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website: http://jsci.utq.edu.iq Email: utjsci@utq.edu.iq

Study of agro behavior technological and selection of seven varieties of durum wheat (*Triticum durum* Dest.) cultivated in zone sub wet (Smar Wad) , Algeria.

Kadhum Hamid Abdul Hussain

Sciense colloge - University of Thi-Qar

Abstract

The objective is to study the behavior of 7 varieties of durum wheat, under sub-humid climate (soft and rainy winter and dry and hot summer) and a clay soil and weak organic matter rates. Among the 7 varieties, 5 are from France and 2 from Algeria. During the vegetation's growth, we studied the biological parameters for each variety in the laboratory of the Institute of Agriculture of Blida (Algeria) in 2005 and the results were interpreted statistically. The best results were given by V2, V3, and V4 in terms of grains number and V5 in terms of quality.

Key words: cereals, varieties, parameters, analyzes, variance

Introduction

Cereals are and will remain for a long time the prevalent cultures in Algeria. Cereals constitute the base of the Algerian food, mainly couscous and bread which occupy a strategic place among the food in this country. The room production is spread out over 3 million hectares over 8 million hectares of the grounds cultivated. 40% is durum wheat and 20% the common wheat. Poor yield obtained since many years have to be increased by progresses in genetic and the improvement of farming techniques. At any time self-sufficiency remains difficult to reach. It is within this framework that this study was carried out and which consists on the adaptability of five varieties of durum wheat with a French origin and two local varieties under agrope-doclimatic conditions of Wad-Smar (Algeria).

The goal of the study is to test the behavior of seven varieties of durum wheat in a sub-humid area with soft and rainy winter and dry and hot summer. The soil is constituted of clay and mud and a weak rate of organic matter

Material and methods

The vegetation used is formed by five varieties of durum wheat from a French origin noted: SD1242(V1), SD1303/7(V2), SD1303/16(V3), SD1306(V4) and 01DSM53(V5) and two local varieties of durum wheat: Vitron (T1) and Chen' S (T2) which are the witnesses. Sowing was carried out in full field under a complete random block with 4 repetitions, each piece measures $12m^2$ and comprises 6 long lines of 10m and spaced 0,20m. The ground has a clayey texture and low organic matter. A phosphatic manure was brought in quantity in 2 quintals per ha during the plough and before sowing one managed 200Kg/ ha, urea 46% and another contribution out of urea was managed with the formation of ears.

Methods

a) Studied parameters:

The parameters studied into full fields during the culture are: the number of the plants per square meter taken after the survey, the number of tiller by plant carried out on 10 plants of each varieties and each piece and the length of ear measured using a rule on 10 plants.

b) Components of the output:

We study the number of ears per square meters, the number of fertile ear by ears on 10 ears, the number of the sterile wear steps ears on 10 ears, the number of seeds by ears, the weight of thousand seeds, the theoretical yield after the formula: Rend.the.=Nb. Ears m^2 X Nb. seeds/ ears X weight thousand seeds = qx/ha. With the end one has to calculate the output real one kg /ha.

c) Physico chemical Parameters:

* Determination of the water content: The water content is determined by drying of 5 grams of the product has a temperature of 130°C and to calculate according to the following formula: H (%)=(m° - m^1) X 100/m°, or m° represents the mass in grams of the catch of tests and m^1 is the mass in grams of the catch of tests meadows drying.

* Rate of scalding:

It is given on a sample of 100 grams seeds for each variety.

- content of mineral matters: It is calculated by the rate of ash obtained by the incineration of a test specimen in an oxidizing atmosphere, has a temperature of 900°C ± 25°C until complete combustion of the organic matter. It is to

express by the following formula: C(%) = m¹ X 100/ m° X 100/100 - H or one noted with: m° mass of the test specimen in grams, m¹ mass of the residue in grams, H = water content expressed as a percentage.

- Content of proteins: Is realized by spectroscopy near infra-red.

* Technological parameters:

- Wet gluten: Is determined by the assistance of the Glutomatic apparatus followed of a washing of the paste with the sodium chloride solution. The wet gluten is to express as a percentage in mass of the product brought back to the dry matter according to the following formula: G H (%) = mh X 10 X 100/ (100 - H) or mh = mass of the wet gluten in grams and H = water content expressed as a percentage.

Result and discussions

1. Analyze of the morphological characters

* Number of plants per square meter:

The settlement is influenced by the amount of sowing, the weight of miles grains, the quality of the seeds, the characteristics of bed of seed and the climatic conditions before and after sowing. According to the results registered in table 01, the density of settlement for all the varieties is lower at the objective of traced settlement which is about 300 feet /m², this can be with the quality of the seeds used but also in the condition of sowing.

Table (1): number of seedlings rose per square meter

Nbr	Codevariety	Average ± ET	GsHs	Proba	ET Res	CV %
V1	SD1242	127,00±39,01				
V2	SD1303/7	144,25±29,88				
V3	SD1303/16	134,50±6,66		0,0682 NS	24,20	18,1
V4	SD1306	121,75±19,61				
V5	01DSM53	121,50±16,15				
T1	VITRON	170,50±13,46				
T2	CHEN'S	115,75±22,44				

Nbr: number , ET Resi : residualy valors , GsHs : homogene group , Proba : probability , CV : variation coefficient , NS: unsignificant , ET: standard deviation THS : very significalty valor

The analysis of the variance reveals that the results obtained are non significant. The greatest density of settlement was record at pilot variety T1

* Numbers tiller by plant: The results relating to the number of tiller by seedlings are record in table 02 and figure 01. The values are statistically equal for the majority of the varieties which shows homogeneity for this parameter. Tiller has a direct effect on the output in the presence of the good conditions of culture, and it also depends on the variety (1).

Table (2): Numbers tiller by plant

Nbr	Code variety	Average ± ET	GsHs	Proba	ET Resi	CV %
V1	SD1242	5,95 ± 0,33				
V2	SD1303/7	5,07 ± 0,09				
V3	SD1303/16	5,48 ± 0,71		0,1009 NS	0,43	7,9
V4	SD1306	5,28 ± 0,31				
V5	01DSM53	5,48 ± 0,52				
T1	VITRON	5,70 ± 0,28				
T2	CHEN'S	5,65 ± 0,22				

Nbr: number , ET Resi : residualy valors , GsHs : homogene group , Proba : probability , CV : variation coefficient , NS: unsignificant , ET: standard deviation THS : very significalty valor

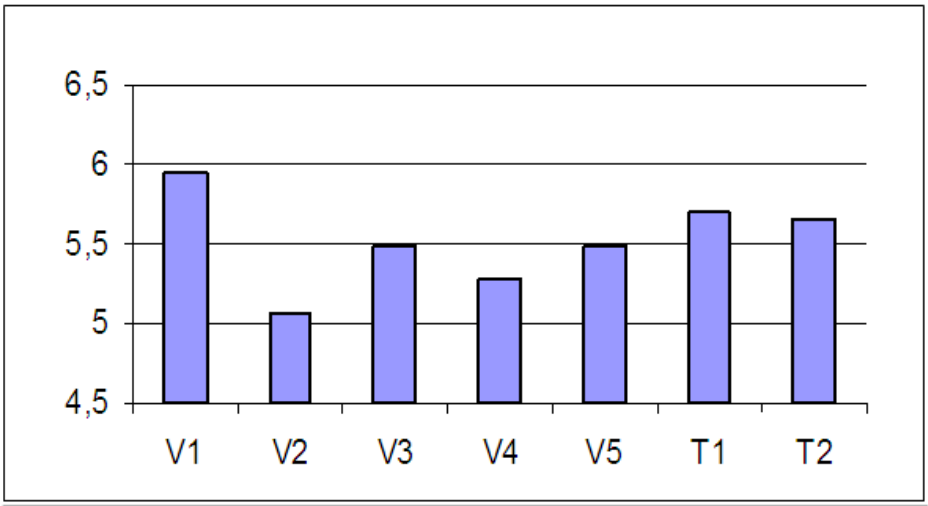

Figure (1): Number of tiller by plant (v: variety)

The analysis of the variance shows a non significant difference between the varieties which were not tested. The greatest number of tiller was recorded at the V1 variety and weakest tiller was at the V2 variety.

* Height of the plants measurements were taken at the flowering time and are presented in table 3 and figure 02. The variation recorded between the highest variety and the smallest one in terms of size, is highly significant. It exceeds 9 cm.

In Algeria, the majority of the cultivated varieties of durum wheat with long straw which is also used as animal feed.

Table (3): Height of the plants at flowering (cm)

Nr	Code variety	Average ± ET	GsHs	Proba	ET Resi	CV %
V1	SD1242	86,39 ± 1,35	AB	0,0001 THS	2,00	2,4
V2	SD1303/7	83,20 ± 2,10	BC			
V3	SD1303/16	85,55 ± 2,14	B			
V4	SD1306	86,88 ± 2,08	AB			
V5	01DSM53	89,79 ± 1,48	A			
T1	VITRON	82,85 ± 2,10	BC			
T2	CHEN'S	80,49 ± 1,54	C			

Nbr: number , ET Resi : residualy valors , GsHs : homogene group , Proba : probability , CV : variation coefficient , NS: unsignificant , ET: standard deviation
THS : very significalty valor

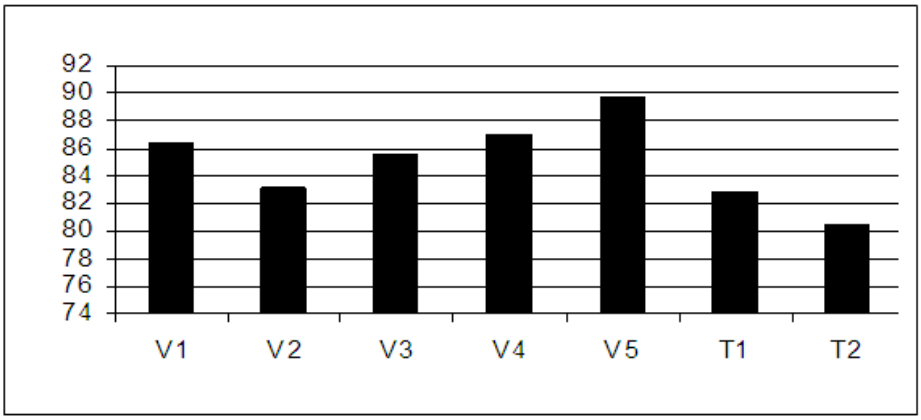

Figure (2): Height of the plants at flowering (cm)

The analysis of the variance shows a very highly significant difference. The test of NEWMANN- KEULS gives us 5 homogeneous groups.

* Length of ear the length of ear for the 7 studied varieties is presented in table 04 and figure 03.

Table (4): Length of the ear (cm)

Nbr	Code variety	Average ± ET	GsHs	Proba	ET Resi	CV %
V1	SD1242	9,28 ± 0,24	A	0,0000 THS	0,40	5,0
V2	SD1303/7	6,90 ± 0,26	C			
V3	SD1303/16	7,11 ± 0,30	C			
V4	SD1306	8,19 ± 0,25	B			
V5	01DSM53	8,70 ± 0,34	B			
T1	VITRON	8,05 ± 0,28	B			
T2	CHEN'S	7,40 ± 0,33	C			

Nbr: number , ET Resi : residualy valors , GsHs : homogene group , Proba : probability , CV : variation coefficient , NS: unsignificant , ET: standard deviation
THS : very significalty valor

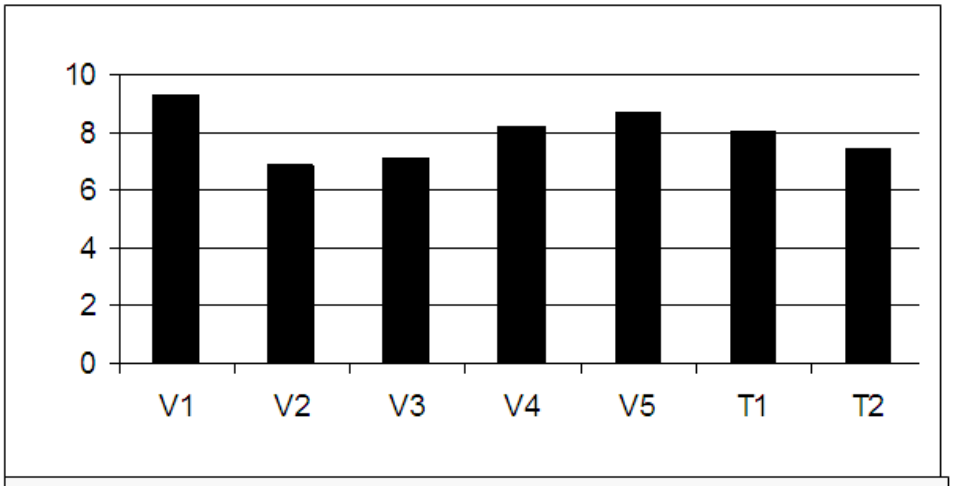

Figure (3): Length of the ear (cm)

The greatest value was recorded at the weakest V1 variety and for the V3 variety. According to SOLTNER (7), the short ear contributes to the limitation of the water losses. One can also note that the length of ear is a varietals characteristic little influenced by the variations of the medium and it is related to the quantity of stored water during the vegetative cycle. The analysis of the variance shows us a very highly significant difference between the varieties tested and the test of NEWMANN and KEULS gives 3 homogeneous groups

2. Analyze components of the output

The components of the output analyzed are presented by average values in table 5.

Table (5): Settlement ear/m2, number of fertile ears /era, number of sterile ears /ear and number of seeds by ear for the 7 studied varieties.

Nr	Code variety	Average ± ET Ear/m²	Average± ET Epillets fertiles	Moy ± ET Epillets stériles	Moy ± ET Seeds/Ear
V1	SD1242	264,50 ± 0,64	22,68 ± 0,24	1,45 ± 0,42	53,92 ± 3,07
V2	SD1303/7	306,00 ± 44,37	18,52 ± 0,49	1,63 ± 0,37	51,50 ± 3,71
V3	SD1303/16	342,00 ± 26,98	19,00 ± 0,59	0,57 ± 0,42	50,22 ± 5,30
V4	SD1306	332,00 ± 19,14	19,80 ± 0,44	0,50 ± 0,37	48,00 ± 2,11
V5	01DSM53	279,75 ± 30,07	20,90 ± 0,30	0,80 ± 0,30	56,05 ± 4,31
T1	VITRON	271,50 ± 10,86	18,32 ± 0,97	0,95 ± 0,19	48,40 ± 4,21
T2	CHEN'S	276,50 ± 22,26	18,33 ± 0,99	0,85 ± 0,13	57,34 ± 4,02
Proba		0,0083 HS	0,0000 THS	0,0000 THS	0,0335 S

Results related to the settlement ear/m2 recorded in table 4 show a highly significant difference for the analysis of the variance. The best settlement was obtained for the weakest V3 variety and for the V1 variety. For the parameter fertile numbers ears/ear, the analysis of the variance shows us a very highly significant difference between the varieties tested. This parameter is a function of the sum of the temperatures between the stage "beginning - tillering" between the duration of the photoperiod and the water supply of the plant (1). For the number of sterile ear per ear, the analysis of the variance gave a difference very highly significant. One can note that a nitrogen deficiency is a hydrous stress at the beginning of growth can cause an increase in the number of sterile ear. In our case, we can note that the sterile ear are located at the base of ear and seldom upwards. For the parameter numbers seeds by ear, the analysis of the variance shows a significant difference between the varieties. The highest value is recorded at the pilot variety T2 and the low value at the variety tested V4. The variation of the number of seed per ear is strongly influenced by the number of ear /m2, the varietal characteristics, the availability out of water and the nitrogenized and phospho-potassic mineral nutrition (1). The results relating to the weight of thousand seeds and the theoretical yield and real are registered in table 6.

Table (6): values of the weight of thousand seeds and the output

Nr	Code variety	Moy ± ET 1000Seeds (g)	Moy ± ET Theoretical yield (q/h)	Moy ± ET Theoretical yield (q/h)
V1	SD1242	36,67 ± 2,46	57,10 ± 7,63	30,20 ± 2,57
V2	SD1303/7	31,69 ± 0,95	49,42 ± 4,46	33,75 ± 1,85
V3	SD1303/16	32,97 ± 2,46	56,18 ± 3,99	35,41 ± 1,89
V4	SD1306	35,76 ± 1,70	56,83 ± 4,52	40,00 ± 3,53
V5	01DSM53	30,03 ± 0,94	47,23 ± 6,42	32,92 ± 2,21
T1	VITRON	35,45 ± 2,46	46,49 ± 4,31	31,67 ± 1,38
T2	CHEN'S	34,42 ± 2,15	54,22 ± 3,77	28,33 ± 3,05
Proba		0,0002 THS	0,0442 S	0,0002 THS

The weight of thousand seeds depends on the phase of seed filling and it is under the dependence of the hydrous food and the surface (3). The analysis of the variance in this case, raises a difference very highly significant. The highest value was recorded at the weakest V1 variety and at the V2 variety. The theoretical yield is related to the intrinsic factors of the variety and it is influenced by the conditions of culture and the conditions climatic (5). The analysis of the variance for the theoretical yield does not show any significant difference between the varieties. One can say that statistically the values are equal and one can conclude that there is homogeneity from the output for all the studied varieties. On the other hand, we can observe a heterogeneity for the real output. The losses recorded with harvest

are due to the reaping-machine threshing-machine, the transport conditions and the frequent attacks of the birds. The analysis of the variance raises us a difference very highly significant.

3. Qualitative analyses of seeds

For the analysis of the quality of seeds one held account of several factors, namely, the water content, the rate of scalding, the content of mineral matter and the content of gluten. The values obtained are recorded in table 7.

Table (7): Qualitative analyses of seeds

Nr	Code variety	H_2O (%)	Scalding (%)	Mineral matter (%)	Gluten (%)
V1	SD1242	10,55	2,30	1,04	33,75
V2	SD1303/7	10,30	2,10	0,94	29,08
V3	SD1303/16	11,00	2,69	0,76	28,48
V4	SD1306	10,30	2,59	0,85	25,07
V5	01DSM53	10,40	4,00	0,87	27,05
T1	VITRON	10,55	3,36	1,09	26,88
T2	CHEN'S	10,50	6,94	0,57	27,11

We notice that the totality of the varieties presents water content almost identical, about 10% what indicates that the seeds are too dry. This is with the delay of the harvest which involved an exaggerated desiccation of seeds. In normal conditions of harvest, the water content must lie between 12 and 14% (3). For the rate of scalding one notices that the majority of the varieties have a rate higher than 2 and the varieties V5 and V7 present high values. This is due to the effects of high temperature which has occurred during the filling of seeds. According to results obtained, one notices that variety T1 shows the highest ash content. It is known that the Algerian corns are characterized by rates of ash raised compared to the European varieties. It should be noted that all the varieties tested of durum wheat, present a high percentage of gluten, which is higher than 15%, which indicates that all these corns are improved and will give pastes of a higher value.

Conclusion

Following the results obtained in vegetation, we notice that the cycle of development is long which indicates a risk of scalding of the seeds which mature at the time of hot summer days. The density of sowing to the lifting showed a non significant difference between the varieties tested which are due to many factors such as the amount of sowing, the weight of thousand seeds, the climatic conditions and the bed of seed. For the number of tiller by plant, we can observe homogeneity for this parameter, whereas the height of the plants has an important heterogeneity. For the length of ear, one recorded a maximum value for the V1 variety and a trifling value for V3. Concerning the number of seeds per ear we found a difference significant between all the varieties. The highest value was recorded at the V2 witness. The water deficit of spring appeared by a reduction in the number of seeds not ear. The variation

of this parameter also depends on the number of sterile ear. The output represents the most important parameter. The theoretical yield presented values higher for all the studied varieties whereas the real output was very different thanks to the water stress recorded at the time from the hydrous stage, thus the V1 variety gave the best output and the pilot V7 variety give most poor yield. On the qualitative level we could arise 2 types of values: the quality of semolina which was evaluated on the basis of water content, the content of protein and the content of gluten. The ash contents highest were obtained at the varieties V6 and V1. The varieties V5 and V2 are resistant to scalding. For the quality of paste, the contents of gluten are satisfactory for all the studied varieties although the V4 variety has a poor quality out of proteins. With the resulting one from our work, from agronomic point of view, we propose for the selection, the varieties, V4, V3 and V2 because they presented a better seed yield and a selection of the varieties V1, V2, V4 and V5 for the quality of their seeds.

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دراسة تقنية السلوك الزراعي وأنتقاء سبعة انواع من حبوب الحنطة الصلبة Triticum (durum Dest.) مزروعة في منطقة شبه رطبة (وادي سمار) الجزائر

كاظم حميد عبد الحسين

كلية العلوم – جامعة ذي قار

الخلاصة

تناولت الدراسة سلوك (٧) انواع من الحنطة (durum) تحت الظروف شبه الرطبة (شتاء معتدل وممطر وصيف حار وجاف) وتربة طينية ذات معدل مواد عضوية قليلة .من بين (٧) انواع (٥) من فرنسا و(٢) من الجزائر . تمت دراسة المقاييس الحيوية خلال مرحلة النمو الخضري لكل نوع في مختبر بليد blida (الجزائر) في سنة ٢٠٠٥ واخضعت النتائج للتحليل الاحصائي .أذ وجد ان افضل نسب انبات كانت للانواع V2 ,V3 ,V4 اما بالنسبة للنوعية فكان النوع V5 من افضل الانواع .