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Study the effect of nitrogen, phosphorus and bio-fertilizer vermicompost on yield and yield components of lentil in autumn and spring sowing in rain fed conditions of Khorramabad,Iran

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ABSTRACT

In order to study the effects of phosphorous, nitrogen chemical fertilizers and biofertilizer vermicompost on seed yield and yield components (Kimia CV.) in the dry land conditions an experiment was conducted at khoramabad city in 2011-2012. The experiment design was factorial experiment in the base of randomized complete blocks design with four replication . the factors were season planting (Autumn and spring)and fertilizer (V1 = Non use fertilizer) , (V2 = 24 hg/ha phosphate ammonium) , (V3 = biofertilizer vermicompost 3636 kg/ha) and (V4 = phosphate ammonium 24 kg/ha + vermicompost 3636 kg/ha) . Analysis of variance showed that the effect of the growing season on yield and yield components was significant at the one percent level. Fertilization effect and interaction of planting season and fertilizing on any of these traits was not significant. Result showed that the highest seed yield was obtained through autumn planting and season planting were significant on yield components. There was positive and significant correlation between seed yield with yield components.

Keyword: dry lentil, season planting, ammonium phosphate, vermicompost, seed yield, yield components.

INTRODUCTION

Lentil (Lens culinaris Med) is the world's most important crops in the area under cultivation of lentil have more than 4 million hectares with a production of 4 million tons [3]. Various agricultural products and their effect on human health and the environment have led to the use of inputs and production methods are of particular interest [4]. Thus, for have a system of sustainable agriculture use of inputs that maintain of ecological aspects such as fertilizers and biological that reduce environmental risks is essential [5]. In addition, one of the ways to increase yield is to change the planting season and the introduction of improved cultivars. The aim of this study was to investigate the effects of biological and chemical fertilizers, and the planting season on yield and yield components and the use of appropriate alternative to chemical fertilizers to achieve sustainable agriculture.

MATERIALS AND METHODS

This experiment was conducted in the city of Khorramabad in crop year of 2011-12. Khorramabad is a city with latitude 33 degrees and 29 minutes North and longitude 48 degrees and 21 minutes east, and with a height of 1200 meters above sea level. Factors studied were: a) chemical and biological fertilizers on four levels includes V1 = control (no fertilizer), V2 = fertilizer (24 kg/ha), V3 = vermicompost (3636 kg/ha), V4 = vermicompost and

chemical fertilizer ammonium phosphate (660.3 kg/ha). B), planting season includes T1 =fall planting, T2 = spring planting. Size of each plot was 4 × 1.25 m and distance between rows was 25 cm. The amount of nitrogen and phosphate with rate 24 kg per hectare in shape of ammonium phosphate and vermicompost (3636 kg/ha) was added to the researchers recommend. Seeds were planting in the fall to a depth of 7 cm and then 200 seeds were planted per square meter. Kimia CV. was resistant from fusarium disease. In order to evaluation of treats sampling were done with quadrate with size of 25 × 0.5 and 4 lines in meddle of plot were considered for evaluation of seed yield. Analyses were performed with a personal computer using the MSTATC and SAS software and for design the diagrams used the EXCEL software. In addition the Duncan's Multiple Range Test (DMRT) (P = 0.05) was used to conduct mean comparison of treatments and find significant differences among means.

Table1: Soil characteristics of the experimental site in Korramabad, Iran

Soli particle (%)			Lime	EC	K(ppm)	P(%)	C(%)
sand	silt	clay					
12	50	38	42.2	0.58	340	8.2	1.03
Texture			PH Ppm	Cu Ppm	Zn Ppm	Mn Ppm	Fe Ppm
silt clay loam			7.65	1.25	0.5	2.7	3.7

RESULTS AND DISCUSSION

Seed yield

The effect of planting season on seed yield showed significant effect and the highest yield (871.667 kg/ha) was obtained from winter planting season (Table 1).In the fall planting crops duration the vegetative growth and biomass production increases. Reproductive organ of crop moisture in the conditions that moisture is suitable cause increasing in seed yield (7). Simple effects of the biological and chemical fertilizer and interaction between the planting season and fertilization on seed yield showed no significant effect.

Number of Pods per square meter

The effect of planting season on Number of Pods per square meter showed significant effect and the highest Number of Pods (1104.750 plants per m²) was obtained from winter planting season (table 1). Fall or winter planting due to appropriate environmental conditions in terms of humidity and temperature will lead to higher productivity and consequently the number of flowers and formed more pods (1).Simple effects of biological and chemical fertilizer and interaction between the planting season and fertilization on pods was no significant difference. According to the studies, number of pods per plant had significant positive correlation with seed yield.

Number of single seedpods

Effect of planting season on one seed pod showed significant effect and the highest number of seed pods (834.500 plants per m^2) was obtained from the autumn sowing (Table 1) One of the reasons that affect a seed pod loss in diet low in irrigated or rain fed, reducing in pollination period and thus reducing in number of pods(6). Simple effect of chemical and biological fertilizer and interaction between season of sowing and fertilization on single seedpods did not have significant effect. According to studies, the single seedpod had significant positive correlation with seed yield.

Number of two seedpods

Effect of planting season on two seedpods showed a significant effect and the highest number two seedpods (125.500 plants per m^2) was obtained from the autumn sowing (Table 1). Available water in winter sowing causes increasing plant canopy and then plant is absorbing more radiation and energy leading to increased seed yield components like number of two seedpods. Simple effect of chemical and biological fertilizer and interaction between season of sowing and fertilization on two seedpods was no significant difference. According to studies, seedpods had significant positive correlation with seed yield.

Number of hollow pods

Effect of planting season on hollow pods showed significant effect and the highest number of hollow pods (144.750 plants per m^2) was obtained from the autumn sowing (Table 1). During the growing season for filling the seeds and water availability before flowering had positive related with seeds growing inside the pods. If stress occurs during grain filling and grain growth during was short, stop growth growing. Simple effect of chemical and biological

fertilizer and interaction between season of sowing and fertilization had significant effect on hollow pods. According to studies, hollow pods had significant positive correlation with seed yield.

Number of fertile pods

Effect of planting season on the number of fertile pods showed significant effect and the highest number of fertile pods (960 plants per m^2) was obtained from the autumn sowing (Table 1). Suitable cultivation causes development of leaf area and absorbs more light, in result photosynthesis increase and more photosynthetic material for fertilization and development of pods can provide and ultimately causes pods to be fertile. Simple effect of chemical and biological fertilizer and interaction between season of sowing and fertilization on fertile pod number was not significant different. According to studies, fertile pods had significant positive correlation with seed yield.

Hundred seed weight

The planting season on seed weight was not significant different. However, the highest 100 seed weight (5.125 g) was obtained from the autumn planting season (Table 1). Hundred seed weight is a genetic trait and is partly influenced by the environment and probability it causes the lack of non-significant in 100 seed weight. Simple effect of chemical and biological fertilizer and interaction between season of sowing and fertilization on 100 seed weight had no significant difference (Fig1). According to studies, 100 seed weight had positive correlation but no significant effect with seed yield.

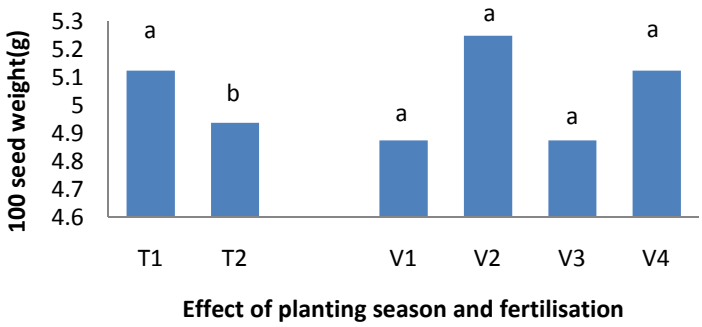

Figure 1- Effect of planting season and fertilization on 100 seed weight

Table 2 - Analysis of variance between traits measured

S.O.V	df	Seed yield	Number of Pods	Number of single seedpods	Number of two seedpods	Number of hollow pods	Number of fertile pods	Hundred seed weight
Replication	3	46743^{*}	3798.8^{ns}	4078.6^{ns}	1242.9^{ns}	809.6^{ns}	3403.8^{ns}	0.03^{ns}
Planting season(a)	1	2244859^{**}	4964400.5^{**}	3072100.7^{**}	117128^{**}	17719^{**}	4388943^{**}	0.28^{ns}
fertilization(b)	3	20790.7^{ns}	50364.8^{ns}	52138.7^{ns}	1039.2^{ns}	2086.7^{ns}	54041^{ns}	0.28^{ns}
a×b	3	12901^{ns}	36805.5^{ns}	16799.1^{ns}	$1247/2^{ns}$	1194.9^{ns}	23107^{ns}	0.19^{ns}
Error	21	14958.4	36349.8	32421.9	909.8	1764/1	34552	0.15
CV	-	20.16	21.22	1925	18.15	15.16	10.11	7.71

**, **significant at 5 and 1%,NS:not significant*

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