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Determination of the planting depth of potato seed tuber yield and yield components of two varieties agria and draga response curves seed

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ABSTRACT

In order To determine the relationship between planting depth and potato seed tuber yield and yield components of two cultivars Agria and Draga response curves to the factorial experiment with two factors, factor in sowing depth first Tuesday (10, 15 and 20 cm) and the second factor of two cultivars (Agria and Draga) in a randomized complete block design with three blocks in 2007-2008 Farming Village Meadows Farvj city functions performed in the East North Khorasan Province and Attributes such as number of stems per plant, number of tubers per plant, average tuber weight, tuber yield and total number of eyes was determined, Depth of planting Traits, the number of stems per plant, number of tubers per plant, average tuber weight, tuber number and yield levels in the eyes of a percentage difference between the mean And the highest overall performance of the three planting depth, planting 10 cm were produced Increasing the planting depth of 10 cm total decreased performance. Regression showed that the relationship between planting depth with the total number of tubers per plant and tuber number in both the linear and quadratic models significantly. But the number of stems per plant yield, average tuber weight, the likelihood of a significant level only in the linear model. Relation to planting depth on potatoes as a function of the curve And the slope of the line is That for every centimeter increase in planting depth reduced the rate of 1183 kg. The highest positive correlation between the number of stems per plant, number of tubers per plant ($r=0.85^{**}$) correlation between the total number of tubers per plant ($r=0.67^{*}$) and a negative correlation between the mean tuber weight the number of tubers per plant ($r=0.60^{*}$) was shown. So in the production of seed tubers the number should be given to attribute of stems per plant It also increases the number of stem tuber number will increase. Seed production is important because of the weight of the thyroid gland, it is suggested that in modify this attribute is given

Key words: seeding knot, potato, planting depth , Regressio

INTRODUCTION

Potato¹ is one of the products widely cultivated in the world and almost double the per hectare production of rice and wheat are the calories that. This plant has a wide range of climates and environments compatible in tropical and temperate altitudes up to 4000 meters above sea level is found to be [2].

1 . *Solanum tuberosum*

Today potato is considered as one of the important food resources in a cording to wheat and rice a maize has brilliant role in producing carbohydrates body needs in human and vegetables, and has high potential [10]. and because this plant is compatible with a variety of environmental conditions in different countries, cultures, and work [17, 28].

The cultivation of potatoes in about 150 thousand hectares of seed needed per acre and the average is three tons, the average annual needs of about 450 thousand tons of seed potatoes will be [10]. Thus, in Iran, like other developing countries, seed potato production is the main limiting factor. Therefore, it is necessary in some countries such as Iran, China, production of seed potatoes should be considered [21].

Seed is the only input that can save additional money can be effective in increasing performance even with plenty of energy without the use of good seed not be achieved to the maximum product [7].

Gland seed is one of the very important factors in the qualitative and quantitative characteristics of potato production is impressive. The seed tuber healthy and fit, in addition to slightly increased significantly effective in reducing product waste. therefore, given the importance it is necessary solutions to achieve higher quality seed tubers to be used [5].

Function of the number of potato tubers produced per plant and weight of any single gland can be . The number of tubers produced per plant ranges from 3 to 10 there. The underground stems and tubers produced about 3 - to total tuber highly correlated with the number of stem production had. While the negative relationship between number of stems per plant and tuber in both shoot there [2].

for producing enough gland seed knowledge and experience are required. The issues in this regard should be paid special attention to farming and to the breeding [27].

In regard to factors such as seed tuber weight, tuber number and function of the eye should be carefully considered . These parameters can influenced by genetic factors and environmental factors such as number of implanted depth and so on. Therefore the proper depth of planting potatoes in the region is one of the factors. this product has a significant role in the performance [22].

To expedite the proper planting depth on potato sprouts and suitable soil is required to timely; also need the proper planting depth for root penetration and good soil drainage also be considered [22].

Proper planting depth may be the emergence, seedling establishment and survival suits and each stage of growth with favorable environmental conditions to be met. Proper planting depth is usually the most will lead to achieve maximum product performance. Considering that the soil is different in each region and other varieties of a species also have different reactions, proper planting depth is the number given to each region and the growing number of properties to be determined [15,23].

Potatoes racing with the root system is weak .if the glands of the large depth of soil to be cultivated in or be killed so that they are not properly covered with a layer of soil either there are risks for potato products are [20].

Totally planting depth and method of farming, soil temperature and humidity around the tubers grown on the land has significant effect in this regard, the planting depth and soil conditions should be set [20].

Tubers grown in deep, often causing the plant to a single stem and much lower density per unit area if planting is done and the surface gland production out of the soil and the sun will destroy . Several factors can affect the depth of planting potatoes which include seed quality, soil moisture and temperature [24].

Ezaazimi et al (2009) concluded during the test planting depth of 7 cm of depth of sowing the seed yield of non-tuber , non-seed tuber weight, tuber number and function of oral significant difference had and increase performance with the highest yield of 24,552 kg per hectare than other has depth. Because they increase performance by reducing the accelerating emergence, planting depth were noted [9].

Alimohammadi et al (2004) reported increasing the planting depth of 5 cm to 20 m potato increased the number of days from sowing to emergence meters of 15 cm planting depth and tuber yield was obtained. Potatoes are grown in dry soil when the gland is should be cultivated to a depth where soil moisture is higher than. In warm conditions than cold conditions should be planted deep, more, because the surface temperature is higher [26].

Memarzadeh (1993) the experimental three aila, kuzyma and draga and planting depth examined significant difference in the level and depth of planting and one percent to five percent figure observed for the interaction of

two factors, planting depth, and the figure for the number of tuber do not show statistically significant differences. Also, compared to average yield figures showed two digits of the number of draga and aula, kuzyma significant difference in the level of five percent. In dry soil, and soil test germination percentage with normal moisture, and soil saturated with moisture, size was measured. Tubers in dry soil moisture lost and most of the buds of may the buds with normal moisture in the soil after planting was carried out and the soil around the roots with water to produce buds and stems are earned [25].

Mortazavi beck and Aminpoor (2002) test showed that the increase in planting depth (from 10 to 20 cm) of the total was significantly increased [20].

Haghani (1998) test of over 10 varieties of potato planting depth of two 15 and 25 cm, depth 25 cm was reported superior. Planting depth and shoot in the head have a major role in air [12]. So that the increase in planting depth (depending on crop conditions until about 20 cm) of head and ultimately increasing the performance [8,23].

The results also indicated to the Central Province shown with increasing the planting depth of 15 cm stem of air and increased performance And increase the planting depth to 25 cm and more, reducing the number of aerial stems and has the performance [3].

Alhgany Dizaky et al (2007) concluded in the trial The depth of planting, number of tubers per plant increased, but thyroid weight was increased with increasing planting depth. The highest tuber yield of four planting depth (6, 12, 18 and 24 cm) at the depth of 18 cm, respectively [6].

Our aim is to determine the best depth for planting two varieties Agria and Draga in order to achieve maximum production of seed tubers in North Khorasan .

MATERIALS AND METHODS

To determine the planting depth of seed potato tuber yield and yield components of two cultivars Agria and Draga curves response, a factorial experiment with two factors, factor in sowing depth first (depth of 10 cm, depth 15 cm 20 cm) Factor Two cultivars (Agria and Draga) in a randomized complete block design with three replications. 2007-2008 agricultural crops in a field experiment in Village Meadows city functions Farvj. The location 37 degrees north latitude and 19 minutes And 58 degrees 7 minutes east With a height of 1131 meters above sea level, located in the North East province In clay loam soil was conducted with pH =7.6. nearly ten years, according to the weather station, city Farvj minimum temperature and maximum temperature of -17.5 and 36.5 C °, average annual rainfall of 260 mm and the number of frost days and a period of 120 days Drought is 154 days from late May until October. Ammonium phosphate fertilizer based on soil testing 150 kg/ha and 75 kg/ha and 200 kg/ha of urea fertilizer Klrvtas in two stages, 100 kg/ha and 100 kg/ha at planting time as the road was used before flowering. Also at the time of planting, the tubers with a fungicide poison Bnvmyl disinfection And then, in rows 70 cm apart And 25 cm row spacing Plots of 10 m in length and 4 in row And other agricultural operations, and care was required during the season. 10 m from each experimental unit at harvest time selection And counting the number of stems per plant And after harvest Traits such as number of tubers per plant per experimental unit, The mean tumor weight, Gland and the total number of eyes in the And then tested on data variance analysis performed And compared by Duncan's multiple range test was performed at the level of five percent. Finally, to determine characteristics associated with planting depth of the response curves were used And the correlation coefficients between traits were determined using SAS statistical software

RESULTS AND DISCUSSION

Results of variance analysis showed That the depth of planting where probable of effect on the level of a percent, there was significant difference in mean The regression relationships showed total yield of the planting depth, number of stems per plant, average tuber weight, number of tubers per plant and tuber eye on the possibility of a significant level of linear and planting depth with respect to the total number of tubers per plant and number of eyes in addition to significant tumor Linear model, quadratic model was significant at the one percent level Number of attributes and number of stems per plant and average tuber weight showed no significant difference But other traits showed significant levels of a percent difference The interaction of cultivar and planting depth causes means having a total yield of the one percent level But other traits showed no significant difference. Results of variance analysis showed that the effect of planting depth in percent probability of a significant difference existed (Table 1).

A ccording to the Table (2) and Figure (1) concept can be The highest total yield of the three planting depth, planting 10 cm were produced. Increasing the planting depth of 10 cm total decreased performance. The pilot in the

central province of the Abbasifar *et al* (1996) reported With increasing planting depth increased to 15cm performance And increasing the planting depth to 25 cm and More can reduce performance. In another experiment in Mashhad Alhgany Dizaky *et al* (2007) concluded that reducing the planting depth, number of tubers per plant increased[6].

The gland weight increased with increasing planting depth. The tuber yield of four planting depth (6, 12, 18 and 24 cm) at a depth of 18 cm, respectively. The experimental Alimohammadi *et al* (2004) reported. Increasing the planting depth of 5 cm to 20 cm potato increased the number of days from sowing to emergence of 15 cm planting depth and tuber yield was obtained. The results of this study, other studies have also read Such an outcome will be so as the depth of 10 cm depth for the Northern Khorasan seed production[4].

Arab (2011) compared the experimental Agria on the right depth to twenty cm reported According to the [1]. Figure (2) is inferred to be Relation to planting depth on potatoes as a function of the curve And the slope of the line is That for every centimeter increase in planting depth reduced the rate of 1183 kg.

The study also compared the performance of Agria is more (28.10 tonnes per hectare) and superior Draga as a figure for the North Khorasan Haghani (1998) test of over 10 varieties of potato planting depth of two 15 and 25 cm, depth, 25 cm was reported superior[12]. Also been reported in some references. The planting depth in the head and stem have a major role in air so that the increase in planting depth (depending on crop conditions, about 20 cm) of head and ultimately increase the performance [1, 8, 24].

Results to act in the central province also shown that increasing the planting depth of 15 cm, the number of stem and air operations increased and increased planting depth to 25 cm - feet and more, reducing the number of stems air and yield has the [3].

Figure (5 and 6) with respect to planting depth on potato tubers per plant was a non-linear And the largest gland in depth 10 and 15 cultivar Agria were obtained. Figure (3 and 4) the relationship between planting depth with an average tumor weight was linear and the highest weight in the planting depth was 20 cm). The trait number of stems per plant in the upper 10 cm of the stem had the highest number of The number of stems per plant decreased with increased planting depth The relationship between planting depth and number of stems per plant was reduced as negative. Abbasifar *et al* the experiment (1996) The planting depth of 5, 15, 25 and 35 cm depth of 15 cm in stem highest number reported, but in most experiments at a depth of 10 cm stem was achieved[3]. The other references also emphasised that the appropriate depth[26].

The stems of both varieties were similar and a depth of 20 cm in most cultivar Agria gland was seen in the eyes Perhaps the biggest cause more gland and the number was reduced, Such as planting depth increased, But on a smaller number of tuber gland weight increases.

The purpose of this experiment was to produce seed Proper planting depth was 10 cm Because of the high yield and number of tubers per plant and number of stems per plant was greater.

The average weight of tubers and tuber eye depth was 20 cm for Because the experiment weight and number of eyes is important in tumor So be careful if the depth is greater Total gland weight less but increased.

Among the two varieties experiment varieties Agria is suggested. So for seed tuber production in Northern Khorasan province depth of 10 varieties Agria and looks good.

It was With increased planting depth, number of stems and tubers but reduced tumor weight increased. Similar results have been obtained in other references [25,20]. According to the table (2) of the total number of Agria 10 cm planting depth, the average tumor weight in two varieties Agria and Draga 20 cm depth were highest weight But the number of stems per plant varieties Agria and Draga in the upper 10 and 15 cm the highest number of stems are.

Abbasi Far *et al* (1996) The planting depth of 5, 10, 15, 25 and 35 cm depth of 15 cm to 35 cm depth is the significant In this test the depth of 10 cm and 20 cm of depth of 15 cm, respectively[3]. The experimental three aula, Kuzyma and Draga and planting depth was investigated, but the interaction of these two factors showed no statistically significant difference [20].

As it can be seen maximum depth of 20 cm was cut The reason is that with increased planting depth has decreased the number of stem And reducing the number of stem tuber is reduced Thus reducing the number of gland function is decreased.

Results in According to Table (3) The highest positive correlation between the number of stems per plant, number of tubers per plant ($r=0.85^{**}$) was obtained The high correlation between the number of other references, with the number of shoots produced gland has been reported (Arzani, 2004).

Correlation between the average weight of the entire gland ($r=0.72^{*}$) and the total number of tubers per plant ($r=0.67^{*}$) is also positive and significant at the level of five percent of the significant The increasing number of tubers per plant and average tuber weight and yield increases will Breeding in these two parameters that need to be a particular focus. The highest negative correlation between the number of tubers with eyes on stalks Plant ($r=-0.82^{**}$) and the significant tumor weight and number of tubers per plant ($r=-0.60^{*}$) was shown in other references as well as the relationship between the number of thyroid gland weight has been reported as negative [19].

Therefore in the production of seed tubers should be given to attribute the number of stems per plant. Because the increased number of stem Gland may also increase the number Because the production of seed tubers, the tuber is The weight of the gland, the debate should be modified according to the attribute Besides the increasing number of stems, number of eyes in the gland decreases And tuber productive as this product is used in order to be The number of eyes on tuber not seem to matter.

Table 1- Quantitative analysis of variance in potato seed tubers

S.O.V	df	Mean of Squares				
		number of eyes tuber	number stem per plant	average weight of tuber	number tuber per plant	total yield
block	2	0.077ns	2.344**	6.722ns	0.043ns	0.392ns
planting depth	2	8.436**	3.502**	100.389**	5.929**	3.147**
linear model	1	13.209**	7.002**	200.083**	10.267**	3.033**
quadratic model	1	3.662**	0.000ns	0.694ns	1.590**	3.260**
cultivar	1	7.119**	0.075ns	4.839ns	2.645**	3.042**
planting depth× cultivar	2	0.106ns	0.020ns	4.784ns	0.019ns	8.808**
Error	10	0.182	0.188	3.314	0.028	0.127
C.V%		6.52	12.99	3.44	2.22	1.29

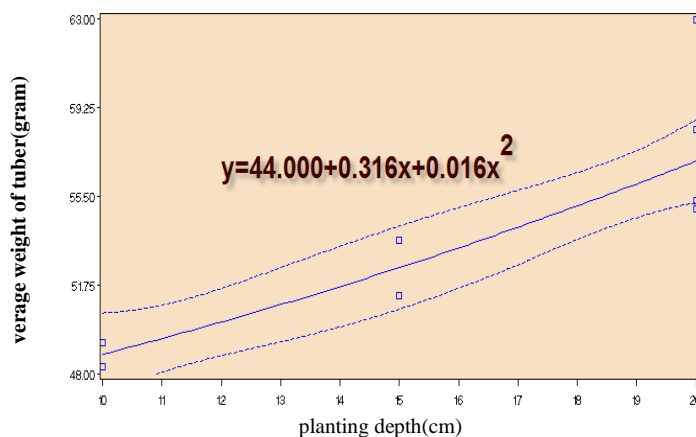


Figure 4: The average weight of planting depth on potato tubers

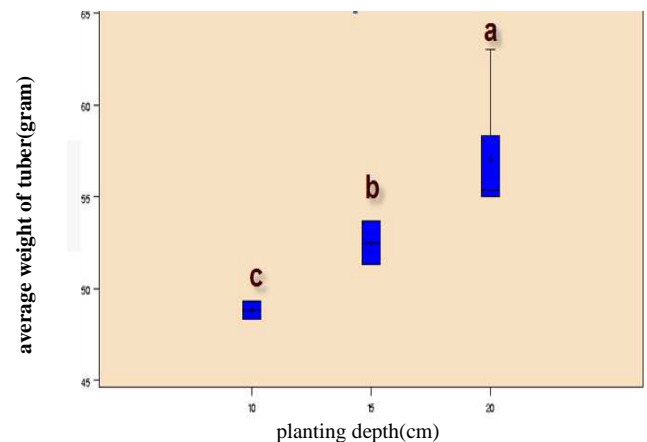


Figure 3: Effect of planting depth on the average weight of tubers in potato

ns, * and ** = non significant, significant at 5% and 1% levels respectively.

Table 2 - Comparison of different levels and varieties of planting depth on Quantitative charactics potato yield

Factor	total yield(tan/ha)	number of eyes tuber	number stem per plant	number tuber per plant
planting depth				
10 centimeter	28.488a	5.807b	4.111a	8.29a
15 centimeter	28.08b	5.899b	3.333b	8.00a
20 centimeter	27.48b	7.905a	2.583c	6.44b
cultivar				
Draga	27.27b	5.908b	3.407a	7.196b
Akria	28.10a	7.166a	3.277a	7.963a

Means followed by similar letters in each column are not significantly different at 5% probability level.

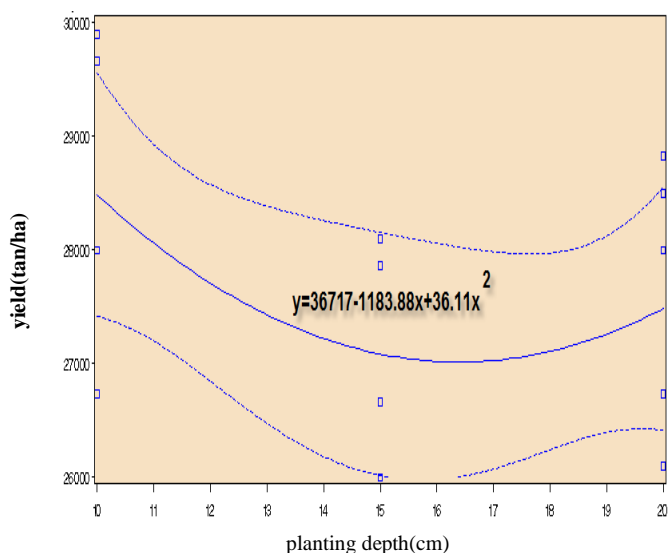


Figure 2: relation to planting depth with the Potato yield

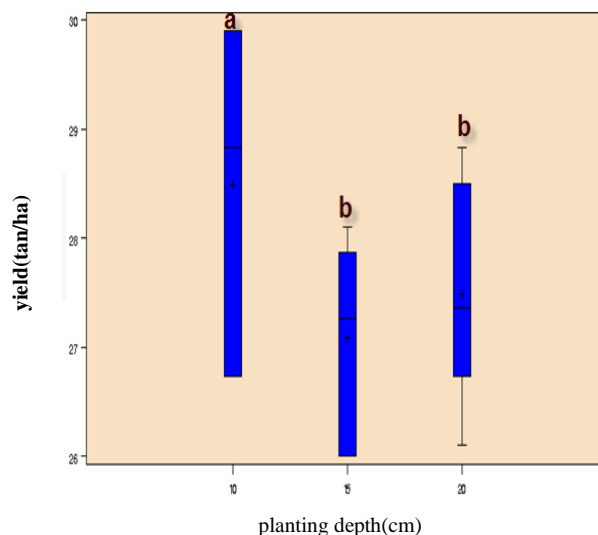


Figure 1: Effect of planting depth on potato yield

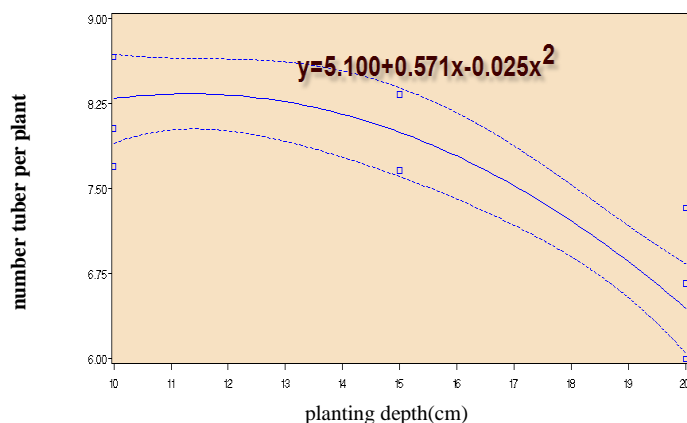


Figure 6: Number of tubers per plant in relation to planting depth with the Potato

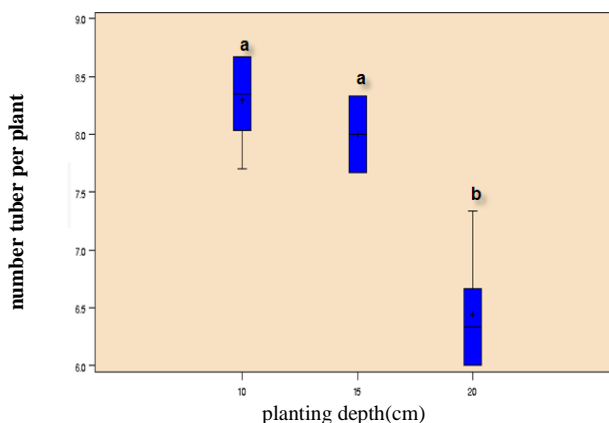


Figure 5: Effect of planting depth on tuber numbers in potato plants

Table (3): correlation coefficient of the studied characters in potato

	total yield	number tuber per plant	average weight of tuber	number stem per plant	number of eyes tuber
total yield	1.00				
number tuber per plant	0.67*	1.00			
average weight of tuber	0.72*	-0.60*	1.00		
number stem per plant	0.25 ns	0.85**	0.14 ns	1.00	
number of eyes tuber	0.14 ns	-0.25 ns	0.26ns	-0.82**	1.00

Means followed by similar letters in each column are not significantly different at 5% probability level.

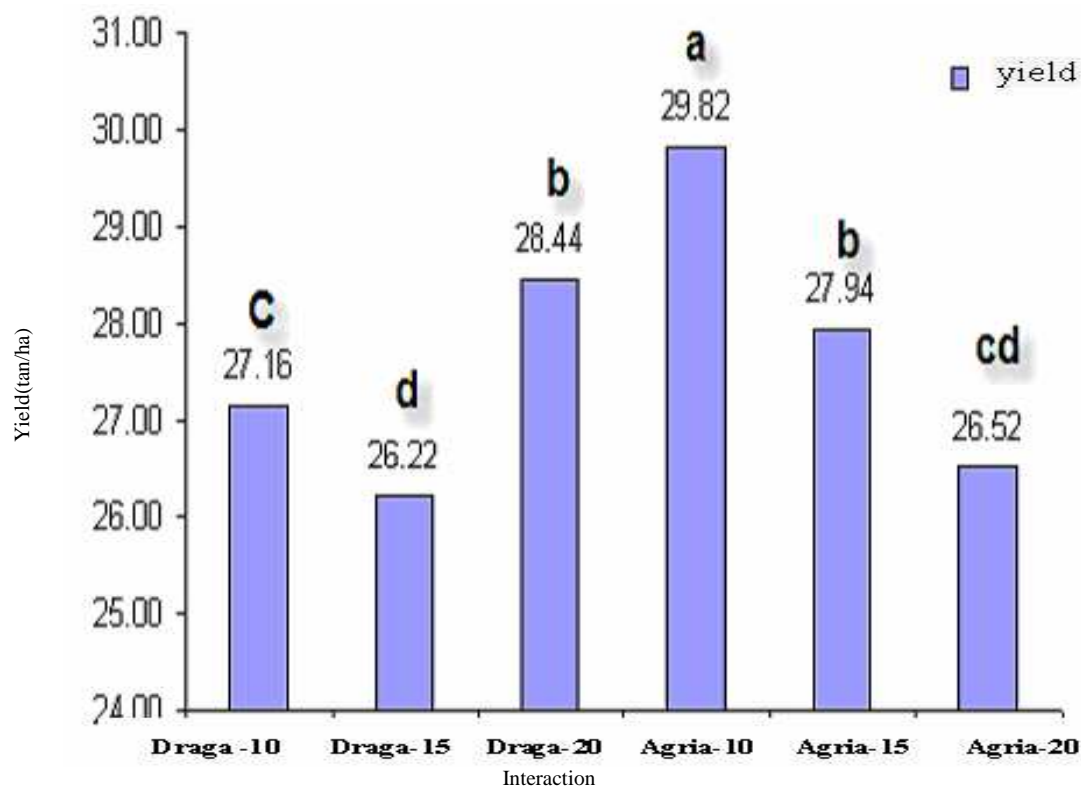


Figure7- Interaction for yield of potato cultivars and planting depth

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