Available online at www.scholarsresearchlibrary.com

Scholars Research Library

Scholars Research Library

Annals of Biological Research, 2012, 3 (3):1385-1387
(http://scholarsresearchlibrary.com/archive.html)

Annals of Biological Research
Scholars Research Library
ISSN 0976-1233
CODEN (USA): ABRNBW

Study of the Effect of Different Levels and Application Timing of Nitrogen Fertilizer on Yield and Number of Potato Tuber of Agria in Ghorveh, Iran

Behnam Etemad* **and Mansour Sarajuoghi**

Department of Agronomy, Borujerd Branch, Islamic Azad University, Borujerd, Iran

---

ABSTRACT

In order to study of the effect of Nitrogen fertilizer on yield and yield components and determination the best level of this fertilizer for Agria cultivar of potato (Solanum tuberosum L.), a factorial experiment was conducted based on a Randomized Complete Block Design (RCBD) with tree replications in Ghorveh, Kordestan, Iran. In this research the effects of tree levels of nitrogen fertilizer, 4 different of application times of the fertilizer and interaction of these treatments were studied. The results of variance analysis showed that there are significant differences (P≤0.01) between main treatments and interactions between them. In this study the maximum number of tubers (25.55), the maximum weight of tubers and the maximum number of stems obtained after application of 200 Kg/ha N fertilizer. The maximum tuber yield, the maximum tuber number and the maximum dry weight of tubers were observed in condition that third part of Nitrogen fertilizer used at first and the rest of fertilizer used after Earthling up.

Keywords: Nitrogen, Agria, Potato.

INTRODUCTION

Potato is a member of Solanaceae family. This plant is originally from heights of South America and has been considered as an important source of food from long time ago. This plant introduced in Europe in sixteenth century for first time and became one of the important foods. Potato cultured widely in many places of Europe in seventeen and eighteen century. Potato needs cool nights and wet soils with good drainage and in warm places cannot produce appropriate yield [1, 3, 4, 5].

Less than half of this production use for humans demands. Regard to food importance, Potato has fifth rank after Wheat, Rice, Maize and Barley. Production coefficient of Potato in North America was observed 3.04, 2.68 and 1.12 more than Wheat, Rice and Maize respectively. Although protein efficiency ratio (PER) of Potato was 2.02, 1.33 and 1.20 more in comparison with Wheat, Rice and Maize respectively. Total production of Potato increased because increasing yield per unit area during the last years. Average production of Potato in North America and North of Europe is about 20-35 t/ha. Major potato producing countries are Russia, China and Poland respectively [2, 3, 4, 6].

MATERIALS AND METHODS

This experiment was conducted at the experimental field in Ghorveh City (14^o 6' E, 23^o 45' N and 191om above the sea level). Ghorveh is located in cold region with mild summers and cold winters. The experimental design was a factorial experiment based on Randomized Complete Block Design (RCBD) with 12 treatments and tree replications. During of this study main effects and interactions of different levels of N fertilizers (N1=100 Kg/ha, N2=150 Kg/ha and N3=200 Kg/ha) and 4 different of application times of N fertilizer (T1= application of total fertilizer during culture, T2= application of half of fertilizer during culture and the rest during Earthling up, T3= application of third part of Nitrogen fertilizer during culture and the rest during Earthling up and T4= application of total fertilizer during Earthling up).

RESULTS AND DISCUSSION

The analysis of variance showed application of different levels of N fertilizer significantly affected the number of stem per square meter ($P\leq0.05$), Stem dry weight ($P\leq0.01$), the number of tuber per square meter ($P\leq0.01$), tuber dry weight ($P\leq0.05$), total dry weight ($P\leq0.01$), tuber yield ($P\leq0.01$) and Harvest index ($P\leq0.05$) Results showed that the maximum numbers of tuber was in condition of application of 200 Kg/ha N fertilizer. All different level of N fertilizer reduced number of tubers after 75 days application. Also using of different levels of N fertilizer significantly affected the Leaf area Index yield ($P\leq0.01$), Number of stem per square ($P\leq0.01$) and tuber dry weight ($P\leq0.05$) (table 1).

This study showed the interaction of different levels of N fertilizer × different of application times significantly affected the Number of stem per square ($P\leq0.05$), Stem dry weight per square meter ($P\leq0.05$), number of tuber per square meter ($P\leq0.05$), tuber dry weight ($P\leq0.01$), total dry weight ($P\leq0.05$) and tuber yield ($P\leq0.05$) (table 1).

Experiments identified that most number of tubers and most tuber dry weight were achieved after using of 200 Kg/ha N fertilizer. Also the most number of tubers and most tuber dry weight were reached after application of third part of Nitrogen fertilizer during culture and the rest during Earthling up. These results showed that most tuber yield achieved after application of third part of 200 Kg/ha N fertilizer during culture and the rest during Earthling up (table 2).

Table 1. Analysis of variance for studied traits

S.O.V	df	Leaf area Index	Number of stems	Stem dry weight	Number of tubers	Tuber dry weight	Total dry weight	Tuber yield	HI
Replication	2	ns	ns	ns	ns	ns	*	ns	ns
Levels of N fertilizer	5	ns	*	**	**	*	**	**	*
Times of N fertilizer application	4	**	**	ns	ns	*	ns	ns	ns
Interaction	5	ns	*	*	*	**	*	*	ns

*Ns, non-significant; *, Significant at p≤0.05; **, Significant at p≤0.01*

Table 2. The mean of Comparison for studied traits

Treatments		Leaf area Index	Number of stems / m^2	Stem dry weight / m^2	Number of tubers / m^2	Tuber dry weight	Total dry weight	Tuber yield	HI
Levels of N fertilizer	N1	4.110a	16.142a	417.125a	24.641a	581.740a	795.811a	10850.115a	25.712a
	N2	3.920ab	18.217c	369.711c	24.712bc	600.425bc	750118b	11800.562b	24.217bc
	N3	4.265a	18.345a	400.252ab	25.55b	612.742a	775.621ab	12650.815ab	23.511c
Times of N fertilizer application	T1	3.617c	17.122bc	397.716ab	25.001a	592.717ab	761.572b	1092.518b	25.002a
	T2	4.002a	17.761b	390.417b	24.917ab	585.472b	770.752b	1112.816bc	24.712bc
	T3	3.895b	17.945b	385.930b	34.972c	592.345ab	745.527ab	1140.860bc	33.515c
	T4	3.265a	17.345a	300.252ab	23.815b	500.740a	675.621ab	1086.211ab	23.511c

Means in a column followed by the same letter are not significantly different at P≤0.01.

REFERENCES

[1] A Eskandari, H Khazaei, A Nezami and M Kafi, *Journal of Water and Soil*, **2011**, 25 (2), 240-247 (In Farsi).
[2] M Aghighi Shahvrdi Kandi, A Tobeh, A Gholipouri, S Jahanbakhsh, D Hassanpanah and O Sofalian, *International Journal of Agriculture: Research and Review*, **2012**, 2 (2), 68-73.
[3] MR Khajehpour, Industrial Plants, Isfahan University Jahad Publications, Isfahan, Iran, **2004**; pp. 571 (In Farsi).
[4] NK Fageria, VC Baligar and CA Jones, Growth and Mineral Nutrition of Field Crops, Third Edition, CRC Press, USA, **2010**; pp. 586.
[5] RC Adhikari and MD Sharma, *Nepal Agric Res J*, **2004**, 5, 23-26.
[6] SB Philips and JG Warren, *Hort Science*, **2005**, 40 (1), 214-217.