EFFECT OF INFECTION BY SUNN ON SEMOLINA QUALITY PARAMETERS OF DURUM WHEAT

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ABSTRACT

The losses due to sunn- bug (Eurygaster SPP) damage are important in cereal production and industry among Middle East countries including Iraq. Samples of 3 durum wheat (T.durum) cultivars (Wahat Al – Iraq, Doar 29, AL – ibrahimia) with 0, 10 and 20% of suni – bug damage were used to determine the effect of suni - bug damage on milling properties and semolina quality .One thousand kernel weight, semolina yield (g), ash and gluten content in semolina were esitmated, also virtreousness value and amylase enzymes active by falling number test, sedmentation value by SDS sedimentation test were done. The result showed that as the damage increased, semolina yield of all cultivars decreased significantly (66, 62.6, 59.9)%, (63.5, 59.55, 55.98)% (70.0, 67.7 ,62.5)% for damage level 0,10,20 % to Wahat Al- Iraq ,Doar-29, AL-ibrahimia respectively. Test weight decreas as the damage level increased(80,76,75),75,72,72),(70,70,67)g for damage level 0,10,20% for Wahat Al-Iiraq, Doar29, al-abrahimia cultivars. There were significantly increased at semolina ash content at20% damage level for all cultivars where as semolina gluten content was decreased, Sedementation value decreased in grain at 20% damage level of all cultivars comparision to other levels this refer that the gluten quality was deteriorated. Virtreousness rate decreased for all caltivars as damage level increased. There were significant increaseing at p<0.01 in amylases enzymes activity as damage level increased for three cultivars. It was concluded that suni – bug damage would decrease substantially semolina yield because of effect at test weight and one thousand kernel weight ,also semolina quality decreased because of effect of gluten content, amylases enzymes activity and sedementation value

INTRODUCTION:

Durum wheat (*Triticum durum desf.*) is one of the most important cereal crops in the world, pasta is the most common product made from durum wheat, it is also used in the preparation of bulgur, noodles, Couscous, and various type of bread, (Toufeili, et al,1997,Trocoliet al,2000). Bug – damaged grain produces flour with reduced bread making quality (Trocoli et al 2000,Mousa,2007). The sunnbug damaged wheat contains residual salivary secretion of insects which includes Proteolytic enzymes (Sivri,2004). The residual protease break the gluten structures during mixing and fermentation resulting in poor dough and bread properties(Mousa *et al* 2010,Koksel *et al*,2001)., grain with higher levels of damage (10%) must be rejected from milling grades of wheat

(Boyacioglu and Appolonia,1994) .The price of durum wheat was a fected by the level of kernels sunn – bug damaged, in addition to other quality factors . Durum wheat should have a high protein content and a high semolina yield with uniform particle size. Durum wheat with (11.5 - 13.5 %) protein content considered satisfactory for pasta production pasta quality is mainly related to gluten quality however there are some factos that exert a substantially influence on the gluten quality of durum wheat((Capocchi etal,2000) The literature provides information about the affect of sunn – bug damage on bread wheat quality , but not much information is available on durum wheat milling and semolina for locally varieties in iraq,also the effects of sunn-bug on durum wheat is essential for millers who might have to use damaged wheat especially in years with heavy sunn- bug damage. Hence the present study was planned to investigate the Effect of sunn – bug damage on the milling and semolina properties of local durum wheat.

MATERIALS AND METHODS :

Three suni – bug (Eurygaster Spp) damaged durum(Triticum durum desf) wheat samples (wahat Al - Iraq, doar 29, and AL - Abrahimia) were obtained from farmers in mousal, wahat Al - Iraqcultivar was grown in rainfall region, Dour 29 was irrigated cultivar, Al – Ibrahimia cultivar grown in rainfall and irrigated region. Wheat samples were cleaned to separate foreign materials by hand, The insect – damage level of these grain samples were determined and the sample blended to obtain grain samples of each cultivar with damage levels (10% medium damage and 30% high damage) .Undamaged (sound) samples were collected from each cultivars, this was used as a control sample . , For the estimate of insect damage levels 3 sets of 20 gm sample were taken randomly from themedium – and high damage samples of each cultivar. The number and weight of the damaged kernels in each set was recorded and the percent damage level was reported (on kernel number basis and on weight basis) as the average of 10 determination, All of the tests on the grain sample were performed in duplicate, The hectoliter weight was determined by Hectoliter weight Type MID -100. One thousand kernel weight was determined by counting the number of seeds in 20 g of wheat , Determination of proportion of Virtuousness by Technician infralyzer 400 programs index (1981) Moisture content of the sample were determined according to the Approved method 44 - 15(AACC,2000).

MILLINGi:

Sound and sunn – bug damage grain sample were tempered to 16.5 and 16 % moisture control respectively and milled into semolina on a Buhler pneumatic laboratory mill. Milling was performed in duplicate. Semolina samples weregrownd

into flour using Quaderumat laboratory mill (barbender , Germany) , sedimentation , falling number, moisture , ash content and falling number values of the sample were determined using

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Approved methods 44 - 15A, 08 - 01 and 56 - 81B(AACC,2000) respectively. The SDS sedimentations test was performed as described by William(1986). Statistical analysis of the samples were performed by using one way analysis of variance (L.S.D)Least significant difference test was used to determine the deference among means by (SAS 2001).

RESULTS AND DISCUSSION :

Sunn – bug damag had substantial effect on the physical properties (Test weight, one thousand kernel weight) and semolina yield of durum weight sample Fig .1, 2 shows that one thousand kernel weight and test weight decreas significantly, as the damaged level increased in all cultivars. The yields of semolina are presented in Fig 3. AS the bug damage level increase, semolina, yields of all cultivars decrease significantly.



Besides the decreases in semolina yield the ash content of the semolina sample increased. Table (I) shows the ash content of sound wheat (0.80, 0.83, 0.83, 0.83, 0.83) for the three cultivars, this

increasing in ash content because ofdecreasing in protein and starch content as a result of their degradation by enzymes ,these value were in the acceptable rang according to the(standard for pasta products(1976) which rang between (0.6 - 0.9%). Ash content of semolina sample increased significantly only at20% level damage for all cultivars. Ash content is basically an indicator of bran content within flour and semolina , it affect color of pasta , causing undesirable brown spots on the surface (Dexter and Marchylo,2001) .There were significant correlation between ash content in semolina and brightness,when semolina extraction rate was high, semolina have deep colour and high ash content(Califoria wheat Commission,2001)

	Cultivars	Wahat Al-Iraq	Doar- 29	Al-Abriamia	Means
Damage%					
	0	0.80	0.83	0.83	0.78
	10	0.80	1.00	1.00	0.82
	20	1.20	1.53	1.53	1.21
	L.S.D5%		0.28		
	Mean	0.99	0.81	1.11	
	L.S.D 5%				0.12

Table 1 . Ash content of suni-bug durum wheat damage

Virtreousness is quality characretic in durum wheat affecting semolina to a large extent (Troccolietal,2000). The Value of Vitrousness is showed in Table 2. As the bug damage level increased virtreousness valeus decreased significantly in all cultivars.Al- Ibiramia have lowest value 81.9%. Vitreous kernels have a glassy, translucent appearance rather than afloury text

The negative effect of nonvitreous kernels on the semolina yield is associated with semolina granulation and protein gluten , is beyond question . Vitreous areas of the enodsperm are higher in presence of semi – vitreous kernels reduces semolina yield as those kernels pulverize more readily (Troccoli et al,2000)

Cultivars	Wahat Al-Iraq	Doar-29	Al-Abriamia	Means
Damage%				
0	88.8	92.0	87.00	89.4
10	84.00	86.0	82.00	84.0
10	64.00	80.9	82.00	84.0
20	81.80	82.0	81.9	81.3
L.S.D5%		0.22		2.55
Mean	84.8	86.9	83.3	
L.S.D 5%				1.2

Table2.Virtreousness of suni-bug durum wheat damage

Table.3 shows gluten content% of semolina.Gluten content of sound wheat semolina

was (13.3, 13.8, 12.5) % for What AL – Iraq, Doar 29, AL – Abrahami these values

are agreement with the study of(Al-Kunany 2004). The result showed that the gluten content of cultivars varied as a result of genetic and environment factors (Peterson etal, 1992), the table showed significant decreased in gluten content% for all three wheat cultivars grain, what-Al-Iraq cultivar

have alow gluten content at 20% damage level.gluten content is important and in durum wheat quality and pasta cooking quality. SDS sedimentation value of semolina and wheat kernels are also shown in table.4, There were significant difference between SDS value of cultivars, because of the gentic and environment factors (Ames etal,1999).

Cultivars	Wahat Al-Iraq	Doar-29	Al-Abriamia	Means
Damage%				
0	13.30	13.80	12.50	13.2
10	11.00	11.29	11.00	11.1
20	9.28	10.0	9.82	9.7
L.S.D5%		1.22		1.5
Mean	11.2	11.7	11.1	
L.S.D 5%				2.0

Table3.Gluten content of suni-bug durum wheat damage

There are relationship between SDS sedimentation value and the quality of gluten and ash content (Boyacioglu and Appolonia1994), the SDS sedimentation values decrease significantly in all cultivars as suni – bug damage level increased,Al-Ibrihmia cultivar have lowest sedmentation value at 20% level damage, sedimentation value was important for cooking quality,Dick and Young(1988) showed significant Correlation (r = 0.71) between the cooking properties and SDS value . Falling number value of semolina sample were decreased significantly for all cultivars considerably (table.4), indicating the amylase activities of the sound and damaged sample were high, Mousa (2007) referd that falling number decreased in the damage bread wheat at 3-5% level because of suni – bug saliva had amylase enzymes besides proteases and the decrease of flour slurry viscosity as a result of starch content decrease in the kernel. The result of this study are important to those whom make decision and answerd their quastions about utilizing suni-bug damaged wheat,further work is under way to evaluate the effect of suni-bug damage on the quality of pasta products

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Cultivars	What Al-Iraq	Doar- 29	Al-Abriamia	Means
Damage%				
0	32.0	36.0	26.0	31.3
10	29.8	32.9	23.0	21.3
20	27.0	30.0	33.4	25.7
L.S.D5%		1.22		3.4
Mean	28.6	32.9	33.4	
L.S.D 5%				2.0

Table4.Sedmentation value and falling number(sec) of suni-bug durum wheat damage

Falling number sec of suni-bug durum wheat damage

ſ	Cultivars	Wahat	Al-	Doar-29	Al-Abriamia		Means
			Iraq				
	Damage%						
	0	621		711	601	641	
	10	555		625	500	560	
	20	490		520	430	480	
	L.S.D5%	3.55				6.0	
	Mean	555.3		618.0	510.3		
	L.S.D 5%						4.5

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تاثير الاصابة بالسونة على المعايير النوعية لسميد الحنطة الخشنة مكارم علي موسى قسم علوم الاغذية والتقانات الاحيائية كلية الزراعة جامعة بغداد

<u>المستخلص:</u>

يعد التضرر بحشرة السونة من الامور المهمة في مجال صناعة الحبوب ومنتجاتها في اقطار الشرق الاوسط ومنها العراق. استخدمت ثلاثة اصناف من الحنطة الخشنة وهي(واحة العراق و دور – 29 و الابراهيمية) المتضررة بحشرة السونة بنسبة 5% و 10% و20% لغرض دراسة تاثير التضرر بحشرة السونة على

خصائص تصنيع ونوعية السميد وقدر وزن الف حبة والوزن الاختباري لحبوب الحنطة وحاصل السميد المنتج ومحتوى السميد من الرماد والكلوتين وقيمة الشفافية ونشاط انزيمات الاميليز باختبار رقم السقوط وكذلك قيمة الراسب من خلال اختبار الترسيب باستخدام مادة صوديوم دودوسيل سلفات SDS. أوضحت النتائج ان بزيادة مستوى التضرر بحشرة السونة في الحنطة خفض حاصل السميد المنتج معنويا وكان 66%, 662% ، 65.5% ، 55.5% ، 55.9% ، 0.0% % 2.56% 7.7% لكل من نسب التضرر 0 و 10 و20% للاصناف واحة العراق ودور – 29 و الابر اهيمية على التوالي الت كذلك انخفض الوزن الاختباري للحبوب بارتفاع نسبة التضرر اذ كان (67،75، 8% ، 75، 77 ، 70 مرة 70، 70 غم لكل من نسب التضرر 0 و 10 و20% للاصناف واحة العراق ودور – 29 و الابر اهيمية على التوالي الت كذلك انخفض الوزن الاختباري للحبوب بارتفاع نسبة التضرر اذ كان (76، 75، 8% ، 75، 77 ، 70 ، 70 مرة محتوى الرماد معنويا في السميد عند نسبة تضرر 20% للاصناف واحة العراق ودور – 29 و الابر اهيمية على التوالي ارتفع محتوى الرماد معنويا في السميد عند نسبة تضرر 20% و 10 و 20% للاصناف بينما انحفض محتوى الكلوتين معنويا في المعيد بزيادة نسب التضرر . لوحظ ان نوعية الكلوتين تدهورت بزيادة نسب التضرر وذلك من خلال انخفاض قيمة الراسب معنويا في النماذج المتضرر . لوحظ ان نوعية الكلوتين تدهورت بزيادة نسب التضرر وذلك من محتوى الكلوتين معنويا في السميد بزيادة المات الماد . لوحظ ان نوعية الكلوتين تدهورت بزيادة السوناف النفافية بزيادة التضرر لحبوب الحلحة في المعنويا في النماذج المتضرر . وحظ ان نوعية على مستوى أحتمال 20.0 في نشاط انزيمات الاميليز بزيادة النضرر الاصناف الثلاث . لوحظ ان هناك زيادة معنوية على مستوى أحتمال 20.1 في نشاط انزيمات الاميليز بزيادة النضرر لحبوب الحلحة في بحشرة السونة في الاصناف الثلاث ، يمكن ان نستنتج ان التضرر بحشرة السونة يقل من عائدات الحلياة نوعيته من بحشرة السونة في الاصناف الثلاث ، يمكن ان نستنتج ان التضرر بحشرة السونة يقل من عائدات الحنطة الخشنر . بسبب تاثيرهاعلى قيمة وزن الالف حبة والوزن الاختباري للحبوب مما يؤثر على حاصل ألسي ألسميد وكذلك نوعيته من بحلل ألتأثير على محتوى الكلوتين وقيمة الراسب ونشاط انزيمات ألاميليز .