

IMPACT OF CORN GRAIN MOISTURE AT HARVESTING TO AGRONOMIC TRAITS IN SUBSEQUENT GENERATION

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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 the impact of corn grain moisture at harvesting of original population to some agronomic traits in subsequent generation of the variety 5018. In spring season 2015 , a seeds population of this variety were planted. When the moisture of ear grains was go 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 . Ten ears were harvested from each treatment . In fall season 2015 , varietal trail was carried out to the five treatment materials , using Randomized Complete Bock Design , with four replicates . The results were revealed significant differences among treatments in number of days from planting to maturity , crop growth rate. g. plant .day<sup>-1</sup> , crop growth rate . g .m<sup>2</sup>. day<sup>-1</sup> and grain yield kg. m<sup>-2</sup> . The highest grain yield ( 1.07 kg. m<sup>-2</sup> ), was produced from plant seeds , which harvested with moisture (19-22)% .It can be concluded the best harvesting moisture to produce seeds for plating in subsequent generation was ( 19-22 )% .

Keywords: maturity , plant height , LAI , grain yield

الخرزلي وبكتاش

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تأثير رطوبة حبوب الذرة الصفراء على بعض الصفات الحقلية في الجيل التالي

فاضل يونس بكتاش

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أستاذ

باحث

قسم المحاصيل الحقلية – كلية الزراعة – جامعة بغداد

المستخلص

نفذ البحث خلال الموسمين الربيعي والخريفي لعام 2015 في حقول قسم المحاصيل الحقلية – كلية الزراعة – جامعة بغداد، بهدف دراسة تأثير رطوبة حبوب الذرة الصفراء أثناء الحصاد على بعض الصفات الحقلية في الجيل التالي للصفة 5018 . في الموسم الربيعي 2015 تمت زراعة بذور الصنف 5018 عندما وصلت نسبة الرطوبة في حبوب العرائيص (37-40) % ، حصدت منها عشرة عرائيص و اعتبرت المعاملة الاولى ، حيث نفذت خمسة معاملات لخمس مستويات رطوبة الحبوب اثناء الحصاد و هي ( 37-42) % و (34-36) % و (30-33) % و (25-28) % و (19-22) % ، ذلك بحصاد عشرة عرائيص عشوائيا من كل معاملة. في الموسم الخريفي 2015 نفذت تجربة مقارنة للمعاملات الخمسة باستعمال تصميم القطاعات الكاملة المعشاة و بأربع مكررات . أشارت النتائج الى وجود فروقات معنوية بين المعاملات في عدد الايام للنضج ، نمو المحصول للنبات باليوم ، معدل نمو المحصول و حاصل الحبوب للمتر المربع. يمكن الاستنتاج بأن افضل رطوبة لحصاد حبوب الذرة الصفراء لغرض الزراعة في الجيل التالي هي ( 19-22 )% .

كلمات مفتاحية: النضج ، ارتفاع النبات ، دليل المساحة الورقية ، حاصل الحبوب.

## INTRODUCTION

Corn (*Zea mays* L.) grains plays an important role in supplying food for human beings, livestock, poultry and also in industrial uses (11). It is exclusively used in agriculture due to the high energy supplement of corn grains (6). In spite of the high importance of this crop, different qualitative traits, such as low hectoliter and its tendency to become powdery during milling, have not been considered. Their for, the production of a higher quality crop according to certain criteria is one of the main goals in corn production (8). The corn grains moisture content at harvesting times is great importance for economical value and as a seeds for second generation (14, 21). To increasing reach larger productions, it is extremely important to use good quality seeds, and in order to do so, the monitoring of grain moisture content, maximum dry matter accumulation, and appearance of black layer are important aspects (5, 13, 19). The quality of corn grains in fall season production in Iraq, can be guaranteed by early harvesting, due to its less exposure to adverse environmental conditions, insect attack, fungus and exposure to unadequate of climatic factors, such as early rainfall, highest humidity and lowest temperature, in addition, it provides better utilization of the production and processing infrastructure, even if the harvesting of immature grains occur (2, 3, 4). Corn may be harvested any time after grain reaches physiological maturity, which occurs at around 30% moisture. However, corn may not be safely stored until considerable moisture loss occurs (1, 9). Thus, grain elevators discount wet corn to account for drying expenses and moisture weight loss during drying. Moisture dockage schedules between elevators may vary, so thoroughly compare rates. Most schedules discount about 2.5-3.0% per each percent moisture above the standard, and may increase as moisture content rises. Water evaporated during drying (shrinkage) accounts for 1.18% of the dockage per percent moisture (10, 18). Corn lose this weight regardless of whether the sell wet grain to the elevator, dry it mechanically or let the grain field dry. Thus, should subtract this value from the dockage rate to evaluate realized or "actual" dockage.

The objective of this research to evaluate of corn grain harvesting moisture to some agronomic traits in subsequent generation.

## 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 seeds population of this variety was planted using 75 cm between rows and 25 cm within the rows. The field was fertilized using 320 kg.ha<sup>-1</sup> dap, which added at field preparation time. Urea (46% N), with 100kg. ha<sup>-1</sup>, 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 ear grains was go to the first treatment (37-42%). Ten ears were harvested for each treatment. Ear harvesting dates were performed manually when the grains had 37-42%, 34-36%, 30-33%, 25-28% and 19-22% moisture content, ten ears were harvested for each treatment. Then, the grains were naturally dried to 15.5%. In fall season 2015, varietal trial was carried out to the five treatment materials, using Randomized Complete Block 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 difference at 5% level (20).

## RESULTS AND DISCUSSION

**Number of days to maturity:** 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 significant differences were found among grain moisture percent in number of days to maturity (Table 1). Harvesting ears at maturity time with grains moisture 25-28% caused to early maturity of the second generation (91 days), at the same time this treatment didn't differed significantly from harvesting with 19-22% grain moisture (94 days), Table 1 also shows that with increasing of grains moisture content during harvesting time caused to increase number of days from planting to maturity for the second

generation , (Figure 1). It could be concluded that for seed production program , adequate grain moisture content on the average 25% at harvesting time , if there is no environmental effects , specially , rains , winds and insect or other biological effects m which cause damage of the grains .

**Plant height:** The plants growth from seeds harvested with different moisture % didn't influenced significantly to the plant height , (Table 1 ) . It was concluded when the plant height not necessary to the researchers or farmers , they can harvest with grain moisture 19-42 % , if there is no environmental effects

**Crop growth rate . g. plant . day<sup>-1</sup> :** Significant difference were found among harvesting grains in different moisture levels in the crop growth rate g. plant . day<sup>-1</sup> for the second generation (Table 1) . The highest value of this trait 2.89 g. plant. day<sup>-1</sup> produced from the plants growth from the seeds were harvested with grain moisture 25-28% , but this treatment didn't differed significantly from the 19-22 % m which produced 2.71 g. plant.day<sup>-1</sup> . The Figure 2 revealed a linear decay cure between grain harvesting moisture and crop growth . g. plant . day<sup>-1</sup> with R<sup>2</sup> = 72.70 / It could be concluded that the favorable time for corn grains harvesting moisture ( 19-28 )% to get highest crop growth rate for seeds production used at follow .

**Crop growth rate . g. m<sup>2</sup> . day<sup>-1</sup> :** This trait deals with the total crop growth .g . m<sup>2</sup> . day<sup>-1</sup> , which shows the activity of crop physiology (15) . Table 1 showed significant differences among corn grains moisture during harvesting times at seeds production times and their effects to the crop growth rate . g. .m<sup>2</sup>. .day<sup>-1</sup> .

The grains moisture treatment 25-28 % produced highest crop growth rate , which didn't significantly difference from both treatments 19-22 % and 30 – 33 % . Figure 3 showed decay linear curve with R<sup>2</sup> = 72.7% . 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 crop growth. g. m<sup>2</sup> . day<sup>-1</sup> in corn production.-----

**Leaf area index :**The differences among grain moisture content during harvesting time were not significant for lef area index ( Table1 ) . It was concluded when the leaf area index do not necessary to the researchers or farmers , they can harvest with grain moisture 19-42 % , if there is no environmental effects.

**Grain yield. kg.m<sup>-2</sup> :** The scientist and farmers are wants successful and adopted harvesting time to get highest grain yield and some other agronomic characters (11 , 12) . The grain yield production of corn as a sink of their components, which influence by environmental factors , one of them moisture at harvesting time (16). Significant differences were found among grain moisture harvesting for corn grain yield of the second generation (Table 1) . The highest grain yield ( 1.07 kg.m<sup>-2</sup>) produced from plants , their seeds harvested , when the moisture 19-22 % . While the lowest grain yield ( 0.82 kg .m<sup>-2</sup> ) was produced from the plants were grown from seeds harvested with moisture 37-42 % . The results , also shows that with increasing grain moisture decrease grain yield (Figure 4). It was concluded that when corn plants are cultivate for seed production, must be harvest when the grains not more than 22%. .

**Table 1. Mean number of days to maturity , plant height , crop growth rate plant CGR.g. plant. day , crop growth rate day CGR.g.m<sup>2</sup>.day<sup>-1</sup> , leaf area index and grain yield for the fall season 2014**

Grain moisture %	No. of days to maturity	Plant height cm.	CGR.g. plant. day <sup>-1</sup>	CGR.g.m <sup>2</sup> .day <sup>-1</sup>	LAI	Grain Yield kg.m <sup>-2</sup>
19-22	94	189	2.71	18.13	57.52	1.07
.25-28	91	189	2.89	19.36	57.90	1.02
30-33	95	183	2.62	17.56	57.85	0.87
34-36	96	175	2.53	16.92	57.90	0.86
37-42	95	175	2.29	15.32	50.40	0.82
LSD	3.9	NS	0.34	2.25	NS	0.05

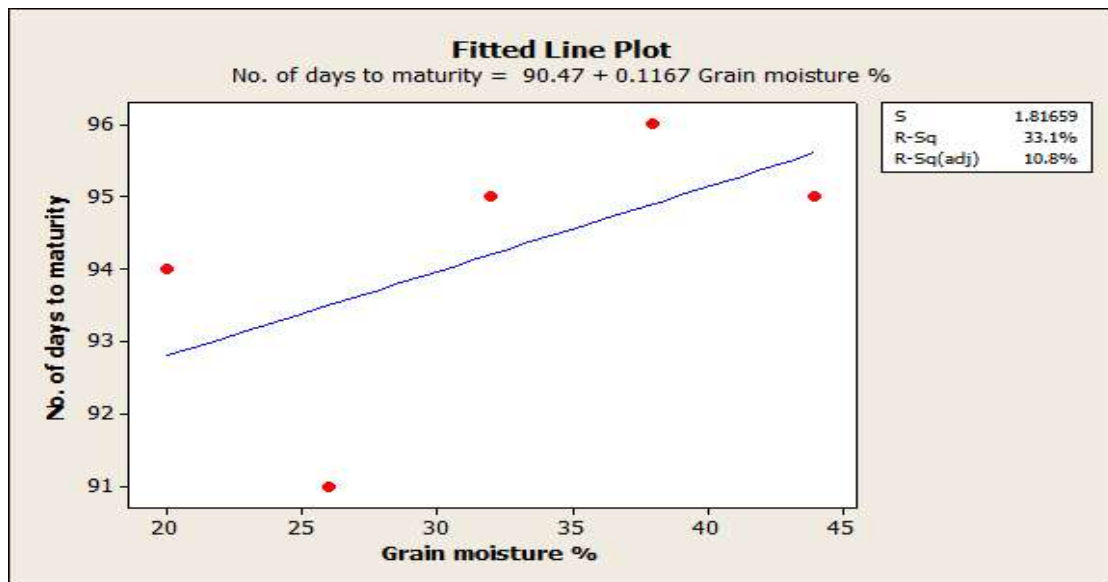


Figure 1. Mean number of days to maturity for the fall season 2014

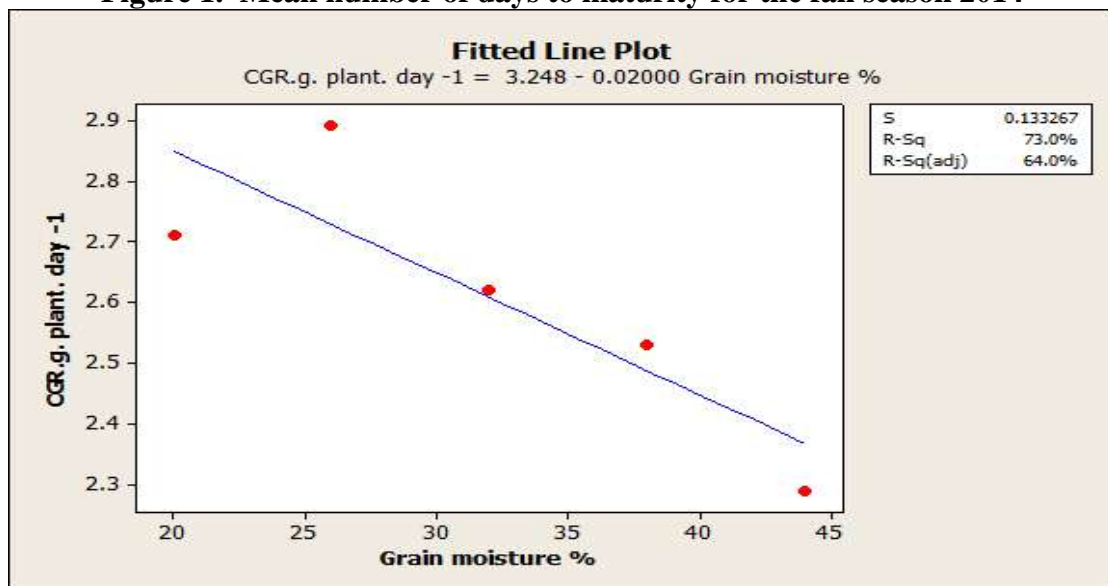


Figure 2. Crop growth rate plant  $\text{g.day}^{-1}$  (CGR.g. plant. $\text{day}^{-1}$ ) for the fall season 2015

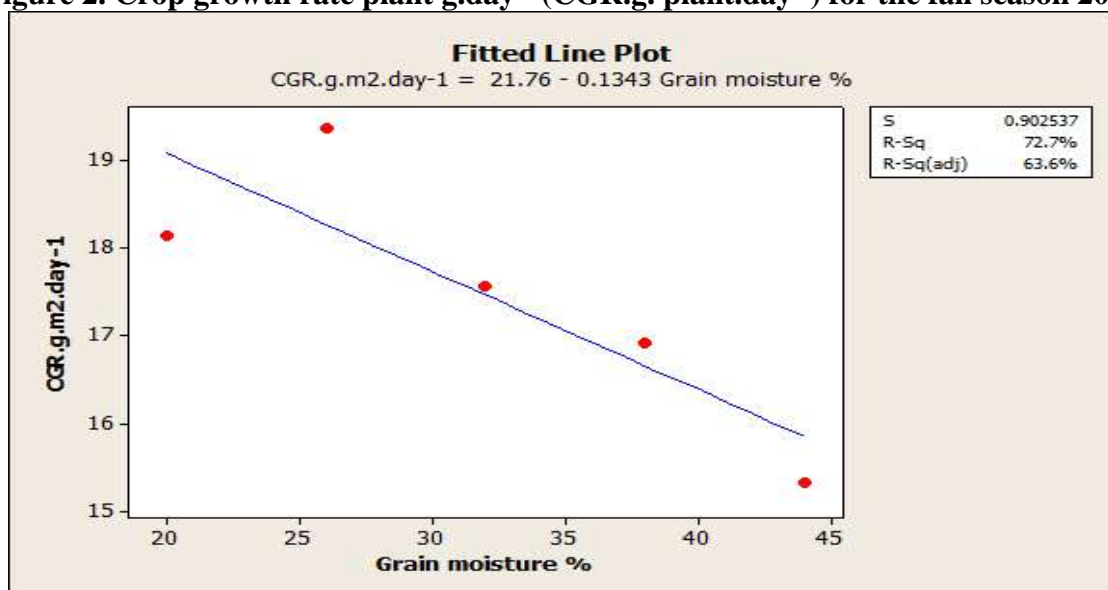


Figure 3. Crop growth rate  $\text{g. m}^2. \text{day}^{-1}$  day (CGR.g. $\text{m}^2. \text{day}^{-1}$ ) for the fall season 2015

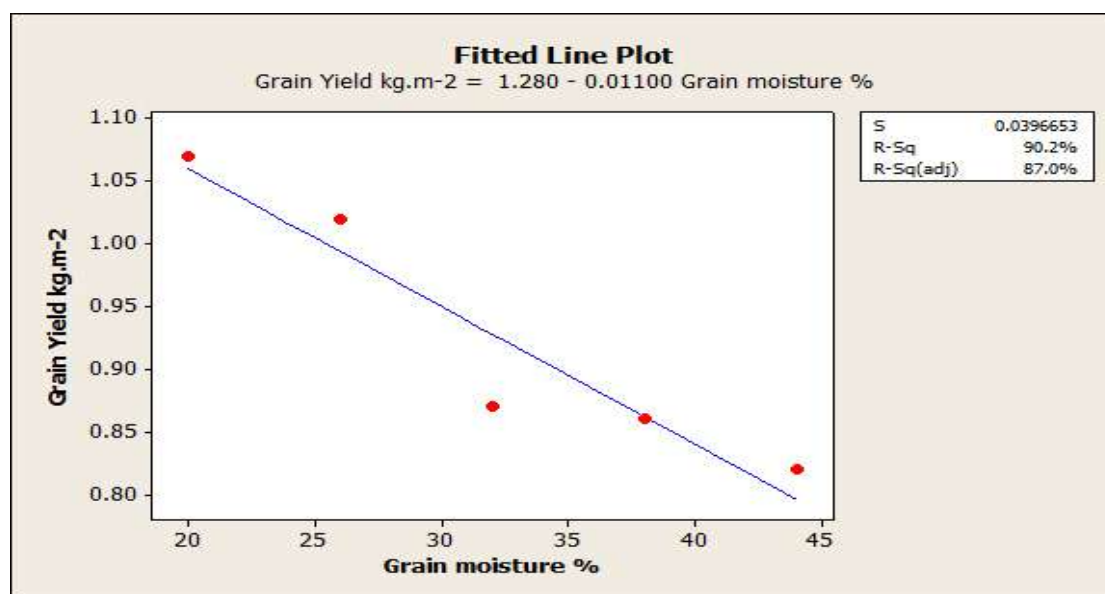


Figure 4. Grain yield kg.m<sup>-2</sup> for the fall season 2015

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