Plant Archives Vol. 19, Supplement 1, 2019 pp. 142-145 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

STUDY OF CERTIFIED WHEAT (*TRITICUM AESTIVUM L.*) CULTIVARS RESPONSE TO DIFFERENT PLANTING DATES TO EVALUATE THE ACTIVE PRODUCTS AND YIELD

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Abstract
Planting dates are very important in agriculture because of related to temperatures throughout the wheat growing season. Thus, wheat cultivars should be chosen which fit the best planting date to reach the optimum yield. Therefore, this study aimed to choose the best certified cultivars that can be planted in best sowing date depending upon the global changing in Thi-Qar area in southern Iraq to get the optimum yield of grain yield and protein as active product. Four certified cultivars of wheat (Bohoth 22, Al-Rasheed, Tamooz 2 and Iraq) were planted in four sowing dates (1st Nov., 20th Nov, 10th Dec. and 30th Dec.) that arranged in factorial experiment by using randomized complete block design in three replicates. Bohoth 22 cultivar produced the highest grain yield in the second planting date as well as Iraq cultivar gave the highest protein percentage in the second planting date. Throughout the results of this study, it is clear to understand that all cultivars might be chosen and planted in all planting date in study area because stability of production under the sever environmental conditions.

Key words: Wheat, Cultivars, Planting dates, Active products

Introduction

Wheat (*Triticum aestivum L.*) is the most important world strategy crop, where the cultivated area of it is 736.5 million hectares produced 739.9 million ton of grain (FAO, 2017). In addition, its food components values is considered necessary to the human body because its grains contain 63-71% starch, 8-17% protein and water, 2-2.5% cellulose, 1.5-2% fat, 2-3% sugar, and 1.5-2 metal elements as well as gluten protein that it is important in baking industry (Jamali *et al*., 2000). Although the importance of crop as world food, still its production is concern that it is not enough to meet the needs of the food community for many reasons especially concerning the global changing. The good cultivars and environmental conditions such as temperature locate under the crop management in which it is necessary to reach the highest production. The environmental conditions have very special physiological rules in the plant metabolism especially in photosynthesis affecting production (Riaz *et al*., 2010). Manipulating in planting date will gave clear vision about the response of wheat cultivars to the effect of temperature and light to introduce the highest grain yield. Thus, number of tillers and spikes, and spike growth were changed by changing in planting date (Bassu *et al*., 2010; Thiry *et al*., 2002) and the number of seeds per spike reduced at early and late sowing date (Refay, 2011). Delay the sowing date for two weeks lead to reduce 15% from the grain yield, and it reduced to 30% when delay the sowing date for four weeks (Podolska and Wyzińska 2011). Tahir *et al*. (2009) found that the early planting date on 1stDecember significantly gave the highest of grain yield of wheat (4289.54 kg ha^{-1}) compared to the late planting date 30th December (2109.50 kg ha^{-1}) and they mentioned to the Inqlab-91 verity recorded the highest 1000 grain weight in the early planting date 1st December (36.22 g). On the other hand, introducing a new varsities and types is one method to face the global changing especially the high temperature to get best grain production, thus many studies were done in the past to choose the best cultivars under the best environment conditions. Mohammed (2012) mentioned that simito cultivar was significantly superior compared to other cultivars. A study in southern Iraq to compare ten genetic cultivars of wheat found that the cultivar IR98 was the best in most research traits (Al-Taher *et al*., 2015). Al-Salim *et al.* (2015) found in their study about ten genetic soft winter wheat cultivars found that the Egyptian and American cultivar recorded the highest grain yield (4.840 and

4.660 ton ha^{-1}respectively). The study aimed to plant the right cultivar on the right sowing date under Thi-Qar region in southern Iraq to gate the highest grain yield of wheat crop to face the global changing that threaten the human food.

Material and Methods

A field experiment carried out during the winter growing season 2017-2018 in Al-Shatra City, north of Annassariya City (54 km) southern of Iraq, in the field of Organic Fertilizer Preparation Project in Al-Shatra Affiliated to the directorate of Thi-Qar Agriculture. Four certified varieties of bread wheat (Bohoth 22, Al-Rasheed, Tamooz 2 and Iraq) sow in four different planting dates (1st Nov., 20th Nov, 10th Dec., and 30th Dec.) To determined the response the cultivars to changing in time of sowing depending upon the temperature during the growing season to produce the best grain yield and protein percentage. The treatments arranged in factorial experiment by using randomized complete block design in three replicates. The plot area was (3× 2 m), and the cultivars planted in lines within 20 cm distance among lines. After taking samples from the field to analysis the soil characteristics, urea fertilizer (46% N) applied in two times at the planting date and after 30 days from planting date within average 180 kg ha^{-1}, as well as phosphorous fertilizer and potassium fertilizer (42% K) within average 80 and 60 kg ha^{-1} respectively applied at planting date (Jadwa & Saleh, 2013). Ten plants of wheat were took from the middle lines to determine the traits of cultivars studied in this project such as flag leaf area (cm^2), 1000 grain weight (g), grain per spike, biomass and grain yield (ton ha^{-1}), protein percentage in grain. Flag leaf area was determined by using Thomas equation (Thomas, 1975) as shown in bellow:

Flag leaf area= Leaf length (cm)× maximum width (cm) × 0.95.

The data analyzed depending upon the Genestat program, and the treatments means were compared by using the lest significant different (L.S.D.) under the level of probability ($P>0.05$).

Result and Discussion

Weather condition during the growing season

The weather conditions appeared (Table 1) some variation in their rates compared to the prevailing conditions in the area of this study. Thus, the maximum temperature varied from 20.78 to 34.90˚C, and the minimum was from 5.40 to 17.20˚C, and this is accompanied by a decrease in the amount of rainfall that varied from 0.0 to 1.62 mm. in addition, the summation of sunshine throughout the months of crop growing season was 107.02 mj/m^2 and moreover the summation of sunshine during the seeds failing period was approximately 41.14 mj/m^2. Thus, this conditions might have an influence of the behavior of the response cultivars to give the best yield in the best time of sowing especially during the period of emergence, tillering and filling. These stage later will give an indicator about the trend of cultivars and their responses to change in temperature throughout those stage of growth.

Grain yield (ton h^{-1})

The results shown (Table 2) the significant effect of treatments on the grain yield, and the highest number for this trait was recorded by Bohoth 22 cultivar (4.668 ton ha^{-1}) compared to the lowest one (3.773 ton h^{-1}) recorded by Tamooz 2. In addition, the second planting (20th Nov.) date recorded the highest grin yield with an average (5.148 ton ha^{-1}) against the lowest rate (3.530ton ha^{-1}) recorded by the last planting date (20th Dec.). The same effect was observed by the interaction between study factors. The reasons might be to the effect of temperature during the crop growth (Table 1) especially at the late planting date where observed reduction in the maximum and minimum temperatures during vegetative growth. In addition, the influence of rainfall throughout the growing season might be affected on response of cultivars as well as the influence of temperature. This results agreed with (Srivastava *et al*., 2005; Shirinzadeh *et al*., 2017).

Protein yield %

It is clearly to see the significant effect of treatments on the protein yield and the trend of this trail (Table 3), where notes superiority Iraq cultivar significantly and gave the highest protein yield (10.31 %) compared to Tamooz 2 cultivar which recorded the lowest yield with an average (9.95 %). In addition, the second sowing date (20th Nov.) significantly recorded the highest percentage of protein yield (10.67 %) compared to lowest value (9.83 %) that recorded by the forth planting date (30th Dec.). The same tread noticed by the combination treatment where the combination of Iraq cultivar with the second planting date recorded the highest yield of protein (11 %). The late planting dates led to grow plant in high temperature especially during the filling stages (Table 1), thus the plant under this conditions resorts to rapid growth, which affects the yield, and this is what has been done in this study? Shah *et al*. (2006) reported that the early planting date promoted the plant to produce high tiller number, spike tall, biological yield and grain yield for all cultivars compared to late planting dates.

Relationship of FLA with grain yield and protein percentage

To understand the effect of temperatures on growth and yield of grain wheat cultivars and the percentage of protein which consider the main active products to wheat crop, the study of trend of flag leaf area with grain yield and protein percentage should be observed. Thus, the results of (Fig. 1) showed the highly significant correlation between FLA and grain yield (r^2= 0.97) at 0.05of the level of probability of four cultivars under the planting dates. In addition, the linear correlation was recorded between the FLA and protein percentage with an average (r^2= 0.85) for the cultivars under the planting dates of this study. The linear correlation coefficient showed cultivars stability in grain and protein production under different rang of temperatures especially during the filling period and this results agreed with Srivastava *et al*. (2005).

Conclusion

Choosing the best cultivars of red winter wheat to produce the highly active productions such as grain and protein related to environmental changes especially temperatures changing. Thus, determining the sowing planting for the certified cultivars observed in this study and appeared that all cultivars maybe give stability production under all planting dates in this study in the area of study. Despite the superiority of by Bohoth 22 cultivar planted in the second sowing date; however, the trend of the varieties in the production during all planting dates is considered to be not very different and given an acceptable production under the conditions of the study area. To face all the environmental problems, the researchers should be reevaluate the olds knowing such as planting dates, cultivars, plant population, etc.

Table 1 : Weather conditions throughout the months of growing season 2017-2018.

Months of growing season 2017/2018	Rainfall amount mm	Maximum Temperature ºC	Minimum Temperature ºC	Summation of sunshine mj/m2/ month
Oct.	0	34.9	17.2	17.42
Nov.	0.41	26.32	12.39	11.11
Dec.	0	21.34	6.6	11.85
Jen.	0.08	20.78	5.4	12.14
Feb.	0.22	22.96	8.74	13.36
Mar.	0	30.21	13.34	20.68
Apr.	1.62	30.49	15.46	20.46

Table 2 : Effect of planting dates, cultivars and their combination on the grain yield (ton ha^{-1}) in growing season 2017-2018.

Planting dates	Cultivars				Means of planting dates
	Iraq	Tamooz 2	Al-Rasheed	Bohoth 22	
1st Vov.	4.237	3.622	3.192	4.559	3.927
20th Nov.	5.040	4.877	4.996	5.678	5.148
10th Dec.	4.492	3.522	4.256	4.436	4.176
30th Dec.	3.604	3.070	3.447	4.000	3.530
Means of cultivars	4.368	3.773	3.973	4.668	
L.S.D. at 0.05	Combination =**0.**4501		Cultivars =**0.2**250	Planting Dates = **0.2**250	

Table 3 : Effect of planting dates, cultivars and their combination on the protein yield (%) in growing season 2017-2018.

Planting dates	Cultivars				Means of planting dates
	Iraq	Tamooz 2	Al-Rasheed	Bohoth 22	
1st Vov.	10.27	9.86	10.03	9.66	9.95
20th Nov.	11.00	10.50	10.70	10.50	10.67
10th Dec.	10.00	9.46	10.36	9.96	9.95
30th Dec.	10.00	9.97	9.43	9.93	9.83
Means of cultivars	10.31	9.95	10.13	10.01	
L.S.D. at 0.05	Combination = 0.578		Cultivars = 0.289	Planting Dates = 0.289	

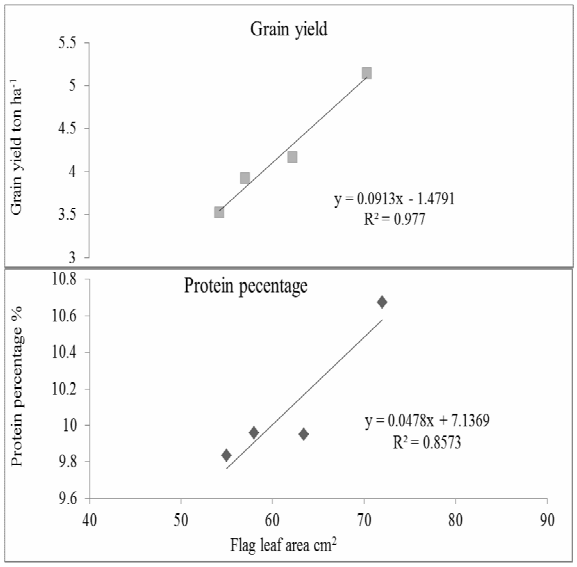

Figure 1 : The relationship of flag leaf area (FLA) with grain yield and protein percentage under different planting dates for four certified cultivars in Thi-Qar area in southern Iraq.

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