

INFLUENCE OF LIQUID ORGANIC MANURE ON YIELD AND ECONOMICS OF FIELD PEA

ABSTRACT

A field experiment was conducted during *Rabi* season of 2022 at Crop Research Farm (CRF), Department of Agronomy, SHUATS, Prayagraj (UP) to investigate the effect of liquidorganic manure and spraying schedule on growth and yield of Field pea. The treatments consists of liquid organic manure (panchagavya 2.5%, 5.0%, and 7.5%) and spraying schedule(every 7 days, 14 days, and 21 days) whose effect is observed on Field pea (var. RACHANA).The experiment was laid out in Randomized Block Design with nine treatments replicated thrice. The treatment with the application of Jeevamrutha (500 l/ha) + Spraying at interval of 7 days recorded significantly higher plant height (97.87 cm), plant dry weight (31.54 g), number of pods/plant (21.97) and number of seeds/pod (4.95) seed yield (2.88 t/ha), and stover yield (4.91 t/ha) of Field pea as compared to other treatments. The maximum Gross return (INR 167040.00 /ha), Net return (INR 110640.0 /ha) and B: C ratio (1.96) were recorded in treatment with the application of Jeevamrutha (500 l/ha) + Spraying at interval of 7 days as compared to other treatments.

Key words: *Field pea, Panchagavya, Jeevamrutha, Schedule of application, Growth, yield, economics.*

INTRODUCTION

Field pea (*Pisum sativum* L.) is a pulse and is an important food crop grown globally as a source of stable protein. Amongst which, India is the world's leading producer and consumer of pulses. Pulses have a wide range of uses as food, feed, and fodder as it provides protein rich food for humans, nutrient rich feed and fodder for cattle, in addition to being a less expensive source of protein. Pulses have been known for significant role in preserving and enhancing the soil's fertility. Pulse cultivation develops a method to fix atmospheric nitrogen in their root nodules, allowing them to satisfy their nitrogen needs to a large extent. Because of which pulse crops fit well into the cropping system. Pulses can withstand drought conditions better than cereal, millets and other crops because of their unique plant types, early maturity, low water and fertilizer requirements and deep-rooted system.

Field pea is grown both in developed and developing countries. In developed countries, field pea is grown on industrial scale, whereas in developing countries, these are grown on subsistence level and considered as staple food. Field pea is used predominantly for human consumption. The field pea market is highly segmented and the demand depends on end use. Field peas are sold in primary or secondary wholesale markets directly by the producer. Three main marketing segments were identified: (1) the direct food use market, (2) the split (dal) market, (3) Feed substitute for animals. Field pea is mostly consumed as whole seed. It is either consumed separately or combined with other dishes. There are certain quality traits of Field pea that are mostly preferred by consumers viz. creamish green and white seed colour, bold and heavy seed.

Organic farming is an age-old traditional practice evolved by our fore fathers where in only organic manures or natural inputs available on the farm are used. Thus reduces the cost of production against chemical inputs. Organic farming provides balanced nutrition thereby taking care of soil health by improving physical, chemical and biological properties of the soil through nutrient cycling. It also guarantees environmental safety and food products free from toxic substances. The natural inputs used in organic farming are easily available, releases nutrients slowly, supplies macro and micro nutrients and provides favourable soil environment for microbial population.

In modern farming liquid manure play a crucial role in significant yield increase as well as reduce the fertilizer dose. The Panchagavya, Jeevamrutha, Sanjivak are ecofriendly liquid organic preparation made from cow products i.e., cow dung, urine, milk, curd, ghee, legume flour and jaggary etc. results in higher growth, yield & quality of crops. They contain macro nutrients, essential micro-nutrients, vitamins, essential amino acids, growth promoting factors like IAA, GA and beneficial microorganisms. In the existing technology of organic farming where FYM and compost are used as sources of nutrient supply, productivity of soil depletes during the transitory period (until fertility, structure and microbial activity of soil have been restored) leading to low yield levels in initial years of cultivation (**Natarajan, 2002**). The increasing concern for environmental safety and global demand for pesticide residue free food has evoked keen interest in crop production using eco-friendly products which are easily biodegradable and do not leave any harmful toxic residues besides conserving nature.

In Sanskrit, panchagavya means blend of five substances obtained from desi cow, each individual of these five products is called ‘Gavya’ and together termed as ‘Panchagavya’ which is mixture of five products of cow such as cow dung, cow urine, milk, ghee and curd in a proper ratio (5:3:2:2:1) to this banana, jaggary and coconut water is added that allows it to ferment and the end product is known as panchgavya. It is highly effective organic product recommended for crop improvement in organic agriculture (Sangeetha and The vanathan, 2010). Panchagavya has played a significant role in providing resistance to pests and diseases, resulting in increased overall yields (**Tharmaraj et al., 2011**). Spraying of panchgavya induces early flowering, high seed setting percentage and also it increases the growth and yield components with growth promoting activity and it is a low-cost technology. It possess the properties of fertilizers and bio pesticides (**Sireesha, 2013**). It has resulted in positive effect on growth and productivity of crops (**Somasundaram et al., 2003**).

Panchagavya plays an important role in the quality of fruits and vegetables. It is used as a foliar spray, soil application along with irrigation, as well as seed treatment (Natarajan, 2002). Use of chemical fertilizers and pesticides in agriculture fields led to environmental degradation and hence as an alternative to chemicals. V.N. Maheswari *et al.*, (2017) reported that Panchagavya can act as growth promoter and immunity booster.

Considering all these points in view, the present investigation entitled “**Influence of organic liquid manures on growth and yield of Field pea**”. Was conducted during *Rabi* season of 2023 at Crop Research Farm, Naini Agricultural Institute, SHUATS, Prayagraj, (U.P).

MATERIALS AND METHODS

The experiment was conducted during *Rabi* season of 2022 at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P). The soil of the field constituting a part of central Gangetic alluvium is neutral and deep. The soil of the experimental field was sandy loam in texture, nearly neutral in soil reaction (pH7.8), low level of organic carbon (0.62%), available N (225 Kg/ha), P (38.2 kg/ha), K (240.7 kg/ha) and zinc (2.32 mg/kg). The experiment was laid out in Randomized Block Design along with 9 treatment combination and replicated thrice. Treatment were randomly arranged in each replication, divided into 27 plots. The treatment combination are as follows follows 1.Panchagavya + Every 7 Days 2.Panchagavya + Every 14 Days 3. Panchagavya + Every 21 Days 4.Jeevamrutha + Every 7 Days 5.Jeevamrutha + Every 14 Days 6.Jeevamrutha + Every 21 Days 7.Cow urine + Every 7 Days 8.Cow urine + Every 14 Days 9.Cow urine + Every 21 Days.. The growth parameters and yield, production was recorded at harvest from randomly selected plants in each plot. The data was computed and analysed by following statistical method of Gomez and Gomez(1984).

RESULT AND DISCUSSIONS

GROWTH PARAMATERS

Plant Height (Cm)

100 DAS data was recorded non-significant, treatment with Jeevamrutha (500 l/ha)

Spraying at interval of 7 days (6.35) recorded maximum number of nodules per plant. And lower found in Panchagavya 2.5% + Every 21 Days (4.09).

The increase in number of nodules per plant might be due to the better availability of nutrients that were supplied by regular application of panchagavya. The foliar application of panchagavya supplies micronutrients and enhancing the cell division increased number of nodule production in plants, ultimately promoting the required growth and development. Similar findings were reported by **Kumaravelu and Kadamban (2009)**

Number of nodules/ plants

At 60 DAS, treatment with application of Panchagavya (3%) + Spraying at interval of 21 days (26.84) recorded significantly maximum number of nodules per plant. However, treatment with Panchagavya (3%) + Spraying at interval of 7 days (24.51), Panchagavya (3%) + Spraying at interval of 14 days (25.24) and Cow urine (2500 l/ha) + Spraying at interval of 14 days (25.01) were statistically at par with the Panchagavya (3%) + Spraying at interval of 21 days

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Plant dry weight (g/plant)

100 DAS, maximum plant dry weight was obtained with application of Jeevamrutha (500 l/ha) + Spraying at interval of 7 days (31.54 g/plant) which was significant over all the treatments. However, Cow urine (2500 l/ha) + Spraying at interval of 7 days (30.48), Jeevamrutha (500 l/ha) + Spraying at interval of 14 days (29.04) Jeevamrutha (500 l/ha) + Spraying at interval of 14 days (29.84) statically at par with Jeevamrutha (500 l/ha) + Spraying at interval of 7 days.

Dry matter production in plant of Field pea was significantly influenced due to different interval and concentration of panchagavya. The inoculation of panchagavya supplied the plant with enough macronutrients (N, P & K) and micronutrient (Zn, Fe, Cu and Mn) that are required for overall plant growth and development thus the application of panchagavya increased the dry matter production in plants. Similar findings were reported by **Kumar et al. (2011)**.

Yield Parameters

Number of pods per plant (No.)

The treatment with application of Jeevamrutha (500 l/ha) + Spraying at interval of 7 days (21.97) recorded significantly maximum number of pods per plant. However, Panchagavya (3%) + Spraying at interval of 7 days (20.62) and Jeevamrutha (500 l/ha) + Spraying at interval of 21 days (19.44) was statistically at par with the Jeevamrutha (500 l/ha) + Spraying at interval of 7 days.

Increase in number of pods/plant could be attributed to the fact that application of panchagavya concentrations at different intervals must have created a stimuli in the plant system that altered physiological process and biochemical activities which modify plant anatomy and morphology of the yield attributes in plants as reported by **Latha and sharanappa(2014)**.

Number of seeds per pod (No.)

The treatment with application of Jeevamrutha (500 l/ha) + Spraying at interval of 7 days (4.95) recorded significantly maximum number of pods per plant. However, treatment with application of Panchagavya (3%) + Spraying at interval of 7 days (4.65) and Jeevamrutha (500 l/ha) + Spraying at interval of 14 days (4.25) were statistically at par with the Jeevamrutha (500 l/ha) + Spraying at interval of 7 days.

The increases in number of seeds per pod might be due to more vigorous and luxuriant vegetative growth which in turn favoured a better partitioning of assimilates from source to sink. Similar findings were reported by **Kumawat et al. (2011)**.

Seed Index (g)

Seed Index data was non-significant; however maximum seed index was found in Panchagavya (3%) + Spraying at interval of 7 days (21.78 g) and lower in Panchagavya

(3%) + Spraying at interval of 14 days (20.50 g)

The balance supplement of major and minor nutrient might have induced cell division, expansion of cell wall, meristematic activity, photosynthetic efficiency that help to produce a healthy seed. Similar findings were reported by **Kumawat *et al.* (2011)**.

Economics

The result showed that maximum gross return ((INR 167040.00 /ha), net return (INR 110640.0 /ha) and benefit cost ratio 1.96) were recorded in treatment with the application of Jeevamrutha (500 l/ha) + Spraying at interval of 7 days as compared to other treatments.

UNDER PEER REVIEW



CONCLUSION

The concluded experiment showed that spraying of Jeevamrutha was found to be profitable and economically efficient. The conclusion drawn are based on one season data only which requires further confirmation for recommendation.

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Table 1. Influence of organic liquid manures on growth and yield of field pea (*Pisum sativum.L*)

Treatment	AT HARVEST		
	Plant height (cm)	Number of Nodules/ Plant	Plant dry weight (g/plant)
Panchagavya (3%) + at an interval of 7 days	90.38	24.51	24.74
Panchagavya (3%) + at an interval of 14 days	85.46	25.24	27.94
Panchagavya (3%) + at an interval of 21 days	83.76	26.84	26.35
Jeevamutha+ at an interval of 7 days	91.87	23.11	31.54
Jeevamutha+ at an interval of 14 days	88.82	24.37	29.04
Jeevamutha+ at an interval of 21 days	85.37	23.44	27.72
Cow Urine+ at an interval of 7 days	89.90	20.64	30.48
Cow Urine+ at an interval of 14 days	87.59	25.01	29.84
Cow Urine+ at an interval of 21 days	87.68	22.57	26.76
F test	S	S	S
SEm (±)	0.94	0.79	0.78
CD (p=0.05)	2.83	2.44	2.45

Table 2 Effect of organic liquid manures and spraying schedule on yield attributes of Field pea

Treatment	Pods/plant (No.)	Seeds/pod (No.)	Seed Index (g/seeds)	Seed yield (t/ha)	Stover yield (t/ha)	Harvest Index (%)
Panchagavya (3%) + at an interval of 7 days	20.62	4.65	21.78	2.38	3.82	38.39
Panchagavya (3%) + at an interval of 14 days	14.22	2.15	20.5	1.68	3.48	32.56
Panchagavya (3%) + at an interval of 21 days	12.89	2.81	20.83	1.79	3.45	34.16
Jeevamutha+ at an interval of 7days	21.97	4.95	21.46	2.88	4.91	32.65
Jeevamutha+ at an interval of 14 days	15.29	4.25	21.7	1.97	3.7	34.74
Jeevamutha+ at an interval of 21 days	19.44	3.88	21.58	2.01	3.2	38.58
Cow Urine+ at an interval of 7days	18.09	3.48	21.53	1.91	3.56	34.92
Cow Urine+ at an interval of 14 days	16.24	2.55	21.36	1.58	3.37	31.92
Cow Urine+ at an interval of 21 days	15.57	3.35	21.66	1.96	3.78	34.15
F test	S	S	NS	S	S	S
SEm (±)	0.91	0.23	0.65	0.28	0.41	1.18
CD (p=0.05)	2.73	0.70	-	0.86	1.30	3.56

Table 3 Effect of organic liquid manure and spraying schedule on economics of Field pea

Treatment combinations	Total cost of cultivation (₹/ha)	Gross returns (₹/ha)	Net returns (₹/ha)	B:C ratio
Panchagavya (3%) + at an interval of 7 days	47,650.00	138040	90,390.00	1.90
Panchagavya (3%) + at an interval of 14 days	43,275.00	97440	54,165.00	1.25
Panchagavya (3%) + at an interval of 21 days	42,025.00	103820	61,795.00	1.47
Jeevamutha+ at an interval of 7days	56,400.00	167040	1,10,640.00	1.96
Jeevamutha+ at an interval of 14 days	47,650.00	114260	66,610.00	1.40
Jeevamutha+ at an interval of 21 days	45,150.00	116580	71,430.00	1.58
Cow Urine+ at an interval of 7 days	65,150.00	110780	45,630.00	0.70
Cow Urine+ at an interval of 14 days	52,025.00	91640	39,615.00	0.76
Cow Urine+ at an interval of 21 days	48,275.00	113680	65,405.00	1.35