and muriate of potash were used as source of nitrogen, phosphorus and potassium, respectively. The data obtained in respect of various observations were statistically analysed by the method described by Cochran *et al.,* 1967. The significance of "F" and "t" was tested at 5 per cent level of significance.

3. Results and discussion

This chapter deals with the results obtained during the course of the present investigation entitled "Effect of integrated nutrient management on productivity of lentil (*Lens esculenta* Moench)" in Dehradun valley.

The data of the various observations recorded periodically were subjected to statistical computation in a randomized block design (RBD) in order to find out the significance of different treatments by using the analysis of variance technique. The experimental findings on different aspects are integrated and presented in tables along with suitable illustrations.

Growth Parameters Plant height

An important indicator of plant growth was plant height. At different growth stages, the observations on this parameter were recorded. The data on the influence of plant height in different treatments at 30, 45, 60 days after sowing and at maturity stages are highlighted in given table.

It was clear from the data that the plant height was increased greatly with the advancement of the crop growth in all treatments and attends maximum plant height at maturity stage. The plant height was found significant in all treatments at 30 DAS. However, it raised from 10.19 cm in case of T1 control to 11.78cm in case of treatment T5 which was at par with all the treatments.

At 45 DAS the maximum plant height was recorded at T_5 (16.58 cm) which was at same with treatments T6, T8 and T10 whereas minimum plant height was recorded in treatment T1 which is 12.34 cm.

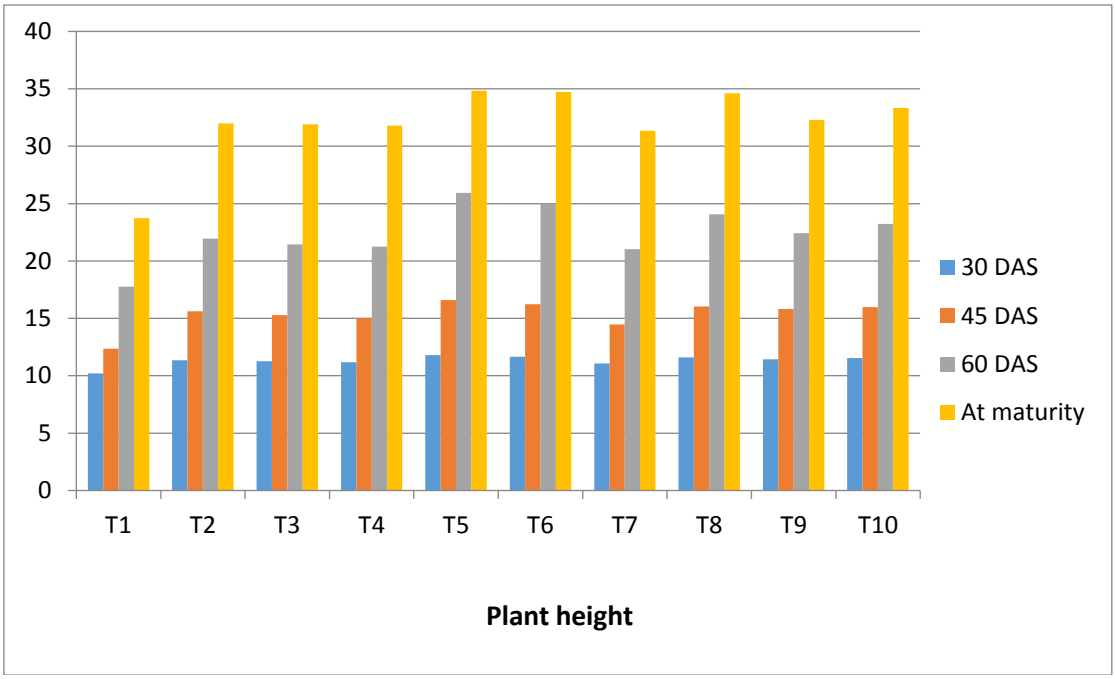
At 60 DAS the maximum plant height was recorded at T5 (25.94 cm) which was at same with treatment T6 whereas minimum plant height was recorded in treatment T1 which is 17.76 cm.

The height of plant was maximum in treatment T5 which was about 34.82 cm at maturity stage which was at par with treatments T6, T8 and T10. The minimum plant height was recorded on treatment T1 Control (23.74 cm).

Height of plant (cm) at different stages of plant growth as influenced by various treatments.

S.No.	Treatments	Plant height (cm)			
		30 DAS	45 DAS	60 DAS	At maturity
T1	Control	10.19	12.34	17.76	23.74
T2	RDF	11.34	15.62	21.96	31.98
T3	FYM	11.26	15.29	21.45	31.90
T4	Vermicompost	11.18	15.01	21.26	31.78
T5	RDF + FYM	11.78	16.58	25.94	34.82
T6	RDF + Vermicompost	11.64	16.24	24.98	34.72

T7	Rhizobium + PSB	11.06	14.46	21.02	31.36
T8	RDF + Rhizobium + PSB	11.60	16.02	24.07	34.62
T9	FYM + Rhizobium + PSB	11.43	15.82	22.42	32.30
T10	Vermicompost+Rhizobium + PSB	11.53	15.98	23.24	33.32
	S.Em ±	0.232	0.249	0.325	0.524
	C.D. at 5%	0.695	0.746	0.972	1.568
	CV	3.559	2.815	2.510	2.830



YIELD ATTRIBUTING PARAMETERS

The data on yield attributing parameters was recorded in each treatment and then statistically computed before presenting the results.

Number of pods per plant

The number of pods per plant was found to deviate significantly due to various fertility treatments as revealed from given table. The pod per plant is a very important yield attributing parameter observed, significantly influenced by various integrated nutrient management treatments. The application of RDF + FYM which was treatment T5 recorded maximum number of pods per plant (86.18). This treatment was found significantly superior than the other treatments. The application of chemical fertilizer alone or in combination with organic manures and bio-fertilizers significantly influenced the number of pods per plant whereas, the minimum number of pods per plant was reported in T1 (40.00)

Number of seeds per pod

The number of seeds per pod was found to influence significant due to different treatments was presented in given table. The effect of various integrated nutrient management treatments were found significant on increasing number of seeds per plant than the control. The maximum number of seeds per plant was recorded in treatment T5 (4.30). It was found significantly superior than all the other treatments except treatments T6 and T8. The combined application of chemical fertilizers with organic manures increased number of seeds per pod

significantly. The minimum number of seeds per plant was recorded in treatment T1 (3.38)

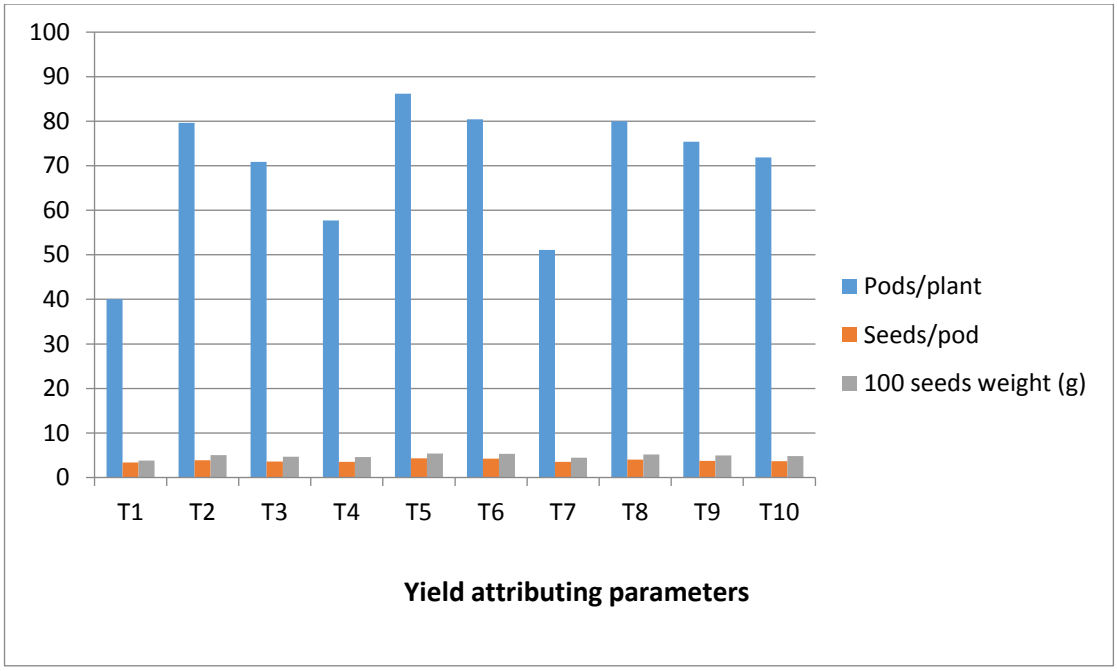
4.2.5 100 seeds weight.

The seed weight of 100 seeds was also deviated significantly due to applied fertility treatments as revealed from data in table.

The result indicated from the data that the 100 seeds weight was significantly influenced by various integrated nutrient management treatments. The maximum weight of 100 seeds (5.40 g) was recorded in treatment T5, this treatment was found significantly superior than all the treatments except treatments T2, T6 and T8. The effect of combination of organic manures and inorganic fertilizers was found significant than control. The minimum weight of 100 seeds was recorded in T1 (3.80).

Yield attributing parameters as influenced by various treatments

S.No.	Treatments	Pods/plant	Seeds/pod	100 seeds weight (g)
T1	Control	40.00	3.38	3.80
T2	RDF	79.64	3.90	5.02
T3	FYM	70.90	3.58	4.68
T4	Vermicompost	57.70	3.55	4.60
T5	RDF + FYM	86.18	4.30	5.40
T6	RDF+Vermicompost	80.44	4.22	5.28
T7	Rhizobium + PSB	51.10	3.48	4.48
T8	RDF + Rhizobium + PSB	79.98	4.05	5.14
T9	FYM + Rhizobium + PSB	75.38	3.74	4.94
T10	Vermicompost+Rhizobium + PSB	71.84	3.65	4.82
	S.Em ±	0.847	0.105	0.147
	C.D. at 5%	2.536	0.315	0.442
	CV	2.117	4.810	5.303



Yield attributes

The factors which are directly responsible for ideal grain production viz. number of pods per plant, number of seeds per pod and test weight were augmented significantly due to increased supply of nutrients from integrated nutrient management treatments having RDF + FYM. This integrated nutrient management treatment was found significantly superior to rest of the treatments except the integrated nutrient management treatment having RDF + vermicompost and RDF + Rhizobium + PSB. Thus the integrated nutrient management treatments RDF + vermicompost and then RDF + Rhizobium + PSB attained the second and third best position, respectively with respect to encouraged yield attributing parameters. The organic sources like FYM or vermicompost are not only the store house of plant nutrients but also improve the physiochemical as well as biological properties of the soil. On the other hand, for the soils applied with only chemical fertilizers are deprived of all these advantages necessary for more production of functioning leaves, greater accumulation of carbohydrates, protein and their translocation to the reproductive organs, which in turn increased the higher number of pods per plant as well as other associated yield attributing parameters. These results on lentil are exactly in accordance to the similar findings obtained by other scientists, **Gendy and Derar (1995), Naphode*et al.* (1997), Tiwari*et al.* (1997), Sayed (1998), Singh *et al.* (1999), Anonymous (2001), Bandhyopadhyay and Puste (2002), Singh *et al.* (2003)** and **Pathak*et al.* (2003).**

Productivity parameters

The combined application of RDF + FYM resulted in significantly higher grain and straw yields of lentil (10.85 and 18.52 q/ha) but was at par with trearment RDF+Vermicompost as compared to those treatments having separate application of nutrients either from RDF or FYM or vermicompost or Rhizobiium + PSB.. The trend of increase in grain and straw yield obtained due to RDF + FYM was exactly in accordance with the similar increases recorded in the yield attributing characters i.e. pods per plant, seeds per pod and 100 grain weight and the increased vegetative growth parameters up to the maximum extent. The increases in yield attributing parameters and consequently the grain yield of lentil as a result of integrated nutrient management have also been reported by many workers. **Gupta and Namdeo (1997), Chandra and Parek (2002), Pathak*et al.* (2003), Rajput and Pandey (2004), Vasanthi and Subramanian (2004),**

Rajput and Kushwah (2005), Meena*et al.* (2006).
The significant increases in straw yield due to various integrated nutrient management treatments RDF + FYM, RDF+ vermicompost and RDF + Rhizobium + PSB, may be mainly due to similar increases in vegetative growth characters viz. plant height and branches particularly only pods per plant as a result of such treatments. The harvest index did change up to significant level due to different fertility treatments. The significant differences in harvest index under these treatments might be because of the proportionately equally higher grain production over its straw.

4. Return

Cost of cultivation

The common cost of cultivation of different treatment combinations were work out, considering all operation from land preparation to harvesting and input used. The treatment cost was calculated separately and it was combined with common cost of cultivation to find out the total cost of cultivation. Data presented in table revealed that the total cost of cultivation was minimum (Rs 24,500 ha^{-1}) under the control. However, the total cost of cultivation was maximum (Rs 35,728 ha^{-1}) was recorded under the application of Vermicompost + Rhizobium + PSB.

Gross return (Rs ha^{-1})

It is evident from the data that among different fertility levels and inoculation of seed with PSB culture minimum gross return was recorded (Rs 38,010 ha^{-1}) under the control treatment. The maximum gross return of (Rs 50,112 ha^{-1}) was recorded under the application of Vermicompost + Rhizobium + PSB.

Net returns (Rs ha^{-1})

The net return was markedly influenced due to different cost incurred and yield (grain & straw) obtained under various treatments. The minimum net return of (Rs 13,510 ha^{-1}) was recorded under control. However, the maximum net return of (Rs 19,047 ha^{-1}) was recorded under the application of RDF + FYM.

Benefit: cost ratio

Data concerned with benefit: cost ratio in lentil as influenced by different fertility levels and inoculation of seed with PSB culture is presented in (Table 4.8). The minimum benefit: cost ratio in lentil (1.40) was recorded under Vermicompost + Rhizobium + PSB. However, the maximum benefit: cost ratio in lentil (1.72) was recorded under the 1application of RDF + FYM.

S.No	Treatments	Cost of cultivation (Rs./ha)	Gross return (Rs./ha)	Net profit (Rs./ha)	B:C ratio
T1	Control	24500	38010	13510	1.55
T2	RDF	25655	39600	13945	1.54
T3	FYM	24900	40600	15700	1.63
T4	Vermicompost	25842	41820	15978	1.62
T5	RDF + FYM	26365	45412	19047	1.72
T6	RDF + Vermicompost	27512	43602	16090	1.58
T7	Rhizobium + PSB	28802	42800	13998	1.49

T8	RDF + Rhizobium + PSB	30622	46480	15858	1.52
T9	FYM +Rhizobium + PSB	34244	49000	14756	1.43
T10	Vermicompost+Rhizobium + PSB	35728	50112	14384	1.40

Net return and benefit: cost ratio from lentil as influenced by various treatments

References

[1]. Anonymous (2002). Effect of phosphorus and Seeds rate on growth and yield of bold seeded Kabuli chick pea

[2]. Aulakh, M.S. and N.S. Pasricha (1979).Phosphorus in soil, crop and fertilizers.Indian Society of Soil Science. 29 (12): 433-438

[3]. Azad, A.S. Gill, A.S. and H.S., Dhaliwal (1991).Response of phosphorus and Rhizobium culture on grain yield of lentil. Lens Newsletter 18 (12): 14-19

[4]. Bahoria, R.B.S., Tamar, R.A.S., Khan, H. and M.K., Sharma (1997).Effect of phosphorus and sulphur on yield and quality of cluster bean (*Cyamopsistetragonoloba*).Indian Journal of Agronomy. 42 (1): 131-134

[5]. Bakker, D.M., Hamilton, G.J., Houlbrooke, D.J., Spann, D. and Burrgel, A.V.(2007). Productivity of crops grown on raised bed on duplex soils prone to water logging in Western Australia. Australia J. Experimental Agriculture. 47(11): 1368-1367

[6]. Bandhyopadhyay S. and Puste A.M. (2002). Effect of integrated nutrient management on productivity and residual soil fertility status under different rice (Oryza sativa)-pulse cropping systems in rained lateritic belt of West Bengal. Indian Journal of Agronomy. 47 (1) 33-40

[7]. Bhoosan B. and Singh V.K. (2004). Effect of planting method, irrigation schedule and weed management practice on the performance of fieldpea. J. Food Legumes 27(2): 112-116

[8]. Bhowmick, M.K., Duary.B.,Biswa P.K.(2015). Integrated weed management in blackgram. Indian J. Weed Science. 47(1): 34-37

[9]. Blackman, V.H. (1919).The compound interest law and plant growth. Ann. Bot. 33:353-356. 52 Chandra R.D. (1991) Influence of different levels of Rhizobium inoculation and phosphorus on nodulation, dry matter production and yield of lentil. Legume Research .14 (3) 145-146

[10]. Bouyocus, G.J. (1962).Direction for making mechanical analysis of soil by hydrometer method.Soil Science. 42: 225-228

[11]. Chandel, A.S. and Saxena, S.C. (2001).Effect of some new post-emergence herbicides on weed parameters and seed yields of soybean. Indian J. Agron 46(2): 332-338

[12]. Chandra,R. and N. Pareek (2002).Effect of inoculation of different strains of Rhizobium leguminosarumBv.vaciae on nodulation and yield of lentil genotypes. Legume Research, 26 (4): 292 - 295.

[13]. Chou beyA .K. Kaushik M.K. and. Singh S.B. (1999).Response of lentil (Lens cullinarismedikus) to phosphorus and zinc sulphate nutrition. Crop Research 17 (3) 309-312

[14]. Dhaker, S.C., Mundra, S.L.M. and Nepalia,V. (2010).Effect of weed management and sulphur nutrition on productivity of soybean. Indian J. Weed Sci. 42(3&4): 232-234

[15]. Dhingra, K.K. Sekhon, H.S. and Sandhu R.S. (1988).Phosphorus Rhizobium interaction studies on biological nitrogen fixation and yield of lentil. Journal of Agri. Science U. K. 11 O (1): 141-144

[16]. Gendy E.N. and Derar R.A. (1995).Effect of number of irrigation and farmyard manure application on lentil. Egyptian Journal of Agricultural Research .73 (4) 889-895

[17]. Gupta, 8 .R. and A.K., Sharma (1992).Interactive effect of Rhizobium and phosphorus on nodulation crop yield and nitrogen fixation in lentil.Field Crop Abstract. 45 (4): 301-302

[18]. Gupta,S.C.and S.L. Namdeo (1997).Effect of Rhizobium and phosphate solubilizing bacteria and FYM on nodulation, grain yield and quality of chickpea .Indian Journal of Pulse Research 10 (2): 171-174

[19]. Harithavardhini, J., Jayalalitha, K., Rani, A. and Krishnaveni (2016).Effectof post emergence herbicides on weed control efficiency, partitioning of drymatter and yield of blackgram. International J. Food, Agril. And Veterinary Sci. 6(2): 39-44

[20]. Hoque, M.S. (1986).Response of lentil to inoculation with Rhizobium /eguminosarus. Lens News Letter. 19 (2): 86

[21]. Idnani, L.K. and Gautam, H.K. (2008).Water economization in summer greengram as influenced by irrigation regimes and land configuration.Indian J. Agril. Sci. 78(3): 214-219

[22]. Jain, R.C. Tiwari R.J. and Nema D.P. (1995).Integrated nutrient management for lentil under rain fed conditions in Madhya Pradesh. Lens Newsletter. 22 (1-2) 13-15

[23]. Jha, B.K., Chandra, R. and Singh, R. (2014). Influence of post emergence hericideson weeds, nodulation and yield of soybean and soil properties. Legume Res. 37(1): 47-54

[24]. Jinger, D., Saxena, R. and Dass, A. (2016).Effect of sequential application of herbicides on weed control indices and productivity of rainy season greengram in north Indian plains.Indian J. Agron. 61(1): 112-114

[25]. Joseph B. and Verma S.C. (1994).Response of rainfed chickpea to Jalshakti incorporation and phosphorus and sulphurfertilization.Indian Journal of Agronomy. 39 (2): 312-314 53

[26]. Kantwa, S.R., Ahlawat, I.P.S. and Gangaiah, B. (2005).Effect of land configuration, post monsoon irrigation and phosphorus on performance of sole and intercropped pigeonpea.Indian J. Agron. 50(4): 278-280

[27]. Kaur, G., Brar, H.S. and Singh, G. (2010). Effect of weed management on weeds, nutrient uptake, nodulation, growth and yield of summer mungbean. Indian J. Weeds Sci. 42(1&2): 114-119

[28]. Krishna Reddy, S.V. and Ahlawat, l.P.S. (2001). Dry matter accumulation and nutrient uptake in lentil (*Lens culinaris*Medikus) in relation to cultivars, phosphorus, Zinc and bio-fertilizers.Research on crops. 2 (1) 21-24

[29]. Kumar Purshottam, Agrawal, J.P. Sood, B.R. and Kumar, P. (1995).Effect of inoculation, nitrogen and phosphorus on lentil (Lens culinaris).Indian Journal of Agronomy. 40 (3) 520-522

[30]. Kumar, A. and Tewari, A.N. (2004).Efficacy of pre and post emergence herbicides in summer blackgram. Indian J. Weed Sci. 36(1&2): 76-78

[31]. Kumar, P. Agrawal, J .P. and Chandra, S .C. (1993).Effect of inoculation, nitrogen and phosphorus on growth and yield of lentil. Lens News Letter. 20 (1) 57-59

[32]. Kumar, P. Agrawal, J.P. Sood, B.R. and Kumar, P. (1995).Effect of inoculation, nitrogen and phosphorus on lentil (*Lens culinaris*medikus).Indian Journal of Agronomy.40 (3) 590- 522.

[33]. Kumar, R .M.,Subbaiah, S.V., Singh , S .P. and Padkmaja , K. (2002).Studies on direct and residual

effect of organic and inoculation cropping system. Extended summaries, Vol. 1: 2nd Intl. Agronomy congress, Nov. 26-30, New Delhi, pp. 50- 51

[34]. Kumar, S., Angiras, N.N. and Singh, R. (2006).Effect of planting and weed control methods on weed growth and seed yield of blackgram. Indian J. Weed Sci. 38(1&2): 73-76

[35]. Kushwah, B .L. (1985).Response of lentil (Lens culinaris) to phosphate, molybdenum and Rhizobium application on yield and yield components at dry land.Indian Journal of Agronomy.30 (2) 154- 157.

[36]. Lal, R.B. Jaiswal, P.C. Kumar, S. (1995).Effect of sulphur on the yield of urd.Allahabad farmer. 50 (4) 367-368

[37]. Mansoori, N., Bhadauria, N. and Rajput, R.L. (2015).Effect of weed control practices on weeds and yield of blackgram.Legume Research. 38(6): 855-857

[38]. Meena, L.K., Singh R.K. and R.C.Houtum, (2006).Effect of moisture conservation practice phosphorus levels and bacterial inoculation on growth, yield and economics of chickpea (*Cicerarietinum* L.). Legume Research, 29 (1): 68- 72. 54

[39]. Mehta, V.R. and Singh, H.G. (1979).Response of green gram to sulphur on calcareous soils.Indian Journal of Argil.Science. 49 (9): 703-706.

[40]. Minhas, R.S. Sharma, P.O. and Jaggi, R.C. (1987).Response of lentil to NPK application in the wet temperate zone of AP. Indian Journal of Agricultural Chemistry. 20 (2) 175-179

[41]. Mishra, S.K. and Tiwari, V.N. (2001) Effect of phosphorus, sulphur, bio-fertilizer on yield, nodulation and quality of pea. Annual Planning of Soil Research. 3 (2): 202-205

[42]. Naphode, P.S. and Wankhade, S.C. (1997). Effect of varying limits of sulphur and molybdenum on the content and uptake of nutrient and yield of mung P.K.V. Res. Journal. 11 (2): 139-143

[43]. Nema, V.P. Singh, S. and Singh, P.P. (1984).Response of lentil to irrigation and fertility levels. Lens Newsletter. 11 (2): 21-23

[44]. Olsen, S.R., Cole, C.V., Watanable, F.S. and Dean, L.A. (1954).Estimation of available phosphorus in soils by extraction with sodium bicarbonate.Cric.USDA. p939

[45]. Pal A.K. (1987).Response of lentil to phosphate, molybdenum and Rhizobium application on yield and yield components at dry land condition.Field Crop Abstract. 40 (10): 757

[46]. Pal, D., Dwivedi, A., Singh, R. and Kumar, K., Singh, A. and Tomar, S.S. (2015).Integrated effect of land configurations and weed management regimes on weed dynamics and performance of urdbean in alluvial soil.Indian J. Science and Technology. 8(11):235-239

[47]. Parminder Singh, Kanwar, J.S. and Kulbir Singh (2007).Response of integrated weed management and planting patterns on seed productivity of pea.Seed Research. 35(2): 164-167

[48]. Pathak, Styajite, Namdeo,K.N.Chakravarti, V.K. and R.K. Tiwari (2003).Effect of bio-fertilizers, diammonium phosphate and zinc sulphate on growth and yield of chickpea .Crop Research, 26 (10): 42 - 46.

[49]. Rajesh Kumar, Khokar and Warsi, A.S. (1987). Fertilizer response studies in grain. Indian Journal of Agronomy. 32 (4): 362-364

[50]. Rajkhowa, D.J., Sakia, M,and K.M., Rajkhowa, (2003).Effect of vermicompost and levels of fertilizer on green gram. Legume Research, 26 (1): 63 - 65.

[51]. Rajput R.L. and R.N. Pandey, (2004).Effect of method of application of bio-fertilizer on yield of pea (Pisiumsativum). Legume Research, 25 (1):75 -76. 55

[52]. Rajput,R.L. and S.S. Kushwah, (2005). Effect of integrated nutrient management on yield of pea

(Pisiumsativum).Legume Research, 28 (3): 231 - 232.

[53]. Ram, H. and Dwivedi, K.N. (1992).Effect of source and levels of sulphur on yield and grain quality of chickpea.Indian Journal of Agronomy. 37 (1): 112-114.

[54]. Raskar, B.S. and Bhai, P.G. (2002).Bio-efficacy and phytotoxicity of pursuit plus herbicides against weeds in soybean. India J. Weed Sci. 34(1&2): 50-52

[55]. Rathore, R.S. Khandwe, R. Khandwe, N., and Singh P.P. (1992).Effect of irrigation schedules phosphorus level and phosphorus solubilizing bacteria on lentil. Lens Newsletter 19 (1) 17-19

[56]. Saber, M.S.M. and Kabesh, M.O. (1990).A comparative study on the effect of bio-fertilization of sulphur application on yield and nutrient uptake by lentil plants.Egyptian Journal Soil Science. 30 (3): 415-422

[57]. Sayed, E. I. (1998). Influence of bio-fertilization with Rhizobium and phosphate solubilizing bacteria on nutrient uptake and yield of lentil. Egyptian Journal of Microbiology. 33 (1) 61-71

[58]. Sayed, E.I. (1999). Influence of Rhizobium and phosphate solubilizing bacteria on nutrient uptake and yield of lentil in New Valley. Egyptian Journal of Soil science. 39 (2) 175-186

[59]. Sekhon, H.S., Kaul, J.N. and Sandhu, P.S. (1983).Effect of phosphorus fertilization on yield and nodulation lentil. Lens Newsletter. 10 (1): 25-27

[60]. Sekhon, H.S.,Dhingra, K.K. , Sandhu, P.S. and Bhandari, S.C. (1986).Effect of time of sowing, phosphorus and herbicide on the response to Rhizobium inoculation. Lens Newsletter. 13 (1): 11- 15

[61]. Sharma, A.K., Billore, S.D. and Singh, R.P. (1993). Integrated nutrient management for lentil under rainfed condition. Lens News/after. 20 (2): 15-16 56

[62]. Sharma, R.A. (1997).Influence of conjunctives use of organic and fertilizer nutrient on nutrient uptake and productivity of soybean.Safflower cropping sequence in tropic chromasterts.Crop Research. 13 (2): 321-325

[63]. Sharma,A.K.,Singh R.P. Gwal,H.B.and M.D. Vyas , (1992). Studies on nutrients response in lentil under rainfedcondition . Indian Journal of Pulse Research, 5 (1): 31 - 32.

[64]. Singh Bhopal, Singh, C.M., Bhargava M, Sood, R.D. and Singh, B. (1991). Effect of NPK fertilizers in cultivars field on rained lentil. Indian Journal of Pulse Research. 4 (1) 105 - 106

[65]. Singh G.B and Yadav D.V. (1992). Integrated nutrient supply system in sugarcane and sugarcane based cropping system. Fertilizer News (37): 15-22

[66]. Singh N.P. and Saxena, M.C. (1986).Response of lentil to phosphorus and zinc application. Lens Newsletter .13 (2) 27- 28

[67]. Singh, 0.8., Sharma, H.B. and Singh V.K. (1999). Effect of nitrogen, phosphorus and Rhizobium culture on yield and yield attributes of lentil under dry land conditions. Indian Journal of Pulse Research. 12 (2) 260-262

[68]. Singh, 8 .and Kumar, V. (1996).Effect of phosphorus and sulphur on lentil under rainfed condition.Indian Journal of Agronomy. 41 (3): 420-423

[69]. Singh, M. and Singh, R.P. (2010).Influence of crop establishment methods and weed management practices on yield and economics of direct seeded rice. Indian J. Agronomy. 55: 224-229

[70]. Singh, M. and Singh, V. (1994).Effect of phosphorus and sulphur on growth and yield of lentil.Legume Research. 17 (2): 119-112

[71]. Singh, O.N., Sharma, M. and Dash, R. (2003).Effect of seed rate phosphorus and FYM application on growth and yield of bold seeded lentil.Indian Journal of Pulse Research.16 (2) 116- 118 57

phosphorus and potassium in western Uttar Pradesh.Indian Journal of Agronomy. 39 (4) 688---689

[72]. Sinha, R.B. and Sakal, R. (1993). Effect of pyrite and organic manure on sulphur nutrition of Crops in calcareous. Indian Society of Soil Science. 41 (2): 312-315

[73]. Subbiah, B.V. and Asija, G.L. (1956).A rapid procedure for the determination of available nitrogen in the soils.Curr. Sci. 25: 259-260

[74]. Tiwari, A. , Sharma, S.K., Shrivastava, S.P. and Tombhare, B.R. (1997). Study as plant physiological growth parameter and yield as soybean under the influence of manure on fertilizer. Advances of Plant Science. 10 (1): 149-152

[75]. Tiwari, A. Sharma, S.K., Shriwastava, S.P. and Tombhare, B.R. (1997). Study as plant physiological growth parameters and yield as soybean under the influence of manures and fertilizer. Advances Plant Science. 10 (1) 149-152

[76]. Tomar, S.S., Dwivedi, A., Singh, A. and Singh, M.K. (2016).Effect of land configuration, nutritional management module and bio-fertilizer application on performance, productivity and profitability of urdbean in North-Western India. Legume Res. 39(5): 741-747

[77]. Vasanthi, D. and Subramanian S., (2004).Effect of vermicompost on nutrient uptake and protein content in black gram (*Cicerarietinum*). Legume Research 27 (4): 293 -295.

[78]. Veeraputhiran, R. and Chinnusamy, C. (2008).Performance of time and dose of post emergence herbicide application on relay crppedblackgram. Indian J. Weed Sci. 40(3&4): 173-175

[79]. Vivek, Tomar, S.S. and Singh, V. (2016).Performance of herbicides in blackgram. 16(2): 245-247

[80]. Walkley, A.J. and Black, I.A. (1934).An experiment of the Degtjareff method for determining soil organic matter and a proposed modification of the chromic acid titration. Soil Sci. 37: 29-38.

[81]. Watson, D.J. (1952).The physiological basis variation in yield. Advance Agron. 4:101-145.

[82]. Yakadri, M., Ramesh T. and Latchanna, A. (2004). Dry matter production and nutrient uptake of mungbean [*Vigna radiata* L) as influenced by nitrogen and phosphorus application during wet season. *Legume. Res.*27(1):58-61.