Original Research Article

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

ABSTRACT

A field experiment was conducted during the*Rabi* season of 2022 at Crop ResearchFarm(CRF),DepartmentofAgronomy,SHUATS,Prayagraj(UP)toinvestigatetheeffectof liquidorganic manure and spraying schedule on thegrowth and yield of Field peas. Thetreatments consist of liquid organic manure (panchagavya 2.5%, 5.0%, and 7.5%) andsprayingschedule(every7days,14days,and21days)whoseeffectisobservedonFieldpea(var. RACHANA).The experiment was laid out in Randomized Block Design with ninetreatmentsreplicatedthrice.Thetreatmentwiththeapplicationof Jeevamrutha(500l/ha) +Sprayingatintervalsof7daysrecordedsignificantlyhigherplantheight(97.87cm),plantdry weight (31.54 g), number of pods/plant (21.97), and number of seeds/pod (4.95) seedyield (2.88 t/ha), and stover yield (4.91 t/ha) of Field pea as compared to other treatments.ThemaximumGrossreturn(INR167040.00/ha),Netreturn(INR110640.0/ha),and B:Cratio (1.96) were recorded in treatment with the application of Jeevamrutha (500 l/ha) +Sprayingat aninterval of 7 days as compared toother treatments.

Keywords:*Fieldpea,Panchagavya,Jeevamrutha,Scheduleofapplication, Growth,yield,economics.*

INTRODUCTION

Fieldpea(*Pisum sativum* L.)~~is~~Pulsesareanimportantfoodcropgrowngloballyas a source of stable protein. Among which, India is the world's leading producer andconsumer of pulses. Pulses have a wide range of uses as food, feed, and fodder as itprovides protein-rich food for humans, nutrient-rich feed, and fodder for cattle, inaddition to being a less expensive source of protein. Pulses havebeenknownfortheirsignificantroleinpreservingandenhancing~~the~~soil'sfertility.Pulse cultivationdevelops a method to fix atmospheric nitrogen in their root nodules, allowing them tosatisfytheirnitrogenneedstoalargeextent.Becauseofthispulsecropsfitwellintothecroppi ngsystem.Pulsescanwithstanddroughtconditionsbetterthancereal,millet,and other crops because of their unique plant types, early maturity, low water andfertilizerrequirements,and deep-rooted system.

Field pea is grown both in developed and developing countries. In developedcountries,fieldpeaisgrownonanindustrialscale,whereasindevelopingcountries ,theseare grownonasubsistence levelandconsideredasastaplefood.Fieldpeaisusedpredominantly for human consumption. The field pea market is highly segmented, andthe demand depends onend-use. Field peas are sold in primary or secondary wholesalemarkets directly by the producer. Three main marketing segments were identified: (1)the direct food use market, (2) the split (dal) market, and(3) Feed substitute for animals.Fieldpea ismostlyconsumedaswhole seed. It is either consumed separately orcombined with other dishes. There are certain quality traits of Field peas that are mostlypreferredbyconsumersviz.creamishgreenandwhiteseedcolor,boldandheavyseed.

Organic farming is an age-old traditional practice evolved by our forefatherswhere ~~in~~ only organic manures or natural inputs available on the farm are used. Thus,reducingthecost of production against chemical inputs. Organic farming providesbalancednutritiontherebytakingcareofsoilhealthbyimprovingthephysical,chemic al,andbiologicalproperties ofthesoilthroughnutrientcycling.Italsoguaranteesenvironmental safety and food products free from toxic substances. The natural inputsused in organic farming are easily available, release nutrients slowly, supply macroandmicronutrients,andprovide a favorablesoil environment forthemicrobialpopulation.

In modern farming liquid manure play a crucial role in significant yieldincreaseaswellasreducethefertilizerdose.ThePanchagavya,Jeevamrutha,Sanjiva k are eco-friendly liquid organic preparation made from cow products i.e.,cow dung, urine, milk, curd, ghee, legume flour, and jaggary, etc. resulting in highergrowth, yield & quality of crops. They containmacro nutrients,essential micro-nutrients, vitamins, essential amino acids, growth-promoting factors like IAA, GA,andbeneficialmicroorganisms.Intheexistingtechnologyoforganicfarmingwhere FYM and compost are used as sources of nutrient supply, theproductivity of soildepletes during the transitory period (until fertility, structure,and microbial activityof soil have been restored) leading to low yield levels in initial years of cultivation**(Natarajan, 2002)**. The increasing concern for environmental safety and globaldemand for pesticide residue-free food has evoked keen interest in crop productionusing eco-friendly products which are easily biodegradable and do not leave anyharmfultoxicresiduesbesidesconserving nature.

In Sanskrit, panchagavya means ablend of five substances obtained from desicow, eachindividual of these five products is called 'Gavya' and together termed as'Panchagavya' which is amixture of five products of cow such as cow dung, cowurine, milk, ghee, and curd a proper ratio (5:3:2:2:1) to this banana, jaggary, andcoconut water is added that allows it to ferment and the end product is known aspanchgavya.Itisahighlyeffectiveorganicproduct recommendedforcropimprovementinorganicagriculture(SangeethaandThevanathan, 2010).Panchagavya has played a significant role in providing resistance to pests anddiseases,resultinginincreasedoverallyields**(Tharmaraj*etal.*,2011)**.Sprayingofpa nchgavyainducesearlyflowering,andahighseedsettingpercentage,andalso~~it~~increasest hegrowthandyieldcomponentswithgrowth-promotingactivityanditisalow-cost technology. Itpossessesthepropertiesoffertilizersandbiopesticides**(Sireesha, 2013)**. It has resulted in apositive effect on thegrowth and productivity ofcrops**(Somasundaram*etal.*,2003)**.

Panchagavya plays an important role in the quality of fruits and vegetables. It is usedas a foliar spray, soil application along with irrigation, as well as aseed treatment**(Natarajan,2002)**.The useofchemicalfertilizersandpesticidesinagriculturefieldsledtoenvironmentaldegradation andhenceasanalternativetochemicals.**V.N.Maheswari *et al.*, (2017)** reported that Panchagavya can act as agrowth promoter andimmunitybooster.

Consideringallthesepointsinview,thepresentinvestigationentitled**"Influence of organic liquid manures on growth and yield of Field pea".** Wasconducted during the*Rabi* season of 2023 at Crop Research Farm, Naini AgriculturalInstitute,SHUATS, Prayagraj,(U.P).

MATERIALSANDMETHODS

The experiment was conducted during the*Rabi* season of 2022 at Crop Research Farm,Department of Agronomy, SHUATS, Prayagraj (U.P). The soil of the field constituting apart of central Gangetic alluvium is neutral and deep. The soil of the experimental fieldwas sandy loam in texture, nearly neutral in soil reaction (pH7.8),low level of organiccarbon (0.62%), available N (225 Kg/ha), P (38.2 kg/ha), K (240.7 kg/ha) and zinc (2.32mg/kg).The experiment was laid out in Randomized Block Design along with 9 treatmentcombinations and replicated thrice. Treatment was randomly arranged in each replication,divided into 27 plots. The treatment combination is as followsfollows1.Panchagavya + Every7 Days 2.Panchagavya +Every 14Days 3. Panchagavya +Every 21Days 4.Jeevamrutha + Every 7 Days 5.Jeevamrutha + Every 14 Days 6.Jeevamrutha + Every 21 Days 7.Cow urine + Every7 Days 8.Cow urine +Every 14Days 9.Cow urine +Every 21Days. The growth parametersand yield, production were recorded at harvest from randomly selected plants in each plot.Thedatawascomputedandanalysedbyfollowingthestatisticalmethodof GomezandGomez(1984).

RESULTANDDISCUSSIONS

GROWTHPARAMETERS

PlantHeight(Cm)

100DAS datawas recordedasnon-significant, treatment with Jeevamrutha(500l/ha)

Spraying at intervals of 7 days (6.35) recorded amaximum number of nodules per plant. Andlowerfound in Panchagavya 2.5%+Every 21Days (4.09).

The increase in thenumber of nodules per plant might be due to the better availability ofnutrients that were supplied by regular application of panchagavya. The foliar applicationofpanchagavyasuppliesmicronutrientsandenhancingthecelldivisionincreasingthe numberofnodule production in plants, ultimately promoting the required growth and development.Similarfindings werereported by **KumaraveluandKadamban(2009)**

Numberofnodules/plants

At60DAS,treatmentwiththeapplicationofPanchagavya(3%)+Sprayingatintervalsof21 days (26.84) recorded a significant maximum number of nodules per plant. However,treatmentwithPanchagavya(3%)+SprayingatintervalsofDaysDays(24.51),Pancha gavya (3%)+ Spraying at intervals of 14 days (25.24), and Cow urine (2500 l/ha) +Sprayingatintervalsof14days(25.01)werestatisticallyatparwiththePanchagavya(3%)+Spra yingatintervalsof 21 days

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Plantdryweight(g/plant)

100 DAS, maximum plant dry weight was obtained with theapplication of Jeevamrutha(500l/ha)+ Sprayingatintervalsof 7days(31.54g/plant)whichwassignificantoverallthetreatments. However, Cow urine (2500 l/ha) +Spraying at intervals of7 days (30.48),Jeevamrutha (500 l/ha) + Spraying at intervals 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) +Sprayingat interval of7 days.

Dry matter production in the plant of Field peas was significantly influenced due todifferentintervalsandconcentrationsofpanchagavya.Theinoculationofpanchagavyasupplie dtheplant withenoughmacronutrients(N,P&K)andmicronutrients(Zn,Fe,Cu,andMn) that are required for overall plant growth and development thus the application ofpanchagavyaincreasedthedry matterproductioninplants.Similarfindingswerereportedby**Kumar*etal*.(2011)**.

YieldParameters

Numberofpodsperplant(No.)

The treatment with theapplication of Jeevamrutha (500 l/ha) + Spraying at intervals of 7 days(21.97) recorded a significant maximum number of pods per plant. However, Panchagavya(3%) +Spraying at an interval of 7 days (20.62) and Jeevamrutha (500 l/ha) + Spraying atan intervalof21days(19.44)werestatisticallyatparwiththeeevamrutha(500l/ha)+Sprayingatan interval of7 days.

The increase in thenumber of pods/plants could be attributed to the fact that theapplication ofpanchagavya concentrations at different intervals must have created astimulus in the plantsystem that altered physiological processes and biochemical activities which modify plantanatomy andmorphologyoftheyieldattributesinplantsasreportedby**Latha**and**sharanappa(2014)**.

Numberofseedsperpod(No.)

The treatment with theapplication of Jeevamrutha (500 l/ha) + Spraying at intervals of 7days(4.95)recordeda significantmaximumnumberofpodsperplant.However,treatmentwiththeapplicationofPancha gavya(3%)+Sprayingatintervalsof7days(4.65)andJeevamrutha(500l/ha)+Sprayingatinterval sof14days(4.25)werestatisticallyatparwiththeJeevamrutha(500l/ha)+Spraying atanintervalof7 days.

Theincreasesinthenumberofseedsperpodmightbeduetomorevigorousandluxuriantvege tativegrowthwhich inturnfavoredabetter partitioningofassimilatesfromsourcetosink.Similarfindingswerereported by **Kumawat*et al*.(2011)**.

SeedIndex(g)

Seed Index data was non-significant; however maximum seed index was found inPanchagavya(3%)+Sprayingatintervalsof7days(21.78g)andlowerinPanchagavya(3%)+Sprayingat intervals of 14days (20.50g).

Thebalancesupplementofthemajorandminornutrientsmighthaveinducedcelldivision,expansionofcellwall,meristematicactivity,andphotosyntheticefficiencythathelptoproduceahealthy seed. Similar findingswerereported by**Kumawat*et al*.(2011)**.

Economics

The result showed that maximum gross return ((INR 167040.00 /ha), netreturn(INR110640.0/ha),andbenefit-costratio1.96)wererecordedintreatmentwiththeapplication of Jeevamrutha (500 l/ha) + Spraying at aninterval of 7 days as compared toothertreatments.

CONCLUSION

The concluded experiment showed that spraying of Jeevamrutha was found to be profitableand economically efficient. The conclusion drawn is based on one-seasondata only whichrequiresfurtherconfirmation for recommendation.

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Table1.Influenceoforganicliquidmanuresongrowthandyieldof fieldpea(*Pisumsativum.L*)

Treatment	ATHARVEST		
	Plant height(cm)	Numberof Nodules/Plant	Plant dry weight(g/plant)
Panchagavya(3%)+atanintervalof7days	90.38	24.51	24.74
Panchagavya(3%)+atanintervalof14days	85.46	25.24	27.94
Panchagavya(3%)+atanintervalof21days	83.76	26.84	26.35
Jeevamutha+atanintervalof7days	91.87	23.11	31.54
Jeevamutha+atanintervalof14days	88.82	24.37	29.04
Jeevamutha+atanintervalof21days	85.37	23.44	27.72
CowUrine+at anintervalof7days	89.90	20.64	30.48
CowUrine+at anintervalof14days	87.59	25.01	29.84
CowUrine+at anintervalof21days	87.68	22.57	26.76
Ftest	S	S	S
SEm(±)	0.94	0.79	0.78
CD(p=0.05)	2.83	2.44	2.45

Table2Effectoforganicliquidmanuresandsprayingscheduleonyieldattributesof Fieldpea

Treatment	Pods/plant (No.)	Seeds/pod (No.)	SeedIndex (g/seeds)	Seedyield (t/ha)	Stoveryield (t/ha)	Harvest Index(%)
Panchagavya(3%)+atanintervalof7days	20.62	4.65	21.78	2.38	3.82	38.39
Panchagavya(3%)+atanintervalof14days	14.22	2.15	20.5	1.68	3.48	32.56
Panchagavya(3%)+atanintervalof21days	12.89	2.81	20.83	1.79	3.45	34.16
Jeevamutha+atanintervalof7days	21.97	4.95	21.46	2.88	4.91	32.65
Jeevamutha+atanintervalof14days	15.29	4.25	21.7	1.97	3.7	34.74
Jeevamutha+atanintervalof21days	19.44	3.88	21.58	2.01	3.2	38.58
CowUrine+at anintervalof7days	18.09	3.48	21.53	1.91	3.56	34.92
CowUrine+atanintervalof14days	16.24	2.55	21.36	1.58	3.37	31.92
CowUrine+atanintervalof21days	15.57	3.35	21.66	1.96	3.78	34.15
Ftest	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

Table3Effectoforganicliquidmanureandsprayingscheduleoneconomicsof Fieldpea

Treatmentcombinations	Total cost ofcultivation(₹/ha)	Grossreturns(₹/ha)	Net returns(₹/ha)	B:Cratio
Panchagavya(3%)+atanintervalof7days	47,650.00	138040	90,390.00	1.90
Panchagavya (3%)+atanintervalof14days	43,275.00	97440	54,165.00	1.25
Panchagavya(3%)+atanintervalof21days	42,025.00	103820	61,795.00	1.47
Jeevamutha+atanintervalof7days	56,400.00	167040	1,10,640.00	1.96
Jeevamutha+atanintervalof14days	47,650.00	114260	66,610.00	1.40
Jeevamutha+atanintervalof21days	45,150.00	116580	71,430.00	1.58
CowUrine+at anintervalof7days	65,150.00	110780	45,630.00	0.70
CowUrine+atanintervalof14 days	52,025.00	91640	39,615.00	0.76
CowUrine+atanintervalof21 days	48,275.00	113680	65,405.00	1.35