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Evaluation of different treatments of Humic on Pumpkin-naked seeds seeds in terms of the number of germination components

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ABSTRACT: In order to investigate the different treatments of Humic on Pumpkin-naked seeds in terms of the number of germination components, an experiment in the context of random blocks with 7 humic material treatments was repeated three times in plant physiology lab of Agriculture Faculty of Islamic Azad University of Ardabil Branch in 2011. In this research some properties as FGP, CVG, GI, GRI, MGT, Rs, and MDG under the effects of different treatments of humic materials were measured. The experimental results of the variation showed that there is no meaningful difference between the evaluated indexes from the experimental conditions pints of view. The results coming from the correlation analysis demonstrated that the relation between CVG and MGT and also MDG were negative and meaningful and positive and meaningful respectively. Also a meaningful and positive relation between GI and GRI were observed. Utilizing cluster analysis treatments s was categorized in two groups. The results of cluster analysis showed that the second group including treatments s with numbers 2, 5 and 6 (0.5 Pits solution, 0.5 Leonardit solution and 1 Cc in liters) and were known as the best group. The results of analyzing to main components showed that the first component justified and explained 50.202 percent of all variations. And for GI, FGP, GRI get the maximum coefficients and are positive and second component explained 41.07 percent of all variations, and had strong correlations with MDG, Rs and MGT. Therefore the two components explain 91.272 percent.

***Keywords*:** Cucurbita pepo L seeds, humic material, germination components, main components

INTRODUCTION

One of the most valuable medicinal plants in pharmaceutical industries in most of the countries a kind of pumpkin plant; namely Cucurbita pepo which is called Pumpkin-naked seeds in English. It belongs to Cucurbita and Cucurbitals brach and is from Cucurbitaceous family. Pumpkin-naked seed is an herbaceous perennial plant that is native to tropical and semi tropical areas and from the United States has spread to other parts of the world (Dai and Sardari, 2009 and wagner, 1997). The active materials in the seeds of this plant are used for the treatment of prostatic hyperplasia, urinary tract irritation, atherosclerosis, and also men and women sex hormones regulation. Pumpkin-naked seed is a long day plant and the temperature for its germination is 12 C. The optimum temperature for growth is between 25 to 35 ° C. Growth period of the plant depending on the cultivar and climatic conditions are between 120 to 140 days. The plant does not require special soil and soil with medium texture and rich soil is better. Unsuitable conditions for the crop could be acidic soil, and cold areas, areas with high groundwater, and the areas which are sensitive to herbicides (Omid Beigi, 2001). Humic acid in all agricultural soils is naturally presented and it makes up about 80 percent of soil organic matter. The ideal amount of organic matter in agricultural soils is between 4 to 6 percent. This amount in Europe is 2 to 4 percent and in some parts of Eastern Europe, including Ukraine it reaches to 6 percent.

But in dry areas, soil organic matter and consequently Humic acid is very low, so except for the northern coastal strip, the amount of soil organic material in most parts of our country is under one percent and in many places even is under 0.1 percent. Until about 5 years ago humic acid

was almost unknown in Iran. From 2003 the Gholzar Agriculture Corporation, for the first time imported humic acid with the name of Black Earth and with effort recognized it to Iranian farmers and it was received very well. Two years later the company imported a better humic acid with the trade name Agri Hume that was production of Humatech Company (Ahmadi, 2009).

Humic substances increase the quality of crop miraculously, and enhance plant tolerance against both biotic and abiotic stresses (Gadimov et al., 2007). Yang et al., (2004) argued that humic substances could influence, both directly and indirectly, the physiological processes of plant growth. Their direct effects include increasing permeability in cell membrane, respiration, biosynthesis of nucleic acid, ion absorption, enzyme and enzyme-like activities. Humic acid reduces application rate of the fertilizer, and enhances plant tolerance against stresses such as heat, drought and cold as well as makes it more resistant in dealing with diseases, insect and other environmental and agronomical pressures. In addition, it increases overall production of the plant i.e. the yield, and invigorates the stem (Mollasadeghi, 2010). The present study was designed to investigate the effect of different treatments on germination indices in plant material Humic has a Cucurbita pepo L.

MATERIALS AND METHODS

The trial in 2010 in the laboratory of Plant Physiology Islamic Azad University, Ardabil was done. Trial randomized complete block designs with seven treatments were performed in triplicate. Control treatments, respectively, Pits solution at 0.5, 1 and 1.5 cc per lit solution Leonardit also at 0.5, 1 and 1.5 of cc per lit. Petri dishes were then washed and disinfected for testing. The filter paper was placed inside each Petri dish 16 seeds were planted *Cucurbita pepo* L. To each his own solution was added and then the seeds were placed on filter paper to another. Petri dishes were placed in a dark environment. Full germination of seeds per day until the experiment was evaluated and, if necessary, the prepared solution was added to the treatment. One day after incubation, germinated seeds were counted. In order to measure germination indices, the germinated seeds were counted daily, whereas at the end of last day, indices for germination such as final germination percentage (FGP), coefficient of velocity of germination (CVG), germination index (GI), germination rate index (GRI), mean germination time (MGT), velocity of germination (Rs) and mean daily germination (MDG) were measured. The calculations were done using the following equations:

Coefficient of velocity of germination (CVG):

$CVG = 100 \times \sum Ni / \sum NiTi$

Where, Ni is the number of germinated seeds for each day, Ti is number of days as of the start of experiment, Germination index (GI):

$GI = (13 \times N1) + (12 \times N2) + \ldots. + (1 \times N13)$

where, N1 and N2 and … are the number of germinated seeds in first and second days, respectively, and so forth; numbers 10, 9 and … are weights applied on the number of germinated seeds at first and second days and so forth.

Germination rate index (GRI):

$GRI = G1/1 + G2/2 + \ldots + Gx/x$

G1 = germination percentage at first day

G2 = germination percentage at second day and so forth

Mean germination time (MGT): (Andalibi et al., 2005)

$MGT = \sum NiTi / \sum Ni = 100 / CVG$

Where, Ni is number of germinated seeds for each day, Ti is number of days as of the start of experiment, Final germination percentage (FGP): (Al-Mudaris, 1998; Gharineh et al., 2004)

$FGP = Ng / Nt \times 100$

Where, Ng is total number of germinated seeds, Nt is total number of evaluated seeds, Germination speed (Rs): was estimated based on Magour method and by using the following equation, (Rajabi and Poustini, 2005)

$Rs = \sum Si / Di$

Where, Si is the number of germinated seeds in ith day, Di is day number to nth counting Mean daily germination (MDG), which is an index of daily germination and is calculated using the following equation:

$MDG = FGP/d$

Where, FGP is final germination percentage (viability), d is day number to reach final.

The study genotypes were classified using cluster analysis based on all the traits and data standardized using WARD. Statistical calculations were done using MSTAT-C and Minitab-15, SPSS-16 software. Diagrams and statistical tables were drawn using Excel and Word programs.

RESULTS AND DISCUSSION

Analysis of variance (Table 2) Analysis of variance showed that the experimental conditions between any of the parameters evaluated were not significantly different. Correlation analyses of the results of the laboratory analysis are presented in Table 2. The mean duration of germination, speed of germination index, positive and negative relationship with mean daily germination significant positive relationship was observed. Similarly, germination index, germination index and germination rate was a significant positive relationship. The relationship between germination rate and germination rate index was positive and significant. Results showed that the relationship between mean daily germination, mean germination time is negative and significant. The treatment of characteristics of the final germination percentage (FGP), germination rate (CVG), germination index (GI), germination rate index (GRI), mean germination time (MGT), germination rate (Rs) and mean daily germination (MDG) using cluster analysis

(cluster) were grouped (Figure 1). Treatments were divided into two groups in terms of these attributes. Treatments 1, 3, 4, and 7 were in the first group. The treatment of characteristics and duration of mean daily germination woman had maximum germination and the rest of the characters allocated to lower-middle position (Table 3 and Figure 2). Treatments 2, 5 and 6 were in the second group. The treatment of characteristics, germination index, germination rate, germination index and germination rate had a maximum value and the rest of the characters allocated to lower-middle position (Table 3 and Figure 2). Table 3 Values of visa and the visa vectors germination indices of the two components of the show. The first vector is 50.22 percent of the variations indicated. Note that the germination index, germination percentage, germination index and germination index of the component with the highest coefficients were positive. The second component is 41.07 percent of the total variation explained by residual and highly correlated with the mean daily germination, speed of germination and mean germination time was. First and second principal components of total 91.272% of the changes were justified.

Table 1. Analysis of variance of germination

S. O. V	df	MS						
		Coefficient of Velocity of Germination	Germination Index	Germination Rate Index	Mean Germination Term	Final Germination Percent	Germination rate	Mean daily germination
Rep	2	1.367ns	595.286ns	72.304ns	0.150ns	72.545ns	0.690ns	5.454ns
Factor a	6	0.584ns	341.825ns	51.237ns	0.048ns	33.482ns	0.613ns	1.320ns
Error	12	2.290	904.563	111.257	0.225	46.503	1.235	4.576
CV (%)		8.38	31.90	20.40	8.53	7.01	16.86	14.51

ns: No significant

Table 2. Correlation coefficients germination index

	Coefficient of Velocity of Germination	Germination Index	Germination Rate Index	Mean Germination Term	Final Germination Percent	Germination rate
Germination Index	-.0328	1				
Germination Rate Index	0.038	0.926**	1			
Mean Germination Term	-0.978**	0.290	-0.076	1		
Final Germination Percent	0.215	0.427	0.591	-0.375	1	
Germination rate	0.145	0.866*	0.989**	-0.187	0.655	1
Mean daily germination	0.793*	-0.199	0.138	-0.890**	0.696	0.265

Table 3. Comparison of groups given from cluster analysis for different traits

Traits	Means	
	The 1 group	The 2 group
Coefficient of Velocity of Germination	0.517	-0.781
Germination Index	0.546	0.827
Germination Rate Index	0.804	0.565
Mean Germination Term	-0.599	0.777
Final Germination Percent	0.836	0.035
Germination rate	0.870	0.460
Mean daily germination	0.699	-0.667
Total	3.514	2.875
% of Variance	50.202	41.07

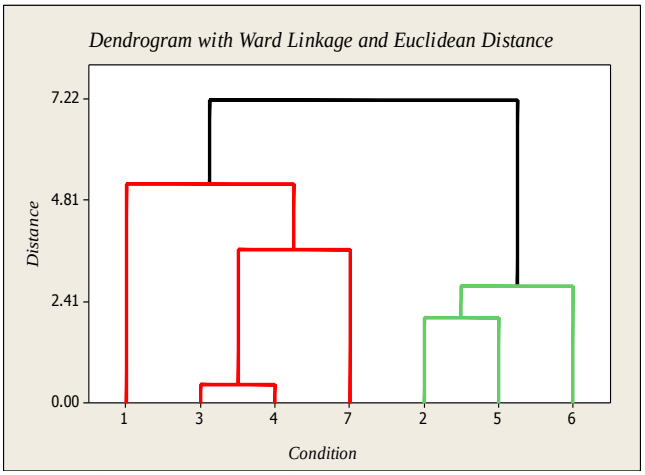

Figure 1. Dendrogram resulting from cluster analysis of minimum variance method based indices into the germination

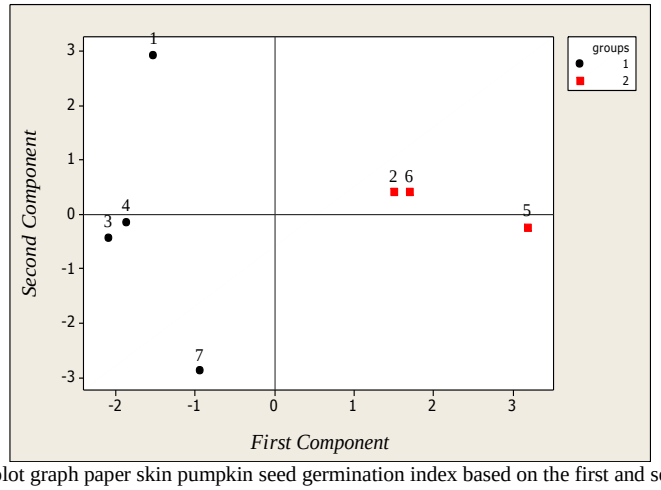

Figure 2. View biplot graph paper skin pumpkin seed germination index based on the first and second components (1: Control, 2: Pits and 3: Leonardit)

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