Effect of Seeding Rate and Sowing Method on Grain Yield of Mexican Wheat (*Triticum aestivum* L.) Grown in the Libyan Desert

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ABSTRACT

Grain yield and grain size of the dwarf Mexican wheat as affected by seeding rate and sowing method were studied under the arid conditions and the sandy soils of Al-Kufra desert. Drilled wheat seed yielded more than broadcast seed in Al-Kufra oasis. Using the same rate (80 kg/ha) drilling increased the yield by 19.6 %. The seeding rate of 80 kg/ha drilled produced the highest grain yield (5.336 tons/ha), whereas the 80 kg/ha broadcast produced the lowest yield (4.460 tons/ha).

However, seed rates of 160 and 240 kg/ha broadcast reduced the weight of 1,000 grains by 9 and 2 %, respectively.

INTRODUCTION

It is believed that wheat must be sown at high seeding rates under arid conditions and in sandy soils to avoid crop failure and to give some assurance against loss of stands under adverse conditions. In India, it was reported that seeding rates of 100 kg/ha for dwarf wheat were optimum for all sowing dates (5). However, grain yield of wheat as affected by seeding rate differed according to rate of nitrogen application, date of sowing and varieties (1,7,8). Higher seeding rate was recommended with low-tillering varieties, low productive soil and with late sowing.

The normal seeding rates of wheat grown in Libya ranges from about 100 to 150 kg/ha (2,4). In Al-Kufra oasis, where the soil consists mainly of coarse sand, a seeding rate of about 100 to 130 kg/ha is usually used (7). The environmental conditions in Al-Kufra are different than the coastal plains where most of the Libyan wheat is grown. Al-Kufra oasis is located in the south eastern part of the Libyan desert at a latitude of 24°N and a longitude of 23°E. The climatic conditions of the region are typical of arid area where the maximum and the minimum temperature of July and January are about 37°, 18°C and 19, 3°C, respectively. The relative humidity and mean annual rainfall are 50 % and 2.5 mm, respectively. The soil at Al-Kufra oasis consists of more than 90 % coarse sand, 2–6 % silt and 1–4 % clay. The soil nitrogen and organic matter content are less than 0.5 % and 1 %, respectively. The soil pH ranges from 7.4 to 8.3 (3).

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This paper deals with studies on the effect of seeding rate and sowing method on the grain yield of dwarf mexican wheat grown under Al-Kufra desert conditions.

MATERIALS AND METHODS

A field experiment was conducted at Al-Kufra Agricultural Project farm. The Mexican dwarf wheat (*Triticum aestivum* L) variety 'Super X' was planted on 14th October, 1970 at rates of 80 kg/ha drilled, 80 kg/ha broadcast, 160 kg/ha broadcast and 240 kg/ha broadcast. The treatments were replicated 4 times in a randomized block design. The size of the experimental plot was 15 × 500 metres to facilitate the mechanized operations. The land was disked to 20–30 cm, preirrigated and levelled. Preplant fertilizer was added at the rate of 400 kg/ha from 18–50–0 compound fertilizer. Zinc sulfate (36%) at the rate of 50 kg/ha was added before planting. Additional amount of nitrogen fertilizer at the rate of 80 kg/ha in form of urea (46%) was top-dressed at the crown root emergence. Irrigation was 2 to 3 hours every other day by sprinklers. The experiment was harvested at May and grain yield and grain size were determined.

RESULTS AND DISCUSSION

The analysis of variance and the average grain yield as affected by seeding rate and method of sowing are given in Tables 1 and 2. According to F test the differences in grain yield due to seeding rate are not significant. The seeding rates of 80 kg/ha drilled, 80 kg/ha broadcast, 160 kg/ha broadcast and 240 kg/ha broadcast produced the respective average grain yields of 5.336, 4.460, 4.532 and 4.624 tons per hectare.

It appears that seeding rate of 80 kg/ha drilled gave the highest average grain yield (5.336 tons/ha), whereas 80 kg/ha broadcast gave the lowest yield (4.460 tons/ha). Compared to the seeding rate of 80 kg/ha broadcast, the rates of 80 kg/ha drilled, 160 kg/ha broadcast and 240 kg/ha broadcast increased the grain yield by 19.6, 1.6 and 3.7%, respectively (Table 5). From this data, although limited, it appears that the optimum

Table 1 Analysis of variance for grain yield of Mexican wheat as affected by seeding rate and sowing method.

Source of variation	d.f.	S.S.	M.S.	F
Replicates	3	66,026.56	22,008.85	
Treatments	3	19,597.00	6,532.33	0.388
Error	12	151,521.86	16,835.76	
Total	15	237,521.86		

Table 2 Average grain yield of Mexican wheat as affected by seeding rate and sowing method.

Seeding rate and method of sowing	Average grain yield (Tons/ha)
80 Kg/ha Drill	5.336
80 Kg/ha Broadcast	4.460
160 Kg/ha Broadcast	4.532
240 Kg/ha Broadcast	4.624

L.S.D. 5% = 1.040 tons/ha.

seeding rate for Mexican wheat is 80 kg/ha planted in drills. It seems also that drilling produced more yield than broadcasting method

Tables 3 and 4 show the analysis of variance and the weight of 1,000 grains as affected by seeding rate and sowing method. Grain size ranged from 27.1 to 29.8 gm/1,000 grain. Although the differences are not significant, the heavier seeding rates gave smaller grain size. The rates of 160 and 240 kg/ha broadcast reduced grain size by 9% and 2%, respectively. The rate of 80 kg/ha either drilled or broadcast gave the largest grain size (29.8 gm per 1,000 grains, respectively).

Table 3 Analysis of variance for grain size of Mexican wheat as affected by seeding rate and sowing method.

Source of variation	d.f.	S.S.	M.S.	F
Replicates	3	72.83	24.28	
Treatments	3	19.72	6.57	0.885
Error	9	66.77	7.42	
Total	15	159.32		

Table 4 Average grain size (wt. of 1,000 grain) of Mexican wheat affected by seeding rate and sowing method.

Seeding rate and method of sowing	Wt. of 1,000 grains (gm)
80 Kg/ha Drill	29.8
80 Kg/ha Broadcast	29.8
160 Kg/ha Broadcast	27.1
260 Kg/ha Broadcast	29.2

L.S.D. 5% = 4.4 gm.

Table 5 Percentage change in grain yield and grain size due to seeding rates and sowing methods.

Treatment compared	grain yield	Grain size
$\frac{\text{80 Kg/ha drill} - \text{80 Kg/ha broadcast}}{\text{80 Kg/ha broadcast}} \times 100$	+19.6	0.0%
$\frac{\text{160 Kg/ha broadcast} - \text{80 kg/ha broadcast}}{\text{80 Kg/ha broadcast}} \times 100$	+1.6%	−9%
$\frac{\text{240 Kg/ha broadcast} - \text{80 Kg/ha broadcast}}{\text{80 Kg/ha broadcast}} \times 100$	+3.7%	−2%

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