International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2018; 6(6): 1252-1254

Received: 01-09-2018
Accepted: 05-10-2018

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Effect of different level of FYM, PSB and Neem cake on physico-chemical property and yield of field pea

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Abstract
A field Experiment was conducted during the winter season of 2016-17 at research farm of Soil Science and Agricultural Chemistry SHUATS, Allahabad. Field trails were dsigned in split plot arrangement based on Randomized Block Design with three replication and nine treatment The treatment consisted of three factors namely FYM (0, 10, 20 kg), PSB (0, 1, 2 kg.) Neem Cake (0, 0.25, 0.5 t ha^{-1}). The result shows that application of different levels combination of FYM, PSB and Neem Cake increased growth and yield of Field Pea. It was recorded from the application of Bio-fertilizers in treatment T_7 [(@ 100% FYM: PSB + 100%. Neem Cake)] increased pH 7.1, EC 0.26 dS m-1, Organic carbon 0.63%, available Nitrogen 339.00 kg ha^{-1}, Phosphorus 32.70 kg $^{-}ha^{1,}$ Pottasium 206.56 kg ha^{-1} The physical parameters of soil such as bulk density g/cc, particle density g/cc and pore spaces % increased. It was also concluded from trail that the application of fertilizers in treatment T_7 [(@ 100% FYM: PSB + 100% Neem Cake)] was found in increasing Plant height, No. of leaves per plant, No. of branch, length of pod (cm), number of grain per pod, Test weight (g.$plot^{-1}$) and grain yield and as well as yield.

Keywords: Field pea, yield and FYM, Neem cake

Introduction
Pea (*Pisum sativum* L.) is one of the important vegetables in the world and ranks among the top 10 vegetable crops. Pea is commonly used in human diet throughout the world and it is rich in protein (21-25 %), carbohydrates, vitamin A and C, Ca, phosphorous and has high levels of amino acids lysin and trypophan (Bhat *et al*., 2013) [2]. Its cultivation maintains soil fertility through biological nitrogen fixation in association with symbiotic rhizobium prevalent in its root nodules and thus play a vital role in fostering sustainable agriculture (Negi *et al*. 2006) [8]. Therefore, apart from meeting its own requirement of nitrogen, peas are known to leave behind residual nitrogen in soil 50-60 kg/ha (Kanwar *et al*., 1990) [7].

FYM is known to play an important role in improving the fertility and productivity of soils through its positive effects on soil physical, chemical and biological properties and balanced plant nutrition. It improves the structure and water holding capacity of soil. Due to low and unstable production and increasing the population pressure, per capita availability of pulses decreasing from 69 g in 1961 to about 31.6 g in 2010-11, against the minimum requirement of 80 g per capita per day. To make up minimum 50 g pulses per capita per day and further demand from burgeoning population at least 23.88 m tonnes of pulses are required by 2015 which is expected to touch 29.30 million tonnes by 2020. To satisfy the demand of pulses requirement of ever increasing population, the production of pulses has to be increased only by increasing the yield/unit area/day.

FYM increases the availability of added inorganic nutrients resulting in the positive effect on the photosynthetic surface, thereby improved the yield.

Biofertilizers are known to play an important role in increasing availability of nitrogen and phosphorus besides improving biological fixation of atmospheric nitrogen and enhance phosphorus availability to crop (Bhat *et al.*, 2013) [2]. Therefore, introduction of efficient strains of rhizobium in soils with low nitrogen may help augment nitrogen fixation and thereby boost production of crops. Phosphorus is known to play an important role in growth and development of the crop and have direct relation with root proliferations, straw strength, grain formation, crop maturation (Bhat *et al*., 2013) [2].

Enhancing P availability to crop through phosphate-soubilizing bacteria (PSB) holds promise

In the present scenario of escalating prices of phosphatic fertilizers and a general deficiency of P in Indian soils (Alaguwadi and Gaur, 1988) [1]. A judicious use of organic manures and biofertilizers may be effective not only sustaining crop productivity and in soil health, but also in supplementing chemical fertilizers of crop (Jaipal *et al.*, 2011) [5].

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The addition of neem cake (NEC) also positively affected the available soil organic C (SOC), N, P, K, and Mn content of soil resulting better growth and grain yield of mung bean (*Vigna radiata*) and chick pea besides suppressing soil born pathogens. The inoculation, of seed with Rhizobium leguminosarum bv. Phaseoli (RHL) is known to increase nodulation, nutrient uptake, growth and yield response of crop plant and soil fertility. The phosphate solubilising bacteria (PSB) – Pseudomonas fluorescence (PSF) also improves grain yield and soil nutrients besides suppressing soil born pathogen. Co-inoculation of RHL and PSB and their combination with FYM improved plant biomass production, grain yield.

Material and Method

Soil Sampling

The soil of experimental area falls in order of Inceptisol and in experimental plots is alluvial soil in nature. The soil samples randomly collect from five different sites in the experiment plot prior to tillage operation from a depth of 0-15 cm. The size of the soil sample reduce by conning and quartering the composites soil sample is air dry and pass through a 2 mm sieve by way of preparing the sample for physical and chemical analysis. The experimental details are given below under different heading:

Design and treatment

The experiment was carried out in 3×3 factorial randomized block design with three levels of FYM, PSB and Neem Cake, The treatments were replicated three times and were allocated at random in each replication.

Experimental sites

The experiment was conducted on the research farm of department of Soil Science and agricultural chemistry, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad which situated six km away from Allahabad city on the right bank of Yamuna river, the experimental site is located in the sub – tropical region with 250 N latitude 81.500 E longitude and 95 MS Laltitude.

Table 1: Soil Parameters before Sowing of Field Pea

S. No.	Particular	Results	Methods
1.	Soil pH (1:2)	7.1	Jackson (1958) [6]
2.	Soil EC (dS m^{-1})	0.26	Wilcox (1950) [12]
3.	Organic Carbon (%)	0.63	Waikley and Black (1934)
4.	Available Nitrogen (Kg ha^{-1})	339.00	Subbiah and Asija (1956) [10]
5.	Available Phosphorus (Kg ha^{-1})	32.30	Olsen *et al.* (1954) [9]
6.	Available Potassium (Kg ha^{-1})	206.56	Toth and Prince (1949)

Table 2: Effect of FYM, PSB and Neem Cake on physico-chemical properties of Field Pea

Treatment	Bulk Density	Particle density	pore Space (%)	Solid Space (%)	Soil PH (%)	EC (dSm^{-1}) ha^{-1}	Organic Carbon ha^{1-})	N (kgha$^{-1)}$	P (kg)	K (kg)
T_0	1.05	2.28	41.63	52.82	6.90	0.22	0.34	312.36	25.03	175.40
T_1	1.03	2.24	46.49	53.50	6.84	0.21	0.40	319.63	25.36	183.10
T_2	1.05	2.52	42.08	57.91	6.88	0.22	0.36	328.53	27.63	195.53
T_3	1.07	2.40	44.74	55.26	6.98	0.22	0.46	334.56	31.10	199.03
T_4	1.03	2.50	41.40	58.59	6.93	0.23	0.49	337.80	31.40	203.73
T_5	1.09	2.43	45.42	54.58	6.96	0.23	0.41	326.00	27.43	195.23
T_6	1.05	2.24	47.37	52.63	6.97	0.23	0.45	335.23	31.70	203.50
T_7	1.05	2.45	38.29	56.16	6.80	0.24	0.63	339.00	32.30	206.56
T_8	1.09	2.56	37.92	56.52	6.76	0.21	0.59	330.06	2.53	203.80

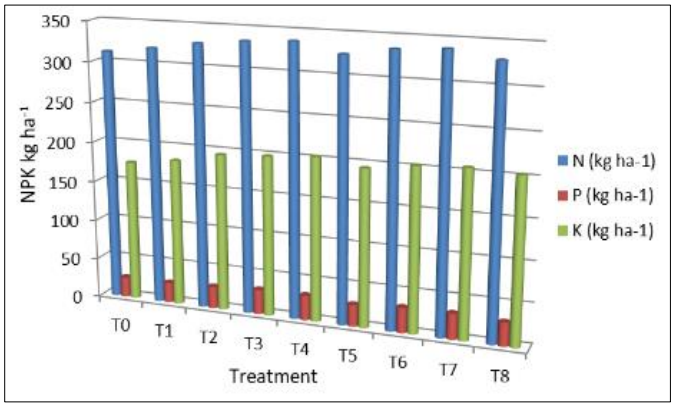

Fig 1: Effect of Different levels of FYM, PSB and Neem Cake on their interaction on N P K of Field Pea

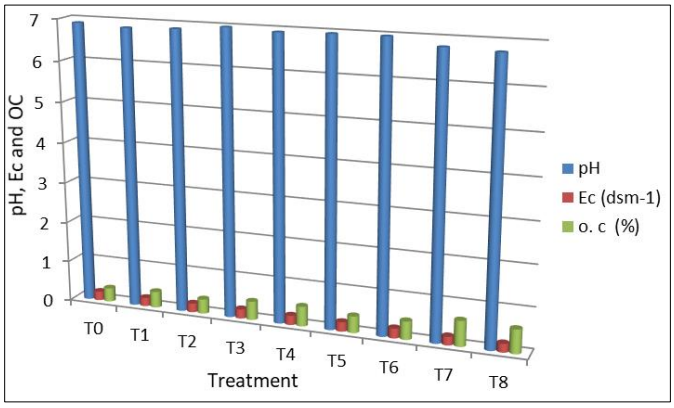

Fig 2: Effect of Different levels of FYM, PSB and Neem Cake on their interaction on pH, EC and organic carbon of Field Pea

Result and Discussions

The maximum pH 7.1 was recorded with T_7 (100% FYM: PSB + 100% Neem Cake) treatment combination followed by 7.06 with T_4 (100% FYM: PSB + 50% Neem Cake) treatment where as the minimum 6.69 pH was recorded with control T_0 (0% FYM: PSB + 0% Neem) Cake treatment. The trend of EC the maximum EC dSm^{-1} 0.26 was recorded with T_4 (100% FYM: PSB + 50% Neem Cake) treatment combination followed by 0.24 with T_7 (100% FYM: PSB + 100% Neem Cake) treatment whereas the minimum 0.20 EC was recorded with control T_0 (0% FYM: PSB + 0% Neem Cake) non difference in EC interaction between FYM, PSB and Neem Cake. The result of the data depicted that the maximum organic carbon 0.63 was recorded with T_7 (100% FYM: PSB + 100% Neem Cake) treatment combination followed by 0.59 with T_8 treatment whereas the minimum 0.34 organic carbon was recorded with control T_0 treatment. The statistical analysis of organic carbon data indicates that there was non-significant difference in organic carbon interaction between FYM, PSB and Neem Cake. In case of available nitrogen the maximum available nitrogen 339.00 was recorded with T_7 (100% FYM: PSB + 100% Neem Cake) treatment combination followed by 337.80 with T_4 (100% FYM: PSB + 50% Neem Cake) treatment combination whereas the minimum 132.36 available nitrogen was recorded with control T_0 (0% FYM: PSB + 0% Neem Cake) treatment. The maximum available phosphorus 32.30was recorded with T_7 (100% FYM: PSB + 100% Neem Cake) treatment combination followed by 31.4 with T_4 (100% FYM: PSB + 100% Neem Cake) treatment combination whereas the minimum 25.03 available phosphorus was recorded with control T_0 (0% FYM: PSB + 0% Neem Cake) treatment. The statistical analysis of available phosphorus data indicates that there was significant difference in available phosphorus interaction between FYM, PSB and Neem Cake.

The maximum potassium 206.56 was recorded with T_7 (100% FYM: PSB + 100% Neem Cake) treatment combination followed by 203.73 with T_4 (100% FYM: PSB + 50% Neem Cake) treatment combination whereas the minimum 175.40 potassium was recorded with control T_0 (0% FYM: PSB + 0% Neem Cake) treatment. The statistical analysis of potassium data indicates that there was significant difference in potassium interaction between FYM, PSB and Neem Cake.

References

1. Alagawadi AR, Gaur AC. Associative effect of Rhizobium and PSB on yield and nutrient uptake by chickpea, Plant and soil. 1988; 105:241-246.
2. Bhat TA, Gupta M, Ganai MA, Ahanger RA, Bhat HA. Yield, soil health and nutrient utilization of field pea (*Pisum sativum* L.) as affected by phosphorus and Biofertilizers under subtropical conditions of Jammu, International journal of modern plant and animal science. 2013; 1(1):1-8.
3. Black CA. Methods of soil analysis Am. Soc. Agron. madison, Wisconsin, U.S.A, 1965, 2.
4. Bouyoucous GJ. The hydrometer as a new method for the mechanical analysis of soils. Soil Sci. 1927; 23:393-395.
5. Jaipal, Sharma S, Dixit AK, Sharma AK. Growth and yield of capsicum and garden pea as influenced by organic manures and biofertilizers, Indian J of Agricultural Sciences. 2011; 81(7):637-642.
6. Jackson ML. Soil chemical analysis, Second edition Indian Reprint, prentice hall of India, New Delhi, 1958, 498.
7. Kanwar JS. Punjab Veg. Grower. 1990; 25:12-15.
8. Negi S, Sing RV, Dewivdi OK. Effect of Biofertilizers, nutrient and lime on growth and yield of garden pea, Legume research. 2006; 29(4):282-285.
9. Olsen SR, Cole CV, Watnahe FS, Dean LA. Estimation of available phosphorus in soils by extraction with sodium bicarbonate U.S. Deptt. Agr. Circ, 1954, 939.
10. Subbaih BV, Asija CL. A rapid proceducre for the estimation of available nitrogen in soils. Current sci. 1956; 25:256-260.
11. Walkley A, Black IA. Critical examination of rapid method for determining organic carbon in soils, effect of variance in digestion conditions and of inorganic soil constituents. Soil Sci. 1947; 632:251.
12. Wilcox LV. Electrical conductivity, Amer Water works Assoc. J. 1950; 42:775-776.