) through chemical fertilizers, F₄: Vermicompost @ 1 t/ha + rest PK (50:25 kg/ha) through chemical fertilizers, F₅: Neem cake @ 5.89 q/ha + rest PK (54:32kg/ha) through chemical fertilizers, F₆: FYM @ 1.5 t/ha + rest NPK (15:54:25 kg/ha) through chemical fertilizers, F₇: Vermicompost @ 0.5t/ha + rest NPK (15:55:32 kg/ha) through chemical fertilizers and F₈: Neem cake @ 2.9 q/ha + rest NPK (15:57:36 kg/ha) through chemical fertilizers. The experiment was laid out in RBD (Factorial) with three replications. Recommended dose of nitrogen (30 kg) was maintained with the use of 3t FYM, 1t Vermicompost and 5.8q Neem cake/ha and additional P & K that was provided through inorganic sources. Half of recommended dose of

nitrogen (15 kg/ha) was provided through organic sources and rest of NPK was by the inorganic fertilizers. The crop was sown in the 1st November, 2007. Recommended cultural practices were timely adopted during the course of this investigation. The observations were recorded on growth, yield attributes and yield of garden pea affected by various treatments applied. The major nutrients (N, P, K) available in organic sources *i.e.* FYM, Vermicompost and Neem cake contained 1, 3 and 5.2 per cent N, 0.4, 1.0 and 1 per cent P₂O₅ and 1, 1.5 and 0.45 per cent K₂O, respectively. An economics of the treatments used in garden pea crop was calculated to draw suitable treatment of integrated nutrient management for higher production. The economics of the treatments were computed on the basis of prevailing market rates of produce and agro inputs.

RESULTS AND DISCUSSION

Variety and INM treatments showed significant response on yield attributes. The maximum length of pod (7.68 cm), number of pods/plant (7.42), average weight of pod (4.40 g) and pod yield (98.64 q) were obtained under variety Azad Pea-3 (V₂) which was significantly higher in comparison to variety Arkel (V₁). Among the various INM treatments, all the yield attributing parameters of garden pea such as number of grains/pod (7.33), number of pods/plant (7.67), weight of pods/plant (35.68 g) and shelling (48.33%) were significantly improved with the application of Vermicompost 1 t/ha + PK (50:25 kg/ha) as compared to recommended dose of NPK (30:60:40 kg/ha) and control followed by neem cake @ 5.8 q/ha + rest PK (54:32 kg/ha) and FYM @ 3 t/ha + rest PK (48:10 kg/ha), (Table 1). The increase in yield attributing parameters might be due to integration of organic manure with inorganic fertilizer increased the availability of nutrients and these nutrients being important constituents of nucleotides, protein, chlorophyll and enzyme involved in various metabolic processes which have direct impact on vegetative and reproductive phases of plant. Inorganic fertilizer and organic

manures (Neem cake, FYM, Vermicompost, *Azospirillum* and *Phosphobacterium*) alone or in combination on growth yield and quality of tomato was tested by Kumaran *et al.* (1) and observed that the better response was observed when organic manures + inorganic fertilizers applied.

The data pertaining to yield of pods (q/ha) of garden pea varieties were markedly influenced by various treatments of organic manures and inorganic fertilizers (Table 2). Among the all treatment combinations, Vermicompost @ 1 t/ha + rest PK (50:25 kg/ha through chemical fertilizers) with variety Azad Pea-3 (V₂F₄) gave highest yield of pods (126.54q/ha) whereas, minimum yield was recorded under control plot (F₁) with variety Arkel. In this treatment, the higher values of yield attributing parameters like number of pods/plant, length of pod and weight of pods/plant were recorded and all the above parameters are directly associated for the enhancement of yield of pods (q/ha). This increase in the yield might be due to the use of vermicompost which is rich in major nutrients and in addition to that it contains micronutrients also. These nutrients are easily available to the development of plant and available nutrients retention capacity prolonged in the soil with application of vermicompost and its balance availability might be resulted in producing better yield with the integration of inorganic fertilizers. The above finding was supported by Patil *et al.* (4) who reported that among the other sources of organic manure, vermicompost @ 1 t/ha in addition with NPK improved the yield of tomato. Meena *et al.* (2) also reported that yield of pods was maximum with the application of vermicompost in comparison to FYM with recommended dose of nitrogen in garden pea.

The yield of pea varieties and economics of crop was affected by different INM treatments (Table 2). Among the treatment combinations, maximum yield of pods (126.54 q/ha), net return (Rs. 66,022) and cost benefit ratio (1 : 2.93) was recorded under the variety Azad Pea-3 with the application of vermicompost @ 1 t/ha + rest PK

Table 1: Effect of Varieties and INM treatments on yield attributes and green pod yield of garden pea.

Treatments	Height of plant (cm)	Length of pod (cm)	No. of grains pod ⁻¹	No. of pods plant ⁻¹	Average weight of pod plant ⁻¹ (g)	Weight of pod plant ⁻¹ (g)	Shelling percentage	Green pod yield (q/ha)
V ₁ -Arkel	53.38	7.27	6.62	6.37	4.16	27.30	45.00	81.50
V ₂ -Azad pea-3	56.51	7.68	6.95	7.42	4.40	32.50	47.08	98.64
V ₃ -NDVP6	54.75	7.38	6.67	6.67	4.19	28.58	45.58	84.83
C.D. (P = 0.05)	2.18	0.30	0.27	0.28	0.17	1.14	1.62	4.30
INM treatments								
F ₁ -Control	47.83	5.44	4.47	4.20	3.44	13.36	40.22	33.56
F ₂ -Reco. NPK (30:60:40 kg/ha)	53.07	7.50	6.84	6.72	4.09	27.59	47.67	82.87
F ₃ -FYM 3 t/ha + rest PK (48:10 kg/ha)	56.03	7.66	7.06	7.24	4.42	32.05	46.00	96.99
F ₄ -VC 1 t/ha + PK (50:25 kg/ha)	57.33	7.78	7.33	7.67	4.64	35.68	48.33	108.54
F ₅ -NC 5.89 q/ha + PK (54:32 kg/ha)	57.03	7.97	7.23	7.43	4.49	33.36	46.89	100.83
F ₆ -FYM 1.5 t/ha + NPK (15:54:25 kg/ha)	55.90	7.85	6.93	7.01	4.40	30.86	47.22	92.75
F ₇ -VC 0.5 t/ha + NPK (15:55:32 kg/ha)	55.00	7.67	7.04	7.12	4.38	31.18	47.44	95.26
F ₈ -NC 2.9 q/ha + NPK (15:57:36 kg/ha)	56.87	7.69	7.05	7.14	4.42	31.58	47.22	95.79
C.D. (P=0.05)	3.06	0.49	0.45	0.46	0.27	1.86	2.65	7.02

Table 2: Effect of INM treatments on economics of garden pea crop.

Treatments	Yield of pods (q/ha)	Gross income (Rs/ha)	Cost of cultivation (Rs /ha)	Net return (Rs/ ha)	Cost-Benefit ratio (C:B)
V ₁ F ₁	34.62	24234	18195	6038	1: 0.33
V ₁ F ₂	77.51	54257	20242	34014	1: 1.68
V ₁ F ₃	89.56	62692	20895	41796	1: 2.00
V ₁ F ₄	95.64	66948	22555	44392	1: 1.97
V ₁ F ₅	92.20	64540	24341	40198	1: 1.65
V ₁ F ₆	86.86	60802	20569	40232	1: 1.96
V ₁ F ₇	90.68	63476	21395	42080	1: 1.97
V ₁ F ₈	84.93	59451	22229	37221	1: 1.67
V ₂ F ₁	35.84	25088	18195	6038	1: 0.38
V ₂ F ₂	95.54	66878	20242	34014	1: 2.30
V ₂ F ₃	106.61	74627	20895	41796	1: 2.57
V ₂ F ₄	126.54	88578	22555	44392	1: 2.93
V ₂ F ₅	112.29	78603	24341	40198	1: 2.23
V ₂ F ₆	99.98	69986	20569	40232	1: 2.40
V ₂ F ₇	105.19	73633	21395	42080	1: 2.44
V ₂ F ₈	107.14	74998	22229	37221	1: 2.37
V ₃ F ₁	30.22	21154	18195	6038	1: 0.16
V ₃ F ₂	75.56	54892	20242	34014	1: 1.17
V ₃ F ₃	94.79	66353	20895	41796	1: 2.18
V ₃ F ₄	103.43	72401	22555	44392	1: 2.21
V ₃ F ₅	97.99	68593	24341	40198	1: 1.82
V ₃ F ₆	91.41	63987	20569	40232	1: 2.11
V ₃ F ₇	89.91	62937	21395	42080	1: 1.94
V ₃ F ₈	95.31	66717	22229	37221	1: 2.00

* Sale rate of green pods @ Rs. 700 / q

(50:25 kg/ha through chemical fertilizers) and this treatment combination was found to be the most economical followed by FYM @ 3 t/ha + rest PK (48:10 kg/ha) in the same variety which gave 1:2.57 cost : benefit ratio. Hence, it is suggested that vermicompost @ 1 t/ha + rest PK (50:25 kg/ha through chemical fertilizers) will be useful for the cultivation of garden pea variety Azad Pea-3 under agro-climatic conditions of Eastern Uttar Pradesh, particular under Faizabad conditions.

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