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NUTRIENT USE EFFICIENCY IN VEGETABLE PEA UNDER ORGANIC MODULE

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ABSTRACT:

The present paper highlighted the effect of our developed of organic module. (Combined application of press mud with seed treatment of bio fertilizer) on yield,, nutrient use efficiency and economic of pea cultivation. A significantly higher percent accumulation of nitrogen, phosphorus and sculpture in soil and there uptake by grain was noted this module. The nutrient utilization use efficiency 20.8 kg/kg N, 148 kg/kg P and 176.2 kg/kg S more under press mud @ 5 t/ha with dual inoculation of bio fertilizer compared to its per conventional practices. The interaction impact on grain yield and interaction impact on economically nutrient use efficiency was respectively (18.6 to 62.7 and00 to 27.3 %) and higher benefit obtained (2.4 rupee/rupee invested) was realized under press mud @ 5t/ha with dual inoculation of bio fertilizer.

KEYWORDS: Yield, Nutrient use efficiency and C: B ratio

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INTRODUCTION:

In India adopted conventional intensive agriculture, high yielding varieties and indiscriminate use of chemical fertilizers. Its due to agricultural lands have become vulnerable to degradative processes such as soil erosion, nutrient depletion and loss of organic matter, and have suffered a consequent decline in soil productivity and low use efficiency of fertilizers. Therefore, we have promoted re-evaluated our agriculture practices and investigate alternative production system to supplement the nutritional requirement of crops through application of organic inputs and biofertilizers to the maximum possible low-level use of chemical fertilizers Bhattacharyya and Chakrabotry (2005). The restoration and productivity of soils can be enhanced by using various off-form sources of organic wastes, including Press mud, bio fertilizers, agricultural and industrial processing wastes. These technologies are not only

the store house of a large number of essential nutrients but also improve considerably the physical environment of the soil and nutrients with minimize the expenditure on costly fertilizer inputs and mostly improve the economic yield and use efficiency of fixed or native nutrients in the soil by combined use of bio fertilizers and press mud.

MATERIAL AND METHODS:

The present experiment was conducted during rabi season of 2002 to 2005 in a sandy loam alluvial soil Seeds of Arkel prominent vegetable pea of eastern Uttar Pradesh were sown in field experiments. Total six treatments combinations were in the experiments To -control, T_2- Press mud @ 5t/ha T_3 Press mud @ 5t/ha plus Seed treatments in Rhizobium T_3, Press mud @ 5t/ha plus Seed treatments in *PSB*, T_4 Press mud @ 5t/ha plus Seed treatments in Rhizobium with PSB, T_5 Conventional farmers technique (i) poor farmers use of with out or less amount of fertilizer (ii) Rich farmers use of recommended fertilizer. Were evaluated in Split plot design. Seed inoculation of *Rhizobium* in vegetable pea and soil application of phosphate solubilizing bacteria before sowing as per the treatment. Culture sultry of bio fertilizer @ 200gm each 10 litters water and 10 % sugar was prepared separately, the seed were dipped in bio fertilizers slurry for 15 minute and thoroughly mixed to get uniform coating on all the seeds. Required and measured quantity of seeds were taken in plastic bucket (25littr capacity) and recommended quantity of individual biofertilizers.Utilization use efficiency, percentage return to fertilizer, interaction impact on economic nutrient use efficiency according Singh *et al*., 2005.

RESULTS AND DISCUSSION:

Grain Yield

Application of pressmud @ 5 t/ha along with seed treated in *Rhizobium* and *PSB* @ 5 kg/ha soil application T_4 (9.6 q/ha), T_2 (8.9 q/ha) and T_3 (8.7 q/ha) was registered 62.7%, 50.8% and 47.4 % respectively, higher grain yield and interaction impact on grain yield (18.6 to 62.7 %) variation and highest benefit cost ratio 1:2.4 was recorded under this treatment over single or un-inoculated crop or control. Inoculation with *Rhizobium* and *PSB* resulted more availability of N and P, which caused significant improvement in crop growth & net assimilation rate and leaf area index (table 2). The improvement was more conspicuous under dual inoculation because associative effect between *Rhizobium* and *PSB* inoculation resulted in significant increase in growth and yield attributes compared to single or un-inoculated plot. This favorable effect of combined inoculation might be resulted due to increased availability of N and P in root zone which further stimulates for more yields from cited by Tyagi *et al*. 2003, Tanwar *et al*. 2003).

Nutrient content and uptake in grain:

Significantly higher phosphorus nitrogen and sulphur content and uptake in grain was found when the application of pressmud @ 5t/ha along with *Rhizobium* and *PSB* had lead to highest phosphorus percentage and uptake by grain (0.52, 3.8 0.35and 5.4, 35.5, 3.4 kg/ha) respectively followed by application of pressmud @ 5 t/ha along with individual inoculation of *Rhizobium or PSB.* The inoculation of *PSB* was responsible for significant increase in P and nitrogen content and uptake by grain. When inoculation *Rhizobium* produce favorable effect of on availability of nitrogen in root zone was realized by fixing more atmospheric N by *Rhizobium* (Tanwar *et al*., 2003). *PSB* plays a vital role in the solubilization of various insoluble inorganic and organic phosphates present in soil or added phosphatic fertilizers through production of organic acid by microorganism reported by (Tyagi *et al*. 2003).

Nutrient use efficiency versus grain yield:

Maximue utilization use efficiency of nutrients nitrogen, phosphorus and sulphur (20.8 kg/kg, 148 kg/kg and 176.2 kg/kg) respectively were obtained when the application of Pressmud @5 t/ha with dual inoculation of biofertilizers (*Rhizobium* and *PSB*). This treatment similarly effect on interaction on grain yield increased from 2.92 to 27.3 % in pea grain yield compared to conventional farmers technique (table1). Biofertilizers functionality based on the release of enzymes (soil dehydrogenase), metabolites (sidrophores) growth promoters (IAA) and as promote nitrogen, phosphorus supply through increase nitrogenase activity by *Rhizobium* and produced humic substances like Humic and Felvic acid by *PSB* and pressmud form stable complexes with phosphates which are readily absorbed by plant. It's due to more utilization use efficiency versus grain yield similar reporte found (Gull *et al*. 2003, Singh *et al*. 2005 and Nard *et al*. 2004).

Table 1 Effect of organic input on yield, nutrient content, uptake and use efficiency vegetable pea

Treatment	Yield q/ha	Nutrient content in grain (%)			Nutrient uptake by grain (kg/kg)			Utilization use efficiency of nutrient (kg/kg)		
		Nitrogen	Phosphorus	Sulphur	Nitrogen	Phosphorus	Sulphur	Nitrogen	Phosphorus	Sulphur
Control	5.9	3.0	0.42	0.17	17.7	2.5	1.3	--	--	--
Pressmud @5t/ha	7.9	3.5	0.51	0.35	26.6	4.0	2.6	20.1	133	153
Pressmud @5t/ha +Rhizobium	8.9	3.6	0.52	0.33	32.04	4.6	3.0	20.4	142.8	176
Pressmud @5t/ha +PSB	8.7	3.6	0.52	0.34	31.3	4.5	3.0	20.5	140	164.7

Pressmud @5t/ha +Rhizobium+ PSB		9.6	3.8	0.52	0.35	35.5	5.0	3.4	20.8	148	176.2
Conventional farmer technique	Poor Farmer N_{30} kg/ha	7.0	3.4	0.49	0.28	24	3.4	1.96	17.4	110	118.3
	Rich FarmerN_{30} ,P_{60} kg/ha	8.2	3.5	0.50	0.33	28.7	4.1	2.7	20.4	143	164.3

Table 2 Effect of organic in put on economic and physiological value in vegetable pea

Treatment		Interaction impact on economic use efficiency (%)	Cost of cultivation	Gross return	Net return	Return per rupee invested (C: B)	Interaction impact on grain yield	LAI (Cm)	Leaf NAR (mmolm^{-2}s^{-1})
Control		--	11180	29500	18320	1.6	--	1.6	7.64
Pressmud @5t/ha		11.5	13620	39500	25880	1.9	33	2.0	18.14
Pressmud @5t/ha +Rhizobium		21.2	13820	44500	30680	2.1	50.8	2.2	14.62
Pressmud @5t/ha +PSB		18.9		43500	29620	2.1	47.5	2.3	16.19
Pressmud @5t/ha +Rhizobium+ PSB		27.3	13970	47000	33300	2.4	62.7	2.4	17.11
Conventional farmer technique	Poor Farmer N_{30} kg/ha	00	13248	35000	21752	1.6	18.6	9.98	9.98
	Rich FarmerN_{30},P_{60} kg/ha	10.6	14048	41000	26952	1.9	38.9	9.37	9.37

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