

## EFFECT OF BARLEY MALT SUPPLEMENTATION ON THE QUALITY OF BREAD

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### ABSTRACT

Malted flour was prepared from barley varieties Haider 93 and Jau 87. Malted barley was obtained from Murree Brewery, Rawalpindi. The malted flour was supplemented in flour of two wheat varieties viz. Punjab 85 and Inqulab 91 to test the quality of bread. Falling number values showed a linear increase in  $\alpha$ -amylase with progressive rise in malt concentration, hence improving the diastatic activity of wheat flours. The supplementation of whole barley malted flour of Haider 93 in wheat flour showed the lowest falling number value (116 seconds) indicating the highest  $\alpha$ -amylase activity. Hence low  $\alpha$ -amylase activity in wheat can be improved with the supplementation of malted barley flour. The mixing time decreased by the addition of malted barley flours especially at levels of 0.75% and 1.0%, while peak height rose from 62 to 73% by various concentrations of malts. There was significant improvement in bread loaf volume due to malt supplementation. The highest loaf volume and weight to volume ratio was observed in bread loaves of Inqulab 91. Whole barley malted flour of Haider 93 proved to be the best supplement for bread baking quality when used at levels of 0.75% and 1.0%.

**Key words:** Barley, Malt, Supplementation, Falling Number, Mixograph, Bread Preparation and Evaluation.

### INTRODUCTION

Malt and malt extracts contribute maltose, minerals, salt, soluble protein, dough conditioning enzymes, flavor, colour and nutritive materials which promote vigorous yeast activity, and accelerate flavor and aroma to the baked products (Pylar, 1988). In dough,  $\alpha$ -amylase activity can be enhanced by the use of malt flour (Warchalewski *et al.*, 1989) to get optimum bread production (Zawistowska & Bushuk, 1988).

The research studies conducted by different workers, (Anjum, 1991; Ahmad 1993) have indicated that commercial wheat varieties grown in Pakistan are generally low in amylase activity especially  $\alpha$ -amylase and recommended the use of malt for bread production. The present study was undertaken to delineate the supplementation of different barley malt flours on bread quality.

### MATERIALS AND METHODS

Wheat varieties namely Inqulab 91 and Punjab 85 and barley varieties Haider 93 and Jau 87 were collected from Wheat Research Institute, Faisalabad. Five

kilogram sample of each wheat variety was tempered and milled according to AACC (1983). Break flour and reduction flours were mixed to get straight grade flour. Two types of malted barley were used in this study. First prepared in the laboratory and the second obtained from Murree Brewery, Rawalpindi. In the laboratory, malted barley was prepared and then ground by using Udy Cyclone Mill and Quadrumate Senior Mill.

Falling number, mixographic studies and bread baking qualities were determined according to their respective procedures described in AACC (1983). The instructions of Blish *et al.* (1928) were followed to compute baking quality scores.

#### Details of Treatments

- M1 Malt of Murree Brewery milled in Quadrumate Senior Mill.
- M2 Malt of Murree Brewery milled in Udy Cyclone Mill.
- M3 Malt of Jau 87 milled in Quadrumate Senior Mill.
- M4 Malt of Jau 87 milled in Udy Cyclone Mill.
- M5 Malt of Haider 93 milled in Quadrumate Senior Mill.
- M6 Malt of Haider 93 milled in Udy Cyclone Mill.

T0	Control
T1	0.25% Straight grade malted barley flour of Murree Brewery
T2	0.50% Straight grade malted barley flour of Murree Brewery
T3	0.75% Straight grade malted barley flour of Murree Brewery
T4	1.00% Straight grade malted barley flour of Murree Brewery
T5	0.25% Straight grade malted barley flour of Jau 87
T6	0.50% Straight grade malted barley flour of Jau 87
T7	0.75% Straight grade malted barley flour of Jau 87
T8	1.00% Straight grade malted barley flour of Jau 87
T9	0.25% Straight grade malted barley flour of Haider 93
T10	0.50% Straight grade malted barley flour of Haider 93
T11	0.75% Straight grade malted barley flour of Haider 93
T12	1.00% Straight grade malted barley flour of Haider 93
T13	0.25% Whole barley malted flour of Murree Brewery
T14	0.50% Whole barley malted flour of Murree Brewery
T15	0.75% Whole barley malted flour of Murree Brewery
T16	1.00% Whole barley malted flour of Murree Brewery
T17	0.25% Whole barley malted flour of Jau 87
T18	0.50% Whole barley malted flour of Jau 87
T19	0.75% Whole barley malted flour of Jau 87
T20	1.00% Whole barley malted flour of Jau 87
T21	0.25% Whole barley malted flour of Haider 93
T22	0.50% Whole barley malted flour of Haider 93
T23	0.75% Whole barley malted flour of Haider 93

T24 1.00% Whole barley malted flour of Haider 93

## RESULTS AND DISCUSSION

### Falling number (FN)

The straight grade flour showed highest falling number (FN) value (606 sec), while subsequent decrease in FN was observed due to supplementation of different concentrations of various malts (showing low  $\alpha$ -amylase activity) as indicated in Table 1.

Gradual decrease in FN was observed with an increase in malt concentration from 0.25% to 1.0%. All types of malted barley flours showed a positive effect of improving  $\alpha$ -amylase activity. The highest  $\alpha$ -amylase activity was observed when whole barley malted flour of Haider 93 was used at a level of 1.0%. According to Mailhot and Patton (1988) falling number value should be between 200 to 300 seconds for all types of breads.

### Mixographic characteristics

Mixograph bowl of 10g capacity was used. In case of mixing time, the influence of barley supplementation was less apparent. The highest mixing time (3.5 min) and the highest peak height (74%) was observed when straight grade malted barley flour of Haider 93 was used at 0.25% and 0.50% levels respectively (Table 2). The peak height varied widely among different malt levels. Hence there was a pronounced effect on peak height due to different concentrations of malts. Angelino (1988) concluded that barley malt flour within desirable limits improves rheological properties of wheat flour which was also observed in the present investigation.

**Table 1. Falling number values of different malt supplemented wheat flours.**

Types of malt	Concentration of Malt				
	0.00%	0.25%	0.50%	0.75%	1.0%
	Falling number values (Seconds)				
M1	606	296	234	197	178
M2	606	413	323	295	256
M3	606	443	352	311	255
M4	606	330	221	192	192
M5	606	264	222	207	198
M6	606	336	288	251	116

**Table 2. Mixographic characteristics of flour by using different levels of malted barley flours.**

Types of malt	Concentration of Malt				
	0.00%	0.25%	0.50%	0.75%	1.0%
<b>1. Mixing Time (min.)</b>					
M1	2.8	2.7	2.6	2.8	2.8
M2	2.8	2.8	2.9	2.4	2.8
M3	2.8	2.7	2.0	2.5	2.8
M4	2.8	2.6	2.9	2.7	2.8
M5	2.8	3.5	2.8	2.8	2.7
M6	2.8	3.3	3.0	2.6	2.7
<b>2. Peak Height (%)</b>					
M1	60	73	72	69	71
M2	60	68	62	69	70
M3	60	70	72	70	70
M4	60	68	72	68	67
M5	60	73	74	69	70
M6	60	67	68	67	69

**Table 3: Loaf weight, volume, weight to volume ratio and bread baking quality score of different malt levels on Punjab 85.**

Treatment	Weight(g)	Volume (cc)	Wt. to Vol. ratio	Baking Quality score
T0	142.61	450	3.15	61.0
T1	137.34	425	3.09	56.5
T2	136.33	450	3.30	61.0
T3	128.03	475	3.71	63.5
T4	138.74	475	3.42	66.5
T5	145.77	450	3.08	62.0
T6	143.18	450	3.14	65.0
T7	142.84	475	3.32	66.5
T8	140.36	500	3.56	68.0
T9	141.39	450	3.18	64.0
T10	135.12	475	3.50	65.5
T11	148.80	500	3.36	69.0
T12	150.31	500	3.32	70.0
T13	143.51	475	3.30	71.5
T14	141.24	500	3.54	67.5
T15	138.27	500	3.61	71.0
T16	141.57	525	3.70	72.5
T17	146.28	500	3.24	74.5
T18	139.35	500	3.58	78.5
T19	145.29	550	3.78	74.0
T20	148.27	550	3.69	72.5
T21	142.87	500	3.49	78.0
T22	146.39	525	3.58	79.5
T23	143.17	525	3.66	81.5
T24	139.28	575	4.12	83.0

**Bread baking quality**

The data on loaf volume, loaf weight and weight to volume ratio of bread prepared from Punjab 85 and Inqulab 91 have been presented in Tables 3 and 4 respectively. Loaf volume and weight to volume ratio was higher in Inqulab 91 as compared to Punjab 85.

In case of bread baking quality, wide variation was noticed as a result of supplementation of different types and concentrations of malted barley flour. The highest baking quality score (91.5) was given to bread of Inqulab 91 when whole barley malted flour of Haider 93 was used at 1.0% level followed by 0.75% and 0.50% (Tables 3, 4). Punjab 85 showed lower score. Lower score of the control sample (T0) was due to the absence or very low  $\alpha$ -amylase activity.

In general, wheat varieties showed improvement, specially in bread loaf volume, due to effect of both types and levels of malted barley flours. Whole barley malted flours have given better results on bread loaf volume. Highest bread loaf volume was observed when whole barley malted flour of Haider 93 was used at the rate of 1.0% for Punjab-85 and Inqulab 91 (Tables 3, 4). The major effect of malt supplementation was on bread volume which resulted due to increase in  $\alpha$ -amylase

activity. Both wheat varieties showed significant improvement on bread loaf volume due to the addition of malted barley flours at different concentrations. The results are in concordance with workers like Warchalewski *et al.* (1989) and Seibel *et al.* (1968). Generally there was a gradual increase in loaf volume score with an increase in malted flour supplementation in wheat flour (Tables 3, 4). It was further observed that whole barley flour yields bread with an improved loaf volume as compared to other types and sources of malted flour. The bread weight obtained from flours supplemented with different types and concentrations of malts showed erratic behaviour.

Inqulab 91 showed highest overall scores, while whole barley malted flours of Haider 93 proved to be the best supplement for both wheat varieties when used at levels of 0.75% and 1.0%. The results revealed that supplementation of whole barley malted flour of Haider 93 improved the quality of bread measured in terms of loaf volume, weight to volume ratio and overall bread baking quality scores. It may be concluded that wheat flour may be supplemented with malt to get better quality bread.

**Table 4: Loaf weight, volume, weight to volume ratio and bread baking quality score of different malt levels on Inqulab 91.**

Treatment score	Weight(g)	Volume(cc)	Wt. to Vol. ratio	Baking	Quality
T0	143.37	475	3.30	65.0	
T1	141.71	475	3.35	72.0	
T2	142.34	500	3.51	73.5	
T3	138.29	500	3.61	74.0	
T4	142.74	525	3.67	73.0	
T5	145.19	500	3.51	69.5	
T6	143.29	500	3.48	71.0	
T7	144.84	525	3.62	71.5	
T8	143.42	575	4.00	72.0	
T9	141.74	500	3.52	68.5	
T10	139.29	525	3.76	72.5	
T11	148.71	525	3.53	73.5	
T12	146.81	550	3.74	77.0	
T13	145.72	525	3.60	73.0	
T14	143.71	550	3.86	78.0	
T15	150.21	575	3.82	81.5	
T16	146.92	575	3.91	83.5	
T17	138.44	525	3.79	79.5	
T18	145.42	575	3.95	83.5	
T19	147.75	600	4.06	85.0	
T20	147.24	600	4.11	84.5	
T21	145.71	550	3.77	87.5	
T22	146.07	600	3.10	89.5	
T23	147.37	600	3.07	90.5	
T24	141.43	625	4.38	91.5	

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