RESPONCE OF CORN GRAIN TRAITS TO HARVESTING MOISTURE

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ABSTRACT

This research was conducted during spring and fall seasons, 2015, at the fields of Field Crop Department– College of Agriculture– University of Baghdad. The objective was to evaluate response of corn synthetic variety 5018 traits in next generation to harvesting moisture in the first generation. In spring season 2015, seeds of the synthetic variety 5018 were planted. When moisture of the ear grains was reached the first treatment (37-42%), ten ears were harvested. Ears harvesting dates were performed manually when the grains had 37-42%, 34-36%, 30-33%, 25- 28% and 19-22% moisture content. In fall season 2015, varietal trail was carried out to the five treatment materials, using Randomized Complete Bock Design, with four replicates. The results showed, significant differences among treatments for all the studied traits, except grain filling duration. The highest grain growth rate (7.23 mg.grain.day^{-1}) and grain yield (159.46 g.plant^{-1}), were produced from plants grown it's seeds harvested with (19-22)%, which didn't differ significantly from the plants grown it's seeds harvested with moisture (25-28)%. It can be conclude that the perfect corn grain moisture for harvesting (19-22)% for the nex generation seeds .

Keywords: Growth rate, grain filling, grain yield.

استجابة صفات الحبوب للذرة الصفراء لرطوبة الحصاد

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المستخلص

نفذ البحث خلال الموسمين الربيعي والخريفي لعام 2015 في حقول قسم المحاصيل الحقلية– كلية الزراعة– جامعة بغداد، بهدف دراسة استجابة صفات الحبوب للذرة الصفراء الصنف التركيبي بحوث 5018 لرطوبة الحصاد في الجيل الاول. تمت في الموسم الربيعي 2015 زراعة بذور الصنف 5018، وعندما وصلت نسبة الرطوبة في حبوب العرانيص (37–40)%، حصدت منها عشرة عرانيص و اعتبرت المعاملة الاولى، حيث نفذت خمس معاملات لخمسة مستويات رطوبة الحبوب اثناء الحصاد وهي (37–42)% و(34–36)% و(30–33)% و(25–28)% و(19–22)%. في الموسم الخريفي 2015 نفذت تجربة مقارنة للمعاملات الخمسة باستعمال تصميم القطاعات الكاملة المعشاة وبأربع مكررات وأشارت النتائج الى وجود فروقات معنوية بين المعاملات و لجميع الصفات المدروسة، عدا مدة امتلاء الحبة. اعلى معدل نمو للحبة (7.23 ملغم. حبة. يوم$^{-1}$) وحاصل حبوب (159.46 غم . نبات$^{-1}$)، حصلت من زراعة بذور حصدت في الجيل الاول برطوبة (19–22)%، ألأ انها لم تختلف معنويا عن رطوبة الحبوب (25– 28)%. يمكن الاستنتاج بأن أفضل رطوبة حبوب للذرة الصفراء اثناء الحصاد في الجيل الاول لانتاج بذور الزراعة هي (19– 22)%.

كلمات مفتاحية: معدل النمو، امتلاء الحبة، حاصل الحبوب.

INTRODUCTION

Another factor causing damage to grains is drying. Among the post-harvest processes, artificial drying is the most relevant when dealing with corn grain harvest from ears with high moisture content. Despite its advantages, artificial drying has been causing damage to grains, with significant reductions in their physiological quality (9, 13, 16). According to these authors the removal of water from the seeds may cause chemical, physical and physiological changes, which makes the drying process a critical step in the production of grains. Therefore, the initial drying of corn grains harvested with high moisture contents is recommended to be initially performed at a lower temperature, 35 °C, since it appears to simulate the processes which normally occur to the plant, allowing the mechanisms of tolerance to desiccation to become active or to be imposed on grains (14, 21). During the natural drying of seeds in the field, they lose water gradually, allowing the development of mechanisms of tolerance, preparing them to withstand the consequences of dehydration (11, 12, 17, 19). The production process occurs with the preservation of grains quality during storage, which is a fundamental aspect to be considered (15). Harvest losses are just as important as moisture dockage rate in evaluating your harvest timing decision. However, harvest losses are nearly impossible to predict (6, 7, 8). Our environment often encourages quick corn dry down and minimal harvest losses, if we have a hot, dry harvest season. However, the threat of a hurricane or unrelenting rainfall can be conversely disruptive. The bottom line is that the longer corn stays in the field, the greater the likelihood of substantial field losses (1, 10). Each of these factors may cause substantial field loss, which may considerably outweigh moisture savings. Thus, the longer it takes you to complete harvest, the earlier should start harvest. Harvest fields with marginal plant health, such as drought-stricken or questionable stalk quality, or refuge acres (non-Bt hybrids) with considerable insect infestation promptly to minimize losses, (16,17). The objective of this research was to evaluate response of corn synthetic variety 5018 traits to harvesting moisture.

MATERIALS AND METHODS

In this research, corn synthetic variety 5018 was used, classified as dented, produced by Agricultural Researches Office -Ministry of Agriculture. In spring season 2015, a population seeds of this variety was planted using 75 cm between rows and 25 cm within the rows. The field was fertilized using 320 $kg.ha^{-1}$ dap, which added at field preparation time. Urea (46% N), with 100kg. ha^{-1}, was added two times, first part when the plants arrived 25 cm height and the other part at the beginning of flowering. All the agricultural management was performed, as recommended. When the moisture of the grains was reached to the first treatment (37-42%), ten ears were harvested. Ear harvesting dates were performed manually when the grains had 37-42%, 34-36%, 30-33%, 25- 28% and 19-22% moisture content. Then, the grains were naturally dried to 15.5 % . In fall season 2015, varietal trail was carried out to the five treatment materials, using Randomized Complete Bock Design, with four replicates. The same spring season spacing, field and crop management were conducted. The observations were performed to five random plants. Data were subjected to analysis of variance by F test. The means were compared using the least significant differences at 5% level . The objective was to evaluate response of corn synthetic variety 5018 traits to harvesting moisture, (20).

RESULTS AND DISCUSSION:

Among the factors contribute to obtain high physiological quality of grains is the harvest in the proper moisture, (1, 7). During the grains filling duration the moisture stress effect to the grains yield and it's quality, (8, 19).

Grain growth rate. mg. grain. day^{-1}:

Significant differences were found among harvesting grains in different moisture levels in the grain growth rate g. grain. day^{-1} for next generation (Table 1). The highest value of this trait 7.23 $mg.grain.day^{-1}$ was produced from the plants grown from the seeds were harvested with grain moisture (19-22)%, while, didn't significantly differ from the moisture (25-28)%, which produced 7.10 $mg.grain.day^{-1}$. The Figure 1 revealed a linear decay curve between grain harvesting moisture and crop growth rate. mg. plant. day^{-1} with

R^2 = 73%, this means with increasing harvesting moisture of the seeds production in first generation from 28%, will decreased the grain growth yield of the next generation. It can be conclude that the favorable moisture for corn grains harvesting for seeds production 19-22% grain moisture.

Grain growth rate. g. plant. day^{-1}:

Plant grain yield in corn is correlate with the grain growth rate at grain filling time, (15). The Table 1, indicate a significant differences among grain harvesting moisture of the first population. The highest grain growth rate 4.35. g. plant. day $^{-1}$ was produced from the grains harvesting moisture (25-28)%, but didn't differ significantly from the treatment (19-22)%. It was revealed that with increasing the grain harvesting moisture from 28% decreased the grain growth rate (Figure 2). It can be conclude that the best moisture to gate highest grain growth rate. g. plant .day $^{-1}$, at harvesting should be not more than 28%.

Grain growth rate. g. m^2. day^{-1}:

This trait deals a dray matter accumulation rate in the grains. g. m^2. day^{-1}. which shows the activity of crop physiology during day (11). Table 1 shows significant differences among corn grains moisture during harvesting at seeds production in the first generation and their effects to the grain growth rate. g. m^2. day^{-1}. The grains moisture treatment (25-28)% produced highest crop growth rate (29.16 g.m^2. day^{-1}), which didn't significantly difference from the treatments (19-22)% with growth rate 29.08 g. m^2 day^{-1}. Figure 3 shows decay linear curve with R^2 = 62%. It was concluded that the best time for corn grain harvesting to seeds production program between 19-28% and with increasing from this level were caused to decrease the grain growth. g. m2. day-^{1} in next generation.

Grain filling duration. day^{-1}:

The proper date to corn ears harvest is as close as possible to the physiological maturity point, which conform with grain moisture content (1). A non significant differences were found among grain moisture percent in grain filling duration. day $^{-1}$.

Grain yield . g. plant $^{-1}$:

A significant differences were found among grain moisture harvesting of first generation treatments for corn grain yield. g. plant^{-1} of the next generation (Table 1). The highest grain yield (159.46. g. plant^{-1}) produced from plants, their seeds harvested, when the grain moisture was (19-22)%, but, didn't significantly differ from the treatment (25-28)%, (3,6). While the lowest grain yield (122.09 g. plant^{-1}) was produced from the plants grown from seeds harvested with moisture (37-42)%. The corn grain yield was declined with increasing the seeds moisture harvesting of the parents generation, R^2 = 90.1 %, (Figure 4). (9). It could be conclude that when corn plants are cultivated for seed production, must be harvested when the grains don't exceed 22% moisture, (7, 10).

Table 1. Mean grain growth rate GGR mg. grain. day^{-1}, grain growth rate GGR g. plant .day^{-1}, grain growth rate GGR g.m^2. .day^{-1} grain filling duration. day^{-1} and grain yield g. plant^{-1}

Grain moisture %	GGR.mg.grain . day $^{-1}$	GGR.g. plant. day $^{-1}$	GGR.g.m^2. day $^{-1}$	Grain filling duration. day^{-1}	Grain yield. g. plant^{-1}
19-22	7.23	4.34	29.08	36.85	159.46
.25-28	7.10	4.35	29.16	35.20	152.96
30-33	6.07	3.53	23.66	36.90	129.84
34-36	5.67	3.39	22.73	37.80	127.90
37-42	6.07	3.68	24.64	34.10	122.09
LSD	1.15	0.66	04.40	NS	7.28

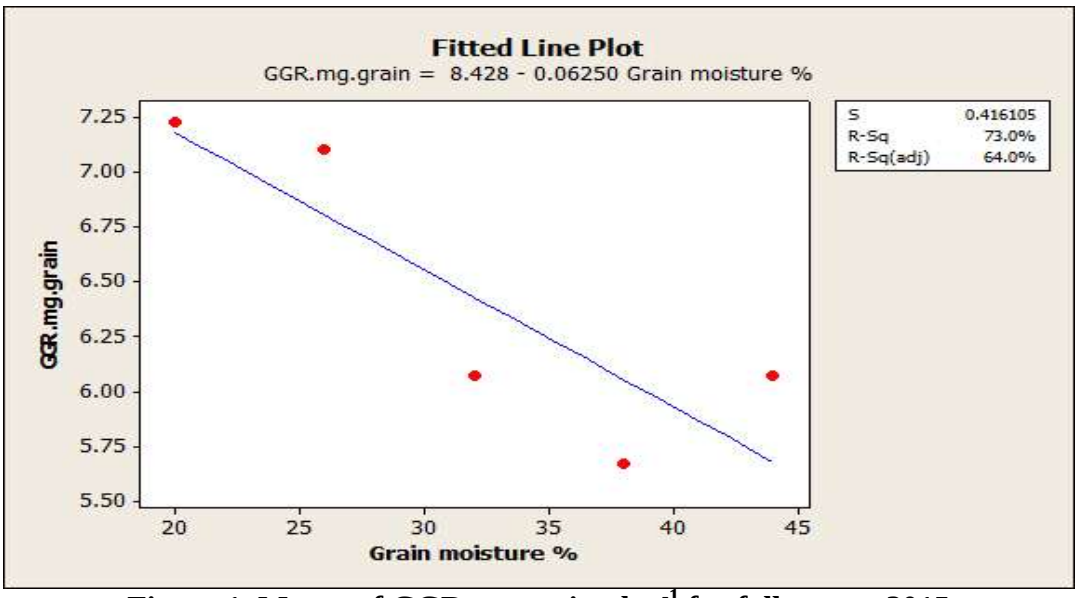

Figure 1. Means of GGR.mg.grain. day^{-1} for fall season 2015

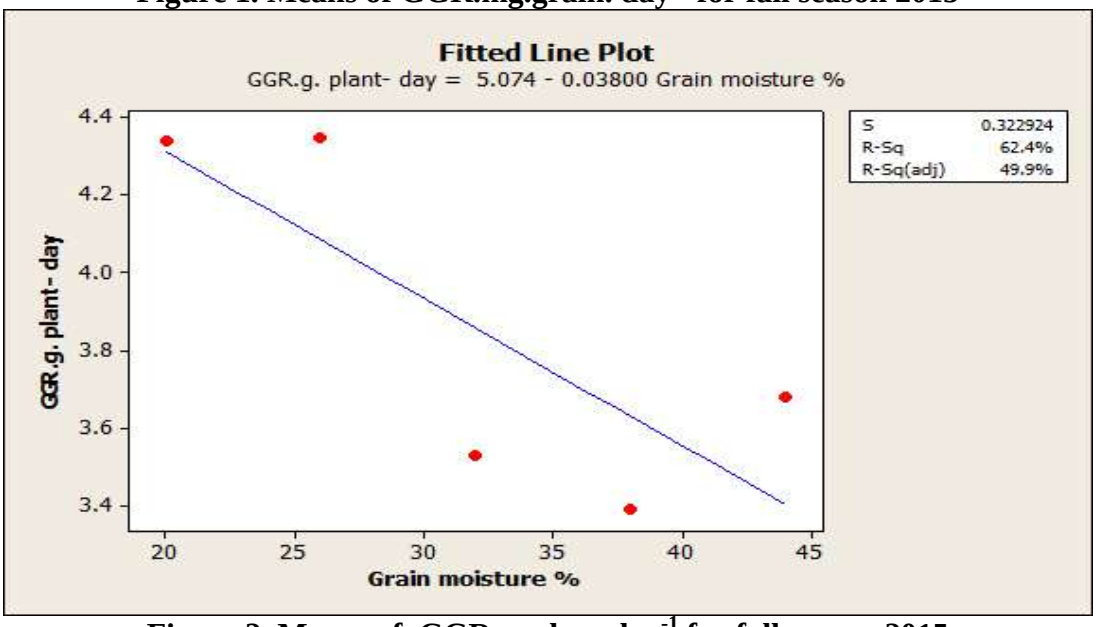

Figure 2. Means of GGR.g. plant.day^{-1} for fall season 2015

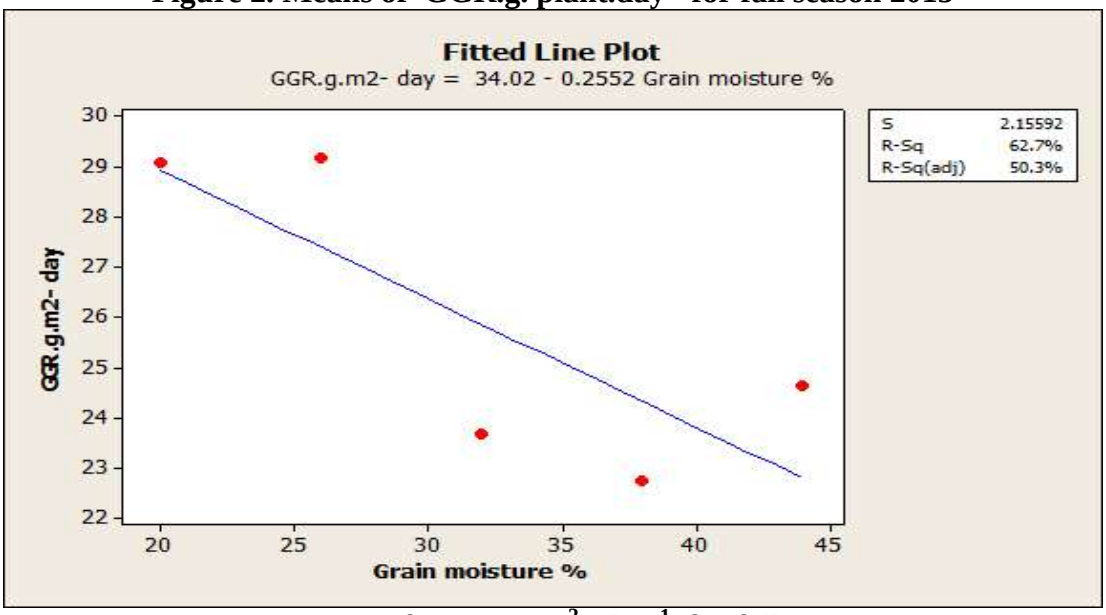

Figure 3. Means of GGR. g. m^2 . day^{-1} for fall season 2015

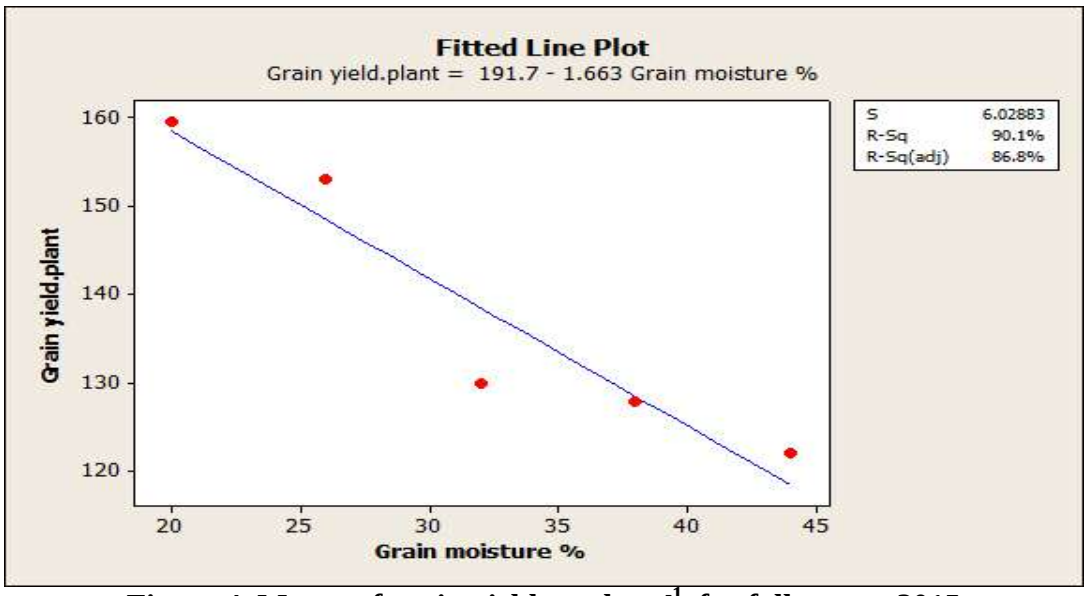

Figure 4. Means of grain yield .g. plant $^{-1}$ for fall season 2015

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