IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Residual Effect Of Integrated Green Manuring Practice On Field Pea

[1]D.K.Debata, RRTTS, G.Udayagiri, Kandhamal, Odisha(762100).

[2] L.K.Das, College of Agriculture, Bhawanipatna, Odisha(766001)

Abstract

One experiment was conducted during the rabi season 2021-22 in RRTTS, G.Udayagiri to study the effect of inorganic fertilizers, organic manure and bio-fertilizers on growth, yield attributes and yield of field pea (*Pisum Sativum* L). It was observed that with combination of inorganic fertilizers along with green manure increased growth and yield . 50% Nitrogen of recommended dose+ glyricidia leaf incorporation significantly increased the yield over control in rice field pea cropping system.

Key words: Field pea, Growth, Inorganic fertilizer, Glyricidia, Yield.

1. Introduction

Pea is an annual plant belongs to the family leguminoceae. It is a cool season crop grown in many parts of the world. The field pea (*Pisum sativum L. var. arvense*) is used as vegetable, fresh, frozen or canned and is also grown to produce dry peas like the split pea. Mature seeds of this type are also used as'dal' and green seeds are also canned for the use in the offseason. This type is also used for green manuring. Pea is an important pulse crop grown in India . Apart from India, other major producers of pea are USA, China, France, UK etc. The major pea growing states in India are Uttar Pradesh, Bihar, Haryana, Punjab, Himachal Pradesh, Orissa and Karnataka. It fixes atmospheric nitrogen and improve the turnover of phosphorus, enhancing soil nutrient cycle and contributing to better production and it also increases the resilience of farming system and providing a better life to the farmers in water scarce environment.. It is consumed in the form of whole grain, split grain, dehulled split grain as well as flour. Major pulses grown all over world are common bean, chick pea, dry pea, lentil, mungbean, urd bean, and pigeon pea. production was recorded as 92.28 million tonnes in2018, of which the contribution of major pulses were dry beans (32.98), chick pea (18.63%), pea (13.53%), cowpea (7.83%), lentils (6.86%) and pigeon pea (6.455%) (FAO, 2018). As per FAO, 2020 data record, 92.32 million tonnes of pulses are produced on an area of94.748 million ha of land with average productivity of 974 kg/ha (FAOSTAT 2020). Field pea primarily is used for human consumption or as livestock feed. Field pea is a grain legume commonly consumed throughout the world as a protein source and is popular in human vegetarian diets. Field pea has high levels of the amino acids, lysine and tryptophan, which are relatively low in cereal grains. Field pea contains approximately 21% to 25% protein. Peas contain high levels of carbohydrates, are low in fiber and contain 86% to 87% total digestible nutrients, which makes them an excellent livestock feed. Field pea also contains 5% to 20% less of the trypsin inhibitors than soybean. This allows it to be fed directly to livestock

without having to go through the extrusion heating process. Field pea often is cracked or ground and added to cereal grain rations. Field pea is an excellent protein supplement in swine, beef cow and feeder calf, dairy and poultry rations. Field pea often is used in forage crop mixtures with small grain. Field pea forage is approximately 18% to 20 % protein. Pea inter seeded at 60 to 100 pounds per acre with a small grain such as oat can increase the protein concentration of the mixed forage by 2 to 4 percentage points and increase the relative feed value by 20 points over oat seeded alone. Field pea also may be grown as a green manure or green fallow crop. Either option can improve or maintain future crop productivity. Opportunities also exist to utilize just-harvested pea fields for a volunteer pea cover crop. At harvest, a small percentage of the dry field pea seeds will have dropped to the ground, even when combines are well-adjusted. These seeds may be stimulated to germinate and start growing. This may require a light harrowing of the field to incorporate the seed. Soil moisture is essential for germination to take place. As the stimulated volunteer plants follow a main crop of field peas, high numbers of *Rhizobium leguminosarum* bacteria inoculum will be in the soil and nodulation is typically excellent. The volunteer pea crop can be used for grazing or the biomass can be left on the soil or worked into the soil. Integrated nutrient management effect was found to increase crop yield by Mishra *et al.* (2010) and Singh and Sharma (2011). Use of imbalanced and inadequate fertilizers has made the soil not only deficient in nutrients but also deteriorated soil health resulting in decline crop response to recommended dose of N fertilizers. In addition the chemical fertilizers becoming expensive over the years. Therefore, the importance of organic manures and bio-fertilizers is gaining prominence. Under such a situation, integrated plant nutrient system (IPNS) has vital significance for maintenance of soil productivity. Therefore, suitable combination of chemical fertilizers, organic manures and microbial cultures need to be developed for particular cropping system and soil. Present investigation was under taken to develop integrated nutrient module for rice-pea cropping system for sustainable production. Pulses are an important source of dietary protein and have unique property to maintain and restoring soil fertility through biological nitrogen fixation as well as addition of ample amount of residues to the soil (Singh *et al*, 2015). Among the pulses, cowpea is popularly known as 'vegetative-meat' has great importance due to highly nutritious, constitutions with protein (23.4%), fat (1.8%) and carbohydrates (60.3%) and also rich source of Ca and Fe (Singh *et al*, 2012). It has ability to grow as catch crop, inter crop, mixed as well as mulch crop where moisture is scarce (Singh *et al*, 2013b), (Kumar *et al*, 2012). Green tender pods are used as vegetable containing moisture (84.6%) protein (4.3%) carbohydrate (8.0%) and fat (0.2%), Calcium (72.0 mg), Phosphorus (59.0 mg) Iron (2.5g), Thamine (0.07mg), Riboflavin (0.09mg) and Vit C (24.0mg) per 100g of edible pods (Suryawanshi *et al*, 2017). Poor yield of such important pulse crop is mainly because of grown under neglected land with improper or imbalance fertilizer and other management (Singh *et al*, 2015) although cowpea is highly responsive to fertilizer application. But timely availability of chemical fertilizers at economic prices is another great problem for the farmers. (Singh *et al*, 2013a). Chemical fertilizers play an important role to meet nutrient requirements of the crop but continuous use of these on lands will have deleterious effects on physical, chemical and biological properties of soil, which in turn reflects on yield (Balai *et al*, 2017). In recent year organic farming is becoming great importance for sustainable agriculture to stop deterioration of the agriculture lands and environment, to get yield safer for human beings and animals and to encourage the natural enemies of harmful insects and soil born diseases Anonymous (2013) . Application of vermicompost favourably improves the physical properties of soil due to higher addition of humus through organics (Khan *et al*, 2013), . Phosphorus solubilizing Bacteria (PSB) is known to play an important role to improve both fertility and productivity of soil through positive effect on all type of properties of soil and balanced plant nutrition. It also improves the structure and water holding capacity of soil (Sipai *et al*, 2017). So, there is a need to enhance the production potential of this crop by use of organic manure, bio-fertilizers and others nutrients in combination.

2. Materials and Methods

The experiments were conducted at Research farm of RRTTS, G.Udayagiri , Kandhamal of Odisha during rabi season of two consecutive years of 2021 and 2022. The experimental site is situated at 20^0 7'N' latitude and 84^0 22 'E' Longitude and at an altitude of 643.74 meters above the mean sea level. The soil of experimental field is brown forest type formed in association with forest growth. These are medium in structure sandy loam to clay loam in texture and red yellow to dark brown in colour, strongly to moderately acidic (pH-4.7) in reaction with medium to high Organic Carbon(o.68-1.32%), exchangeable P(18-47 kg ha $^{-1}$,

exchangeable K(115-235kgha^{-1}, low to medium N(0.03-0.07%) and cation exchangeable capacity (4.5- 6.9 CMOL kg^{-1}) well drained conditions

.

Design-RBD, treatments-12, Replications-3, plot size-5mx3m, spacing- 45cmx15cm

Seed rate-50kg ha^{-1}, fertilizer dose-20:40:20 NPK, Variety-Rachan

3. Result and Discussion

The yield of field pea in different treatments are presented in table 1. It is observed from the table that pea yield due to various treatments ranges from 7.95 to 12.65q ha^{-1} . lowest yield of 7.95q ha^{-1} was observed in control plot. Highest yield was recorded of 12.65q ha^{-1} under residual effect of 50% N+ Glyricidia leaf.(Table1). The residual effect of dhanicha, glyricidia leaf and *Lantana camera* increased the yield to the tune of 42, 47 and 37per cent over control. However, the residual of 50% N with the above treatment resulted 46, 59 and 41 per cent increase in pea yield over control. Better performance was recorded in the order of glyricidia leaf followed by dhanicha and lantana camera with 50% N. The above findings of improvement in overall vegetative growth and development of crop with NPK in the investigation is in close conformity of Upadhyay and Anita (2016) and Balai *et al* (2017). The increase in organic carbon (%) may be due to increase in plant growth, which in turn increased the plant residues into the soil. Similar results were reported by Quddus *et al*., (2018) . Improvement of Nitrogen status after the crop harvests may be due to the addition of INM which increased the availability of nutrients from the native as well as applied fertilizers. The balanced combination of macronutrients (nitrogen, phosphorus, and potassium) and micronutrients (boron and zinc) is pivotal in enhancing nutrient absorption and utilization, resulting in noticeable growth improvements. This aligns with conclusions made by Pathak and Sharma (2023). The interventions successfully addressed nutritional inadequacies, thus promoting strong plant growth and maximizing seed production. These findings underscore the importance of integrating micronutrient supplementation and adopting optimal fertilization practices to enhance crop productivity. This conclusion aligns with the results reported by Kohli *et al.* (2023) and Stanton *et al.* (2022).

It was observed the residual effect of glyricidia leaf+ 50% N resulted higher yield in field pea under Rice-Field pea cropping system.

Table 1. Residual effect of Integrated green manuring practices on Field Pea

Treatment	**Mean yield q ha^{-1}**	**% increase over control**
T1(control)	7.95	-
T2(50%N)	9.09	14
T3(100%N)	11.12	40
T4(Azospirillum)	9.27	16
T5(Dhanicha)	11.35	42
T6(Glyricidia leaf)	11.74	47
T7(*Lantana camera*)	10.95	37
T8 (T2+T4)	9.76	22
T9(T2+T5)	11.65	46
T10(T2+T6)	12.65	59
T11(T2+T7)	11.24	41
T12(T8+PSM)	10.65	33
C.D.(0.05)	0.59	

4. Conclusion

As per findings of these two-consecutive years of experimentation, it may be concluded that combined application of glyricidia leaf+ 50% N resulted in higher yield of field pea under Rice- Field pea cropping system and also fetched significantly higher net return as compared to other treatments.

5.Future scope of studies: Biochemical studies on green manures are to be taken in future study.

6. References

[1]Anonymous. 2013. Report of Expert Group on Pulses. Department of Agriculture & Co-operation, Government of India. Ministry of Agriculture 162 .

[2]Balai RC, Meena LR and Sharma SC. 2017. Effect of different level of nitrogen and phosphorus on cowpea (Vigna unguiculata (L) Walp) under rain fed conditions of Rajasthan. Journal of Agriculture and Ecology 3:19-24.

[3]FAOSTAT 2018, FAOSTAT 2020

[4]Khan MM, Abbas M, Awan FS, Shahid M, Ali M and Ahmad S 2013. Physio-biochemical and genetic changes in stored pea (*Pisum sativum International Journal of Agriculture and Biology*) seeds. 15: 951-956

[5]Kohli, S. K., Kaur, H., Khanna, K., Handa, N., Bhardwaj, R., Rinklebe, J., & Ahmad, P. (2023). Boron in plants: Uptake, deficiency and biological potential. *Plant Growth Regulation*, 100(2), 267-282

[6]Kumara A, Singh ON, Kumar R. 2012. Effect of integrated nutrient management on growth, seed yield and economics of pea (*Pisum sativum*) and fertility changes. *J. Food Leg* 25:121-124.

[7]Mishra, A., Prasad, K. and Rai, G. 2010. Effect of bio-fertilizerinoculation on growth and yield of dwarf field pea inconjunction with different doses of chemical fertilizer. *Journal of Agronomy* 9 (4): 163-68.

[8]Pathak, S., & Sharma, H. R. (2023). Economics of zinc biofortification and nutrient management in garden pea. *Progressive Agriculture*, 23(1), 133

[9]Quddus MA, Hossain MA, Naser HM, Anwar B, Aktar S, Nazimuddin M. Effect of Zinc and Boron application on productivity, quality and nutrient uptake of field pea (Pisum sativum L.) grown in calcareous soils, *Journal of Agriculture science and Practice* (JASP) 2018;3(6):132- 143. 20.

[10]Stanton, C., Sanders, D., Krämer, U., & Podar, D. (2022). Zinc in plants: Integrating homeostasis and biofortification. *Molecular Plant*, 15(1), 65-85

[11]Singh, Y.P. and Sharma, A. 2011. Effect of sources of phosphorusand microbial inoculation on productivity, nutrientavailability in soil and uptake of nutrients by chickpea grownon sandy loam soil. *Indian Journal of Agricultural Sciences* 81(9): 834-37.

[12]Singh AK, Meena MK, Bharati RC and Gade RM. 2013a. Effect of sulpher and Zinc management on yield, nutrient uptake, changes in soil fertility and economics in rice (*Oryza sativa*) - lentil (*lens culniris*) system. *Indian J. Agril.Sc* 83(3):344-348.

[13]Singh AK, Singh KA, Bharati RC and Chadra N. 2013b. Response of intercrops and nutrient management on the performance of tobacco based intercropping system and assessment of system sustainability. *Bangladesh J. Bot* 42(2):343-348.

[14]Singh, R.K., Singh, V.B., Nayak, R., Singh, A.K. and Kannaujia, S.K. (2014a). Comparative evaluation of front line demonstration on yield and economics of field pea (*Pisum sativum* L.) in eastern U.P. Agric. Update, 9(1): 41-43.

[15] Singh, Surendra, Singh, Lokendra, Rahul, V.P. and Kuldeep (2014b). Study on characters association and path analysis in field pea (Pisum sativum L.). *Internat. J. Plant Sci*., 9 (1): 213- 215.

[16]Singh B, Bhuker A, Mor VS, Dahiya OS and Punia RC 2015. Effect of natural ageing on seed quality of fenugreek (Trigonella foenumgraecum *International Journal of Seed Science* and L.). Technology : 243-248.

[17]Sipai AH, Sevak K, Khorajiya KU, Addangadi K and Chaudhary AN. 2017. Evaluation of different modules on yield and yield aJributes of Mothbean (Vigna aconitifolia Jacq.) marchel grown on light textured soil of Kacchchh region. *International J of Agric. Sci* 13(2):261-265.

[18]Suryawanshi L, Kushwah SS and Barchiya J. 2017. Effect of phosphorus nutrition on growth, yield and quality aJributes of cowpea (Vigna ungiculata (L) Walp.). *International J of Agric Sci* 20(9):211-213.

[19]Upadhyay RG and Anita S. 2016. Effect of nitrogen and zinc on nodulation, growth and yield of Cowpea. *L) Walp.) Legume Research* 39(1):149-151.