

## ORIGINAL ARTICLES

### Evaluation of nitrate accumulation in different nitrogen levels in early and late potato cultivars

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#### ABSTRACT

Nitrogen is the main nutrient for crop production in many agricultural regions all over the world, and its effective use for economic stability of agricultural system is important, the table of variance analysis showed that the main effect of cultivar on nitrogen accumulation in dry matter was significant in 1% of probability but it had not significant effect on nitrate accumulation of wet matter. The main effect of nitrogen fertilizer and interaction of fertilizer and cultivar was significant on nitrate accumulation of dry and wet matter ( $P > 0.01$ ). Variance analysis showed that the highest nitrate accumulation based on dry matter was earned in early cultivar on Marfona in 200 kg/ha of nitrogen fertilizer. Increasing N fertilizer to about 200 kg net nitrogen per hectare in all studied cultivars nitrate accumulation were seen.

**Key words:** Nitrogen, Potato, Nitrate, Cultivars

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#### Introduction

Nitrogen is one of the necessary elements for plant growth and is the main component of proteins. When plant growth in unordinary condition (such as excessive use of nitrogen fertilizer) protein production decreased and nitrogen accumulate in non-protein form in plants. Nitrate is one of the non-protein forms that its supernormal consumption showed toxic effects in nutrient chain (Reda, S., 1993). In plant that don't store nitrate in usual condition, irregular nitrogen fertilizer consumption causes accumulate it in high extent. Jamaati et al (1388) stated that the most nitrogen accumulation in dry and wet matter was seen in the highest fertility level (200 kg of net N per hectare). Nitrogen is the most use elements that plants require. Inappropriate use of nitrogen fertility cause subterranean water pollution and excessive nitrate absorption by plant. These plants and water due to entry high amount of nitrate to human body cause different diseases accession. One of these diseases is Methemoglobinemia that is very prevalent in kids and cause death (Prosba, B.U., 1996). Critical extent of nitrate toxicity in potatoes is 250 mg/kg (Hernandes, M., 2000). Because of adverse effect of extra nitrate in used part of plant with human and animals, it is necessary to minimize nitrate amount in dairy used product especially potatoes (Hernandes, M., 2000). Reda *et al* (1993) studied 3 potatoes cultivar and reported that nitrate amount in potatoes tuber is ranged from 213.2 to 497.2 mg/kg in none and 200 kg/ha use of nitrogen, respectively. Prosba (1996) measured nitrate of tubers in 6 cultivars in 3 levels 0, 80 and 160 kg/ha of nitrogen consumption and reported that tubers nitrate amount is increased from 129.2 mg/kg in none and to 208 mg/kg in 160 kg/ha use of nitrogen. Aim of this study is to evaluate nitrate accumulation in different potato cultivars.

#### Material and Methods

In according to study the nitrate accumulation in different levels on nitrogen in early and late potatoes and experiment was conducted as factorial on the base of randomized complete block design with 3 replications in 2010 in research field of agriculture faculty of Mohaghegh Ardabili University. Experimental factors were consisting of nitrogen fertilizer with urea sources with 0, 100 and 200 kg /ha net nitrogen in 2 stages (planting and soiling to bush stage) and second factor was potatoes cultivar (Agrida, Marfona, Clone5 and Clone B6). For nitrate measurement nitrate meter was used.

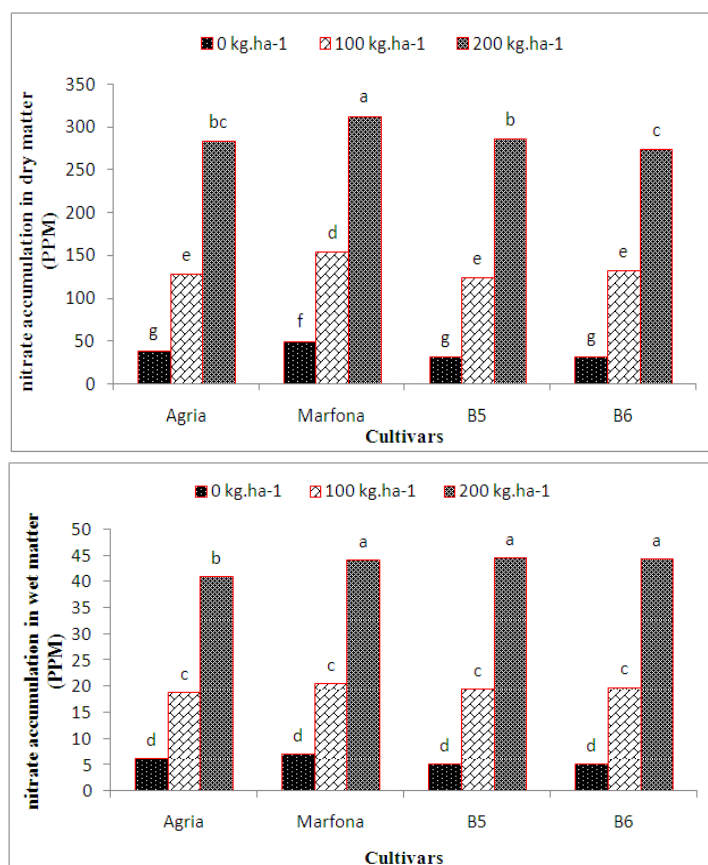
**Results and Discussion**

Results of variance analysis showed that the main effect of cultivar on nitrate accumulation in dry matter was significant ( $\alpha=1\%$ ) but it hadn't significant effect on wet matter nitrate accumulation. The main effect of nitrogen fertilizer levels on cultivar for both nitrate accumulation in dry and wet matter is significant ( $\alpha=1\%$ ). Also means comparisons tables showed that increasing nitrogen fertilizer levels from 0 to 200 kg, increased nitrate accumulation. The most nitrate accumulation was occurred in early cultivar of Marfona with 200 kg nitrogen fertilizer applications and the lowest was recorded in Clone B6, B5 and Agria cultivars (that are late cultivars) in none nitrogen fertilizer consumption. Nitrate accumulation in the base of wet matter in Marfona, Clone B5 and B6, all occurred in highest level of nitrogen application (200kg/ha) and the lowest was earn in none use of it. Actually consuming excessive nitrogen, in addition to decrease yield, increased nitrate of tubers that is an undesirable property in this plant production. Thereupon potato farmers with use superabundant nitrogen fertilizer not only don't increase yield but also promote production cost and decrease crop quality means that increasing nitrate accumulation in tubers is harmful for farmers, consumers, environment and country in all aspects.

**Table 1:** Analysis of variance of effect of N fertilizer level on nitrate accumulation of potato cultivars

S.O.V	DF	nitrate accumulation in dry matter	nitrate accumulation in wet matter
Cultivars(C)	3	1370.79**	5.31 ns
Nitrogen(N)	2	192519.99**	4334.14**
C×N	6	35438.78**	791.31**
Error Experimental	22	35.58	2.42
CV(%)	-	3.90	6.80

\* and \*\* significant difference at  $P<0.05$  and  $0.01$ , respectively.



**Fig. 1:** Interaction between different N fertilizer levels and potato cultivars on nitrate accumulation.

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