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DOUGH PROPERTIES AND BAKING QUALITY OF BALADY BREAD PRODUCED BY INCORPORATION OF HULL-LESS BARLEY SALT TOLERANT GENOTYPES FLOUR

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ABSTRACT

Composite flour blends of three barley genotypes [Giza-123 covered, from low & high salinity, Line1 (naked, from low & high salinity tolerant) in addition to Line2 (naked, from low & high salinity tolerant)] each. The influence of barley flour substitution on bread quality was examined. The mentioned substitution of wheat flour altered the bread loaf diameter, color and loaf texture. These changes were found to be dependent on the barley genotypes.

Barley flours (82%) from all genotypes increased dough water absorption property, causing variable developing time. Blends with Line2 recorded the highest developing time (3 min.). Incorporating barley had no effect with Giza-123 flour from both salinity tolerant genotypes, while the dough with naked barley lines flour increased its stability. Dough resulted from composite flours gave less weakening values ranging between 90, for blends containing flour from Giza-123 or Line 1, and 105 B.U. for the blend containing flour of Line2 both obtained from low salinity tolerant. Dough extensibility of most blends was less extensible ranging from 70 to 80 mm comparing with wheat. Adding barley genotypes flours to wheat flour (cv. Giza-168) resulted in an increase of elasticity, except that of the blend containing flour of Giza-123 (covered, from low salinity tolerant), which had less elasticity (270 B.U.) as compared with wheat (275 B.U.). Dough proportional number was maximized by adding barley flour in all doughs formula except for control sample. In other hand, blends containing barley flour had less energy dough. Loaves diameters from blends containing barley flours were higher than that of loaves from wheat alone. The highest mean loaf weight was achieved by (Wh+HL1) blend, while the lowest one was that of (Wh+ MG) blend. Color of balady bread top layer showed slight difference throughout the samples, except those of (Wh+ML1) and (Wh+HL2), which were significantly lower than control (wheat alone). Color of bread inner layer, for blends containing barley flours, showed significant darker color than that of wheat, except bread that contained flour of Line2 resulting from both salinity tolerant types. Loaves textures, which contained barley flours, clearly differed from that of wheat. Bread odor and taste were slightly different from those contained barley flours. General appearance of different breads took the same trend-like odor and taste; however general appearance of (Wh+ML1) and (Wh+HL2) had a significant lower scores, while blend of (Wh+ML2) recorded a very good score same as control and may be acceptable as balady bread.

Key words: Dough- Balady bread- Barley genotypes- Composite flour- Elasticity- extensibility- Rheological measurements- cereal flours

INTRODUCTION

Balady bread in Egypt is a very important portion in Egyptian's daily staple food. There is a gap between bread production and consumption because of insufficient wheat production as well as the need for enhancing the nutritive value of bread loaf. There is also a problem in diminishing fertile areas of agricultural lands resulting in a decreasing wheat yield. Barley is a good solution for this dilemma; as it is a highly versatile crop that can be grown over a wide range of environmental conditions. Hull-Less barley (HB) is receiving a considerable research attention in food, feed and industrial applications. Currently, barley is mostly being used for livestock feeds and the remainder for food (raw material for malt) and other industrial applications.

Hugo *et al.* (2000), Sandip (2001) and Annica *et al.* (2004) stated that barley is a good source of a dietary fiber, β-glucan that has a number of human health benefits such as lower blood glucose responses and glycemic index, higher satiety ratings, cholesterol-lowering and anti carcinogenic effects. Barley is rich in tocols (42 to

80 rnglCg-') that have vitamin-E and antioxidant activity, and are potent inhibitors of cholesterogenesis. The nutritional values of whole or pearled barley grains have increased its desirability among humans. Vaculova and Heger (1998) added that hull-less spring barley varieties are superior to covered ones in terms of protein content (by 16.3 g/ha), starch (by 52.7 g/kg), weight gain (by 3.33 g), and energy digestibility (by 2.83%). Covered spring barley varieties showed significantly greater grain fiber content (by 29.6 g/kg compared with hull-less ones) and a tendency towards higher grain weight

Hugo *et al.* (2000) mentioned that flour made by mixing wheat with non-wheat flour is termed as composite flour. It is used for the production of balady bread and other products. Those flours are advantageous to developing countries because they reduce wheat imports and enable the use of locally grown grains. Non-wheat cereal, including barely, have technical difficulties associated with that like the limited shelf life and fast staling characteristics. Reducing the losses of bread and improving the quality are attractive to many researchers.

Basman and Koksel (1999) investigated the effects of increasing levels of wheat bran and barley flour on dough properties and baking quality (flat bread commonly consumed in Turkey). Part of the wheat flours were replaced with barley flour at 10, 20, 30 and 40% levels. Bread samples were subjected to sensory analysis. Increasing levels of barley flour decreased all sensory properties.

Gill *et al.* (2002) studied the substitution of wheat flour with barley flour (i.e. native or pretreated/extruded). This treatment reduced the loaf volume. Depending on the barley variety and flour pretreatments, the color and firmness/texture of the bread loaves were altered. The lower loaf volume and firmer crumb texture of barley breads as compared with wheat bread may be attributed to gluten dilution. Also, the physicochemical properties of barley flour components especially that of beta-glucan, can affect bread volume and texture.

Ibrahiem (2005) studied addition of some dietary fibers sources, including hull-less barley, and it effects on resultant doughs and baked products. Concerning hull-les barley, increasing the proportion of rich fiber sources led to an increase in water absorption. The increases in water absorption for blends containing 5%, 10% and 15% hull-less barley were 5.9, 9.3 and 13.8%.

There is a growing research interest in enhancing the food uses of barley and thus making fiber-enriched (β-glucan) products that could possibly be used as functional foods (Sandip, 2001).

The overall objective of the present studies was incorporating two hull-less barley flours as well as flour of a covered barley variety into wheat flour individually at 30% to assess good balady bread by stabilizing the rheological properties of dough and obtaining acceptable bread volume and texture.

MATERIALS AND METHODS

1- Materials:

Three barley genotypes including the covered (hulled) variety Giza-123 and two hull-less (naked) lines introduced from ICARDA, were cultivated during 2002/2003 and 2003/2004 seasons at the Agricultural Experimental Station of Desert Research Center (DRC) located in Ras-Sudr, South Sinai Governorate under two salinity levels of irrigation water (4413 and 8761 ppm). Pedigree/ names and origin of studied genotypes are listed in table (1).

Table (1): Names, pedigrees, and source of studied barley genotypes:

No.	Name	Pedigree and/or selection history	Source
1	Giza123	Giza 117/FAO86	Egypt
2	Line 1	ICNB F_8 - 596 Sel, 3 A P	ICARDA*
3	Line 2	ICNB F_8 - 653 Sel, 5 A P	ICARDA*

*The International Center for Agricultural Research in the Dry Areas.

2- Preparation of wheat and barley genotypes raw materials:

Grains of wheat cv. Giza168, obtained from the Agricultural Research Center, Giza, Egypt , as well as the resultant barley yields of different genotypes from different salinity level were cleaned and tempered for 48 hr to 14% moisture content and milled using a whole-meal experimental mill in the Agricultural Research Center. All meals of wheat and barley genotypes were sieved through 0.3 mm sieve to obtain flour representing 82% extraction rate.

3- Chemical analysis of raw materials:

Flours of wheat barley genotypes were chemically analyzed for their content of total carbohydrates by Nelson's reagent (Malik and

Singh, 1980), soluble protein content using Lowry's method (Lowry *et al.*, 1951) and ash contents by the method of (A.O.A.C., 1990).

Preparation of different blends of flour composites:

Different blends were prepared by partial replacement of wheat flour 82% extraction with barley flours (82% extraction) at a ratio of 70% : 30% (w/w) for each barley genotype. Blends and their designations are referred in table (2) below. Higher substitution of barley flour increased the dryness and hardness Sandip (2001).

4- Rheological characteristics:

The rheological assessment of different dough samples was carried out by using farinograph and extensograph tests according to the method of A.A.C.C. (1994).

Table (2): Blends of flours produced from wheat and different barley flours:

Blend designation	Wheat flour	Barley flour
(Wh)	Giza 168	-
(Wh+MG)	Giza 168	Giza-123 (covered, from low salinity)
(Wh+HG)	Giza 168	Giza-123 (covered, from high salinity)
(Wh+ML1)	Giza 168	Line 1 (naked, from low salinity)
(Wh+HL1)	Giza 168	Line 1 (naked, from high salinity)
(Wh+ML2)	Giza 168	Line 2 (naked, from low salinity)
(Wh+HL2)	Giza 168	Line 2 (naked, from high salinity)

Low salinity at 4413 ppm, High salinity at 8761 ppm

5- Balady bread making:

Different samples of balady bread were prepared from wheat flour (82% extraction) alone and in replacements with different barley genotypes flours (passing through 0.3 mm represented 82% extraction) at 30% for each barley genotype flour. Balady bread samples were prepared at the Agricultural Research Center, Giza, Egypt. According to the common method described by Mekhael (2004). Sieved wheat flour 82% extraction (1 kg) and its blends were mixed with bakery yeast (5 g), sodium chloride (5 g) and water (700-800 ml). Using a high absorption produced very soft dough. The previous formulae were manually mixed for 15 min (each) to form dough. Different doughs were left for 15 min. at 28-30°C for resting. After that the rested dough are manually divided. Units were placed on wooden board previously dusted with sieved bran and left for 15 min. at 28-30 °C, then manually flattened. Flattening was carried out to 18-20 cm diameter and one cm thickness. Baking was carried out with removal of excess bran in a traditional balady bread oven at 450-500°C for a relatively short time (55 seconds). The baked loaves were then cooled at room temperature for at least 30 min.

6- Physical characters and sensory evaluation:

Physical characteristics of different loaves including loaf weight average and loaf average diameter were recorded in replicates. Balady bread was evaluated for its sensory characteristics by ten panelists from the staff of the Cereal Tech Res. Section, Agric. Res. Center. The scoring scheme was established according to the method of Abd El-Latif (1990).

7- Statistical analysis:

Values of each character were statistically analyzed as complete random block design. All data were subjected to ANOVA test and means were compared by Duncan's multiple range test (1955). Comparisons with *P* values <0.05 were considered significantly different.

RESULTS AND DISCUSSION

1. Chemical analysis of raw materials:

Table (3) showed Total carbohydrates, soluble protein and ash (mg/g) for flours wheat and barley genotypes used in composite flours (passed through 0.3 mm sieve).

Wheat flour had the highest carbohydrate content and HL2 appeared closely to it, however, the lowest carbohydrate content was in flour of the covered cultivar, i.e. MG and HG. Soluble protein of naked barleys flour especially Line2 seemed to be higher than covered ones and wheat. The lowest ash content was wheat flour, while naked barleys exhibited flours of lower ash content than covered ones.

Table (3): Total carbohydrates, soluble protein and ash (mg/g) for flours wheat and barley genotypes (passed through 0.3 mm sieve):

Samples	Total carbohydrates	Soluble protein	Ash
Wheat G168	673.38	82.79	11.7
MG	601.43	86.75	21.40
HG	600.51	93.18	16.89
ML1	620.84	88.24	15.89
HL1	650.86	109.31	12.46
ML2	612.96	103.78	15.73
HL2	672.28	100.66	12.18

2. Farinograph test:

Rheological behavior of dough prepared from different blends of wheat Giza-168 and barley genotypes flours on the farinograph apparatus is shown in table (4).

Table (4): Farinograph properties of wheat flour and selected composite barley flours:

Blends	Water absorption %	Arrival time (min.)	Dough development time (min.)	Dough stability (min)	Degree of softening (B.U.)
(Wh)	58.6	1.5	2.0	3.5	120
(Wh+ MG)	64.6	1.0	1.5	3.5	90
(Wh+HG)	64.1	1.5	2.0	3.5	100
(Wh+ML1)	62.3	2.0	2.5	5.0	90
(Wh+HL1)	62.8	2.0	2.0	4.5	95
(Wh+ML2)	63.3	2.0	3.0	4.0	105
(Wh+HL2)	62.3	2.0	3.0	5.0	100

2.1. Water absorption percentage:

It is obvious from table (4) that incorporating barley flours (82%) from all salt tolerant genotypes, increased water absorption property comparing with wheat flour (82%) alone. The maximum percentage increase (64.6%) of water absorption resulted in case of mixing flour of variety Giza-123, (low salinity tolerant), with wheat flour. Also, blending flours of naked lines, i.e. Line 1 and Line 2, with wheat flour resulted in a slight increase in water absorption percentage, as compared to the mentioned maximum. These results are in agreement with Ibrahiem (2005) who reported that, increasing the proportion of rich fiber sources of hull-less barley led to an increase in water absorption. Also, results agreed with those obtained by Skurray *et al.*(1988) and Abd El-Moniem and Yassen (1993) who reported that addition of fiber sources caused an increase in water absorption in the produced dough. This may be due to higher water hydration capacity of fibers, as concluded by Chen *et al.*, (1988). Water absorption is known to play an important role in the quality of baked products. Flours of higher water absorption are considered of higher quality. Increasing in water absorption may be due to the increase in protein content of the added flour. In blends, the increase of water absorption leads consequently to more loaves from certain amount of flour, Abd El-Hamid (1976).

2.2. Developing time (mixing time):

Adding barley flour to wheat flour caused variable developing time; where blends containing MG, HG, ML1, HL1, ML2 and HL2 gave 1.5, 2.0, 2.5, 2.0, 3.0 and 3.0 min., respectively. Developing time increased in case of blends with naked barley flour except that of Line 1 of high salinity tolerant genotype, and that equaled wheat dough developing time. Blends with Line 2 recorded the highest developing time (3 min.) compared to wheat dough. Increases in developing time may be attributed to the difference in granularity of the naked barley flours and wheat flour. It is notable, as reported by Abd El-Hamid (1976), that a flour of a longer mixing time is preferred by the bakers as it gives a sufficient time for the dough formation before reaching the weakening stage, and it is preferred in the case of mixtures as it gives enough time for well blending of such additives. In addition Chen *et al.*, (1988) found a possible interaction between fiber and gluten that prevents the complete hydration and resulted in poor gluten development during mixing. He concluded that the increasing water absorption may be caused by the strong water binding ability of fibers. The longer mixing time could result from the dilution of gluten and the difficulty of mixing fibers and wheat flour homogeneously.

2.3. Stability of the dough:

Incorporating barley flour to wheat flour either had no effect with Giza-123 flours from both salinity tolerant genotypes. On other hand, the dough with naked barley lines flours increased its stability.

Sandip (2001) mentioned that the dough stability refers to the ability of the gluten network to resist the mechanical mixing effects. The higher dough stability is preferred for bread making,

2.4. Degree of softening:

Adding barley flours to wheat flour decreased the degree of softening of dough. Wheat flour from Giza-168 at no replacement, showed a weakening value of 120 B.U. while, the dough resulting from composite flours gave less weakening values ranging between 90, for blends containing flours from Giza-123 or Line 1 of low salinity tolerant genotype, and 105 B.U. for the blend containing flour of Line 2 of low salinity tolerant genotype. These data were in agreement with that found by Sandip (2001) who concluded that weakening of the dough indicates the rate of the breakdown of gluten network after the elapsing of mixing time.

3. Extensograph test:

Data in table (5) indicates the effect of incorporating barley flours (82%) from different salt tolerant genotypes with wheat flour (82%) on the extensibility, resistance to extension and strength of the dough energy as measured by extensograph.

Table (5): Extensograph properties of wheat flour and selected composite barley flours:

Blends	Elasticity (S) (* B.U)	Extensibility (E) (mm)	Proportional number (P.N)	Energy (cm^2)
(Wh)	275	145	1.91	42
(Wh+ MG)	270	70	3.9	21
(Wh+HG)	330	80	4.1	30
(Wh+ML1)	300	77	3.9	26
(Wh+HL1)	355	75	4.8	31
(Wh+ML2)	440	77	5.7	39
(Wh+HL2)	290	78	3.7	22

*** B.U. = Brabender unit**

3.1. Elasticity:

Elasticity of dough clears the elastic networks and contributes to the overall elasticity and strength of the dough (Izydorczyk *et al.*, 2001); also dough elasticity is the ability to regain its shape after extension. It depends on the amount of glutenin in the dough (Bhatty 1986). As shown in table (4), addition of barley flours to wheat flour increases the elasticity of the dough except the mixing of Giza 123 flour from low salinity tolerant genotype, which was less elastic (270 B.U.) than wheat (275 B.U.), whereas dough of other blends were more elastic. Their elasticity units ranged from 290 to 440 B.U. These data were in agreement with Izydorczyk *et al.* (2001). He explained that combinations of high amounts of non-starch polysaccharides and unusual starch characteristics in barley seem to balance the negative effects associated with gluten dilution brought about by addition of barley into wheat flour. So the used barley genotypes, either low or high tolerant genotypes, generally contain amylose and β-glucan, and which enhance the texture and shelf- stability of loaves.

3.2. Extensibility:

Extensibility is the ability of the dough to extend or to stretch. It depends on the gliadin proportion content. Extensibility increases if reduction of S--S bonds in the protein network takes place, as mentioned by (Abd El-Hamid, 1976) and Sandip (2001). From table (5), it is clear that addition of barley flours to wheat flour decreases the extensibility of the dough. Wheat dough alone exhibited the highest extensibility (145 mm), while doughs of other blends were less extensible than wheat; as their extensibility ranged from 70 to 80 mm. The results were in agreement with those found by Basman *et al.* (2003).

3.3. Proportional number:

Dough proportional number was maximized by adding barley flour in all dough formula except the control. These data were in agreement with that found by Yaseen (2000).

3.4. Energy of the dough:

Energy is considered an overall judgment of the strength of the dough, as it is the resultant of the following two properties of the dough i.e. extensibility and elasticity (Bhatty 1986). Dough prepared from wheat flour alone showed the highest energy (42 cm^2), while other dough containing barley flour had less energy.

4. Balady bread characteristics and sensory evaluation:

Table (6) represents physical and sensory characteristics of balady bread prepared from wheat flour (82% extraction) alone (as control) and in replacements with different barley genotypes flours (passed through 0.3 mm represented 82% extraction) at 30% for each barley genotype flour.

It is clearly observed that loaves diameters for blends containing barley flours are higher than that of loaves from wheat alone; as wheat bread recorded the lowest diameter (21.03 cm).

Mean loaf weight of different blends was inconsistent. The highest mean loaf weight was achieved by (Wh+HL1) blend, while the lowest one was that of (Wh+ MG) blend. Urooj *et al.* (1998) reported that increasing the proportion of barley flour in the blend with wheat flour resulted in a progressive increase in farinograph absorption and a significant decrease in loaf volume.

The obtained increase in weight of bread can be attributed to the greater water absorption capacity of β-glucan present in barley. The increasing bread weight was caused by high water retention as mentioned by Chen *et al.* (1988).

Concerning sensory characters of bread, color of crust of balady bread showed slight differences throughout the samples, except those of (Wh+ML1) and (Wh+HL2) which were significantly lower than control (Wheat alone).

However, color of crumb of samples containing barley flours showed significant darker color than wheat excepting breads containing flour of Line 2 of both salinity levels tolerant genotypes; as their inner layer color was slightly different from that of wheat bread. These results agreed with Ibrahiem (2005) who used some dietary fibers sources, including hull-less barley, and it effects on resultant dough and baked products. She found that color and texture were directly related to variety, and level of substitution. Replacement of bread flour with some dietary sources produced acceptable Egyptian balady bread.

From table (6), it is obvious that, loaves textures of breads containing barley flours clearly differed from that of wheat bread. Odor and taste of breads containing barley flours slightly differed from that of wheat. General appearance of different breads took the same trend like odor and taste characteristics; however general appearance of (Wh+ML1) and (Wh+HL2) had significant lower scores, apparently because of color of their bread top layer. As for overall score, the resultant of the previous bread characteristics, was converted to descriptive categories, while blend of (Wh+ML2) record a very good score same as control, and that may be acceptable as Balady bread. These results are in agreement with those obtained by Abo El-Naga (2002) as he recommended using barley (pass through 0.5 mm represented 82% extraction) up to 40%. The firm crumb texture of barley breads compared with wheat bread may be

Table (6): Physical and sensory characteristics of balady bread prepared from wheat flour and in replacements with different barley genotypes flours

Blend	Physical characteristics		sensory characteristics						
	Diameter (cm)	Loaf weight (g)	Color of crust (15)	Color of crumb (15)	Crumb texture (15)	Odor (20)	Taste (20)	General appearance (15)	Overall score
(Wh)	21.03 b	154.10 c	14.0 a	14.0 a	15.0 a	20.0 a	19.3 a	14.3 a	V. good
(Wh+ MG)	21.93 a	105.93 d	14.3 a	10.3 b	12.3 b	19.7 a	19.2 a	14.3 a	V. good
(Wh+HG)	22.13 a	158.3 bc	14.3 a	10.1 b	11.9 b	19.5 ab	19.2 a	14.7 a	Good
(Wh+ML1)	22.53 a	163.53 b	12.5 b	10.8 b	12.8 b	19.5 ab	19.2 a	11.7 b	Good
(Wh+HL1)	22.53 a	176.60 a	14.0 a	10.9 b	12.7 b	18.8 b	18.0 a	14.7 a	Good
(Wh+ML2)	22.40 a	169.27 a	14.7 a	12.0 ab	11.5 b	19.3 ab	19.0 a	14.3 a	V. good
(Wh+HL2)	22.50 a	154.80 c	12.7 b	12.3 ab	12.3 b	19.2 ab	18.8 a	11.7 b	Good

-Values followed by the same letter in columns are not different at $P<0.05$ by Duncan's multiple range test.

attributed to a number of factors. The most obvious factor could be the gluten dilution. The physicochemical properties of barley (β-glucan and starch may also indirectly affect bread volume and texture. Substitution of wheat flour with barley flour reduced the loaf volume and altered the color and firmness/texture of the bread loaves. However, these changes were found to be dependent on barley variety and barley flour pretreatment (i.e. native or extruded) as concluded by Gill *et al.* (2002).

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خواص العجين و جودة الخَبْز للعيش البلدي المنتج بإدخال دقيق الشعير العاري من تراكيب وراثية متحملة للملوحة

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** قسم الأصول الوراثية- مركز بحوث الصحراء- المطرية- القاهرة.

- تم اختبار تأثير الإحلال الجزئي على جودة الخبز الناتج، لخلطات يتألف كل منها من دقيق أحد ثلاثة تراكيب وراثية من الشعير بنسبة ٣٠% (جيزة ١٢٣المغطى، سلالتان عاريتان Line 1 ، Line 2 ناتجتان من محـــصولين مقـــاومين لملوحـــة منخفـــضة وعالية) مع٧٠% دقيق قمح جيزة ١٦٨، هذا الإحلال أدى إلى تغيير قطـــر، لـــون، قوام الرغيف، ويمكن أن يُعزى التغيير الحادث إلى اخـــتلاف التراكيـــب الوراثيـــة المُستخدمة.
- دقيق الشعير (استخلاص ٨٢%) الناتج من جميع التراكيب الوراثية السابقة يزيد مـــن خاصية امتصاص العجينة للماء مسبباً اختلافاً في زمن تكـــون العجينـــة، فالخلطـــة الموجود بها دقيق السلالة Line2 أعطت أعلى قيمة (٣ دقائق) ، في حـــين إدخـــال السلالة جيزة ١٢٣ المقاومة لمستويين من الملوحة، لم يكن لهما أي تأثير، كما أزداد ثبات العجين الناتج من ادخال دقيق السلالتين العاريتين.

- التوليفات الناتجة من أنواع الدقيق السابقة أظهرت درجة ضعف للعجين في مستوى ٩٠ وحدة باربندر للخلطات التي تحتوي على دقيق شعير جيزة ١٢٣ أو Line1 ، أما الخلطة الناتجة من دقيق Line2 أعطت ١٠٥ وحدة باربندر.
- مرونة العجين لمعظم الخلطات تحت الدراسة زادت في حدود من ٢٩٠ إلى ٤٤٠ وحدة باربندر، أيضا المطاطية انخفضت (في حدود ٧٠- ٨٠ ملليمتر) مقارنة بالقمح.
- إضافة دقيق التراكيب الوراثية السابقة إلى دقيق قمح جيزة ١٦٨ زاد من مقاومة العجين للمطاطية عدا الإضافة الناتجة من دقيق جيزة ١٢٣ (مقاومة لملوحة قليلة) فقد سجلت ٢٧٠ وحدة باربندر مقارنة بالقمح الذي سجل ٢٧٥ وحدة باربندر.
- أعطت نتائج رقم تناسب العجين قيمة عظمى لجميع الخلطات عدا الـ Control ، في حين انخفضت طاقة قطع العجين.
- قطر الأرغفة لخلطات الشعير أكبر من الناتج عن استخدام القمح فقط ، كما كان أكبر متوسط لوزن الرغيف عند استخدام التوليفة المكونة من (٧٠% قمح + ٣٠% سلالة Line 1 مقاومة للملوحة العالية)، في حين أقل متوسط نتج عن (٧٠ % قمح + ٣٠% سلالة جيزة ١٢٣ مقاومة للملوحة المنخفضة).
- لون الطبقة العليا للخبز البلدي الناتج من خلط الشعير يختلف قليلاً، عدا ذلك الناتج عن خلط القمح مع السلالتين Line1 أو Line2 المقاومتين للملوحة العالية، مع أن كلاهما منخفض القيمة معنويا عند المقارنة بالـ Control. لون الرغيف من الداخل أكثر دكانة بدرجة معنوية مقارنة باللون الناتج عن دقيق القمح عدا السلالة Line2 الناتجة من مستويي ملوحة منخفض أو عالي.
- لبابة الأرغفة التي تحتوي على دقيق شعير تختلف عن تلك الناتجة من دقيق القمح، كذلك الحال في كل من الرائحة و الطعم و المظهر العام للأرغفة فقد اختلف جميعهم قليلاً، حيث أظهرت الخلطات التي تحتوي على السلالة Line 1 (مقاومة للملوحة المنخفضة) و السلالة Line2 (مقاومة للملوحة العالية) اختلافا أكبر معنوياً.
- التوليفة الوحيدة التي أعطت مواصفات جيدة تشبه تلك الناتجة عن الـ Control أمكن الحصول عليها بخلط دقيق القمح مع السلالة Line2 المقاومة للملوحة المنخفضة.

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