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ORIGINAL ARTICLE

Remobilization of Stem Reserves in Wheat Genotypes under Normal and Drought Stress Conditions

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ABSTRACT

In order to evaluate the remobilization of presorted assimilates to the grains in 5 wheat cultivars, an experiment was conducted in randomized complete blocks design under irrigated and drought stress at Islamic Azad University in 2009-2010 cropping years. The results of analysis of variance showed significant difference in 0.01 percentage level for all traits. Also interaction between genotypes and environment was not significant for any trait. Results showed that the Seimareh genotype had more value of remobilization in stress than normal condition. Also Seimareh genotype has more efficient carbohydrates transport in the stress condition. Finally Seimareh figures with excellence in terms of normal stress to the highest levels of stress in terms of spatial material were stored.

Key words: Drought Stress, remobilization, Stem reserves, Wheat.

Introduction

Wheat production in Mediterranean region is often limited by sub-optimal moisture conditions. Visible syndromes of plant exposure to drought in the vegetative phase are leaf wilting, a decrease in plant height, number and area of leaves, and delay in accuracy of buds and flowers [9]. Drought tolerance consists of ability of crop to growth and production under water deficit conditions. A long term drought stress effects on plant metabolic reactions associates with, plant growth stage, water storage capacity of soil and physiological aspects of plant. Drought tolerance in crop plants is different from wild plants. In case crop plant encounters severe water deficit, it dies or seriously loses yield while in wild plants their surviving under this conditions but no yield loss, is taken into consideration. However, because of water deficit in most arid regions, crop plants resistance against drought, has always been of great importance and has taken into account as one of the breeding factors [9].

One of the strategies for achieving acceptable yield under drought stress in wheat can be used to transport grain carbohydrates. When the stress of photosynthesis after pollination stops, photoassimilates produced before flowering, are gaining more importance, because a lot of grain growth by subsequent transfer of stem reserves to grain supply is being developed [2]. Estimation of stem reserve contribution in yield formation in different experiments and studies due to environmental conditions and application of different wheat varieties varies from 6 to 100 percent have been different [2]. Drought resistant varieties with more storage capacity and efficiency of photoassimilate more transmission resources are under stress [1,5]. Drought by creating this premature aging mobility WSC stimulates stem [6,10] and transfer this successfully for selecting varieties resistant to drought stress has been used in the terminal [7]. This study reviews the amount of

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remobilization of stem reserves in some wheat cultivars under optimal and drought conditions were implemented.

Material and methods

The present work was carried out at the agriculture research center, Islamic Azad university, Ardabil branch, Ardabil, Iran, in 2008-2009 cropping year using 25 Iran and Azerbaijan oriented durum wheat cultivars, arranged as randomized complete block design (RCBD) under irrigated and rain fed conditions with four replications.

Stress treatments included:

1. whole irrigated (100 percent used water based on the plant demand at various growing stages)
2. Limited irrigation (water supply until anthesis and after wards drought employing as water withholding until the end of growing stage).

Each genotype was planted on five rows placed 150 cm apart. Distances between irrigated and drought blocks were 1 m but were 2 m between the two irrigated or drought blocks. Upon the planting, irrigated was performed for whole blocks to moistent soil profile in the rhizosphere of all cultivars to facilitate germination. Irrigation was done as flooding at the harvest time, to prevent border effect, 50 cm of each row from both sides were eliminated to harvest And follow traits were measured:

Storage Material remobilization, Participation of stem reserves in practice, Carbohydrate transport efficiency, stem Special weight in the handle and Stem reserves in transmission efficiency. Data were subjected to analysis by MSTAT-C and Spss16 softwares.

Results

Results showed that the drought stress affected majority of traits (table1).

Combined Analysis of variance showed that condition effects (stress) for the amount of remobilization of stem reserves to grain weight and maturity, especially in the shoot significantly but not significant for other traits. Between varieties in terms of all traits were significant differences at 5% level indicating greater variation among genotypes in terms of specific traits is shooting. Interaction between Genotypes and environment in any of the traits that did not indicate a significant impact on the environment low is the characters. The results showed that the rate of remobilization of stem reserves in stressful environments having significantly more favorable environment (Figure 1). These results was consistent the results of Zhang *et al* [11] and Ahmadi *et al* [1].

According to the Table 2, seen that the Seimareh genotype had more value of remobilization in stress than normal condition. Despite being much greater remobilization of stem reserves in significant environmental stress than normal environment, reducing spikes per unit area due to the significant environmental stress, grain weight per tiller were more favorable than the environment and the participation of stem reserves in significant yield stress environment significantly more of the environment was not desirable. Attribute special weight at maturity shoot under stress; significantly lower than normal conditions (Figure 1). These findings were matched with the results of Ehdaei *et al* [4].

As seen in Table 2, Seimareh genotype has more efficient carbohydrates transport in the stress condition. Ahmadi *et al* study [1] as only two digits of the four varieties under drought stress in the more efficient transfer of this material had to shoot. So we can conclude that this material transfer desirable moisture conditions also play an important role in grain yield. However, that the Seimareh genotype has more participation percent in the performance of stocks shoot weight and shoot, especially in stressful situations to handle in normal conditions and this can be thick with the stem diameter was justified and show the figure of resistance to plant conditions Stress.

This study results showed that stress condition effects on various indicators remobilization not the same. No drought impact on some indicators can be reduced because of storage in assimilates result resource constraints and reduced plant density and result in increased grain weight per plant is under drought stress.

Incidence of diseases such as rust from the photosynthetic efficiency of the current favorable environment, moisture can also reduce interference with the land and to compensate for the effect of drought. Variation among genotypes in terms of traits related to remobilization opportunity genotypes with high capacity allows this transfer.

It should be mentioned, in genotypes as Mv17 Despite high remobilization and thus relatively high share of stem reserves in grain weight due to having particularly high stem remobilization efficiency was very low, while the performance index in the transfer of reserves this weakness stems not and better indicators to measure the performance of this transition appears.. Finally Seimareh figures with excellence in terms of normal stress to the highest levels of stress in terms of spatial material were stored.

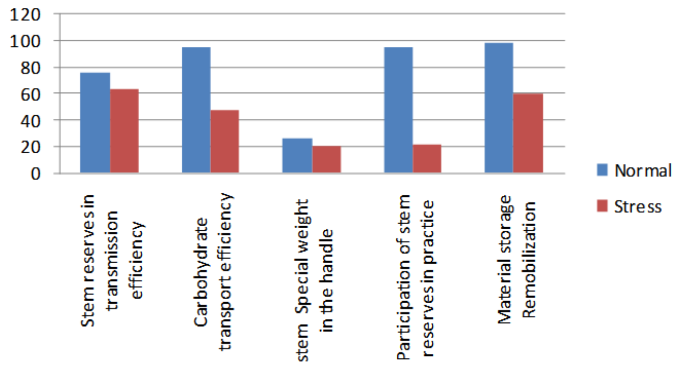

Fig. 1: Effect of drought stress on traits related to remobilization in 5 cultivars.

Table 1: Results of analysis of variance.

		MS				
SOV	Df	Participation of stem reserves in practice	Material storage Remobilization	Carbohydrate transport efficiency	stem Special weight in the handle	Stem reserves in transmission efficiency
Condition	1	-	**	-	**	-
Error	4	9.98	210.26	168.48	10.84	6.59
Genotypes	5	**	**	**	**	**
E×G	5	-	-	-	-	-
Error	20	32.65	449.87	57.89	6.78	19.85
CV (%)	-	18.97	12.98	19.48	8.41	15.78

Table 2: Mean Comparison of traits related to remobilization

		Material storage Remobilization (mg)		Participation of stem reserves in practice (%)		stem Special weight in the handle (mg/cm)		Carbohydrate transport efficiency (%)		Stem reserves in transmission efficiency (%)	
No	Genotype	Normal	Stress	Normal	Stress	Normal	Stress	Normal	Stress	Normal	Stress
2	Kaspard	194	178	10.02	8.4	15.8	17.9	19.3	16.7	17.3	14.8
3	seimareh	287	349	14.2	15.4	16.9	18.4	20.1	23.4	22.4	21.9
4	sardari	483	422	23.3	17.8	15.7	19.5	32.4	21.6	31.6	28.9
5	cascogne	407	327	16.7	13.5	24.8	25.7	18.9	17.4	23.7	20.01

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