GRAIN YIELD ADN YIELD COMPONENTS OF CORN AS INFLUENCED BY HARVESTING MOISTURE

F.Y.Baktash **H.A. Alkazaali**
Prof. **Researcher**
Field Crops Dept. Coll. Agric. Univ. Baghdad
fadelbaktash1@yahoo.com

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 study grain yield and yield components of corn in next generation as influenced by harvesting moisture in the first generation . In spring season 2015 , seeds of the variety 2018 was planted using 75 cm between rows and 25 cm within the rows. When moisture of the ear grains reach 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 with the five treatment materials , using Randomized Complete Bock Design , with four replicates . The results revealed significant differences among treatments for all the studied traits . The highest number of grains (614 grains ear^{-1}) and (4224 grains m^{-2}), were produced from plants grown from seeds with (25-28)%, which significantly differs from other treatments . The highest grain weight (266 mg), grain yield (159.46 g.plant^{-1}) and (10.70 t.ha^{-1}) , were produced from the plants at the moisture content (19-22)% . It could be conclude , that the suitable corn grain moisture harvest for production seeds for next generation are (19-22)% .

Keywords: seeds, yield , ear, evaluation.

مجلة العلوم الزراعية العراقية – 47(5): 1340- 1345 /2016 **بكتاش والخزعلي**

تأثر حاصل الحبوب و مكونات الحاصل للذرة الصفراء برطوبة الحصاد

فاضل يونس بكتاش **حيدر عبدالرضا الخزعلي**
أستاذ **باحث**
اقسم المحاصيل الحقلية – كلية الزراعة – جامعة بغداد
fadelbaktash1@yahoo.com

المستخلص

نفذ البحث خلال الموسمين الربيعي والخريفي لعام 2015 في حقول قسم المحاصيل الحقلية – كلية الزراعة – جامعة بغداد، بهدف دراسة تأثر حاصل الحبوب ومكوناته للذرة الصفراء في الجيل اللاحق برطوبة الحصاد في الجيل الاول. في الموسم الربيعي 2015 تمت زراعة بذور الصنف التركيبي 5018، وعندما وصلت نسبة الرطوبة في العرانيص (37–40)%، حصدت منها عشرة عرانيص و اعتبرت المعاملة الاولى، حيث نفذت خمسة معاملات لخمسة مستويات رطوبة الحبوب اثناء الحصاد و هي (37–42)% و (34–36)% و (30–33)% و (25–28)% و (19–22)%. في الموسم الخريفي 2015 نفذت تجربة مقارنة للمعاملات الخمس باستعمال تصميم القطاعات الكاملة المعشاة و بأربعة مكررات. أشارت النتائج الى وجود فروقات معنوية بين المعاملات ولجميع الصفات المدروسة. نتج أعلى عدد للحبوب (614 حبة. عرنوص $^{-1}$) و 4224 حبة. م$^{-2}$) من النباتات التي زرعت من بذور رطوبتها اثناء الحصاد (25–28%) وتفوقت معنويا على بقية المعاملات. نتج اعلى وزن حبة (266 ملغم) وحاصل حبوب النبات (266 غم) و حاصل حبوب لوحدة المساحة (10.7 طن . هـ $^{-1}$)، من النباتات التي زرعت بذورها المحصودة برطوبة (19–22)%. يمكن الاستنتاج بان افضل رطوبة لانتاج بذور الزراعة هي (19–22)%.

كلمات مفتاحية: بذور حاصل، عرنوص، تفييم.

INTRODUCTION

An option for early harvest is harvesting gains from the ear, without removing the peel and cob. This will extend the harvest period, as well as reduce the risk of grains being contaminated by diseases of late season (8 , 10,13). Several researchers (14 , 15 , 16 , 17) , reported producers' increasing adoption of harvesting on corn ear, to obtain better quality grain, especially for single and three way - cross hybrids. The harvesting of the corn grains from the ear was carried out for many years with moisture content a little lower than 35%, as soon as they reached physiological maturity, followed by artificial drying. However, studies have shown that the maximum values of germination and vigor can occur when grains have high moisture content, even before they have reached physiological maturity (4,5). Ajayi and Fakorede (1) have also found that corn grains harvested before full maturity, regardless of dry weight, germinate faster than those harvested at full maturity , accordingly. Research generally indicates combine efficiency is best (harvest losses are lowest) when corn grain moisture is about 20-22%. Furthermore, corn delivered to market at less than the standard moisture weighs less . Thus, farmer should generally strive to finish harvest before grain moisture falls below 15% .Morphological and physiological changes that occur during maturation period process are used as parameters to identify ideal corn grains moisture harvest , therefore studies are necessary to determine the grains harvest moment of interesting genotypes by precise and practical methods (18 , 19 , 21) . There are several methods used to estimate the ideal corn grain harvest moment , like the milk line development , which is a result of endosperm solidification . The endosperm solidification process beginning at apex and ending at the base of each grains , being a characteristic easily detected in the field and does not especial equipment . The objective was to study grain yield and yield components of corn in next generation as influenced by harvesting moisture of their parent popu - lation .

MATERIALS AND METHODS

In this research, corn synthetic variety 5018 was used , classified as dented, produced by Agricultural Researches Directorate -Ministry of Agriculture . In spring season 2015 , a 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 manag - ement was performed , as recommended. When the moisture of the ear grains was reach 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 trail was carried out with five treatment materials , by 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 the analysis of variance by F test. The means were compared using the least significant difference at 5% level (20).

RESULTS AND DISCUSSION

Corn grain yield was correlated to one or more yield components . The harvesting of grains with highest moisture content affects the grain yield and other agronomic traits of the next generation (11 , 12) .

Number of grains .ear^{-1} :

Significant difference were found among harvesting grains in different moisture levels in the number of grain ear^{-1} for second generation (Table 1) . The highest value of this trait (614 grains . ear^{-1}) produced from the plants grown from the seeds harvested from original population with grain moisture 25-28% . This treatment significantly supe - rior to other treatments (Figure 1). It was concluded that the favorable moisture content for corn grains harvesting for seeds production was (25-28)% , (8) .

Number of grains .m^{-2} :

Table 1, significant differences shows among harvesting grain moisture . The highest

number of grains (4224 grains. m-^{2}) produced from the plants their seeds were harvested with moisture (25-28)% , which significantly differ from the plants harvested with moisture treatments in parent population (Figure 2) . It can be conclude that the best harvesting moisture content for next generation seeds production was (25-28)% .

Grain weight . mg^{-1} :

Significant differences were found among harvesting grains in different moisture levels for the grain weight m $^{-1}$ (Table 1) . The highest value of this trait (266 mg^{-1}) produced from the plants grown from the seeds harvested with grain moisture (19-22%) and this treatment , differ significantly from the other treatments (15) . The figure 3 shows a linear decay curve between grain harvesting moisture and grain weight with R^2 = 97.4 . It was concluded that the favorable time for corn grains harvesting moisture for seeds production in the first generation was (19-22)% , (10).

Grain yield g. plant^{-1} :

A significant differences were found among grain moisture harvesting of original population 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 differs 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) .

Grain yield . t.ha^{-1} :

Table 1 shows significant differences among corn grains moisture during harvesting times at seeds production times and their effects on the crop grain yield in next generation . The grains moisture treatment (19-22) % produced highest corn grain yield , (10.70 t . ha^{-1}) , which didn’t significantly differ from treatments (25-28)% . Figure 5 , indicate decay linear curve with R^2 = 90.22% . It could be conclude that the best time for corn grain harvesting for seeds production program between 19-28 % and with increasing from this level caused to decrease the total dray matter kg.m^{-2} . in corn production and inverse to total grain yield , (15) .

Table 1. Means of number of grains.ear^{-1} , number of grains .m^{-2} , grain weight .mg^{-1} , grain yield g. plant^{-1} and grain yield t.ha^{-1} .

Grain moisture %	No. of grains.ear^{-1}	No.of grains.m^{-2}	Grain weight.mg^{-1}	Grain yield g.plant^{-1}	Grain yield T..ha-^{1}
19-22	601	4025	266	159.46	10.70
.25-28	614	4224	249	152.96	10.25
30-33	587	3933	224	129.84	08.70
34-36	602	4036	214	127.90	08.57
37-42	605	4056	202	122.09	08.18
LSD	7.3	50.4	12.3	7.28	0.48

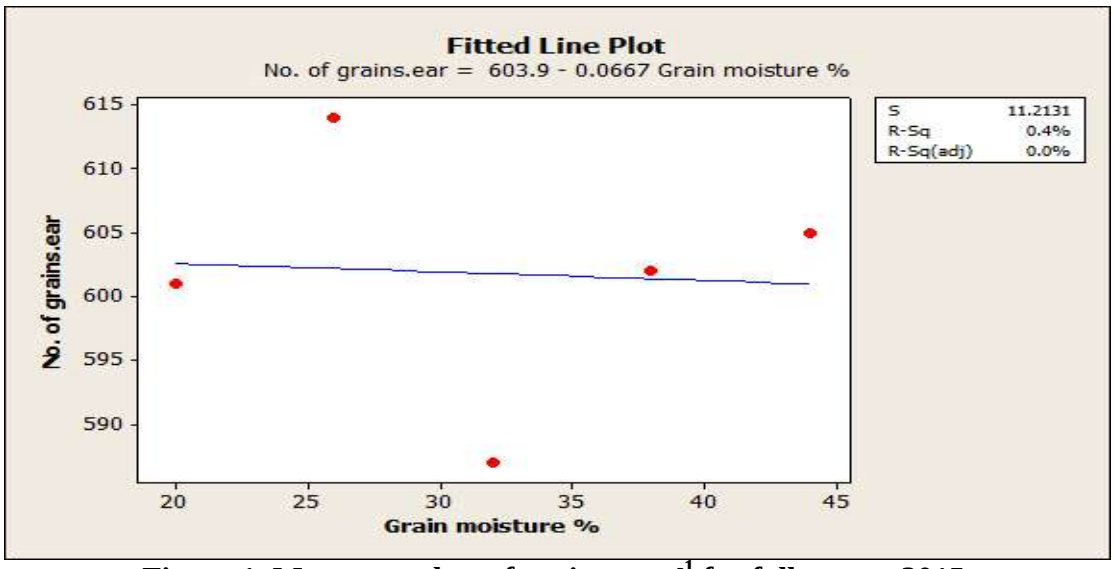

Figure 1. Means number of grains . ear^{-1} for fall season 2015.

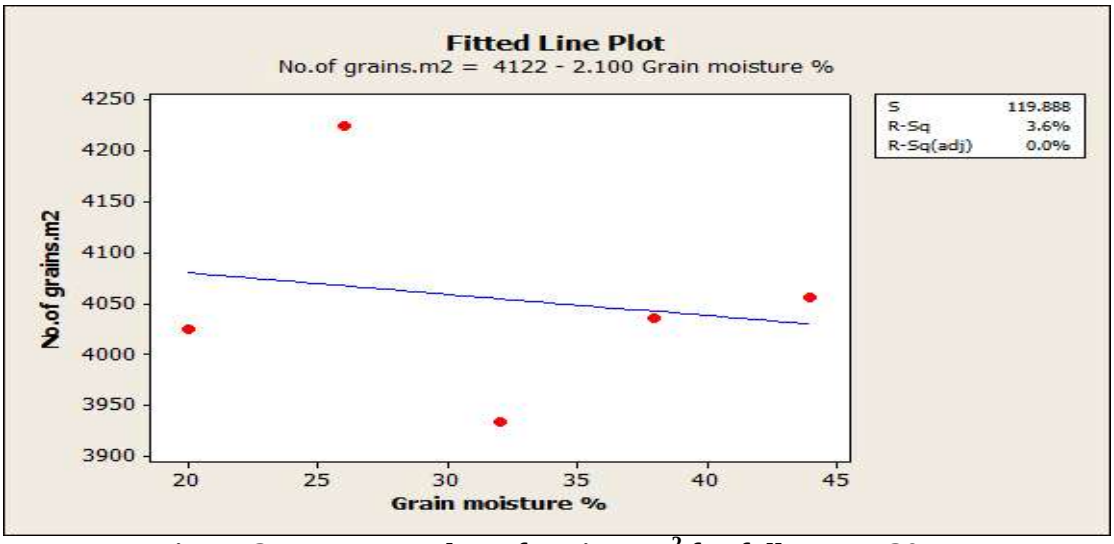

Figure 2. Means number of grains . m^2 for fall season 2015.

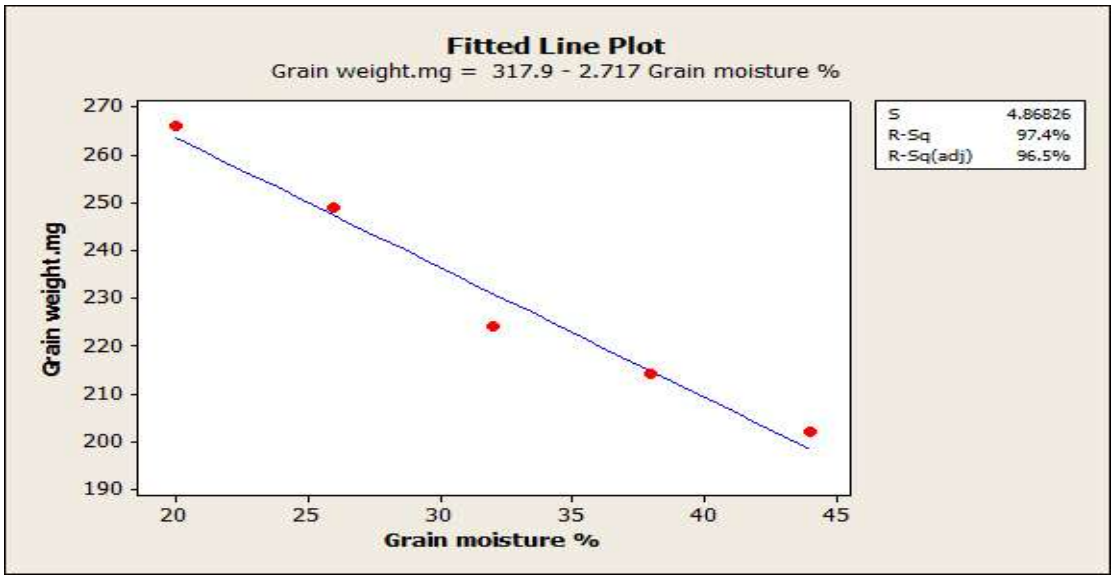

Figure 3. Means grain weight mg. for fall season 2015.

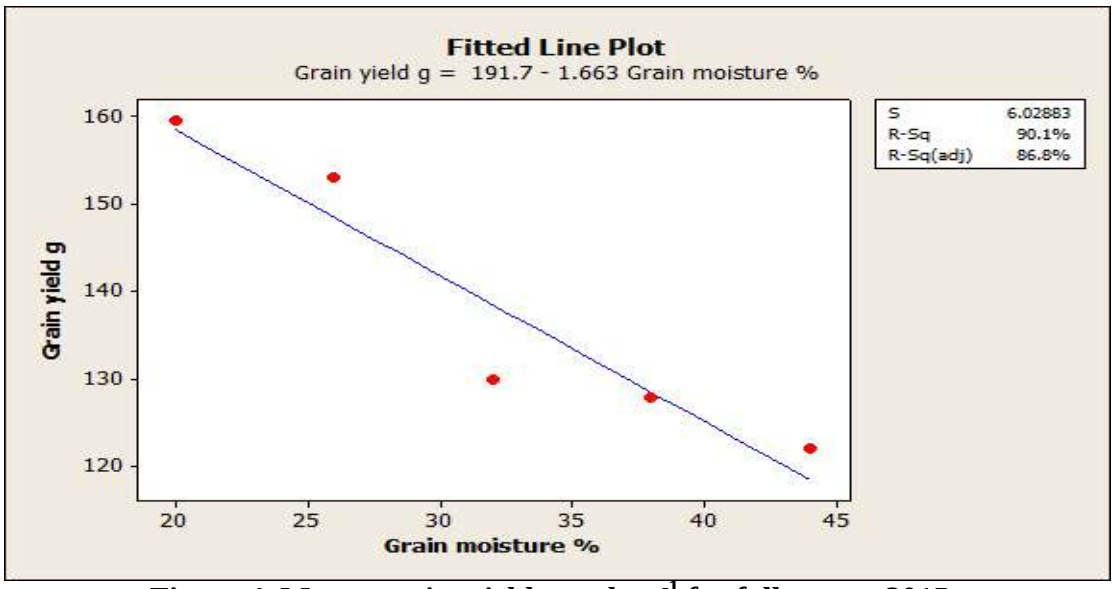

Figure 4. Means grain yield . g. plant^{-1} for fall season 2015 .

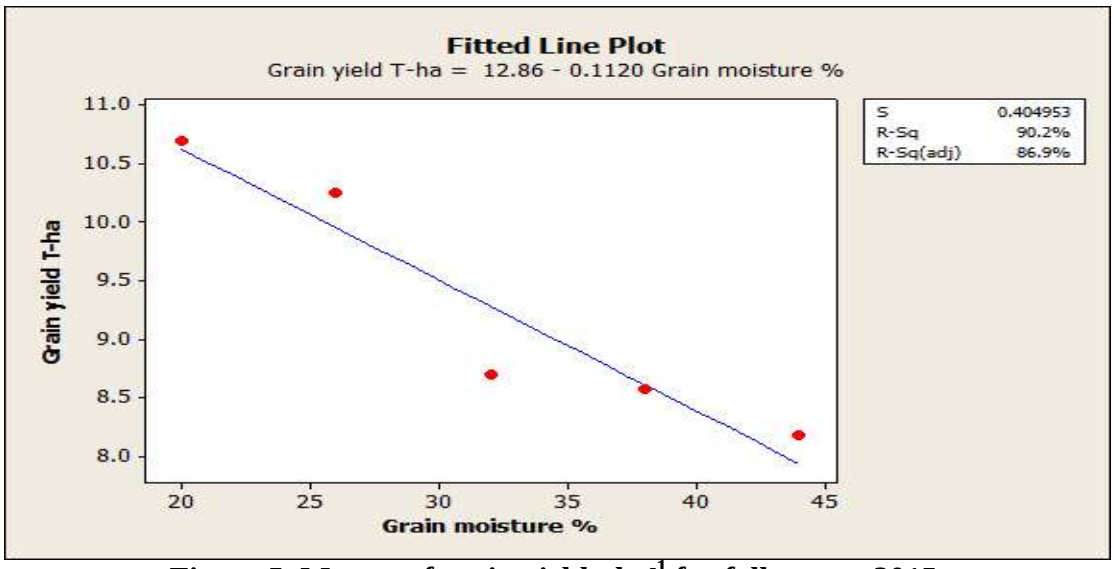

Figure 5. Means of grain yield t.ha^{-1} for fall season 2015.

REFERENCES

1.Ajayi, S.A. and M.B. Facorede . 2000. Physiological maturity effectes on seed quality, seedling vigor and mature plant characteristics of maize in a tropical enviro - nment. Seed Sci. and Tech. , vol. 28, :301-319.

2.Ali , R. M. , M.M. Elsahookie and F. Y. Baktash. 2005 . Response of maize genotypes to planting season and date of harvest . 1- Growth parameters and yield of seeds . The Iraqi J. of Agric. Sci. 36 (2) : 83-92 .

3.Ali , R. M. , M.M. Elsahookie and F. Y. Baktash. 2005 . Response of maize genotypes to planting season and date of harvest . 2- Seed quality and vigor parameters . The Iraqi J. of Agric. Sci. 36 (2) : 93-102 .

4.Ali , R. M. , M.M. Elsahookie and F. Y. Baktash. 2005 .Performance of sunflower as influenced by planting season and date of harvest . I- Growth parameters and F1 seed yield .The Iraqi J. of Agric. Sci. 36 (4) : 47-60

5.Ali , R. M. , M.M. Elsahookie and F. Y. Baktash. 2005 .Performance of sunflower as influenced by planting season and date of harvest. 1I-Seed quality and viability parameters. The Iraqi J. of Agric. Sci.36 (6) : 63-76 .

6.Anderson, J.A., G. Algarswany , C. A. Ros, J.T. Ritchie and A. W. Lebaron . 2001 . Weather impacts on maize , soybean and alfalfa production in the great region . Agron. J. 93 : 1059-1070 .

7.Anonymous , 1993 . Rules for testing seeds . J . Seed Sci. and Tech. 29 :b339-344 .

8.Barary , M. , S. Kordi , M. Rafie and A. A. Mehrabi. 2014 . Effect of harvesting time on grain yield , yield components and some qualitative properties of four maize hybrids . Int. J. Agric. and Food Res. Vol 3 (4):1-7 .

9.Bewley, J.D. and M. Black . 1994 .Seed Physiology of Development and Germination. 2nd ed. New York: Plenum Press, 1994. 445p.

10.Deshpande , V.K.; and G.N. Kulkarni. 1991. Effect of time of haversting on seed quality attributes in maize (*Zea mays* L.).Mysore J. of Agric. Sci. ,.25, (.2), :.162-164 .

11.Elsahookie , M. M. 1990 . Maize Produc - tion and Breeding . Mosul Press. Univ. of Baghdad , Iraq, pp:400 .

12. Elsahookie, M.M. 2002. Seed and Yield Components . IPA. Agric. Res. Center , Baghdad , Iraq. pp: 130.

13.Ferreira, V.F. , J.A. Olivveira , T.P. Ferrreira , L.V.Reis , V.D. Andrade and J.C. Neto. 2013 . Quality of maize seeds harvested and husked at high moisture levels . J. Seed Sci. Vol.35 (3): 1-5 .

14.Grabe , D.F. 1987 . Report of the seed moisture committee . Seed Sci. .and Tech. 15 : 451-462 .

15.Huang, H., D. B. Faulkner, L. L. Berger, and S. R . Eckhoff,. 2012a. Harvest date influence on dry matter yield and moisture of corn and stover. Transactions of the ASABE, 55(2), 593-598.

16.Huang, H., L. Xu, and S.R. Eckhoff .2012b. Effects of selected harvest moistures and frozen storage times on selected yellow dent corn: Wet-milling yields and starch pasting properties. Transactions of the ASABE, 55(2), 598-606.

17.Junior , E.A. , L.M. Mertz , F.A. Henning , S.T. Beske , F.A. Villela and M. B. Labbe . 2014. Ideal seeds harvest moment of different maize hybrids .Ciencia Rural J. Vol. 44 (2) : 253-260 .

18.Pordesimo, L. O., S. Sokhansanj, and W.C. Edens . 2004. Moisture and yield of corn stover fractions before and after grain maturity. Transactions of the ASAE, 47(5), 1597-1603.

19.Stanwood , P. C . and M . B. McDonald . 1989 . Seed Moisture CSSA Special pub. No. 14 , Mad. , WI. , USA , pp: 115 .

20. Steel , R.G.D. and J.H.Torrie . 1980. Principles and Procedures of Statistics . A Biometrical Approach , 2nd ed. Mc. Grau Hill Book Co. , NY. USA. pp: 485 .

21. Valquiria , F. F. and A.O.2013.Quality of maize seeds harvested and husked at high moisture levels. J. of Seed Sc. 35 (3): 225-235.