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2.3 EXPERIMENTAL RESULTS OF VARIETIES, RATE OF SEEDING AND FERTILIZATION  
OF DURUM WHEAT UNDER RAINFED CONDITIONS IN ALEPPO, NORTH SYRIA

by

A.N. Zein El-Abidien  
Professor of Soil Science

and

N. Baghdash  
Agronomist  
Faculty of Agriculture, Aleppo University  
Aleppo, Syria

SUMMARY

Four durum wheat varieties were compared at the Research Center of the Faculty of Agriculture, near Aleppo, Syria, at seed rates ranging between 75 and 150 kg/ha, and at three fertilizer treatments, N<sub>1</sub> (50 kg N/ha), N<sub>1</sub>P (50 kg N/ha and 60 kg P<sub>2</sub>O<sub>5</sub>/ha) and N<sub>2</sub>P (100 kg N/ha and 60 kg P<sub>2</sub>O<sub>5</sub>/ha). Jori C69 gave significantly higher yields than any of the other varieties tested. As regards the other factors studied, it was concluded that 150 kg seed/ha, 50 kg N/ha and 60 P<sub>2</sub>O<sub>5</sub>/ha could be recommended for conditions similar to those of Aleppo area.

1. INTRODUCTION

Syria has been a producer and exporter of durum wheat. Recently high yielding aestivum wheat varieties compete with durum wheat. However, in the semi-arid areas of Syria aestivum wheat does not give good yields and more attention should be given to durum wheat. Recently developed high yielding lines should be introduced and screened in Syria.

From studies on rainfed agriculture carried out in Syria during 1964 to 1968, Loizides found that it was not profitable to fertilize wheat after fallow in a lentils-fallow-wheat rotation. He recommended 28 kg N/ha. In later studies Qunbur et al. during 1973-74 recommended 40 kg N/ha and 40 kg P<sub>2</sub>O<sub>5</sub>/ha for wheat grown after lentils. For the short durum wheat varieties Jori C69 and Giorgio 331 they recommended 89 kg N and 76 kg P<sub>2</sub>O<sub>5</sub>/ha.

The aim of this study was to compare four wheat varieties under three fertilizer regimes and three seed rates over a period of three years under rainfed conditions.

2. MATERIALS AND METHODS

Four durum wheat varieties, Jori C69 introduced from CIMMYT, Giorgio 331 introduced from Italy, Senator Capelli, an Italian variety widely grown in Syria, and Hamari, a local variety, were tested at three fertilizer regimes, namely N<sub>1</sub> (50 kg N/ha), N<sub>1</sub>P (50 kg N/ha and 60 kg P<sub>2</sub>O<sub>5</sub>/ha) and N<sub>2</sub>P (100 kg N/ha and 60 kg P<sub>2</sub>O<sub>5</sub>/ha). The source of N was ammonium nitrate (26 percent N) and that of phosphorus triple superphosphate. In addition, three seed rates were studied, namely 150, 100 and 75 kg/ha in 1975/76 and 1976/77 and 150, 120 and 100 kg/ha in 1977/78.

The 36 factorial combinations of variety, fertilizer and seed rate were in randomized blocks, at the Research Centre of the Faculty of Agriculture at Muslemieh, 18 km NE

of Aleppo in North Syria at 37° 13' E and 36° 20' N and 430 m altitude. Plot size was 2 x 5 m.

The region is semi-arid with mild winters and long, hot summers. Rainfall occurs mainly in winter with some rain in autumn and spring. Annual rainfall ranged from 308 to 458 mm with significant fluctuation in its monthly distribution (Table 1). The experiments were irrigated in 1976/77 and 1977/78 because the spring rainfall was not sufficient for the normal growth of the plants.

Table 1 CLIMATOLOGICAL DATA RECORDED AT MUSLEMIEH RESEARCH CENTRE, ALEPPO, 1975-78

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Total
<u>1975/76</u>										
Min. temp. (°C)	8.5	4.5	-0.9	0.9	-0.2	2.6	7.7	11.0	16.6	458
Mean temp. (°C)	17.5	11.3	4.3	5.3	4.3	8.7	13.5	18.9	24.5	
Rainfall (mm)	28	63	56	71	59	71	45	65	-	
Evaporation (mm)	152	75	28	25	42	68	90	152	330	
<u>1976/77</u>										
Min. temp. (°C)	10.9	4.5	3.1	-2.1	2.3	3.3	6.9	11.5	16.8	308
Mean temp. (°C)	18.7	12.1	7.3	3.2	9.4	9.8	14.6	20.2	25	
Rainfall (mm)	59	18	62	31	18	53	39	28	-	
Evaporation (mm)	152	69	31	53	70	108	141	263	402	
<u>1977/78</u>										
Min. temp. (°C)	6.5	3.2	2.0	2.8	3.1	4.2	7.0	11.4	15.8	339
Mean temp. (°C)	15.7	11.5	6.3	6.5	8.2	11.0	14.6	21.8	25.3	
Rainfall (mm)	37	-	105	108	59	15	12	3	-	
Evaporation (mm)	183	96	37	31	59	112	162	310	423	

The soil was reddish brown, clay to clay loam, deep, granular, with pH 8.2. Total calcium carbonate content varied from 25 to 35 percent, increasing with depth.

Sowing was done on 12 November 1975, 25 December 1976 and 1 December 1977. Emergence was completed in 10-12 days because in all years rains followed sowing. Row spacing was 20 cm.

All phosphate fertilizer and half the nitrogen were applied before sowing, and the other half of nitrogen at tillering stage in March. Weeds were controlled by hand.

Data were recorded on emergence, plant height, tiller, number, heading, maturity, grain and straw yield and morphological characteristics of spikes and grains. Nitrogen and P content was determined at tillering stage and N content at maturity. Also available phosphorus and total N in the soil were determined before sowing and after harvesting.

### 3. RESULTS

Jori C69 and Hamari flowered 7-10 days earlier than Giorgio 331 and Senator Capelli. Early flowering varieties matured earlier than late flowering ones. In 1975/76, flowering of all varieties was delayed compared to the other years, perhaps because of lower temperatures (Table 1).

Comparison of Varieties

Jori C69 gave the highest grain yield in all years, 3621 kg/ha, and Hamari the lowest, 2109 kg/ha (Table 2). The differences among varieties were significant in all years. The straw yield and straw/grain ratio also varied significantly among varieties (Tables 3 and 4). The highest straw yield was obtained from Senator Capelli and the local variety Hamari, which were also the tallest varieties.

The grain/straw ratio was lowest in the semidwarf varieties Jori C69 and Giorgio 331 (Table 4).

Table 2 GRAIN YIELD (kg/ha) OF DURUM WHEAT VARIETIES, MUSLEMIEH, SYRIA, 1975-78

Variety	1975/76	1976/77	1977/78	Mean
Jori C 69	4 542	2 855	3 465	3 621
Giorgio 331	3 710	1 662	3 351	2 908
Senator Capelli	2 354	2 520	3 142	2 672
Hamari	1 825	1 843	2 658	2 109

Table 3 STRAW YIELD (kg/ha) OF DURUM WHEAT VARIETIES, MUSLEMIEH, SYRIA, 1975-78

Variety	1975/76	1976/77	1977/78	Mean
Jori C69	7 433	5 800	5 525	6 253
Giorgio 331	8 667	7 046	6 168	7 294
Senator Capelli	9 875	8 534	7 298	8 569
Hamari	11 871	6 179	4 670	7 573

Table 4 STRAW/GRAIN RATIOS OF DURUM WHEAT VARIETIES, MUSLEMIEH, SYRIA, 1975-78

Variety	1975/76	1976/77	1977/78	Mean
Jori C69	1.69	2.05	1.60	1.78
Giorgio 331	2.37	4.32	1.85	2.85
Senator Capelli	4.35	3.89	2.31	3.52
Hamari	6.83	3.47	1.78	4.03

Differences in number of tillers among varieties varied with years. Hamari tended to give more tillers than the other varieties.

Fertilizer Treatments

The effect of the different fertilizer treatments was not significant in 1975/76 and 1976/77 but in 1977/78 the N<sub>2</sub>P (100 N and 60 kg P<sub>2</sub>O<sub>5</sub>/ha) gave 3.3 tons/ha compared to 3.0

and 3.1 tons/ha for the other two treatments (Table 5). There was an increase of 8 per cent in straw yield by increasing fertilizer rates from 50 kg N/ha (N<sub>1</sub> and N<sub>1</sub>P treatments) to 100 kg N/ha (N<sub>2</sub>P treatment) and a small increase in straw/grain ratio (Tables 6 and 7).

Table 5 EFFECTS OF FERTILIZER REGIMES ON GRAIN YIELD (kg/ha) (MEANS OF VARIETIES AND SEED RATES), MUSLEMIEH, SYRIA, 1975-78

Fertilizer treatments (kg/ha)			1975/76	1976/77	1977/78	Mean
	N	P <sub>2</sub> O <sub>5</sub>				
N <sub>1</sub>	50	0	3 178	2 146	3 032	2 785
N <sub>1</sub> P	50	60	3 191	2 038	3 108	2 779
N <sub>2</sub> P	100	60	2 932	2 196	3 322	2 817

Table 6 EFFECT OF FERTILIZER REGIMES ON STRAW YIELD (kg/ha) (MEANS OF VARIETIES AND SEED RATES), MUSLEMIEH, SYRIA, 1975-78

Fertilizer treatments (kg/ha)			1975/76	1976/77	1977/78	Mean
	N	P <sub>2</sub> O <sub>5</sub>				
N <sub>1</sub>	50	0	9 433	6 655	5 557	7 215
N <sub>1</sub> P	50	60	9 117	6 686	5 894	7 232
N <sub>2</sub> P	100	60	9 713	7 331	6 295	7 780

Table 7 EFFECT OF FERTILIZER REGIMES ON STRAW/GRAIN RATIO (MEANS OF VARIETIES AND SEED RATES), MUSLEMIEH, SYRIA, 1975-78

Fertilizer treatments (kg/ha)			1975/76	1976/77	1977/78	Mean
	N	P <sub>2</sub> O <sub>5</sub>				
N <sub>1</sub>	50	0	3.67	3.37	1.83	2.96
N <sub>1</sub> P	50	60	3.69	3.44	1.90	3.01
N <sub>2</sub> P	100	60	4.04	3.60	1.92	3.19

### 3.3 Effect of Seed Rate

In 1975/76 lower seed rates gave on average higher grain yields but in the other two years higher seed rates gave higher yields (Table 8). Straw yields tended to be lower in higher seed rates (Table 9). Straw/grain decreased with seed rate in 1975/76, but increased in 1976/77 and did not change significantly in 1977/78 (Table 10).

## 4. DISCUSSION

The results of this study show that variety and rainfall affected significantly the yield of durum wheat but the seed rate and fertilizer rates tested affected grain yield only slightly. Jori C69 gave 72 percent higher grain yield than Hamari, the local

Table 8  
GRAIN YIELD (kg/ha) AT VARIOUS SEED RATES (MEANS OF DURUM VARIETIES AND FERTILIZER TREATMENTS)

Seed rate (kg/ha)	1975/76	1976/77	1977/78
75	3 358	1 891	-
100	3 095	2 158	2 218
120	-	-	2 243
150	2 849	2 324	2 636

Table 9  
STRAW YIELDS (kg/ha) AT VARIOUS SEED RATES (MEANS OF DURUM VARIETIES AND FERTILIZER TREATMENTS)

Seed rate (kg/ha)	1975/76	1976/77	1977/78
75	9 836	7 023	-
100	9 404	6 895	6 435
120	-	-	5 659
150	9 145	6 753	5 653

Table 10  
EFFECT OF SEED RATE ON STRAW/GRAIN RATIO OF DURUM VARIETIES

Seed rate (kg/ha)	1975/76	1976/77	1977/78
75	4.53	3.20	-
100	3.69	3.73	1.84
120	-	-	1.90
150	3.17	3.80	1.91

variety, and 36 percent higher than the introduced and released Italian variety Senator Capelli. It appears that Jori C69 has the genetic potential for high yields in Syria.

Rainfall was high in 1975/76 with a good distribution and yields were highest. The difference in yield between years would have been greater had the trials in 1976/77 and 1977/78 not been irrigated in the spring.

The effect of seed rate is influenced by the sowing method and field conditions. The present study indicates that high seed rates should be recommended, 150 kg/ha.

The rates of fertilizer used were high, the lowest being 50 kg N/ha. This may explain why there was no significant increase in yield with increasing N from 60 to 100 kg/ha.

From the findings of this study it is concluded that the cultivation of Jori C69 should be expanded, sown at a seed rate of 150 kg/ha and fertilized with 50 kg N/ha and 50 kg P<sub>2</sub>O<sub>5</sub>/ha.