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RESPONSE OF LENTIL (*Lens culinaris*) TO DIFFERENT SYSTEM OF PLANTING AND ORGANIC FOLIAR APPLICATION

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ABSTRACT

An experiment was conducted during Rabi season 2010-20111 to evaluate the effect of planting system and different organic foliar application on yield component of Lentil (Lens culinaris), Was carried out at the crop research farm, Department of Agronomy, Allahabad school of Agriculture, Sam Higginbottom Institute of Agriculture, Technology and Sciences, which is located at 25° 24' 42" N latitude, 81° 50' 56" E longitude and 98 m altitude above the mean sea level. Experiment was laid out in a Factorial Randomized Block Design (3x2x3) consisting of 18 treatments replicated thrice. Observations were recorded on plant growth, yield and their attributing parameters. In general, best results were recorded from treatment T_{15} (Planting in Ridge and furrow bed + FYM + foliar spray of panchgavya + Fish amino acid).

Key words : *Planting system, organic manure, FYM, organic foliar spray, panchgavya, fish amino acid.*

Pulse crops belong to the family leguminosae and subfamilies Papilionoideae, Caesalpinoideae and Minosoideae. The roots of many species contain nodules, which are habitat of bacteria capable of fixing atmospheric nitrogen.

Lentil (*Lens culinaries*) is the fourth most important pulse crop of the world after beans, pea and chickpea. The cultivated lentil is supposed to have originated in centreal Asia (India, Pakistan, USSR). Two types of lentils are none: Macrosperma (masur or malkamasur) with large flat pods and large seeds (6.9 mm dia) found in Mediterranean, Africa and central Asia and Microsperma (masuri) with small convex pods and small seed (3-6 mm dia), chiefly found in India, Pakistan and South and West Asia (1).

Lentil is one of the most important leguminous crop grown in Egypt Seeds contain 28.6% protein, 63.1% carbohydrate, 3.1% ash, 0.45% phosphorus, 1.16 % potassium,10.0% magnesium and 0.07% calcium, science lentil plants grow do well in sandy soils which are valuable for future expansion, great attention should be taken with respect to nutritional status of these soil (2).

Organic farming in recent years is gaining impetus due to realization of inherent advantages it confers in sustaining crop production and also in maintaining dynamic soil nutrient status and safe environment Farmyard manure, compost, vermicompost, green manuring, agro-wastes and plant wastes from sources both for sustainability of soil organic carbon and supply of plant nutrients in traditional organic farming. In the existing technology of organic farming where FYM and compost are used as sources of nutrient supply, productivity of soils depletes during the transitory period (until fertility, structure and microbial activity of the soil had been restored) leading to low yield levels in initial years of cultivation (3).

Planting system is considered an important aspect of advanced production technology which not only ensures better crop establishment but also results in water saving when the crop in sown on ridges or beds (4). Ridges and furrows have several advantages like reduced contact area of water on land surface thereby reducing crusting of soil and evaporation losses. Suitable land configurations help in enhancing the time of concentration, absorption and storage of water, thus useful for the crops. Moreover this method also favors optimum availability of soil moisture with uniform flow of water and reduced weed competition as compared to check basins. Thus ridges and furrows method provides an environment favorable for maximizing crop yield, and also increasing water use efficiency (5).

MATERIALS AND METHODS

A field experiment entitled, "Response of lentil *(Lens culinaris)* to different system of planting and organic foliar application" was laid out during the third week of November to third week of March in 2010 at the Crop

Table-1 : Interaction effect of different planting systems, organic manures and organic foliar application on growth parameters of lentil at 80 DAS.

Treatment combinations	Plant height (cm)	Plant dry weight (g)	No. of pods/ plant	No. of seeds/ pod	Test weight (g)	Seed yield (q/ha)	Stover yield (q/ha)	Gross return (₹)	Net return (₹)	B : C
T_1 ($P_1M_1F_1$)	20.55	0.80	249.53	18.07	29.65	15.20	20.47	72960	37758.14	1.07
T_2 ($P_1M_1F_2$)	22.83	1.22	237.67	17.20	29.88	14.38	23.62	69024	40471.44	1.41
T_3 ($P_1M_1F_3$)	23.57	1.19	277.13	17.93	28.09	17.62	32.38	84576	52698.79	1.65
T_4 ($P_1M_2F_1$)	20.56	1.25	215.07	18.47	33.68	13.59	21.40	65232	28074.14	0.75
T_5 ($P_1M_2F_2$)	22.78	1.21	254.47	17.80	31.69	14.13	21.70	67824	37315.44	1.22
T_6 ($P_1M_2F_3$)	25.29	1.38	244.47	17.67	30.68	15.92	27.92	76416	42582.79	1.25
T_7 ($P_2M_1F_1$)	21.41	1.12	182.53	16.87	31.36	11.58	15.92	55584	20382.14	0.57
T_8 ($P_2M_1F_2$)	22.35	1.14	168.47	17.53	29.76	10.63	16.87	51024	22471.44	0.78
T_9 ($P_2M_1F_3$)	19.99	1.35	197.73	17.27	29.75	12.25	25.92	58800	26922.79	0.84
T_{10} ($P_2M_2F_1$)	25.91	1.25	293.13	18.00	27.49	18.62	25.88	89376	52218.14	1.40
T_{11} ($P_2M_2F_2$)	24.85	1.65	304.47	17.87	30.56	17.00	25.50	81600	51091.44	1.67
T_{12} ($P_2M_2F_3$)	23.81	1.36	248.87	16.93	30.10	16.08	26.42	77184	43350.79	1.28
T_{13} ($P_3M_1F_1$)	22.25	1.05	231.93	17.13	32.58	15.08	25.92	72384	37182.14	1.05
T_{14} ($P_3M_1F_2$)	20.57	1.40	267.87	17.87	27.66	17.47	29.03	83856	55303.44	1.93
T_{15} ($P_3M_1F_3$)	24.09	1.36	315.33	19.07	31.60	22.75	33.75	109200	77322.79	2.42
T_{16} ($P_3M_2F_1$)	21.44	0.92	207.20	17.93	31.05	13.17	21.17	63216	26058.14	0.70
T_{17} ($P_3M_2F_2$)	23.04	1.49	269.73	17.20	29.89	15.70	26.80	75360	44851.44	1.47
T_{18} ($P_3M_2F_3$)	24.32	1.19	290.47	17.13	29.10	19.60	26.23	94080	60246.79	1.78
Interaction (P x M x F)	F - test	S	S	NS	S	NS	NS	S	-	-
	S. Ed.(±)	0.46	0.01	53.64	0.26	2.03	0.98	1.09	-	-
	C.D. at 5%	0.94	0.02	108.99	0.54	4.13	1.99	2.22	-	-

Research Farm (CRF), Department of Agronomy, SHIATS, Allahabad. The area is situated at south of Allahabad on the right side of Yamuna river at Rewa Road 5 km away from Allahabad city. The soil of the experimental field was sandy loam, Available Nitrogen 225 kg/ha, Available Phosphorus 21.50 kg/ha, Available Potassium 87.00 kg/ha, Soil pH 7.4. Lentil 'DPL 62' was shown on 4th November in the respective years. There were three irrigations given according to the requirements of crop, and three times weeding were applied during the season of crop. The treatments compressions were made using f-test at 5% levels of significance, which are: The economic was calculated on the basis of prevailing market price of lentil and local cost of inputs. The design applied for statistical analysis was carried out with 3×2×3 factorial randomized block design having three factors, with three types of planting system Flat bed, Ridge and furrow bed and Raised bed, and two types of organic manures FYM(5 tonne/ha), and Neem cake (0.47/ha), and three types of organic foliar spray Panchgavya (6 %), Fish amino acid (5%), and combined foliar spray (Panchgavya 3% + Fish amino acid 2.5%), respectively, treatments were; T_1 = Fb + FYM + P, T_2 = Fb + FYM + Faa, T_3 = Fb + FYM + (P + Faa), T_4 = Fb + Nc + P, T_5 = Fb + Nc + Faa, T_6 = Fb + Nc + (P + Faa), T_7 = Rb + FYM + P, T_8 = Rb + FYM +Faa, T_9 = Rb + FYM + (P + Faa), T_{10} = Rb +Nc + P, T_{11}= Rb + Nc + Faa, T_{12} = Rb + Nc + (P + Faa), T_{13} = R & F + FYM + P, T_{14} = R & F + FYM + Faa, T_{15} = R & F + FYM + (P + Faa), T_{16} = R & F + Nc + P, T_{17} = R & F + Nc + Faa, T_{18} = R & F + Nc + (P + Faa) and the treatments were replicated thrice. Treatment was applied in respective plots according to treatment allocation. Seeds was sown with a spacing of 30× 10 cm in all the plots.

RESULTS AND DISCUSSION

The results showed in the Table-1 Pre-harvest data; The maximum plant height (28.52 cm) was recorded under the treatment T_{10} (Planting in raised bed + neem cake + foliar spray of panchgavya). Number of leaves (247.07) was maximum under the treatment T_{18} (Planting in Ridge and furrow bed + neem cake + combined foliar spray of Fish amino acid + panchgavya) and maximum plant dry weight (2.44 g) was in treatment T_{11} (Planting in raised bed + neem cake + foliar spray of Fish amino acid). Post-harvest data**;** Amongst the yield parameters the highest

number of pods (78.73) per plant, numbers of grains (1.91) per pod, seed yield (22.75 q/ha) and Stover yield (33.75 q/ha) was recorded in the treatment T_{15} (Planting in Ridge and furrow bed + FYM + foliar spray of Fish amino acid + panchgavya) and highest 1000 seeds weight was recorded (33.68) under the treatment T_4 (Planting in flat bed + neem cake + foliar spray of panchgavya). Highest net profit (77322.79 Rs/ha) and benefit cost ratio (2.42) was also realized with the treatment T_{15} (Planting in Ridge and furrow bed + FYM + foliar spray of Fish amino acid + panchgavya).

Planting system is considered an important aspect of advanced production technology which not only ensures better crop establishment but also results in water saving when the crop in sown on ridges or beds (4).

Ridges and furrows have several advantages like reduced contact area of water on land surface thereby reducing crusting of soil and evaporation loses. Moreover this method also fervors optimum availability of soil moisture with uniform flow of water and reduced weed competition as compared to check basins. Also the loose and porous heap under ridges and furrows was found to provide better aeration, microbial activity and drainage which gave increased individual plant yield and per hectare yield as compared to other methods. Influence of planting systems on physiological parameters, like leaf area index, lead area duration and dry matter production and yield of chickpea was studied and they reported that ridges and furrows system yielded better results than flat beds (5).

Where, P_1-Planting in flat bed, P2-Planting in raised bed, P_3-Planting in ridge and furrow bed, M_1-FYM, M_2-Neem cake, F_1-Foliar spray of panchgavya (6%), F_2-Foliar spray of fish amino acid (5%), F_3-Combined foliar spray of panchgavya (3%) + fish amino acid (2.5%).

Planting system is considered an important aspect of advanced production technology which not only ensures better crop establishment but also results in water saving when the crop in sown on ridges or beds (4).

Foliar application is regarded as a preferred solution when the quick supply of nutrients is hindered or the soil conditions are not conducive for the absorption of nutrients. The nature of soil plays a very vital role in the availability of Mn, Cu, Zn, and Fe, which are precipitated in insoluble form in alkaline soils. Most of the absorption by the young leaf takes place through the cuti*c*le and hairs (trichomes) while some absorption might take place through stomata (4).

CONCLUSION

Based on highest productivity and based on economic analysis treatment combination T_{15} (Planting in Ridge and furrow bed + FYM 5 tone/ha + organic foliar spray of Fish amino acid 2.5% + panchgavya 3%) were found to be most acceptable treatments with three combination factor planting system, organic manure and organic foliar spray. Since the findings are based on experiment conducted only for one year (2010-2011), it may be repeated to confirm the results.

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