MINI-TUBER POTATO CULTIVARS GROUPED AGRONOMICALLY IMPORTANT TRAITS AND DESTRUCTIVE AND NON-DESTRUCTIVE HARVEST IN GREENHOUSE CONDITIONS USING A CLUSTER ANALYSIS

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ABSTRACT
In this study, three potato cultivars namely Agria, Savalan, Marfona cultivars in four ways harvested at 40 days after planting (non-destructive) and 80 days (destructive), harvested at 60 days after planting (non-destructive) and 80 days after planting (destructive), harvested at 40 (non-destructive) and 80 days (destructive) after planting and harvested at 80 days (destructive) after planting (as a control) in 2008 and 2009 were examined in the laboratory and greenhouse cultivation. Viltj biotechnology company Ardabil. Experiment was factorial based on completely randomized design with three replications in greenhouse. In this study, plant height, number of main stem, number and weight of mini-tubers per plant and per square meter, the average size of mini-tuber, tubers number and weight of less than 1 g, between 1-5 grams and greater than 5 gram were measured and for data analyze were used from the out random samples. Figures from traits in the two cluster. The first cluster contains Agria and Marfona, and the second cluster was contain savalan cultivar. All three clusters were based on different harvests of traits. The first cluster harvested 40 and 80 days and harvested 60 and 80 days, the second cluster harvested 40, 60, 80 and 80 days were harvested in the third cluster.

Keywords: Potato, Cluster Analysis, Destructive And Non-Destruction Harvesting

INTRODUCTION
Potato belongs to the *solanum* genus and *solanaceae* family and one of the world full products that are widely cultivated in the world and nearly every hectare would produce double the calories of rice and wheat (Arzani, 2008). Potato plant one of new plants in the ground between world plant products. Nutritional Aspects, social and economic this important plant at recent years has been remarkable. With the steady increase in world population need food every day with dramatic speed increases. World Food Organization has announced that the world population in 2030 to more than 8 billion people will need to try and keep track of the food supply of the population is in agriculture and allied sciences. Despite remarkable progress in the past three decades, the annual consumption of food has increased by only about 20 percent. According to the 2030 estimates, the value of food production in developing countries is 70 percent more than current production in order to keep pace with the growing population movement, and their needs accountable are properly (Asghari, 2010). An expert in plant breeding will the different cultivars and varieties in order to understand the genetic distance between them and use them in a variety of categories to breeding programs, Cluster analysis methods for classifying action using mathematical formulas to perform (Farshadifar, 1999 and Bryan and Manly, 2004). Since the numbers in each group genetic distance are less than the numbers in the different groups, so if hybridization can be determined according to the numbers in the different groups of characters mean value for each group of phenomena such as heterosis and segregation for more efficiency can be aggressive.

MATERIALS AND METHODS
Plant Materials and Experimental Design
In this study, three potato cultivars namely Agria, savalan and Marfona in four ways harvested [harvested at 40 days after planting (non-destruction) and 80 days (destruction), harvested at 60 days after planting (non-destruction) and 80 days after planting (destruction), harvested at 40 (non-destruction), 60 (non-
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destruction) and 80 days (destruction) after planting and harvested at 80 days (destruction) after planting (as a control) in 2008 and 2009 were evaluated in the laboratory and greenhouse. Factorial experiment based on completely randomized design with three replications was conducted in a greenhouse.

Run the Test Site Profile

The research in the laboratory and greenhouse biotechnology company located in Road Vilkij Ardabil - Astara 7 km in the East was conducted in Ardabil. Place cold semi-arid climate experiment and winter temperatures often below zero and 1350 m altitude, latitude and longitude, respectively, 48.20 and 38/15 are. The average annual temperature maximum and absolute minimum and maximum temperatures, respectively, 1.98, 15.8 and 21.58 °C and mean annual precipitation versus 310.9 mm have been reported.

Plantlets Cultured in Vitro (2008)

In this test promising varieties potato plantlets derived from meristem were amplified using a single bud cuttings. Environmental growth conditions in all stages of research in a growth chamber photoperiod of 24 h light with an intensity of 5000 lux and a temperature of 18-22 °C and relative humidity of 65-75 percent.

Greenhouse Evaluation (2008 and 2009)

After propagation, aseptic seedlings were grown in a soil mixture of soil substrate. To prepare soil mineral cartridge Biolan 1:1 was used. A small hole was created in the bed where seedlings are planted. After completion of planting, all seedlings were irrigated with tap water. During development, irrigation and weeding weeds regularly conducted. Toxin for pest Knfidoor the amount of 250 ml per hectare and to fight fungal diseases Mankozeb the value of a kg of fungicides were used. The experimental design used was factorial based on completely randomized design with three duplications, in which the first factor includes four harvest, Harvest at 40 (non-destructive) and 80 days (destructive) after planting, harvesting at 60 (non-destructive) and 80 days (destructive) after planting, harvesting at 40 (non-destructive), 60 (non-destructive) and 80 days (destructive) after planting and harvested at 80 days (destructive) after planting (as a control) and the second factor plantlets of potato cultivars was (Agria, savalan and Marfona). After the elapse of 80 days, the air was 10 days before harvest topping mini-tubers, mini-tubers were harvested and Plant height, number of main stem, number and weight of mini-tubers per plant and per square meter, the average size of mini-tuber number and tuber weight of less than 1 g, between 5.1 grams and greater than 5 g were measured.

To determine the genetic affinity of hybrids and their grouping, cluster analysis was performed using Euclidean distance squared and WARD (Hoque and Rahman, 2006). For cluster analysis of standardized mean data were used. Statistical analysis was performed using SPSS, and Minitab.

RESULTS AND DISCUSSION

The main objective of cluster analysis to determine the degree of proximity or distance of each other are genetic hybrids, So Agronomist instead of making random piles of hybridization to spend much time and energy. According to the chance of an optimal genotype, the first genotypes based on cluster analysis classified and then choose a hybrid of the best around in clusters according to the desired characteristics, limited hybridization blocks chooses. So done with making hybrids between genotypes far apart the clusters are selected far as possible to achieve the desired results increases.

Potato varieties for all traits in two cluster. The first cluster contains Agria and Marfona cultivars, and the second cluster contains savalan cultivar (Figure 1). The figures are grouped in the first cluster number and weight of mini-tubers per plant and per square meter and the average size are less than the number of mini-tubers was grouped in the second cluster (Table 1). Different harvests on base all traits in three clusters. The first cluster harvested 40, 80 days and 60 and 80 days after planting, at the second cluster harvested 40, 60 and 80 days after planting and the third cluster were harvested 80 days after planting (Figure 2). Harvesting method 40 (non-destructive), 60 (destructive) and 80 days (destructive) after planting grouped in a second cluster has a number of mini-tubers per plant and per square meter and mini-tubers average size more than one and third cluster was (table 2). Cultivars from traits were in two
clusters. The first cluster contains Agria and Marfona cultivars and the second cluster contains savalan cultivar. Different harvests on base all traits in three clusters. The first cluster harvested 40 and 80 days and harvested 60 and 80 days, the second cluster harvested 40, 60, 80 and 80 days were and the third cluster was harvested at 80 days.

Table 1: Average assessment traits in potato cultivars

<table>
<thead>
<tr>
<th>Cluster</th>
<th>cultivars</th>
<th>The number of mini-tubers per plant</th>
<th>Weight of mini-tubers per plant (g)</th>
<th>Medium-sized mini-tubers</th>
<th>The number of mini-tubers per mm</th>
<th>Weight of mini-tubers per mm (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>Agria</td>
<td>5.87</td>
<td>18.84</td>
<td>3.44</td>
<td>587.1</td>
<td>1884</td>
</tr>
<tr>
<td></td>
<td>Marfona</td>
<td>5.58</td>
<td>17.40</td>
<td>3.29</td>
<td>558.3</td>
<td>1740</td>
</tr>
<tr>
<td>Second</td>
<td>Savalan</td>
<td>7.71</td>
<td>25.85</td>
<td>3.61</td>
<td>770.8</td>
<td>2585</td>
</tr>
</tbody>
</table>

Figure 1: Dendrogram potato cultivars for all traits based on the method "Ward"

Table 2: Average traits in different harvesting

<table>
<thead>
<tr>
<th>Cluster</th>
<th>cultivars</th>
<th>The number of mini-tubers per plant</th>
<th>Weight of mini-tubers per plant (g)</th>
<th>Medium-sized mini-tubers</th>
<th>The number of mini-tubers per mm</th>
<th>Weight of mini-tubers per mm (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>40 (non-destructive) after planting</td>
<td>7.11</td>
<td>19.80</td>
<td>3.06</td>
<td>711.1</td>
<td>1980</td>
</tr>
<tr>
<td></td>
<td>80 (non-destructive) after planting</td>
<td>6.67</td>
<td>23.70</td>
<td>3.68</td>
<td>666.7</td>
<td>2370</td>
</tr>
<tr>
<td>Second</td>
<td>80 (non-destructive) after planting</td>
<td>7.92</td>
<td>26.11</td>
<td>3.61</td>
<td>791.7</td>
<td>2611</td>
</tr>
<tr>
<td></td>
<td>80 (non-destructive) after planting</td>
<td>3.86</td>
<td>13.17</td>
<td>3.45</td>
<td>385.6</td>
<td>1317</td>
</tr>
</tbody>
</table>
Figure 2: Classification of the various methods of harvesting traits based on the method "Ward"

REFERENCES