GROWTH, YIELD AND QUALITY RESPONSE OF SOME BREAD WHEAT VARIETIES TO DIFFERENT SOWING DATES

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Approval Sheet

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ABSTRACT

Mohamed Mahmoud Ismail Ismail: Growth, Yield and Quality Response of Some Bread Wheat Varieties to Different Sowing Dates. Unpublished Ph.D. Thesis, Department of Agronomy, Faculty of Agriculture, Ain Shams University, ٢٠١٣.

Two field experiments were carried out in Agric. Expt. Farm at Shalakan, Kaluobia Governorate, Cairo, Egypt during ٢٠١٠/٢٠١١ and ٢٠١١/٢٠١٢ growing seasons to study the Response of three bread wheat cultivars to sowing date. Each experiment included ١٥ treatments which were the combination between five sowing date and three wheat cultivars. The experimental design used was split plot design in ٦ replications. The main plots were occupied by five sowing dates (October ١st, October ١٦th, November ١st, November ١٦th and December ١st). The three wheat cultivars namely Sakha ٩٣, Giza ١٦٨ and Gemmiza ٩ were distributed randomly in the sub-plots.

The weight of blades was in highest values at heading stage followed by marked decreases by advancing the plants towards maturity stage. The substantial decreases in blades dry weight could be mainly attributed to differentiation of spikes and translocation of photosynthetic assimilates from vegetative to reproductive organs. The accumulation of dry matter in spikes was significantly the highest for wheat cultivar Gemmiza ٩.

At harvest, Gemmiza ٩ exhibited the tallest plants, highest spikes No/$m^{٢}$, Main spike length and weight as well as grain No/main spike, grain , straw, biological and GCP yields, NUE, NRE GCPC, wet and dry gluten as well as gluten hydration percentage; test weight and ١٠٠٠-grain weight. The studied traits were greatly affected by genetic make-up of the studied cultivars. It was found a positive relationship between GCPC, vitreosness, wet gluten content; test weight and ١٠٠٠-grain weight.

Sowing wheat plants at ١st November exhibited statistically maximum dry weight of blades, stems + sheaths and spikes in comparable to early and late sowing in the season. It was generally noticed a remarkable reduction in percentage of blades and stems + sheaths by advancing the plants towards maturity stage. On the contrary, the highest spikes yield either absolute amount or percentage of total plant biomass was found when the plants were sown on ١st November.

Sowing on ١st November had remarkable effect on rising NUE, NRE and NPE; yield components including plant height, spikes No/m٢, main spike length and weight as well as grain No/main spike that affected positively on grain, straw, biological and grain protein yields.

Test weight and ١٠٠٠-grain weight were significantly and gradually increased versus late sowing date of wheat till reached its maximum value by sowing on ١st November. It was cleared that the dry weight of vegetative organs of wheat cultivar Gemmiza ٩ exhibited significant maximum dry weight of blades, stems + sheaths and spikes under different growth stages. The dry matter accumulated in plant organs were markedly and significantly decreased versus early sowing date. On the other hand, the decrease in the above traits was monitored at late sowing but by less extent as compared to early sowing. The dry weight of spikes was markedly increased reaching their maximum values at physiological maturity stage.

The dry matter partitioning showed different trend. The percentage of blades and stems + sheaths was markedly decreased by advancing the plants from booting towards maturity stage. These decreases were corresponded with substantial increase in spikes percentage reaching their maximal values at physiological maturity stage.

At harvest, Gemmiza ٩ exhibited maximum tallest plants, highest spikes No/plant; length, weight and grains No/main spike at all studied sowing dates reaching their maximum values when sown on ١st November. The high performance of cultivar Gemmiza ٩ in yield

attributes was positively reflected on its yield and grain technological parameters.

The interaction between sowing dates and studied wheat cultivars affected significantly nitrogen physiological parameters. The data cleared that all the three studied cultivars gave maximum values of NUE, NRE, and NPE by sowing on ١st November. Gemmiza ٩ exhibited maximum value of NUE and NRE in comparison to the other two cultivars grown under the same date.

From the above mentioned data, the author recommended that bread wheat cultivar Gemmiza ٩ was the best adapted cultivar and could be grown on ١st November under the environmental conditions of Kaluobia Governorate.

Key words: Triticum aestivum, wheat growth, wheat yield, wheat grain quality, sowing date.

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LIST OF ABBREVIATION

N	Nitrogen
LAI	Leaf area index
LAD	Leaf area duration
PAR	Photosynthetically active radiation
RUE	Relative use efficiency
TDM	Total dry matter
DAS	Days after sowing
B	Booting stage
H	Heading stage
Phy m	Physiological maturity stage
SDS	Sodium dodocyl sulfate
PTQ	Photo-thermal quotient
GCPC	Grain crude protein content (%)
GCPY	Grain crude protein yield
NPE	Nitrogen physiological efficiency
NUE	Nitrogen use efficiency
NRE	Nitrogen recovery efficiency
NHI	Nitrogen harvest index

١. INTRODUCTION

Wheat (***Triticum aestivum*** **L**.) is the largest and most important enterprise within the Egyptian industry and the most stable food of world's population especially in Egypt. Wheat production occupies a central position in forming agricultural policies and dominates all crops in acreage and production. Wheat is grown in Egypt on an area of ٢,٩٢ million faddans with a total annual production of about ٨,٢ million tones and with an average yield of ٢,٦٥ tons per faddan during the year ٢٠٠٩-٢٠١٠ growing season (**CLAC, ٢٠١١).**

Since wheat is a crop that is adapted to cool, moist growing conditions, and has an optimum temperature of grain growth and development have been found to range from ١٥/١٠°C to ١٨/١٣°C **Chowdhry and Wardlaw (١٩٩٨).** Temperatures above this optimum result in both an acceleration of plant development and a reduction in vegetative stage duration. Increase concentrations of greenhouse gases will result in a continuous increase in earth's temperatures and this increase could significantly reduced wheat plant life and productivity. The yield levels of wheat are relatively not high, possibly due to their greater susceptibility to heat stress, particularly when the plants are exposed to high temperatures coincide with booting and heading stages as well as spikes development. The change of environment temperatures during phenological stages of wheat growth are mainly attributes to environmental changes in sowing date. The terminal or late heat stress especially during anthesis and grain filling stage is considered one of the major environmental factors drastically reduce wheat production throughout most of the wheat growing areas in different agro-ecologies of the country.

In light of the yield losses and low grain quality caused by heat stress as a result of late sowing. Both genotype and the environment in which the crop is grown, as well as the interaction between them have been found to affect the growth, grain yield and quality of wheat.