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The Study of Cold Resistance of Rapeseed Varieties of Urmia

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ABSTRACT: *Sufficient cultivation period and grain efficiency are facilitated through requisite growth level of rapeseed flowers and their level of cold resistance. The present study is administered for analyzing cold effects on rapeseed grain efficiency in Satlu Station of agriculture research and education organization of West Azerbaijan Province. The study is rendered in split plots, random blocks and frequency rate of 3 during 2012-2013 agricultural year. The first factor includes three cultivation dates (September the fifth, October the fifth and November the fifth) and the second factor comprises six rapeseed varieties (Hayola 308, Hayola 330, Hayola 60, RGS, Okapi and Brassica). During the agricultural season, the number of leaves, rosette period, net weight of dried rapeseed flower bush, frostbite degree, the number of clusters, number of cluster grains, kernel net weight and their grain efficiency are measured and registered. The results depict that there is one percent meaningful significance between cultivation period and all the research variables, except the number of cluster grains. They also indicate the fact that both cultivation period and rapeseed variety acquire one percent correlation with all the aforementioned herbal characteristics, except kernel net weight. The highest frostbite degree (90.09 %) is registered in November the fifth cultivation of Hayola 60. The highest net weight of dried rapeseed flower bush (4.16 grams) belongs to rosette period and the highest number of clusters (95 clusters), the highest cluster grains (24 cluster grains), grain efficiency (4785 kilograms in acre), the highest kernel net weight (4.14 grams) and the highest number of leaves (26 leaves) belong to the Brassica variety of September the fifth cultivation date. According to the results, September the fifth is the ideal cultivation date for rapeseed and Brassicas variety is considered the optimal rapeseed variety. It is indicated that Okapi rapeseed is regarded as the optimal variety against frostbite and cold in late cultivation periods.*

Keywords: *Rapeseed Varieties, Cultivation Date, Grain Efficiency, Cold Resistance*

Damages of herbal hypothermia are categorized under frostbite and freezing damages. The first category emerges in higher temperatures than freezing point, which is the zero centigrade. The second category emerges in lower temperatures than freezing point, which is the zero centigrade. Rapeseed is vulnerable to frostbite and depicts 70% grain efficiency deterioration under hypothermia. Such deterioration is more radical in non-irrigated plants in comparison with irrigated ones (Roy and Basu, 2009). In freezing circumstances, hypothermia impacts various herbal parts such as rhizome and torque, resulting in the plant death (Pasban Eslam, 2011). There is negative correlation between comprising parts of grain efficiency, which includes the number of clusters and the number of grain clusters (Novivhiene, 2012). The results of numerous studied depict that frostbite acquires no significant impact on deterioration of the number of leaves of the main branch and the number of cluster grains; however, it effects negatively harvest indices and grain efficiency (Pasban Eslam, 2011). Positive correlation between the number of leaves and grain efficiency are recognized by Velicka *et al.* (2010). Roy and Basu (2009) believe that 1.5 grams net weight of dried herbs indicate higher level of cold resistance of that particular herb. In rapeseed, the number of clusters is of utmost importance, since grain efficiency is one of its depending variables. It is a fact that after the flowering stage, the number of leaves deteriorates and therefore, clusters can play a key role in herbal photosynthesis. Generally, lowest kernel weights belong to those herbs with late cultivation dates and low grain efficiency rates (Bhuiyan *et al.*, 2008).

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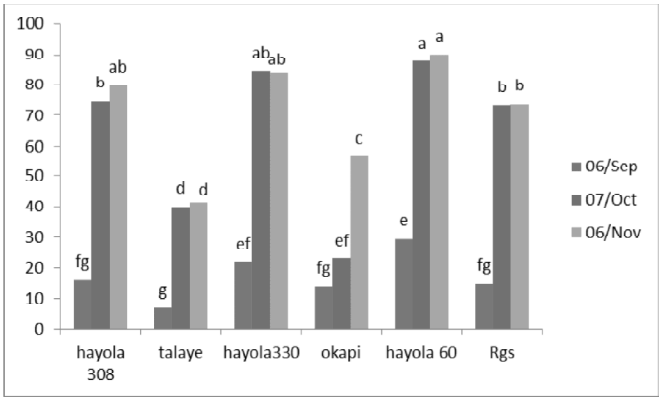
RESEARCH MATERIAL AND METHODOLOGY

The study is rendered as field research in split plots, random blocks and frequency rate of 3 during 2012-2013 agricultural year in Satlu Station of agriculture research and education organization of West Azerbaijan Province. The primary research factor (a) includes 3 cultivation dates (September the fifth, October the fifth and November the fifth) and the secondary research factor (b) comprises rapeseed (Hayola 308, Hayola 330, Hayola 60, RGS, Okapi and Brassica). The study includes 53 split plots. After administration of land preparation stages, 6 rapeseed varieties are cultivated in four line split plots each of which acquires 50 centimeter width and 2 meters length. Considering results of the soil test, 50 kilograms in acre nitrogen as urea fertilizer, 100 kilograms in acre P205 as phosphate ammonium fertilizer and 200 kilograms in acre nitrogen as urea fertilizer of flowering and shooting stages are administered before cultivating rapeseed. Weed extermination is administered in several stages. With average hypothermic circumstance of less than zero centigrade for rapeseed flower bush and 5 centigrade environment temperature, the number of leaves, net weight of the dried herb and the degree of frostbite are measured and registered. During the cultivation season, average rate of the number of clusters, cluster grains, kernel weight and grain efficiency of ten rapeseed flower bush, selected randomly, are measured and registered. Analysis of data variance is administered through utilization of MSTAT-C statistical software and Excel software.

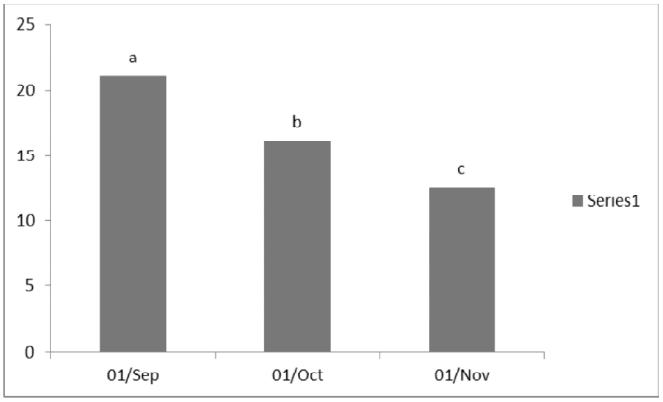
RESEARCH RESULTS AND DATA ANALYSIS

1. Frostbite Degree: The results of data variance (represented in table 1) depict that in one percent p value, there is significant difference between cultivation dates, rapeseed varieties and the corresponding degree of frostbite. Through utilization of Duncan Chart (Graph), average rates are compared and it is indicated that the highest frostbite degree belongs to November the fifth as the cultivation date and Hayola 60 rapeseed variety (90.09). At the same time, the lowest frostbite degree belongs to September the fifth as the cultivation date and Brassica rapeseed variety (6.63). Brassica relative rates are in similar statistical category of Okapi and RGB varieties. In late fall cultivations, due to radical environmental hypothermia and deterioration of temporal sufficiency of enzymatic activities and preparation of meristemic grain deposits, the pace of photosynthesis and the number of rapeseed flower bushes decrease considerably (Anurag *et al.*, 2004).



Graph 1: Comparison of Average Efficiency Rate of Treatment Composite of Cultivation Date and Rapeseed Variety on Frostbite Degree

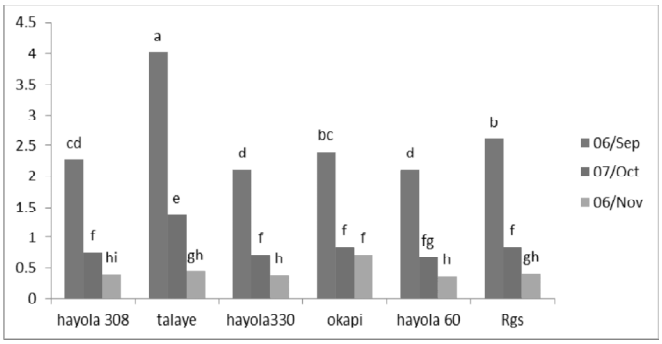
2. Number of Leaves: Table of the data variance (table 1) depicts that cultivation date and rapeseed variety acquire significant efficiency on the number of leaves in one percent p value; however, corresponding correlation of treatment composites are not significant. The first cultivation date and November the fifth acquire the highest (22 leaves) and lowest (13 leaves) number of leaves (represented in graph 2). The results indicate that degree of frostbite acquires significant efficiency on the number of leaves of the main branch (Novickiene *et al.*, 2012).



Graph 2: Comparison of Average Efficiency Rate of Treatment Composite of Number leave of Rapeseed Variety and Frostbite Degree

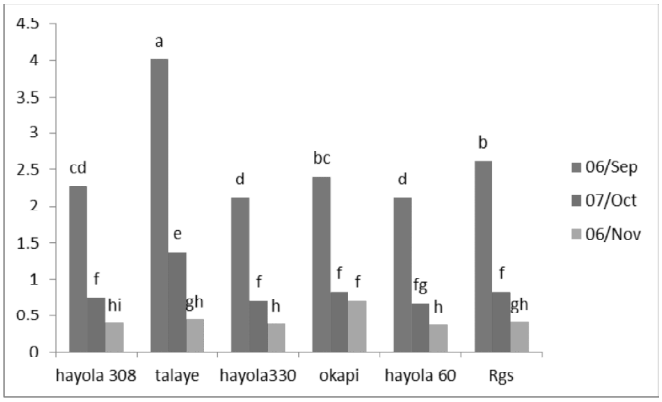
3. Net Weight of Dried Rapeseed Bush in Rosette Stage: The results of data variance (table 1) depict that there is significant correlation and difference between cultivation dates, rapeseed varieties and their corresponding efficiency on the net weight of dried rapeseed bush in one percent p-value. Comparison of research results through utilization of Duncan Chart (Graph 3) indicates the fact that September the fifth acquires the highest net weight

rate of dried Brassica rapeseed (4.16 grams) and November the fifth acquires the lowest net weight of dried Hayola 60 rapeseed (0.37 grams). Resulted net weight deterioration of late cultivation dates is due to the fact that freezing hypothermia of herbal rhizome and stem deteriorate growth and subsequently, results in plant death (Pasban ERslam, 2011).



Graph 3: Comparison of Average Efficiency Rate of Treatment Composite of Cultivation Dates, Rapeseed Variety and Net Weight of the Dried Plant in the Rosette Stage

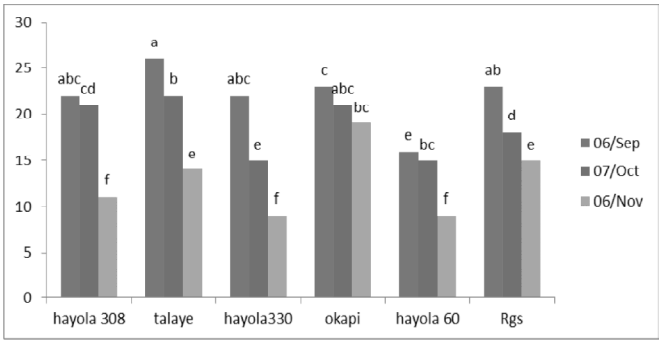
4. The Number of Cluster: The results of data variance (table 1) indicate that in p-value of one percent, there is significant difference between cultivation dates, rapeseed variety, corresponding efficiency of cultivation dates and rapeseed variety and the number of clusters. Comparison of research results through utilization of Duncan Chart (Graph 4) indicates the fact that highest number of clusters (95 clusters) is materialized in September the fifth as the cultivation date of Brassica rapeseed and lowest number of clusters (10 clusters) is materialized in November the fifth as the cultivation date of Hayola 330 rapeseed. Resulted late cultivation dates from immature flowering period deteriorate the number



Graph 4: Comparison of Average Efficiency Rate of Treatment Composite of Cultivation Dates, Rapeseed Variety and the Number of Clusters

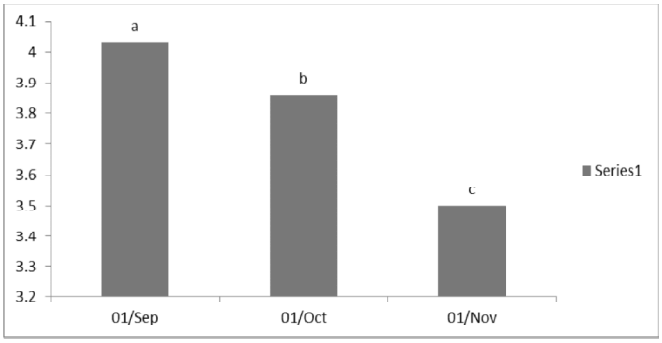
of mature branches of the bush and subsequently, decrease the number of clusters (Azimi *et al.,* 2012).

5. The Number of Grain Clusters: The results of data variance (table 1) depict that in p-value of one percent, there is significant difference between corresponding efficiency of cultivation dates, rapeseed varieties and grain clusters. Comparison of research results through utilization of Duncan Chart (Graph 5) indicates the fact that highest number of grain clusters (26 grain clusters) is materialized in September the fifth as the cultivation date of Brassica rapeseed and lowest number of grain clusters (9 grain clusters) is materialized in November the fifth as the cultivation date of Hayola 60 rapeseed. Resulted late cultivation dates from immature flowering period and decrease of carbohydrate and mineral materials deteriorate the number of cluster grains. Such circumstances are due to the radical hypothermia and concurrence of seeding stages with the warm spring climate (Turhane *et al.,* 2011).



Graph 5: Comparison of Average Efficiency Rate of Treatment Composite of Cultivation Dates, Rapeseed Variety and the Number of Grain Clusters

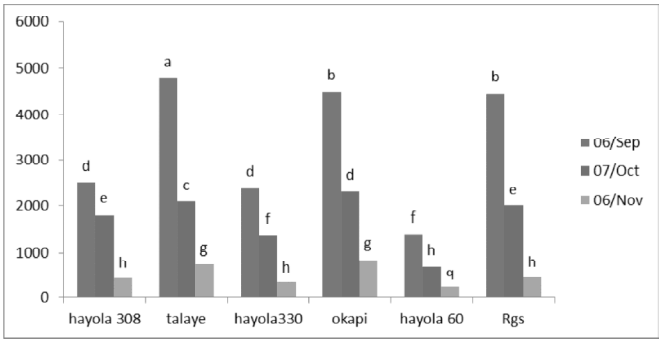
6. Kernel Weight: The results of data variance (table 1) depict that in p-value of one percent, there is significant difference between corresponding efficiency of cultivation dates, kernel weight and rapeseed varieties. However, there is no particular corresponding correlation between cultivation dates and kernel weights. Considering average comparison graph of cultivation dates (Graph 6), it is indicated that highest kernel weight (4.03 grams) is materialized in September the fifth as the cultivation and lowest kernel weight (3.5 grams) is materialized in November the fifth as the cultivation date. During cultivation season, low temperature circumstances and high temperatures in the flowering period result in deterioration of the number of clusters in immature reproductive stages and assimilate movements to grains. Such agricultural conditions are materialized



Graph 6: Comparison of Average Efficiency Rate of Treatment Composite of Cultivation Dates and Kernel Weights

in low kernel weights, brittle grains and deteriorated grain efficiency (Armin *et al*., 2013).

7. Grain Efficiency: Considering utilization of average rate comparison test under one percent p-value (represented in table 1) for the results of analysis of data variance, corresponding statistics of grain efficiency of cultivation dates and rapeseed variety, it is deduced that the highest grain efficiency rate belongs to September the fifth as the cultivation date of Brassica rapeseed (4785 kilograms in acre) and the lowest grain efficiency rate belongs to November the fifth as the cultivation date of Hayola rapeseed (212 kilograms in acre) (Graph 4-22). Late cultivation dates results in exposure of seeding and flowering stages to the terminal heat of the season and deteriorates grain efficiency subsequently (Turhan *et al*., 2011). Ahmadpouri *et al.* (2014) regards lack of mature growth and winter preparation of rapeseed as the main reasons for deterioration of grain efficiency.



Graph 7: Comparison of Treatment Composites of Cultivation Dates, Rapeseed Variety and Grain Efficiency

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