Journal Homepage: -www.journalijar.com
INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)
Article DOI:10.21474/IJAR01/5575
DOI URL: http://dx.doi.org/10.21474/IJAR01/5575

RESEARCH ARTICLE

ASSESSMENT OF WATER SOLUBLE FERTILIZER NPK (18:18:18) FOR INCREASING PRODUCTIVITY OF LENTIL UNDER RAINFED CONDITION IN SULTANPUR.

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Manuscript Info

Manuscript History

Received: 09 August 2017
Final Accepted: 11 September 2017
Published: October 2017

Key words:-
Water soluble fertilizer, Productivity, Rain fed, NPK (18:18:18)

Abstract

Field experiments were conducted at krishiVigyan Kendra, Sultanpur, Uttar Pradesh during rabi seasons of 2015-16 and 2016-17 to study the effect of spray of water soluble fertilizer NPK (18:18:18) on BC Ratio and yield of lentil crop. Pulses are mostly grown by the farmers without any fertilizer application, as positive effect of supplying legume plants with supplementary nitrogen was found to have beneficial effect on enhancing growth and increasing seed yield. Significantly higher seed yield of pulses were recorded with application of Basal application of DAP @ 40kg./ha + Two spray of NPK (18:18:18) at 40 & 60 days spray over basal dose of fertilizer application The lowest seed yield was recorded with no spray of NPK (18:18:18). Among the fertilizer spray treatments irrespective of basal dose of fertilizer foliar application of NPK (18:18:18) was significantly better than all other treatments. Timing of fertilizer application also affected different yield components. Multiple application of both soil and foliar application of NPK gave better results as compared to single application of NPK.

Introduction:-

In India, pulses are mostly cultivated on marginal soils under rainfed situations with minimum external nutrient input. Farmers often fail to apply essential nutrients. Among the modern agro management practices sowing method and fertilizer application are imperative for boosting the growth and production of lentil especially under rainfed conditions. Considerable work has been reported on these aspects but efforts are still required to improve these techniques for getting maximum yield.

Nitrogen (N) is a vital plant nutrient and a major determining factor required for production. It is very essential for plant growth and makes up 1–4% of dry matter of the plants. Nitrogen is a component of protein and nucleic acids and when N is suboptimal; growth is reduced. Its availability in sufficient quantity throughout the growing season is essential for optimum lentil growth. It is also a characteristic constituent element of proteins and also an integral component of many other compounds essential for plant growth processes including chlorophyll and many enzymes. It also mediates the utilization of phosphorus, potassium, and other elements in plants. Optimal amount of these elements in the soil cannot be utilized efficiently if nitrogen is deficient in plants. Therefore, nitrogen deficiency or excess can result in reducing lentil yields.

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Phosphorus is another essential nutrient required to increase lentil yield. Phosphorus plays an important part in many physiological processes that occur within a developing and maturing plant. It is involved in enzymatic reactions in the plant. Phosphorus is an essential factor for cell division because it is a constituent element of nucleoproteins which are involved in the cell reproduction processes. It is also a component of a chemical essential to the reactions of carbohydrate synthesis and degradation. It is important for seed and fruit formation and crop maturation. Phosphorus hastens the ripening of fruits thus counteracting the effect of excess nitrogen application to the soil. It helps to strengthen the skeletal structure of the plant thereby preventing lodging. It also affects the quality of the grains and it may increase the plant resistance to diseases.

Potassium plays essential roles in enzyme activation, protein synthesis, photosynthesis, osmo regulation, stomatal movement, energy transfer, phloem transport, cation-anion balance, and stress resistance. A major limitation for plant growth and crop production under rainfed condition is soil water availability. Plants that are continuously exposed to drought stress can form reactive oxygen species (ROS), which leads to leaf damage and, ultimately, decreases crop yield. During drought stress, root growth and the rates of K^+ diffusion in the soil towards the roots are both restricted. Maintaining adequate plant K is, therefore, critical for plant drought resistance. A close relationship between K nutritional status and plant drought resistance has been demonstrated. Keeping in view the above review, the present study was undertaken to determine the effect of water soluble Fertilizer NPK (18:18:18) for increasing Productivity of Lentil under rainfed condition on BC ratio, yield, and yield attributes of rainfed lentil.

Material and Methods:-

An on-farm field experiment, conducted to assess the effect of balanced fertilization on the performance of lentil crop in rainfed condition in Sultanpur district of Uttar Pradesh. The investigation was conducted during rabi of 2016 and 2017 at KrishiVigyan Kendra, Sultanpur, UP. The experiment was laid out in a randomized block design with combination of 3 fertility levels (T1 Farmer practice (Basal dose of DAP @ 40 kg/ha), T2 Basal application of DAP @ 40 kg/ha + one spray of NPK (18:18:18) and T3 Basal application of DAP @ 40 kg/ha + two spray of NPK (18:18:18) 40 & 60 days after sowing) with three replications.

Full dose of Basal dose of DAP @ 40kg. /ha was band placed as per the treatment just before sowing of seed. The Foliar spray of NPK (18:18:18) was sprayed in one equal splits at 40 days. The Foliar spray of NPK (18:18:18) was sprayed in two equal splits at 40 & 60 days, respectively. BC Ratio and Yield were recorded from each plot. The same procedure was followed for both the years. For recording of data on yield attributes Yield and test weight from each plot was used.

Result Discussion:-

Data Table 1 indicates that the plant height at different stages of growth showed significant increase with fertility level up to Basal dose of DAP @ 40kg. /ha compared to basal application of DAP @ 40kg. /ha + one spraying of NPK (18:18:18) at 40 days and the fertility level Basal application of DAP @ 40kg. /ha + two spraying of NPK (18:18:18) at 40 & 60 days. This could be attributed to a mere fact that higher rates of nitrogen may have caused rapid cell division and elongation. Sarwargaonkar et al. reported significant increase in the plant height of lentil with 100% recommended fertilizer dose (RFD) compared to 75% RFD. Increase in level of fertility from Basal application of DAP @ 40kg./ha +Two spraying of NPK (18:18:18) at 40 & 60 days to Basal application of DAP @ 40kg./ha +one spraying of NPK (18:18:18) at 40 days significantly improved leaf area index at different crop growth stages. Shivay and Singh also found improvement in leaf area index with increasing levels of nitrogen.

Table 1:- Different growth parameters of lentil in response to test treatments.

Particular	Av. Plant height (cm)	Av. Test weight (gm)	Av. pod weight per plant (gm/plant)	Av. No. of seeds/pod
Basal application of DAP @ 40kg./ha +one spraying of NPK (18:18:18) at 40 days	**42**	**16.5**	**6.15**	**1-2**
Basal application of DAP @ 40kg./ha +Two spraying of NPK (18:18:18) at 40 & 60 days	**44**	**16.2**	**6.24**	**1-2**
	43	**16.35**	**6.2**	**1-2**

During the study it was found thatAv. Plant height 43 cm, grains per pod 1-2, Av. pod weight per plant 6.2gm/plant, Av. Test weight (gm) 16.35 gmwere recorded during observation. The promotive effect of NPK (18:18:18) on grain yield and its components has also been reported by Rasheed et al. and Khan et al.

Table 2:- Economical analysis of lentil crop.

Technology	Av. Yield (q/ha.)	Av. Net Return (Rs./ha)	Av. Increased in yield %	B:C Ratio
Farmer practice (Basal dose of DAP @ 40kg./ha)	14.60	59,340	-	1:3.83
Basal application of DAP @ 40kg./ha +one spraying of NPK (18:18:18) at 40 days after sowing	18.83	81,605	28.97	1:4.70
Basal application of DAP @ 40kg./ha +Two spraying of NPK (18:18:18) at 40 & 60 days after sowing	19.90	87,490	36.30	1:4.98

The yield recorded was significantly higher than Basal application of DAP @ 40kg. /ha + two spraying of NPK (18:18:18) at 40 & 60 days 36.30 % (19.90q./ha) as compared to Basal application of DAP @ 40kg. /ha + one spraying of NPK (18:18:18) at 40 days 28.97 % (18.83 q./ha) in comparison to farmers practice. Av. Net return were Rs. 87,490 in Basal application of DAP @ 40kg. /ha +Two spraying of NPK (18:18:18) at 40 & 60 days, followed by Rs.81, 605 in treatment plots. The B: C Ratio recorded was significantly higher than Basal application of DAP @ 40kg. /ha + two spraying of NPK (18:18:18) at 40 & 60 days 1:4.98, followed by as Basal application of DAP @ 40kg. /ha + one spraying of NPK (18:18:18) at 40 days 1:4.70 in comparison to farmers practice.

Conclusion:-

It is concluded that the appropriate nutrient management practices to enhance the lentil productivity. The assessed practice of water soluble fertilizer NPK (18:18:18) was found to be better with 28.97 & 36.30% increase in yield. The lentil crop had realized a net return of Rs. 81605 & 87490/ha as compared to the farmer practice with net returns of Rs. 59,340/ha (37.52 & 47.44% increase in net return per ha.) Soil application of fertilizers combined with foliar application, marginally improved yield in lentil. Thus to enhance food production and elevating the nutritional aspects of lentil, such green agricultural practice be adopted. However, further research work needs to be undertaken to clarify the role foliar application and nutritional aspects of ancient lentil.

References:-

1. Y. S. Shivay and R. P. Singh, “Growth, yield attributes, yields and nitrogen uptake of maize (Zea mays) as influenced by cropping systems and nitrogen levels,” Annals of Agricultural Research, vol. 21, no. 4, pp. 494–498, 2000. View at Google Scholar
2. G. L. Sarwargaonkar, D. K. Shelke, S. A. Shinde, and S. Kshirsagar, “Performance of Kharif maize based legume intercropping system under different fertilizer doses,” International Journal of Agricultural Sciences, vol. 4, no. 1, pp. 152–155, 2008. View at Google Scholar
3. M. Rasheed, A. Hussain, and T. Mahmood, “Growth analysis of hybrid maize as influenced by planting techniques and nutrient management,” International Journal of Agricultural Biology, vol. 5, no. 2, pp. 169–171, 2003. View at Google Scholar
4. A. Ghaffar, N. Akbar, S. H. Khan et al., “Effect of trench spacing and micronutrients on growth and yield of sugarcane (Saccharumofficinarum L.),” Australian Journal of Crop Science, vol. 6, no. 1, pp. 1–9, 2012. View at Google Scholar · View at Scopus.