Innovations

The comparative study on functional property of wheat grains grown in wollega zones for bread production

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Abstract: *This study was conducted to investigate the comparative study on functional property of wheat grains that are grown in wollega zones on Bulk density, Water absorption capacity, oil absorbition capacity, swelling index, viscosity, falling number, gluten index, gelatinization property for bread production. The 22 wheat varieties were selected and collected from wollega zones based on judgment sampling method. The results were analyzed based on the ANOVA output data of the design expert version 6 software. The maximum value of the impurities among the wheat varieties analyzed is 3.99% obtained by Dembidolo variety, whereas the minimum mean value is 0.41% recorded by Gojam variety. The impurity value has great impact to determine the processors to accept or reject the wheat for flour production. Falling number ranges from 474.40 s (wayutuqabayisa) 175.0s (dembidollo) varieties.The highest mean value of BD is 0.8gm/cm^3 recorded by Gudurukubsa while the smallest value obtained is 0.61mg/cm^3 by WayuTukaLiban. TKW ranges from 30.21g (WayuTukaLiban) to 50.54g (GudayaBilaDigalu) varieties. The OAC value ranges from 6.35g/g (WayuTukaBayisa) to 8.64g/g (WayuTukaLiban) varieties. The highest and the lowest mean values are 2.46g/s (Dembdolo) and 1.62g/s (ArjoDanda'a) varieties respectively. The mean viscosity value ranges from 9mpa/s (Bale) to 485mpa/s (Jima GenetiDigalu, GuduruLiban, and ArjoDanda'a) varieties. The swelling index of the wheat varieties ranges from 1.45% (Jima GenetiDigalu) to 1.85% (Jima GenetiLiban). The highest preference score rank for overall acceptability was given to bread from Guduruliben (1st) and to the contrary the poorly accepted bread was produced from Bale variety. Generally, from the sensory value analysis the bread from GuduruLiben andWayuTukaOgolcha wheat varieties obtained the 1st and 2nd ranks, respectively.*

Key words: *1.wheat variety, 2.functional properties, 3.preference score, 4wheat flour, 5.bread.*

1. Introduction

Wheat (*Triticumaestivum L.*) is one of the important grain crops grownglobally. In 2005/2006, from 217 million hectares of land, about 620 million metric tons of wheat was produced with an average yield of 2.85

metric tons per hectare (FAO, 2005).Generally, wheat is grown on larger area than any other crop and its world trade is greater than that of all other crops combined. Besides being used for making bread, biscuit, flour, and pastry products, it is also used in gluten and starch production.

In Ethiopia, wheat remains one of the most important cereals cultivated. In area coverage, it ranks fourth after Teff (*Eragrostisteff*), Maize (*Zea mays*) and Sorghum (Sorghum bicolor) whereas in terms of total production, it is third (CSA, 2007). During 1994-97, an estimated 39 kg/year of wheat was the average per capital consumption in Ethiopia whereas from 1995-97, 331,000 tons of wheat was imported to meet the national wheat requirement (CIMMYT, 2000). In Ethiopia, it is largely grown in the highlands of the country, makes up roughly 10% of the annual cereal production and plays a considerable role in supplying the population with minerals, protein and carbohydrates (Schulthess*et al*., 1997). The crop is grown at an altitude that ranges from 1500 to 3000 m above sea level, between 6-160 N latitude and 35- 420 E longitude. The most suitable agro-ecological zones, however, fall between 1900 and 2700 masl (Bekele*et al*., 2000).
In Ethiopia, Arsi, Bale, Shewa, Ilubabor, Western Hareghe, Sidamo, Tigray, Northern Gonder and Gojam zones are the main wheat producing areas (Bekele*et al*., 2000). In the successful economic production and marketing of wheat, yield levels and quality of produced grain play a significant role. Traditionally, to the producer, yield was the most important economic factor. However, with increasing demand of the quality of the end product from the end user, in relation to the possibility of exporting surplus production combined with the required higher quality standards, the quality of produced grain became more necessary. Flour protein and dough characteristics are directly affected by protein quality and quantity. Thus, there is penalization of low protein grain by a lower price per ton, culminating to significant economic losses for the wheat producer as well as different industry used to raw materials of wheat.

Wheat quality can broadly be described as suitability for particular end-products, or in other words, the ability of the grain to meet the requirements of the processor for example, medium-to high protein hard-grained wheat which producing dough's of medium-to-high strength is usually preferred for pan breads, while for sweet biscuits, low protein, soft-grained wheat with low gluten strength is preferred. For white salted noodles, starch of high pasting viscosity is preferred, along with low amylase contents. Overall, however, the two most important factors are protein content (Finney and Barmore, 1948) and variety (Skerritt, 1998), which largely determines protein and starch quality and hardness. Some are determined genetically (through the variety or cultivar of the wheat) and others are determined by the growth environment. Important environmental factors includes:- soil type and fertility, fertilizer use, water availability and temperature and environmental stresses dung gram filing (Anderson *et al.* , 1997).
Functional properties of wheat flour are very important in relation to storage, milling & handling properties of wheat as well as wheat flour. Bulk density, water solubility index, oil absorption index is an important criterion for conformity to the market place. Falling Number test gives an indication of the amount of sprout damage that has occurred within a wheat sample. The falling number test does not directly measure amylase activity, but measures changes in the physical properties of the starch portion of the wheat kernel caused by these enzymes during the test. As the enzyme activity increases, the FN value decreases. The objective of this study was to evaluate the major functional properties of wheat grain, wheat flour and to assess their suitability for bread.
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2. Materials and methods

2.1 Experimental Materials

Approximately, 60 kilograms of wheat grains were collected from western Oromia parts (four wollega zones in Ethiopia). The wheat grains were sorted to remove the damaged ones, soil and any contaminating dirt and then transported to wollega University laboratory.

Experimental Design

Sample Collection Area

The samples were collected from Bako Agricultural research center, JiJi Flour factory, and Farmers Training Center of the selected zones. These all samples were selected based on information from four wollega zone agricultural office of highly wheat producing woredas and kebeles.

From East Wollega

1. JimmaArjoo
2. GudeyaBila
3. WayuTuka

From West Wollega

1. sayyoo (Dembidollo)
2. Awa Gelan
3. JimmaHoro

From HoroGuduru

1. jimmaGannati
2. Horo District
3. Guduru
4. Jarte
5. Abe Dongoro

From Others Area

1. JiJi flour factory
2. Gojam
3. Bale

Bulk Density (BD)

Bulk density was estimated by method described by Maninder*et al.*, (2007). The flour samples were gently filled into 10 ml graduated cylinders. The bottom of each cylinder was tapped gently on a laboratory bench several times until diminution of the sample level ceases after filling to the 10 ml mark. Bulk density was then calculated as weight per unit volume of sample (g/ml) as given below.

$$\text{Bulk Density} = \left(\frac{\text{weigh of sample}}{\text{Volume of sample}}\right)$$

Water Absorption Capacity (WAC)

Water absorption capacity was determined using the procedure of Sathe*et al*., (1982a). One gram of the sample was mixed with 10 ml distilled water for 5 minutes on a magnetic stirrer. The mixture was centrifuged at 3500 rpm for 30 min and the volume of the supernatant noted. WAC was calculated using the following formula written below.

$$\text{WAC} = \left(\frac{\text{volume of distilled water} * 100}{\text{weight of sample used}}\right)$$

Oil Absorption Capacity (OAC)

One gram of sample was weighed, 10 ml of vegetable oil of a known density (0.99 mg/ml) was added to the sample and the mixture stirred on a magnetic stirrer at 1000 rpm for 5 min. The mixture was centrifuged at 3500 rpm for 30 min and the supernatant removed and measured with 10 ml measuring cylinder (Sathe and Salunkhe, 1982). The OAC was calculated using the following formula.

$$\text{OAC} = \left(\frac{\text{volume of oil absorbed} * \text{density} * 100}{\text{weight of sample used}}\right)$$

Swelling Index

This was determined as the ratio of the swollen volume to the ordinary volume of a unit weight of the flour. The method of Abbey and Ibeh (1988) was used. One gram of the sample was weighed into a clean dry measuring cylinder. The volume occupied by the sample was recorded before 5 ml of distilled water was added to the sample. This was left to stand undisturbed for an hour, after which the volume was observed and recorded again. The index of swelling ability of the sample was calculated using the formula available below.

$$\text{Swelling Index} = \left(\frac{\text{weight occupied by sample of terswelling}}{\text{volume occupied by sample before swelling}}\right)$$

Viscosity values of the flour

The viscosity of the flours and the bread was evaluated by digital Brookfield viscometre (RVDV-I+) in centipoise.

Gelatinization Property

Gelatinization properties of composite flour were evaluated using the method of Sathe*et al*, (1982). Test tubes containing suspensions of 2%, 4%, 6%, 8%, 10%, 12%, 14%,16%, 18% and 20% (w/v) of the composite flour in distilled water was heated for 1 hr in boiling water, followed by rapid cooling under cold running water. The tubes were cooled further at 40°C for 2 hr. The least gelation concentration (LGC) was taken as period the sample inside the inverted tube did not fall.

Falling Number Determination

Falling Number was determined according to AACC (2000) Method No, 56-81B. A 7-gram sample of ground wheat or flour was weighed and combined with 25 milliliter of distilled water in aglass falling number tube with a stirrer and shaken to form slurry. When grinding a wheat sample to perform a falling number test, it should be at least 300 grams to assure a representative sample. As the slurry was heated in boiling water bath at100 degrees Celsius and stirred constantly, the starch gelatinizes and forms a thick paste. The time it takes the stirrer to drop through the paste was recorded as the falling number value.

Gluten Index Determination

Gluten index of wheat was determined through Near-Infrared Reflectance (NIR).A 10-gram sample of flour or ground wheat was weighed and placed into the glutomatic washing chamber on top of the polyester screen. The sample was mixed and washed with a 2 percent salt solution for 5 minutes. The wet gluten was removed from the washing chamber and centrifuged.

Sensory analysis

For sensory analysis, among all eight samples (including two known varieties) selected based on functional property responses (Bulk density, Oil absorption capacity, water absorption capacity, viscosity, swelling index, least gelatinization, falling number, and gluten index), results that showed significant difference at $p<0.01$output values. The sensory evaluation was carried out on quality attributes of crumb, crust, taste, mouth feel, color, texture, and overall acceptability based on a 7 point hedonic scale as described by Iwe and Onuh (1992).

3 Result and discussion

Varieties Name	BD±SD(gm/cm³)	OAC±S(g/g)D	WAI±SD(g/s)	viscosity±SD (mpas-sec)	swelling index%±SD	LGc%±SD	Falling Number	Gluten index
Gudurukubsa	0.80±0.04	6.79±0.03	2.06±4.1	90±0	1.55±0.05	18.67±0.05	200.00±1.82	20.10±1.576
HoroLiben	0.76±0	8.05±0	2.1±0.5	355.33±0.5	1.82±0	20.5±0.05	202.00±1.82	24.40±1.576
WayutukaOgolcha	0.67±0	7.28±0.03	2.16±9.7	484±0	1.59±0.03	17.99±0.1	175.30±1.82	34.30±1.576
Jima GenetiDigalu	0.76±0	7.54±0.05	1.82±17.02	485±0	1.45±0	19.33±0.2	190.30±1.82	20.10±1.576
BaboGambel	0.77±0	7.59±0.02	2.30±1.9	15.67±0.47	1.65±0.03	18.35±0.6	178.00±1.82	6.750±1.576
WayuTukaBelete	0.76±0.04	7.06±0.05	1.98.±5.6	64±0	1.51±0.08	21±0.01	406.40±1.82	23.40±1.576
WayuTukaDigalu	0.68±0	7.59±0.05	2.17±6.8	15.67±0.47	1.53±0.01	18.22±0.5	230.00±1.82	16.00±1.576
GudayaBilaDanda	0.77±0	8.04±0.06	2.11±0.4	166.67±0.5	1.71±0	22.54±0.02	217.00±1.82	21.00±1.576
ArjoHuluka	0.79±0	8.15±0.07	2.16±6.1	274±0	1.63±0.06	19.23±0.05	222.90±1.82	23.40±1.576
WayuTukaDanda'a	0.75±0	7.32±0.04	2.09±1	119.33±0.047	1.57±0.03	18.66±0.7	186.70±1.82	24.50±1.576
Gojam	0.69±0	7.17±0.03	2.18±3.01	26±0	1.66±0.07	17.8±0.1	180.00±1.82	13.30±1.576
WayuTukaLiban	0.61±0	8.64±0.2	2.06±1.6	13.67±0.5	1.46±0.03	20.33±0.8	195.60±1.82	34.40±1.576
HoroSenait	0.79±0.02	8.28±0.1	2.20±3.1	423±0	1.76±0.07	18.22±0.05	268.20±1.82	24.80±1.576
Bale	0.69±0.03	7.742±0.18	2.37±0	9±0	1.55±0.04	19.81±0.7	195.00±1.82	20.40±.576
GuduruLiban	0.78±0.06	8.23±0	2.12±7.9	485±0	1.62±0	20.11±0.5	291.20±1.82	26.20±1.576
WayuTukaBayisa	0.76±0	6.35±0	1.82±6	420±0	1.73±0.04	17.64±0.2	474.40±1.82	24.60±1.576
JardegaJarteLiban	0.74±0.02	7.93±0.03	2.11±3.4	484.67±0.5	1.56±0.1	18.55±0.1	223.00±1.82	20.60±1.576
Dembidolo	0.74±0.02	7.47±0.02	2.46±13.2	340.33±0.5	1.86±0	21.01±0.9	175.00±1.82	22.50±1.576
Jima GenetiLiban	0.73±0.02	8.09±0.05	2.24±12.3	484.33±0.47	1.85±0.1	18.34±0.05	261.20±1.82	24.40±1.576
ArjoDanda'a	0.80±0	8.17±0.04	1.62±91	485±0	1.55±0.01	17.97±0.6	240.00±1.82	22.70±1.576
GudayaBilaDigalu	0.77±0	8.05±0.2	2.13±6.2	59.67±0.5	1.51±0.01	17.22±0.01	250.00±1.82	23.50±1.576
JardegaJarteDanda'a	0.70±0.05	7.65±0.04	2.29±15.3	484.67±0.5	1.66±0.05	19.01±0.03	218.00±1.82	20.50±1.576
p-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Functional properties of wheat varieties

The mean and standard deviation of the functional properties of the wheat varieties were analyzed based on the ANOVA output data of the design expert version 6 software. All the mean values of the functional properties with SD (standard Deviation) and p-values are shown in Table 1.

Table 1.functional properties of wheat varieties cultivated in wollega zones

According to the result shown in Table 1 the functional properties mean values are significantly different ($p<0.05$) from one another. The bulk density (BD) of the wheat is the ratio of the mass of an untapped wheat sample and its volume including the contribution of the inter-particulate void volume. The mean values of bulk density (Table1) shows that statistically significantly different at $p<0.001$. Bulk density is generally affected by the particle size and density of the flour and it is very important in determining the packaging requirement, material handling and application in baking technology in the food industry (Karuna*et al*., 1996). The highest mean value of BD is 0.8gm/cm^3 recorded by GuduruQubsa while the smallest value obtained is 0.61mg/cm^3 by WayuTukaLiban(Table 1). Generally, the bulk density of wheat grains increase with an increasing moisture content, whereas it decreases for some other grains as reported by Wratten*et al.,* (1969), the moisture increment is the problem in storage of the wheat for further processing in baking industry. On the other hand the higher value of bulk density of the wheat provides good thickener property as reported by Chi-Fai Chau and Peter C-K Cheung (1999) who conducted study on another legumes and result in maximum bulk density value of 0.88g/cm^3. Therefore, all the wheat varieties considered for this study have the bulk density value of the suitable range for selection of the wheat for bread production as raw material.

The oil absorption capacity (OAC) of the wheat grain presented in Table 1 is significantly different from each other ($p<0.001$). The mechanism of oil absorption is attributedmainly to the physical entrapment of oil and the binding of fat to the polar chain of protein (Niba*et al*., 2001). It is an indication of the rate at which protein binds to oil in food formulations particularly bread production. The OAC from Table 1 ranges from 6.35g/g (WayuTukaBayisa) to 8.64g/g (WayuTukaLiban) varieties. Fatacts as flavor retainer and increases the mouths feel of foods. Oil increases the leavening power of thebaking powder in the batter and improves the texture of the bread product.

Water absorption index characteristic represents the ability of the wheat flour to associate with water under conditions when water is limiting such as dough and pastes. The water absorbitionindex (WAI) indicated in Table 1 is significantly different($p<0.001$) and the highest and the lowest mean values are 2.46g/s(Dembdolo) and 1.62g/s (ArjoDanda'a) varieties respectively. Some varieties have equal WAI values as evidence Gudurukubsa and WayuTuka Liban recorded 2.06g/s whereas Jima GenetiDigalu and WayuTukaBayisa obtained 1.82g/s (Table 1). Additionally, WayuTukaOgolcha and ArjoHuluka have shown equal values (2.16g/s). Awolu*et al*., (2016) reported that water absorption capacity is important in the development of beaked products like bread. As Houson and Ayenor, (2002) investigated the high water absorption capacity assures that the wheat flour cohesiveness property. Similar finding reports reveal that water absorption capacity is important in bulking and consistency of products as well as baking applications (Niba*et al*., 2001).

The viscosity values of the wheat flour varieties as indicated in Table 1 are significantly different among one another. The mean viscosity value ranges from 9mpa/s (Bale) to 485mpa/s (Jima GenetiDigalu, GuduruLiban, and ArjoDanda'a) varieties respectively. Generally, Asefa and Tadese (2017) reported that viscosity values indicate that the degree of starch gelatinization i.e. as the viscosity of wheat flour increase degree of starch gelatinization decrease during baking and vice versa. Among the varieties used for this research study the one with 64mpa/s (WayuTukaBelete) is near to the FAO (2007) standard which is 75mpa/s while the others are not suitable.

The swelling index of the wheat varieties (Table 1) ranges from 1.45% (Jima GenetiDigalu) to 1.85% (Jima GenetiLiban). As reported by Biliaderis (1982) the swelling properties of floor determine the crystalline arrangement and degree of hydrogen bonding in starch granules in the floor. Consequently, relatively high swelling index (SI) of flour is considered as more suitable for preparation of bread. Among the varieties considered for this study Jima GenetiLiban (1.85%) is preferable for bread production while the others are least suitable for bread production. The gelation property mean value of wheat grain shown in Table 1 is significantly different (p<0.001). The largest mean value is obtained by GudayaBilaDanda (22.54%) whereas the smallest value is recorded by GudayaBilaDigalu (17.22%). Gelatinization property is the minimum concentration of flour at which it becomes able to form gel which is affected by protein, carbohydrates and lipids composition of the grains flour (HaqNawaza, *et al*, 2015). The gelling ability of flour may be due to the thermal degradation of starch, denaturation of protein. Gelation process occurs by the transformation of the viscous liquid in a viscous-elastic three dimensional matrix which involves the swelling of protein and starch through ordinate polymerization of molecules on heating (Alleoni, 2006; Enwere&Ngoddy, 1986).Falling number analysis is an indicator of kernel germination (sprouting) and the resulting increases in alpha amylase activity. Falling number results of 300 seconds or higher usually indicate that minimal amylase activity due to sprout damage is present. As indicated in Table 1, falling number contents of wheat variety cultivated in wollega zones and its flour were significantly (P<0.0001) different from each other. The maximum falling number content (474.40 and 406.40 s) was observed for WayuTuqaBayisa and WayuTuqaBelete, respectively. The minimum falling number content (175.00, 175.30 and 178.00 s) were observed by wheat variety grown in Dambidollo, Wayu Tuqa Ogolcha and Babo Gambel, respectively. A high falling number (for example, above 300 seconds) indicates minimal enzyme activity and sound quality wheat or flour.A low falling number (for example, below 250 seconds) indicates substantial enzyme activity and sprout-damaged wheat or flour.When the falling number is too high, enzymes can be added to the flour in various ways to compensate. While when the falling number is too low, enzymes cannot be removed from the flour or wheat, which results in a serious problem that makes the flour unusable for bread production. Falling Numbers of all varieties were found morethan 400 seconds means that wheat is free ofsprout damage that is sound (Bushuk and Rasper1994) but it may impart problems in the crumband crust of the bread (Hoseney 1994).

In Table 1 the highest wet gluten contents (34.4% and 34.3% were found in wheat variety grown in WayuTuqaLiban and WayuTuqaOgolcha, respectively. The lowest wet gluten values (6.75% and 13.3%) were found in wheat variety grown in Babo Gambel and Gojam, respectively. The wheat grain with high wet gluten content was acceptable for wheat flour, pasta, macroni and bread products. The amount of gluten in flour is an index of the protein content, and the physical properties of the washed out gluten provide an index of flour strength. Both dry and wet gluten increased with increasing protein content in the flours (R.G.Kulkarni, J.G. Ponte, JR, and k, kulp.1987).

The wheat flour containing large amount of protein and high quality of gluten is used for normal bread, whereas that of lower amount of protein is mostly used for confectionary or cakes (Caballero *et al*., 2007). According to AACC (2000) report the standard accepted values of wet gluten content of wheat for bread manufacturing ranges from 22 to 30%, consequently, around 50% (Table 1) of the wheat varieties considered for this research agrees with this standards.

Sensory Analysis

Table 2.the mean values, standard deviations, and ranks of sensory analysis of bread from selected wheat varieties

variety	crumb	Rank	crust	Rank	Taste	Rank	Mouth feel	Rank	color	Rank	Texture	Rank	Overall acceptable	Rank
WTL	5.71±1.4	2	5±1.63	4	5.86±1.2	1	5.43±1.2	1	5.71±1.4	2	5.29±1.3	4	5.43±1.1	4
WTBa	4.43±1.3	6	4.86±1.9	5	4.71±2.1	8	4.71±1.8	8	4.43±1.6	7	5±1.41	5	4.71±1.4	6
GuL	5.86±1.5	1	5.71±1.3	1	5.14±1.4	6	5.43±1.6	1	5.43±1.3	4	5.86±1.4	1	5.71±1.1	1
JGL	5±0.8	5	5.14±1.1	3	5.29±1.3	4	5±1.41	7	5.57±1.1	2	5±0.6	5	5.57±1	3
GudayabilaDigalu	5.29±1	4	5.29±1.5	2	5.29±1	4	5.43±1	1	4.71±1	6	5.57±0.8	2	5.29±0.8	5
WTO	5.57±1.3	3	4.86±1.4	5	5.71±0.8	2	5.43±1	1	6±1	1	5.43±1.3	3	5.43±0.5	4
Bale	5±1.6	5	4.2±1.8	8	5.6±1.1	3	5.1±1.7	6	4.92±1.3	5	5±1	5	4.23±1	7
Gojam	4.2±1	7	4.5±1.3	7	4.9±1	7	5.3±1.5	5	4±1	8	5±1.3	5	5.6±0.6	2
P-value	<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	

WTL= WayuTukaLiben, WTBa= WayuTukaBayisa, JGL= Jima GenetiLiben WTO=WayuTukaOgolcha

The sensory analysis study (Table 2)was conducted on eight functional value based selected varieties. Mean and standarddeviations of crumb preference score of wheat flour from different varieties is summarized in Table 2.Statistical treatment of the analytical data showed significant ($P< 0.05$) difference among the wheat varieties considered for this study on crumb preference score values. According to the result (Table 2) the highest preference score (crumb) was given to the bread from Guduruliben (5.86) and ranked the 1st, whereas the last rank was given to the bread from Gojam(4.2) wheat variety by the panelists. As indicated on the rank given in Table 2, the top (1st) crust preferences score was again given for bread from Guduruliben (5.71) while the last rank (8th) was obtained by Bale (4.2) wheat variety. Both crust and crumb highest preferences scores were obtained by bread from GuduruLiben wheat variety, this is associated with high gluten network development property which is similar to other scholar findings like Hoseney (1994). Taste of bread is an important sensory attribute for acceptability of bread. From Table 2 highest (1st) preference score for taste quality attribute was given to the bread from WayuTukaLiben (5.86) and the lowest rank(8th) was given to bread from WayuTukaBayisa (4.71) wheat variety. The color preference score mean value indicated in Table 2 is statistically significantly ($p<0.005$) different among the given samples. The bread from WayuTukaOgolcha variety obtained the 1st rank while the last rank was given to the bread from Gojem variety. The top scorer of the mouth feel quality attributes were given to the bread from WayuTukaOgolcha (1st) variety whereas the lowest (8th) ranks were recorded by bread from Gojam wheat. From this observation the current study reveals that the chosen texture among the provided bread was GuduruLiben (1st) wheat variety while the lowest preference score (5th) was recorded by WTBa, JGL, Bale, and Gojam wheat varieties. As KarishmaMoktan&PravinOjha (2015) and (Gomez *et al.,*(2003) investigated the texture of bread is affected by composition of bread,baking condition, and amount of water absorbed duringmixing and wheat varieties. The overall acceptability may be affectedby all the above sensory parameters. As shown in the above Table 2 the highest preference score rank for overall acceptability was given to bread from Guduruliben (1st) and to the contrary the poorly accepted bread was produced from Bale variety. Generally, from the sensory value analysis the bread from GuduruLiben and WayuTukaOgolcha wheat varieties obtained the 1st and 2nd ranks, respectively.

Conclusion

In this study the potential to compare the wheat grains and flours accessions quality grown in Wollega zones for bread production was observed. The wheat grains accessions considered for this research was 22 in number from the four wollega zones in addition to the two reference known varieties. The comparison was performed on functional properties and sensory values quality criteria for bread. Based on the results of the analysis of functional properties six varities were selected for bread production in addition to the two known varieties (Bale &Gojem varieties). In conclusion the product produced from GuduruLiben, WayuTukaLiben, and WayuTukaOgolcha was ranked the 1st, 2nd, and 3rd respectively for both functional properties and sensory analysis.

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