Titre : Effet de deux engrais de fond et des précédents culturaux sur le rendement des semences de multiplication de blé dur (*Triticum durum* Desf.)

Title :Effect of two bottom fertilizers and previous crop on yield of durum wheat breeding seed (*Triticum durum* Desf.)

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Abstract

To improve the yield of durum wheat seed (*Triticum durum* Desf.), seven (07) varieties were grown in an experimental field (Tifech region in Souk Ahras). The study focused on planting the varieties on two cropping precedents (sorghum and fallow grazing), in addition to the use of two bottom fertilizers, one potassic (Fosfactyl) and the other phosho-nitrogen, (DAP).

The analysis of the results showed a clear improvement in grain yields in the varieties harvested from the previous crop (Sorgho) and having received Fosfactyl as fertilizer. The best grain yields were displayed by the Carioca, Boussallem and Sersou varieties.

After harvest; the study of soil parameters of the respective parcels showed soil with a sandy loam texture, with a low organic matter, with a slightly alkaline pH, while being low in salts.
Keywords: durum wheat, yield, soil, fertilization, varieties, crops, previous crop.

Résumé:

Afin d'améliorer le rendement des semences de multiplication du blé dur (*Triticum durum* Desf.), sept (07) variétés ont été cultivées dans un champ expérimental (région de Tifech à Souk Ahras- Algérie). L'étude a porté sur le semis des variétés sur deux précédents culturaux (Sorgho et jachère pâturage), en plus de l'utilisation de deux engrais de fond, l'un potassique (le Fosfactyl) et l'autre phosho-azoté, il s'agit du (DAP).

L'analyse des résultats a montré une nette amélioration des rendements en grains chez les variétés récoltées sur le précédent cultural (Sorgho) et ayant reçues le Fosfactyl comme fertilisant. Les meilleurs rendements en grains ont été affichés par les variétés Carioca, Boussallem et Sersou.

Après récolte ; L'étude des paramètres pédologiques des parcelles concernées a montré des sols avec une texture sable-limoneuse, possédant une faible matière organique, avec un PH légèrement alcalin, tout en étant pauvres en sels.
Mots clés : blé dur, rendement, sol, fertilisation, variétés, précédent cultural.

1. INTRODUCTION

The multiplication of cereals in Algeria is dependent on several abiotic factors (mainly precipitation and soil pedological nature) and biotic (genetic potentialities of varieties), expressed by their phenotypic variation and the difference in their yields. In addition the intervention of farmers by tillage, fertilizer input and phytosanitary treatments greatly influence the production from one year to another. **(Chiahi 2009)**

The fact that professionals in the field, in collaboration with the Ministry of Agriculture and other agencies, are developing new methods such as the concept of viability / vigor of seeds, adaptation to biotic and abiotic stresses, Technological quality and rational fertilization. **(Brinis 2012).**

The difference in agro-climatic zones in Algeria also accentuates the fluctuation of this production from one region to another. This problem is based on the fact that the agro-climatic potentialities are poorly known. It is therefore almost impossible to foresee the crops to be developed in agro-climatic zones. It is equally evident that planning forecasts could be little related to the actual potentialities of these areas**. (Derouiche 2007).**

The production of wheat in Algeria is characterized by very unstable fluctuations. It shows no particular trend, but from the 1994/1995 season onwards it undergoes a more or less linear trend. This sudden trend could be due to one of the two main reasons, namely a marked improvement in rainfall and the adoption of new economic reforms during the period (1989-1995), the repercussions of which can be seen from 1994. **(Kellou 2008).**

But if we analyze the effect of all these factors, we can limit the influence of certain factors where the multiplier can intervene widely and maximize the production of these cereals, namely:

1. Planting of seedlings, with plowing, bottom fertilizers, selection of varieties and their doses of seedlings, cover fertilizers, phytosanitary treatment by the use mainly of herbicides and according to the regions of insecticide and even of fungicide.

2. Apart from these factors, linked to field cultivation, we can also add the seed storage conditions at the C.C.L.S. level. Which we describe as post-harvest factors and which can greatly influence seed viability and vigor.

All these reasons led us to consider how far the multiplier can improve cereal seed production! By adopting a system of cultivation grouping several parameters that it can vary itself.

In order to do this, we decided to install such a system in a region characterized by the production of cereal farming associated with the Tifech region (36˚14 latitude

North and 7˚10 longitude East 25 km Northeast - wilaya of Souk Ahras-Algeria-

2. Material and methods

2.1. Experimentation on field: Description and location of the study site.

A. Geographic location.

The experimental real-life study was carried out at the Yousfi pilot farm in the Souk Ahras region, north-east of Algeria 36˚14 latitude North and 7˚10 longitude East.

Figure N ° 01: Satellite image of the experimental site: Yousfi Tayeb pilot farm - ALGERIA.

The year 2012, date corresponding to the beginning of this thesis and as it was planned in the planning of the tasks and the methodology of the work to be carried out. A field trial involved seeding seven (07) varieties of durum wheat at the pilot farm Yousfi Tayeb of Tifech "Souk Ahras" Algeria.

Seeds of five "05" varieties (Boussallem, Gtadur, Ouarsenis, Sersou and Waha) were delivered to us by the CCLS of Souk Ahras.

Seeds of the local MBB variety were brought back from the CCLS GUELMA, in addition to the Carioca variety seed, which has been proven to be very productive in the region, has been provided by one individual along with one of the bottom fertilizers, DAP (Diamonium of Phosphate).

The seeds of the varieties were sown on two (02) preceding different crops: Sorghum and fallow grazing.

The two neighboring plots simultaneously received two different bottom fertilizers, in addition to the DAP already mentioned, Fosfactyl was used.

2.2. Experimental apparatus.

For more representativeness and less variability, we opted for a BAC in split plot. The area of each large plot (Sorghum and fallow pastures) is:

700 m^2 x 2 =1400m^2

Each variety was represented twice in mini plots with an area of 25m^2. Each mini plot was sown with a dose of 350gr of seeds at the rate of (140kg / ha) arranged on 07 lines. The mini plots were separated by a distance of 01 m.

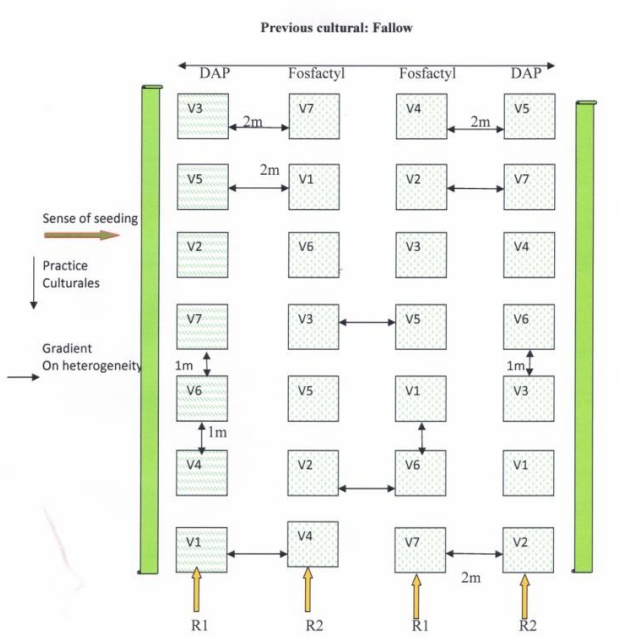

Figure 02: Device of the experimental trial of the previous crop Fallow.

NB : V1 : Boussallem V2 : Carioca V3 : Gtadur V4 : MBB V5 : Ouarsenis V6 : Sersou V7 : Waha

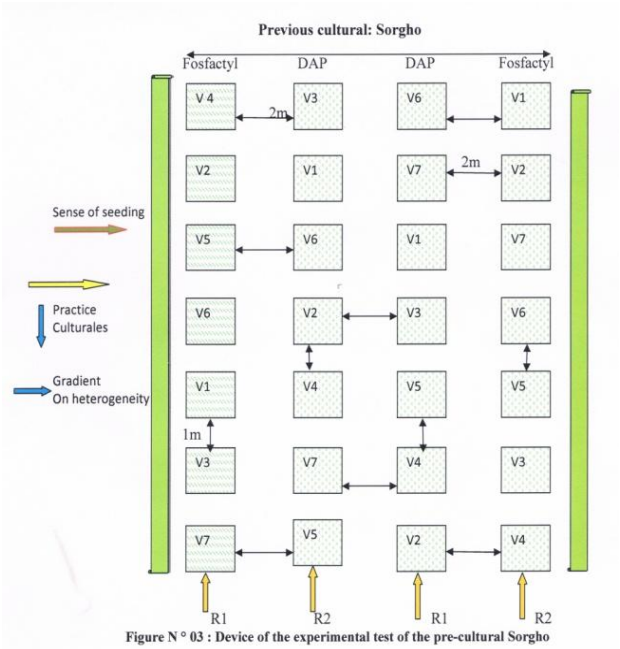

Figure N ° 03 : Device of the experimental test of the pre-cultural Sorgho

NB : V1 : Boussallem V2 : Carioca V3 : Gtadur V4 : MBB V5 : Ouarsenis V6 : Sersou V7 : Waha.

2.3. Conduct of the test

2.4.1. Date of sowing. Planting was carried out respectively on 11 and 12 January 2012 for grazing fallow plot and 15 and 16 January 2012 for the second Sorgho plot.

2.4.2. Phytosanitary treatment:

Treatment of the plots by a mixed weedker DIALEN at the rate of 01 liter / ha.

Plots were treated with the same herbicide (Dialen super) on 02/05/2012 to reduce interactions of other factors.

2.5. Crops.

The harvest was carried out 180 days after sowing, simultaneously for both plots, allowing us to determine the grain weight of each mini plot.

Table 01: Production of the previous plot crop Grain weight: Fallow pasture

Variety / Weight in grains (kg)	Preceding cultural - Fertilizer Fallow / DAP		Preceding cultural - Fertilizer Fallow / Fosfactyl		Preceding cultural - Fertilizer Fallow / Fosfactyl		Preceding cultural - Fertilizer Fallow / DAP	
	V3	2,7	V7	**4,8**	V4	3,2	V5	4,2
	V5	3	V1	**5,9**	V2	**6,9**	V7	3,8
	V7	3,7	V6	4,4	V3	3,2	V4	1,8
	V2	**7,3**	V3	4,9	V5	3,4	V6	**5,2**
	V6	4,1	V5	**6,8**	V1	**6,2**	V3	2,8
	V4	3,8	V2	4,6	V6	**5,8**	V1	**6,3**
	V1	**5,8**	V4	2,2	V7	2,4	V2	**5,9**

Table 02: Production plot preceding crop: Sorghum.

Variety / Weight in grains (kg)	Preceding cultural - Fertilizer Sorghum / Fosfactyl		Preceding cultural - Fertilizer Sorghum / DAP		Preceding cultural - Fertilizer Sorghum /DAP		Preceding cultural - Fertilizer Sorghum / Fosfactyl	
	V4	**5,9**	V3	4,6	V6	**6,2**	V1	**7,7**
	V2	**8,3**	V1	**6,8**	V7	**5,9**	V5	**5,4**
	V5	**5,4**	V6	**7,3**	V1	**7,9**	V7	**6,2**
	V6	**6,1**	V2	**9**	V3	4,9	V6	**6,5**
	V1	**7,2**	V4	**6,1**	V5	**5,1**	V2	**10,2**
	V3	4,9	V7	**5,1**	V4	**5,1**	V3	**5,1**
	V7	4,4	V5	4,8	V2	**7,4**	V4	4,8

3.6. Statistical analysis.

Interpretation of the harvest results was performed using Statistical Analysis System (SAS) software version 9.

4. Results and Discussion.

3.1. Yield on previous crops.

Table 03: The difference in the grain yields of the previous crops.

Alpha			0.05
Error Degrees of liberty			26
Critical value of t			2.05553
Smallest significant difference			0.5518
Averages with the same letter Are not very different.			
T Grouping	Average	Nb	Prec Cult
A	6.2250	28	Sorghum
B	4.4679	28	Fallow

The statistical treatment shows the clear difference in the crop on the two preceding crops; In fact, the crop on the previous crop (Sorgho) with an average of 6.22Kg (24.88 qx / ha) was better than that recorded on the previous crop (pasture fallow) with only an average around 4.50 kg (18qx / ha). This difference may be due to a few factors, mainly related to the cultivation of Sorghum, among them: at.

a. The cultivation period of Sorghum grown in warm weather, lack of precipitation and lack of irrigation prevents nitrogen leaching **(Brisson et al., 2007).** So the mineralization of the soil in full drought does not favor the absorption of all the available nitrogen, which leads to the enrichment of the soil by this mineral.

b. The behavior of sorghum in rotation: It has a greater nitrogen supplement than in the case of maize, the straws of all crops are recycled.

c. The photosynthetic nature of the plant such as corn, sorghum is a C4 plant that allows it to unfold its photosynthetic system and thus its metabolism during dry periods or the tolerance of C3 plants by closing of stomata and decreased absorption, induces side effects **(Brisson et al., 2007).**

3.2. Yield with fertilizers.

Table N 04: Difference in grain yields with bottom fertilizers.

Alpha	0.05
Error Degrees of liberty	2
Middle Square Error	0.071429
Critical value of t	4.30265
Smallest significant difference	0.3073

Averages with the same letter Are not very different.			
T Grouping	Average	Nb	Fertilizer
A	5.45714	28	Fosfactyl
A			
A	5.23571	28	DAP

Regarding fertilizer, although the grain yield harvest after the use of both fertilizers was almost similar, the plots receiving Fosfactyl recorded a slightly higher crop with an average around 5.50kg (22qx / ha) than that obtained on plots that were fertilized by DAP, although the statistical treatment could not detect a significant difference in the harvest between plots that had been fertilized differently. In the field it was remarkable, the plots with Fosfactyl were better than those with the DAP. This slight difference

could be due to the variation in the mineral composition of the two fertilizers. On the one hand, Fosfactyl contains potassium K, in spite of the fact that the wheat has little need for this element. mobile (K + ion) dissolved in intracellular fluid (especially in the vacuole) plays extremely important roles in the plant, such as the maintenance of osmotic pressure in the turgid vacuoles, and in some cases decreases, reducing sweating.

The risk of wilting (**Soltner 2005).** This clearly proves its relation with the hormonal action of ABA (abscisic acid) in tolerance to certain abiotic stresses, such as water deficiency or cold **(Gravot 2009).** On the other hand, Fosfactyl contains sulfur (S) and wheat crops require such an element for good growth **(Mallarino et al., 1999).**

3.3. Variety yield.

Table 05: The difference in the yields of the preceding crop: fallow.

Alpha				**0.05**	
Error Degrees of liberty				12	
Middle Square Error				1.521429	
Critical value of t				2.17881	
Smallest significant difference				1.9003	
Averages with the same letter Are not very different.					
T Grouping			**Average**	**Nb**	**variety**
	A		6.1750	4	V2
	A				
	A		6.0500	4	V1
	A				
B	A		4.8750	4	V6
B	A				
B	A	C	4.3500	4	V5
B		C			
B		C	3.6750	4	V7
B		C			
B		C	3.4000	4	V3
		C			
		C	2.7500	4	V4

For the behavior of the varieties we obtained three groups of varieties according to their harvest (weight of their grains).

Group Carioca (V2) and Boussallem (V1), which showed the best weights, especially the Carioca variety with 7.45 Kg (30 qx / ha), could qualify it by variety of very good yields in grains.

Second group: These varieties were followed by Sersou and Ouarsenis with good yields of around 6.72 kg (27 qx / ha) and 5.70 kg (23 qx / ha).

Finally, the other varieties can be classified in the last group (3rd) which showed average yields, Waha, Gtadur and MBB which did not even reach 4.20 kg (17qx / ha).

3.4. Difference in yields in the previous crop fallow.

Concerning the behavior of the varieties on each previous crop as well as the influence of the fertilizers on the crops, always announce the same result and which is the low yield in grains recorded on the previous crop fallow and with the same classification of the varieties (in three groups); The best yields at Carioca and Boussallem around 6.1kg (24.40 qx / ha) followed by the Sersou and Ouarsenis varieties with weights of around 4.50 kg (18 qx / ha) and finally the varieties Waha, Gtadur and MBB displayed the weights the weakest grains not even reaching 3kg (12qx / ha).

Table 06: The difference in grain yields of varieties.

Alpha				0.05
Error Degrees of liberty				26
Middle Square Error				1.008736
Critical value of t				2.05553
Smallest significant difference				1.0322
Averages with the same letter Are not very different.				
T Grouping		Average	Nb	variety
	A	7.4500	8	V2
	A			
B	A	6.7250	8	V1
B				
B	C	5.7000	8	V6
	C			
D	C	4.7625	8	V5
D				
D		4.5375	8	V7
D				
D		4.1375	8	V3
D				
D		4.1125	8	V4

3.5. Difference in yields between fertilizers on fallow.

For the fertilizer the yield with the application of the Fosfactyl slightly exceeds that of the parcel (sorghum) having received the DAP, with 4.60kg (18.40) qx / ha.

Table 07: Difference in yields between fertilizers on: Fallow pasture.

Alpha	0.05		
Error Degrees of liberty	2		
Middle Square Error	0.228929		
Critical value of t	4.30265		
Smallest significant difference	0.7781		
Averages with the same letter Are not very different.			
T Grouping	Average	Nb	Fertilizer
A	4.6214	14	Fosfactyl
A			
A	4.3143	14	DAP

4.6. The yield in the pre-crop Sorghum.

Table 08: The difference in the yields of the varieties in the previous crop: Sorghum.

Alpha			0.05
Error Degrees of liberty			12
Middle Square Error			0.547857
Critical value of t			2.17881
Smallest significant difference			1.1404
Averages with the same letter Are not very different.			
T Grouping	Average	Nb	variety
A	8.7250	4	V2
B	7.4000	4	V1
B			
B	6.5250	4	V6
D	5.4750	4	V4
D			
D	5.4000	4	V7
D			
D	5.1750	4	V5
D			
D	4.8750	4	V3

While the best grain weights were recorded on the previous crop (Sorgho) and still in the Carioca V2 variety, which stands out in a separate group with 8.72 kg (35qx / ha) followed by the 2nd group with the same varieties Boussallem V1 With 7.40 kg (30 qx / ha) and Sersou V6, the third group

with average harvests of the same MBB, Waha and Gtadur varieties.

4.7. Yields with sorghum fertilizer

Table 09: Differences in yields with sorghum fertilizers

Alpha			0.05
Error Degrees of liberty			2
Middle Square Error			0.540357
Critical value of t			4.30265
Smallest significant difference			1.1954
Averages with the same letter Are not very different.			
T Grouping	Average	Nb	Fertilizer
A	6.2929	14	Fosfactyl
A			
A	6.1571	14	DAP

Again, the difference between yields does not appear with the application of the two fertilizers but always with the classification of Fosfactyl first with 6.30 kg (25.20 qx / ha) followed by DAP with 6.16 kg (24.64 qx / ha).

5. CONCLUSION.

In order to improve durum wheat in the cereal area at the Yousfi Tayeb Tifech pilot farm (Souk Ahras- Algeria), planting of seven (07) varieties on two previous crops (Grazing Fallow and Sorghum) Of the use of two fertilizers, one potash: Fosfactyl, the other binary (phospho-nitrogen): the DAP led to different crops between varieties and plots.

By comparing the average of the grain yields of the varieties, we have deduced the following results:

at.

a. The difference in grain yields on the two preceding crops or the best grain yields were displayed on the previous Sorghum crop.

b. No differences in yields were found between the yields of the varieties with the incorporation of the two fertilizers, although the classification of the varieties was better following the fertilization by Fosfactyl, noted both in the set (of the two Previous crops) than within each plot.

c. A clear difference between the grain yields of the varieties, with a sometimes similar behavior towards the influence of the two factors of variation, previous crop and bottom fertilizer, a behavior that can be explained by:

d. The superiority of certain varieties introduced mainly Carioca, followed by Sersou (Simeto) and Ouarsenis (Ofanto).

e. In addition to its superiority, the local variety Boussallem showed a very good regularity in its yield, both on the two plots (previous crops) and in each plot with the implication of the influence of the fertilizer.

f. The introduced varieties Waha, Gtadur and especially the MBB variety showed the lowest grain yields.

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