Results and discussion

IV.RESULTS AND DISCUSSION

IV.1. Chemical composition of corn cobs, carrot roots powders, wheat flour (72% extraction) and shorts.

The suggested fiber sources were chemically analysed and the obtained results are tabulated in table (2):-

IV.1.1. Moisture content :

Results in Table (2) indicat that the moisture contents were 8.0% in corn cobs, 10.4% in carrot roots powders, 13.0% in shorts and 13.9% in wheat flour (72% ext.) these values were slightly higher than those reported by Hussein (1990) and Soliman (1997).

Food containing more than 14% moisture can not be stored in bulk, they are likely to mold and spontaneaus deterioration may take place (Anon, 1976)., Egyptian standard (1991) (No. 1251/1991) cited that flour moisture must not exceeds 14%.

IV.1.2. Ash content:

Data presented in table (2) showed that ash content were 2.45% in corn cobs, 11.4% in carrot roots, 3.85% in shorts and 0.46% in wheat flour (72% ext.) Carrot have altitude ash content (11.4%) which may be attributed to its high contents of pottassium (2.1%) sodium (1.6%) calcium (0.42%),

Phosphorus (0.34%) and magnesium (0.17%) as cited by Crampton and Harris (1969) therefor, carrot roots have the highest ash content compared with wheat flour shorts and corn cobs.

Table (2) Chemical composition of wheat flour (72% extraction), shorts, corn cobs and carrot roots powders (on dry basis)

Components (%)	Wheat flour (72% ext.)	Shorts	Corn cobs	Carrot roots
Moisture %	13.9	13.0	8.00	10.40
Ash %	0.46	3.85	2.45	11.40
Crude protein N=5.7 %	9.84	15.0	4.62	6.70
Ether extract %	1.66	5.0	1.16	2.00
Reducing sugar %	0.36	1.0	0.90	19.60
Non reducing sugar %	1.38	3.0	1.43	5.50
Total soluble sugars %	1.74	4.0	2.33	25.10
Starch %	83.5	21.15	8.12	8.25
Phytate phosphoraus %	0.08	1.4	0.0	0.00
β-carotene (ppm)	2.8	-	7.3	36.66

Torki, et al., (1990) found that ash content of red wheat shorts 2.78% while, white wheat shorts had 2.55% . Data presented in table(2) show that ash content of wheat flour (72% ext.) was 0.46% the Egyptian standard no. 1251/1991 cited that ash content of the wheat flour (72% ext.) must not exceeds 0.48% on 14% moisture basis.

IV.1.3. Crude protein :-

The results show that crude protein contents were 4.62%, 6.7%, 15.0 %. and 9.84% on dry weight basis for raw materials corn cobs, carrot roots, shorts and wheat flour (72% ext.), respectively. These

results are in agreement with those reported by Abd El-Daim (1986) and Soliman (1997).

IV.1.4. Ether extract :-

The ether extract contents were 1.16%, 2.0%, 5.0% and 1.66 for corn cobs, carrot roots, shorts and wheat flour (72% ext.) respectively. Shorts contains the highest lipid content which may be due to its contamination with aleurone layer and wheat germ residues during the milling process.

IV.1.5 Sugars content :-

The results in table (2) show that reducing sugar, non reducing sugar and total soluble sugars contents were 0.90% 1.43 and 2.33% in corn cobs, 19.6%, 5.5and 25.1% in carrot roots powders, 1.0%, 3.0% and 4.0% in shorts and 0.36%, 1.38% and 1.74% in wheat flour (72%ext.) . These results showed that carrot roots are rich in their sugar content. These results coincide with those reported by Hafez (1996) and Soliman (1997).

IV.1.6. Starch :

Date in Table (2) show that starch content of both corn cobs and carrot roots are almost the same (8.12 and 8.25%) while shorts contain 21.15% and wheat flour (72% ext.) contains 83.5%.

These results demonstrate the starch lower contents of corn cobs and carrot roots than of shorts which may be prefered in making high fiber bread.

IV.1.7. Phytate phosphorous :-

The data presented in table (2) show that phytate phosphorous was absent in both corn cobs and carrot powder (Zero%) while, short and wheat flour (72% ext.) contain 1.4% and 0.08 %, respectively.

The complicated relationships between dietary minerals, protein and phytate content on mineral availbility were studied. They found that, in humans, retention of calcium, iron and Zinc could be decreased significantly by diets high in phytate (Lolas , and Markakis (1975), Harland and Harland (1980) and Kent (1983)). Therefore corn cobs and carrot roots powders are excellent sources of high fiber bread.

IV.1.8. Carotene

Date presented in table (2) show that β-carotene were 7.3 pp.m, in corn cobs and 36.66 ppm in carrot roots and 2.8 ppm in wheat flour (72% ext.). We can notice that β-carotene was higher in carrot roots powder and corn cobs powder contains more caroteniods than wheat flour (72% ext.). β-carotenes act as precursor of vit. A. and carotenoids includes β-carotenes have antioxidant activity (Lillian 1995).

IV. 1.9. Dietary fiber content

Data presented in table (3) show that total dietary fiber contents were 81.32% in corn cobs powder and 46.55% in carrot roots powder while it was 51% in shorts and 2.8% in wheat flour (72% ext.)

On the other hand, the results showed that soluble dietary fiber were 39.38% and 38.03% for corn cobs and carrot roots, respectively Insoluble-dietary fiber was high in corn cobs (41.94%) and low in carrot roots (8.52%) these values of dietary fiber reveal that corn cobs are a good source for both insoluble and soluble dietary fiber while carrot roots are a good source for soluble dietary fiber.

Also, these results demonstrate that corn cobs and carrot roots have high contents of pectic substances 35.38% and 34.53%, respectively

Table(3) Dietary fiber component of corn cobs and carrot roots (% on dry wt. basis)

Component %	Wheat flour (72% ext.)	Shorts	Corn cobs%	Carrot roots%
Acid soluble pectin	-	-	9.58	15.16
Ammonium oxalate sol. Pectin.	-	-	12.87	8.32
Water soluble Pectin	-	-	12.93	11.05
Total pectic substances	-	-	35.38	34.53
Water soluble Hemicellulose	-	-	4.0	3.5
Soluble dietary fiber	-	-	39.38	38.03
Insoluble dietary fiber	-	-	41.94	8.52
Total dietary fiber	2.8	51.0	81.32	46.55

It could be concluded that carrot roots powder can be use in high soluble dietary fiber bread making while, corn cobs powder can be use in the manufacture of high insoluble and soluble dietary fiber bread.

One loaf (100 gram) from high fiber bread (fibers source are carrot roots or corn cobs) will provide the adult with about 33 or 52 gram

fiber respectively the WHO recommendd intake from fiber are 27-40 g/day as cited by Kathryn and Susans (1998).

IV.1.10. Minerals content

Concerning some choice minerals contents i.e: Fe, Cu, Zn, Mn and pb found to by 280, 32, 85, 178 and Zero (ppm), 423, 37, 54, 29 and Zero (ppm) and 18, 21, 20, 25 and Zero (ppm) in corn cobs, carrot roots and wheat flour (72% ext.) respectively These values were in agreement with those reported by Crampton and Harris (1969).

Results reveal that wheat flour (72% ext.) replacement by corn or carrot roots at rate 10% increase minerals content such as iron, copper, manganese and zinc. Now a days there is a project to add iron as ferrous sulfate (at rate 30 ppm iron). From the above mentioned results we can safty use corn cobs or carrot roots powder for bread fortification instead of iron addition beside it's other benefits such as increament of fiber and Zinc.

Table (4) Minerals content of wheat flour 72% extraction , corn cobs and carrot roots powders on dry basis.

Minerals	Wheat flour (72% ext.) (ppm)	Corn cobs (ppm)	Carrot roots (ppm)
Fe (PPM)	18	280	423
Cu (PPM)	21	32	37
Zn (PPM)	20	85	54
Mn (PPM)	25	178	29
Pb (PPM)	0	0	0

IV.2. The effect of replacing wheat flour (72% extraction) by corn cobs powder or carrot roots powder on its mixture chemical composition:-

IV.2.1. The effect of replacing wheat flour (72%extraction) by corn cobs powder on its mixture chemical composition:-

Data presented in Table (5) show the effects of mixing corn powder with wheat flour (72% ext.) at replacement ratios of 10, 15, 20 and 25% corn cobs powder.

Results demonstrate that there are a positive relationship between the percentage of corn cobs powder replacement and the mixture contents from ash, sugars, and total dietary fiber. Also, the results show that a negative relationship from crude protein ether extract, starch and phytate phasphorus of the mixture. These results are attributed to the chemical conistituents of each corn cobs and flour.

IV.2.2. The effect of replacing wheat flour (72% extraction) by carrot roots powder on its mixture chemical composition:-

Data presented in Table (6) show the effects of mixing carrot roots powder with wheat flour (72% ext.) at replacement ratios of 10, 15, 20 and 25% carrot roots powder.

Table (5) The chemical composition of wheat flour (72% extraction) and corn cobs powder mixtuers.

Mixing		Ash %	Crude protein N=5.7%	Ether extract %	Reducing sugars %	Non-reducing sugars %	Total sugars %	Starch %	Phytate phosphorous %	β-carotene (ppm)	Total Dietary fiber
Wheat flour 72%	Corn cobs %										
100	-	0.46	9.84	1.66	0.36	1.38	1.74	83.50	0.080	2.8	2.8
90	10	0.66	9.32	1.61	0.41	1.385	1.795	75.96	0.072	-	10.83
85	15	0.76	9.05	1.58	0.44	1.387	1.827	72.19	0.068	-	14.57
80	20	0.86	8.80	1.56	0.47	1.390	1.860	68.42	0.064	-	18.50
75	25	0.96	8.54	1.54	0.50	1.392	1.892	64.65	0.060	-	22.42

Results show that there are a positive relationship between carrot roots replacement ratios and each of ash, ether extract, reducing sugars, nonreducing sugars, total sugars, beta carotene and total dietary fiber contents of the mixtures. On the other hand, it is found that there are a negative relationship between carrot roots powder replacement ratios and each of starch, crude protein and phytate phosphorus contents of the mixtures.

IV.3. Falling number : (Alpha – amylase activity):

Alpha – amylase activity (falling number) was determined in wheat flour (72% ext.) and replacing wheat flour by corn cobs powder or carrot roots powder. The results are presented in Tables (7 and 8).

These results indicated that there are negative relationship between corn cobs rate replacement and falling numbers. These values are recorded to 415, 379, 357 and 329 sec with 10, 15, 20 and 25% corn cobs powder compared with control (440 sec). Also, these values more less than contral. This may be due to the dilution effects of fiber and decreament of starch content. These results are in agreement with those obtained by Pomeranz (1971).

Table (6) The chemical composition of wheat flour (72% extration) and carrot roots powder mixtuers.

Mixing		Ash %	Crude protein N=5.7%	Ether extract %	Reducing sugars %	Non-reducing sugars %	Total sugars %	Starch %	Phytate phosphorous %	β-carotene (ppm)	Total Dietary fiber
Wheat flour (72%ext.)	Crrot roots %										
100	-	0.46	9.84	1.66	0.36	1.38	1.74	83.50	0.080	2.8	2.8
90	10	1.55	9.53	1.69	2.28	1.79	4.07	75.97	0.070	3.67	7.17
85	15	2.10	9.37	1.71	3.25	1.98	5.23	72.21	0.068	5.50	9.36
80	20	2.65	9.21	1.73	4.20	2.20	6.40	68.45	0.064	7.34	11.55
75	25	3.19	9.06	1.75	5.20	2.41	7.61	64.68	0.060	9.17	13.73

IV.4. The effect of replacing wheat flour (72% extraction) by corn cobs powder or carrot roots powder on its rheological properties:-

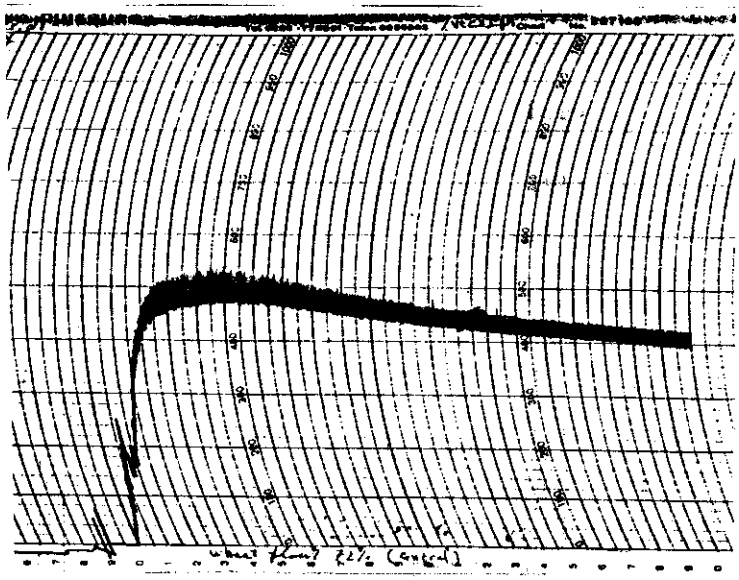
IV.4.1. The Farinograph properties:-

Table (9) and Figs. (1a,b,c,d,e) show the farinograph parameters of wheat flour as affected by different levels (10%, 15%, 20% and 25%) of corn cobs and carrot roots powder.

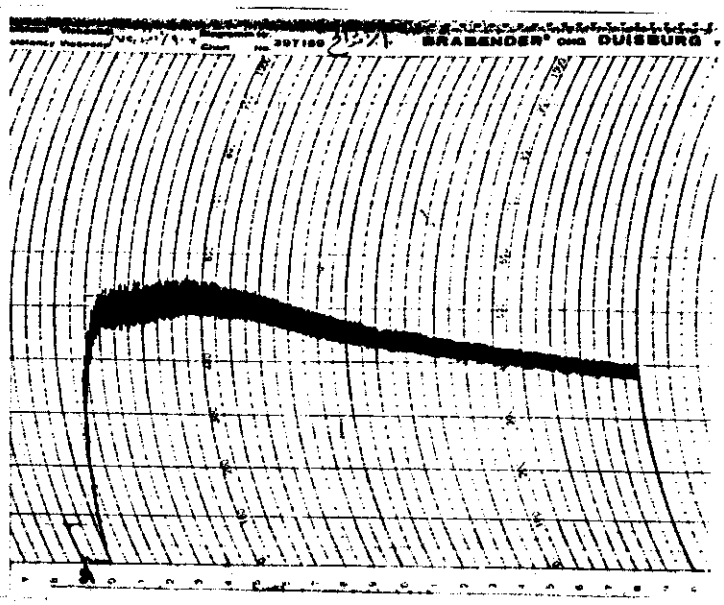
The results showed that addition of corn cobs powder under the above-mentioned concentrations lead to increase water absorption which recorded 64.5 , 66.7 , 65.9 and 60.0% compared with control (59.5). The increasing of water absorption may be due to the strong water – binding ability of fiber as cited by Chen et al (1988). Also, the arrival time increased at all levels except at level of 10%. On the other hand, dough development time was decreased and at level of 10% then increased gradualy and reached level of 10% its maximum (10.0 min) at 25% of corn cobs powder addition longer dough development time may be a result from the difficults of mixing fibers and wheat flour homogeneously as cited by Chen et al (1988).

Table (9): The effect of replacing wheat flour (72% extraction) by corn cobs powder on the farinograph tests :

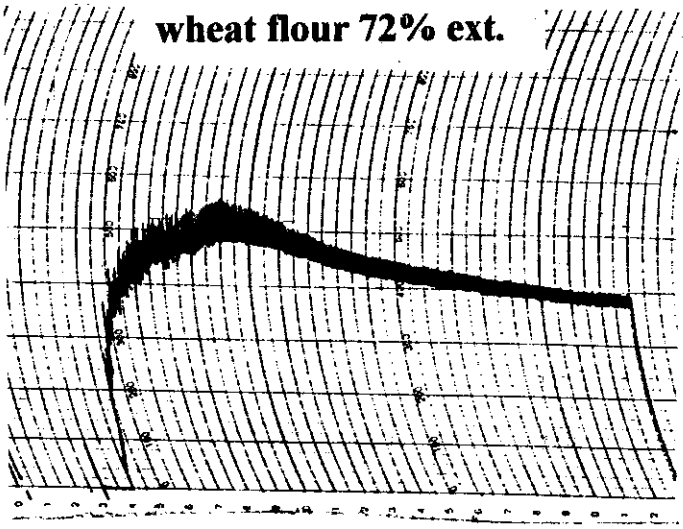
Recipe mixtures		Water absorption (%)	Arrival time	Dough developm et time	Dough stability	Dough weaking after 20 min
Wheat flour 72% ext.	Corn cobs	%	Min	Min	Min	B.U.
100%	-	59.5	2.5	5	6	90
90%	10	64.5	1.5	4.5	6.0	130
85	15	66.7	3.0	5.0	4.0	135
80	20	65.9	3.5	5.5	4.5	110
75	25	60.0	8.0	10.0	17	-



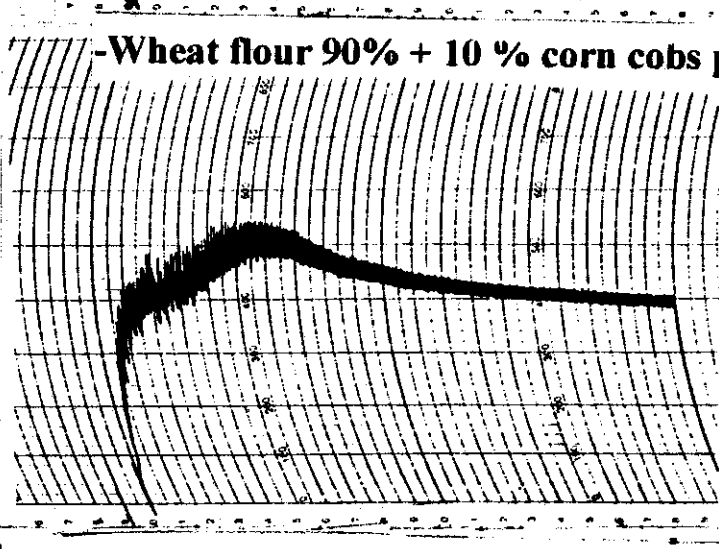
wheat flour 72% ext.



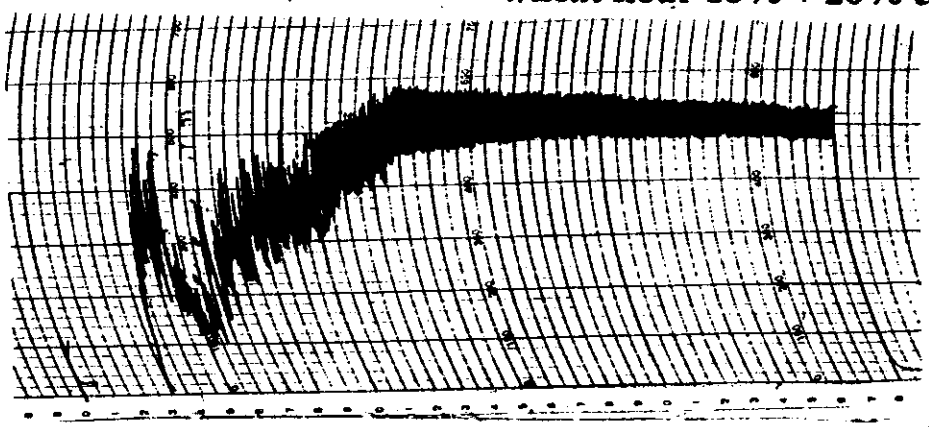
-Wheat flour 90% + 10 % corn cobs powd



Wheat flour 85% + 15% corn cobs powder.



wheat flour 80% + 20% corn cobs powder.



wheat flour 75% +25% corn cobs powder.

Fig.(1) The farinograph characterestics of wheat flour (72% ext.) mixed with corn cobs powder at different ratios

Also, dough stability was found the same at level 10% of corn cobs powder then decreased gradually to reach its maximum at 25% corn cobs powder. The data showed that dough weakening due to replacing wheat flour (72% ext.) by corn cobs were increased comparing with the control. The increasing of dough weakening is a result of the break down of glutein network after elapsing at the appropriate mixing time. As a result the polar points of contact would be few and weak, which led to increase the weakening of the dough mixture. These results are in agreament with those reported by Abd El-Hamid (1976) and Soliman (1997).

On the other hand, farinograph parameters include addition different levels of carrot roots powder 10, 15, 20 and 25% are shown in Table (10) and Figs (2 a,b,c,d). The results showed that addition of carrot roots powder to wheat flour under the above mentioned concentrations lead to increase water absorption which recorded 63.5, 66.1, 68.5 and 70.4% compared with control (59.5%). The increasing of water absorption is attributed to the strong water-binding ability of fiber. The arrival time decreased which recorded 1.5 min at levels of 10% and 15% carrot roots powder then increased gradually at levels of 20% and 25%.

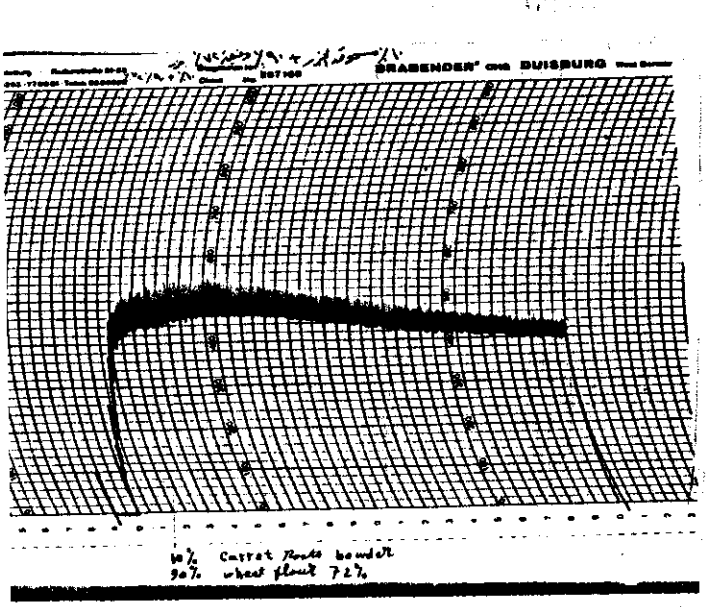
Table (10) Effect of replacing wheat flour (72% extraction) by carrot roots powder on the Farinograph tests :

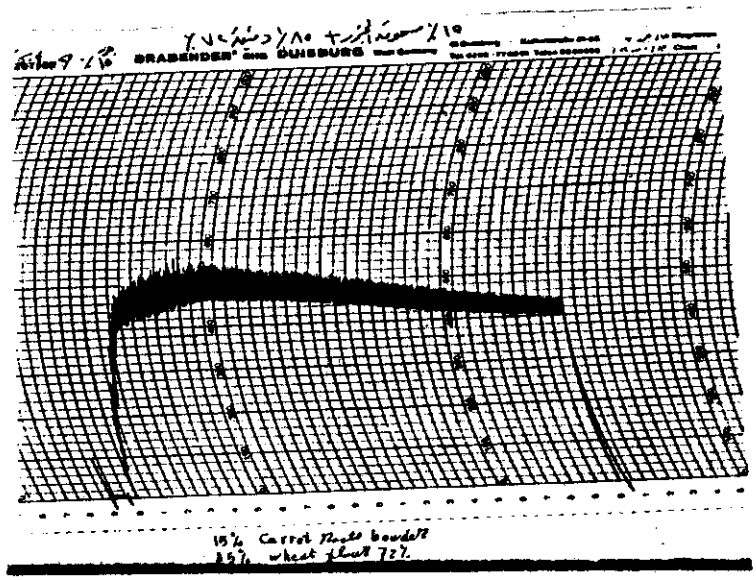
Recipe mixtures		Water absorption (%)	Arrival time	Dough developm-ent time	Dough stability	Dough weaking 20 min
Wheat flour 72% ext.	Carrot roots	%	Min	Min	Min	B.U.
100%	-	59.5	2.5	5	6	90
90%	10	63.5	1.5	5	9.5	80
85	15	66.1	1.5	5	10	75
80	20	68.5	3.5	6.5	9.5	65
75	25	70.4	5.0	8.0	13.5	35

The dough development time showed no change between control and addition of 10% and 15% of carrot roots powder, while addition of 20% and 25% lead to increase dough development time. Also, dough stability increased which recorded 9.5, 10.0, 9.5 and 13.5 min compared with control 6.0 min. Also, results indicated that addition of carrot roots powder to wheat flour lead to decrease dough weakening which recorded (80,75, 65 and 35 B.U) compared with control (90B.U) The low dough weakening could be attributed to a false increament in strength and stability with reduction in dough weakening.

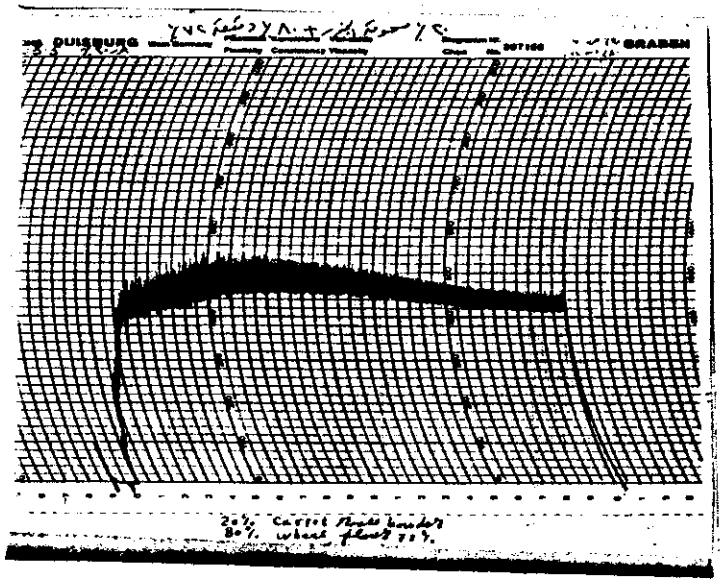
In general , it could be concluded that fiber source addition increase water absorption, dough development time, stability and lower weakening of dough, these dough characteristics may be attributed to :

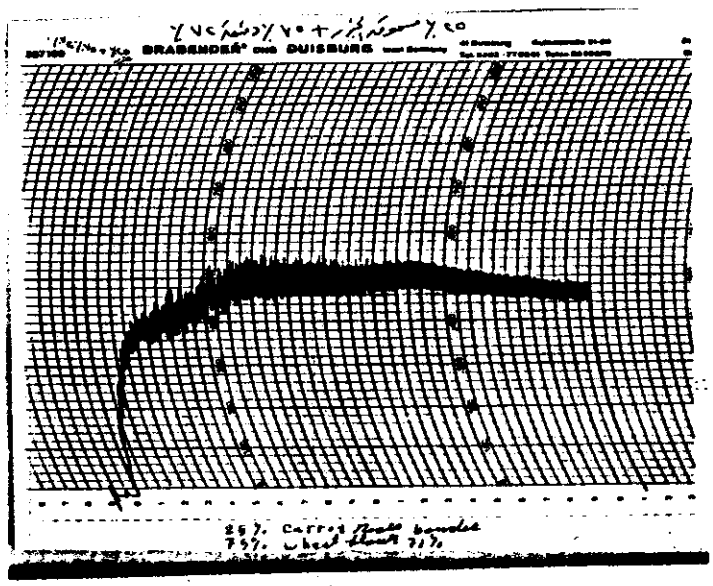
1-High ability of dietary fiber components to swell and absorb more water.





eat flour 90% + 10% carrot roots powder.. Wheat flour 85% + 15% carrot roots powder





eat flour 80% + 20% carrot roots powder.. Wheat flour 75% + 25% carrot roots powder.

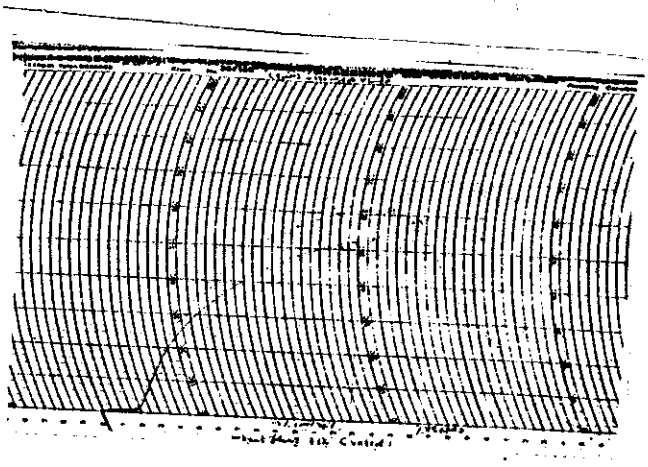
Fig. (2) The farinograph characterestics of wheat flour (72% ext.) mixed with carrot roots powder at different ratios

2-The gluten dillution beside the slow formation of gluten network, which is the parameter of dough development time also dough stability is an important index for the ability of the dough to capture sufficient amounts of gas during fermentation period, but here it had different trend attributed to the fiber addition. Fiber have the ability to absorb more water and dough become tough.

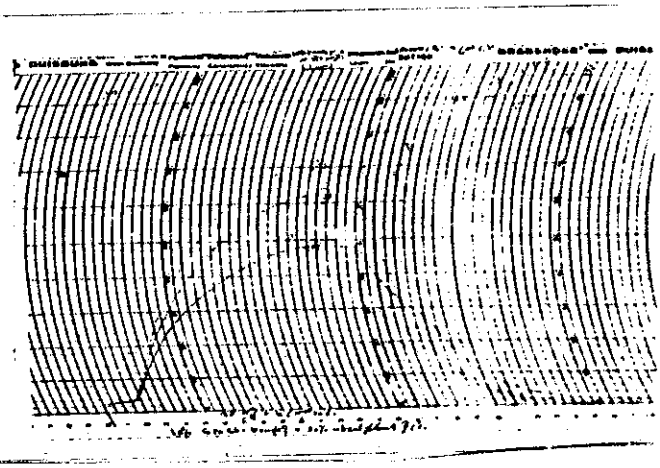
IV.4.2.The extensograph properties :-

Tables (11 and 12) and Figs (3 a,b,c,d,e) and Figs (4 a,b,c,d) show the extensograph parameters of wheat flour as affected by different levels of corn cobs or carrot roots powder (10, 15, 20 and 25%). The data in Table (11) and Figs (3(a,b,c,d) showed that addition of corn cobs powder at levels of 10, 15, 20 and 25% to wheat flour (72% ext.) decreased dough extensibility (E) which recorded 190, 155, 145 and 125 mm.) compared with control (240mm.) The decrease in dough extensibility may be due to the absence of gluten in corn cobs powder more over protease which weakening dough structure El-Farra, et.al. (1985). AS well as resistance to extension increased when corn cobs powder was added at the different levels of the abovementioned ratios .

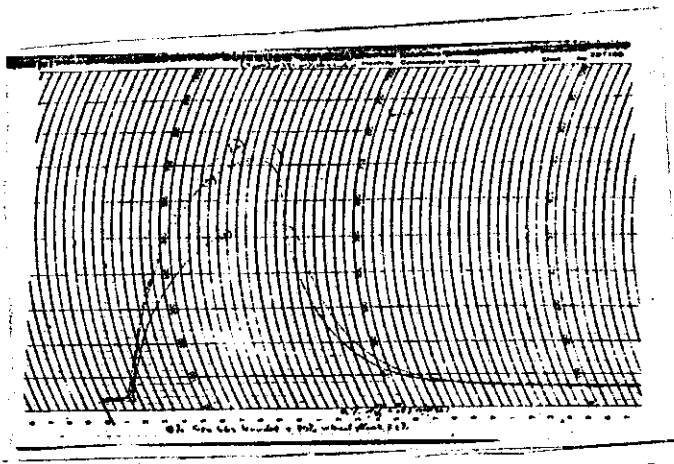
The increase in resistance to extension is belived to be due to the deficiency of corn cobs protein in glutenin, Abd El-Hamid. (1976).
The dough energy when corn cobs powder was added at different levels to wheat flour was decreased gradually and reached to maximum decrease at ratio 80% wheat flour to 20% corn cobs powder.



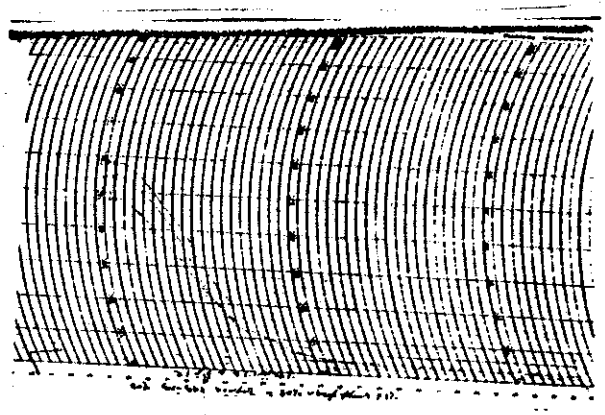
wheat flour 72% ext.



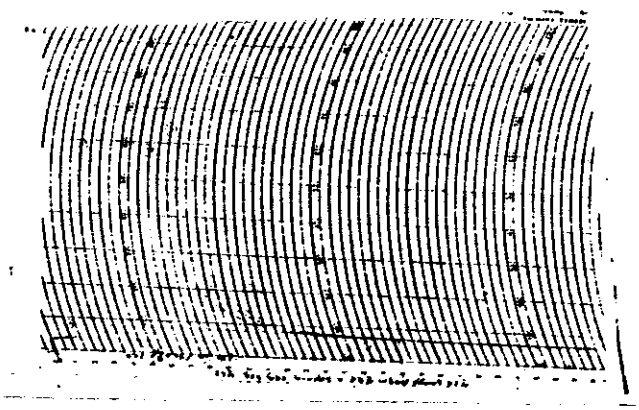
wheat flour 90% + 10% corn cobs powder.



heat flour 85% + 15% corn cobs powder.

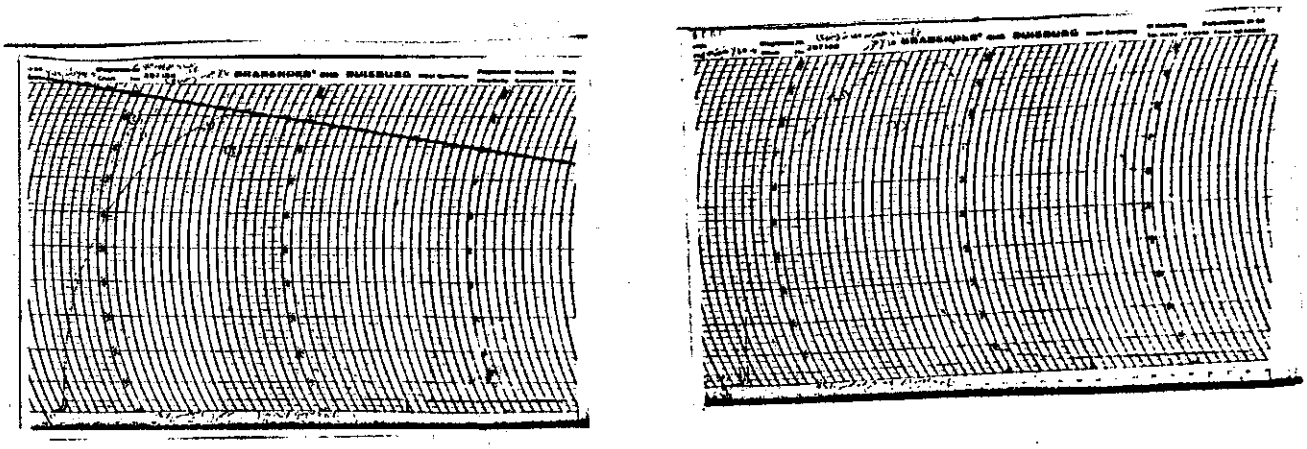


-Wheat flour 80% + 20% corn cobs powder

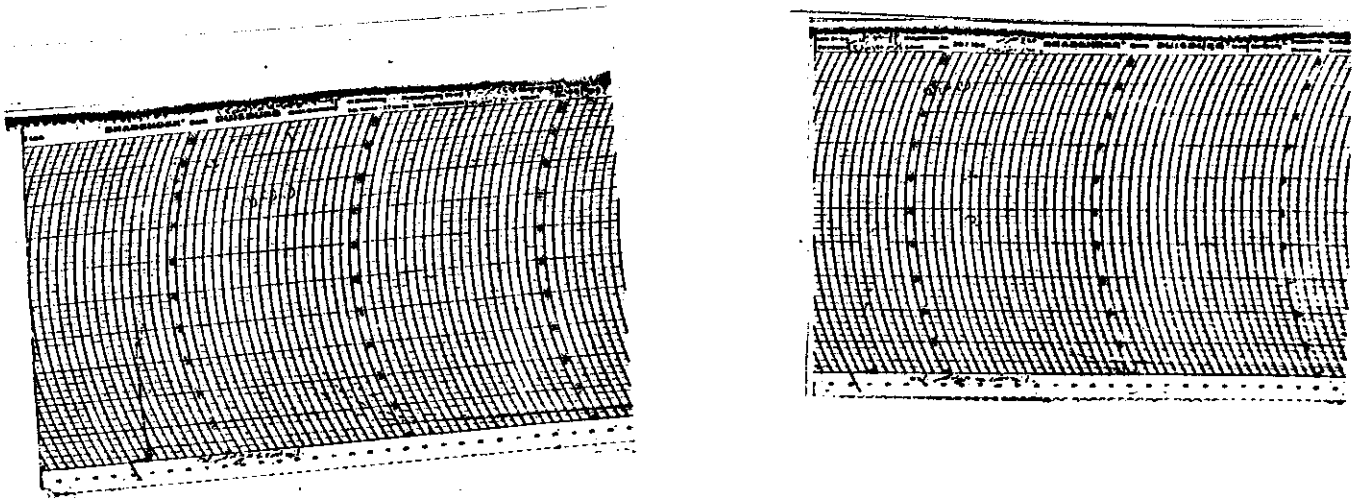


-Wheat flour 75% + 25% corn cobs powder.

Fig (3). The extensograph of wheat flour (72% ext.) and its corn cobs mixtures at different ratios



'heat flour 90% + 10% carrot roots powder. wheat flour 85% + 15% carrot roots powder



wheat flour 80% + 20% carrot roots powder. wheat flour 75% + 25% carrot roots powd

Fig (4). The extensograph of wheat flour (72% ext.) and its carrot roots powder mixtures at different ratios

Table (11) The Effect of replacing wheat flour (72% extraction) by corn cobs powder on the extensograph testes :

Recipe mixture		Dough extensiblity (E) mm	Resistance to extension (R) B.U	Proportional number (R/E)	Dough energy Cm^2
Wheat flour 72% ext. %	Corn cobs %				
100	-	240	640	2.6	174
90	10	190	960	5.05	148
85	15	155	680	4.38	90
80	20	145	560	3.86	77
75	25	125	800	6.4	96

The results could be attributed to its low gluten content and characteristics since there are a balance between the extensibility and resistance to extension. El-Sayed (1998).

On the other hand, the extensograph testes of replacing wheat flour (72% ext.) by carrot roots powders at different levels (10,15,20 and 25%) are shown in table (12) and illustrated in Fig (4a,b,c, d)

The results showed that dough extensibility was gradually decreased as the added carrot roots powder ratios increased. This may be due to the blends low gluten content due to the addition of carrot roots powder. Also, resistance to extension showed increament which recorded 940, 940, 970 and 970 (B.U) compared with control (640 B.U) However, proportional number had higher values (5.08, 5.08, 6.46 and 7.18) than control (2.6).

Table (12) The effect of replacing wheat flour (72% extraction by carrot roots on the extensograph tests

Recipe mixture		Dough extensibility (E) mm	Resistance to extension (R) BU	Proportional number (R/E)	Dough energy Cm^2
Wheat flour 72% ext. %	Carrot roots %				
100	-	240	640	2.6	174
90	10	185	940	5.08	160
85	15	185	940	5.08	152
80	20	150	970	6.46	125.2
75	25	135	970	7.18	100

The dough energy of the mixture were decreased gradully by increasing the ratios of carrot root powder in the blend .

These decrease means that the addition of carrot roots powder weakened the dough because of its low content of gluten in the mixtures Soliman (1997). Similar conclusions were obtained by El-. Sabe (1995) and El-Sayed (1998).

IV.5. Organolyptic evaluation of Balady and Toaste breads:-

IV.5.1. Balady bread produced from wheat flour (72 % extraction) with corn cobs or carrot roots bowder :-

The data in Tables (13, 14, 15 and 16)and Figs (5,6,7,8) represent the mean values and statistical analysis of the organolyptic evaluation of balady and toaste breads made from replacing wheat flours (72% extraction) by corn cobs or carrot root powders

The results of sensory evaluation of balady bread produced from mixing wheat flour (72% ext.) with different ratios i-e. 10, 15, 20 and 25% of corn cobs powder are tabulated in table (13).

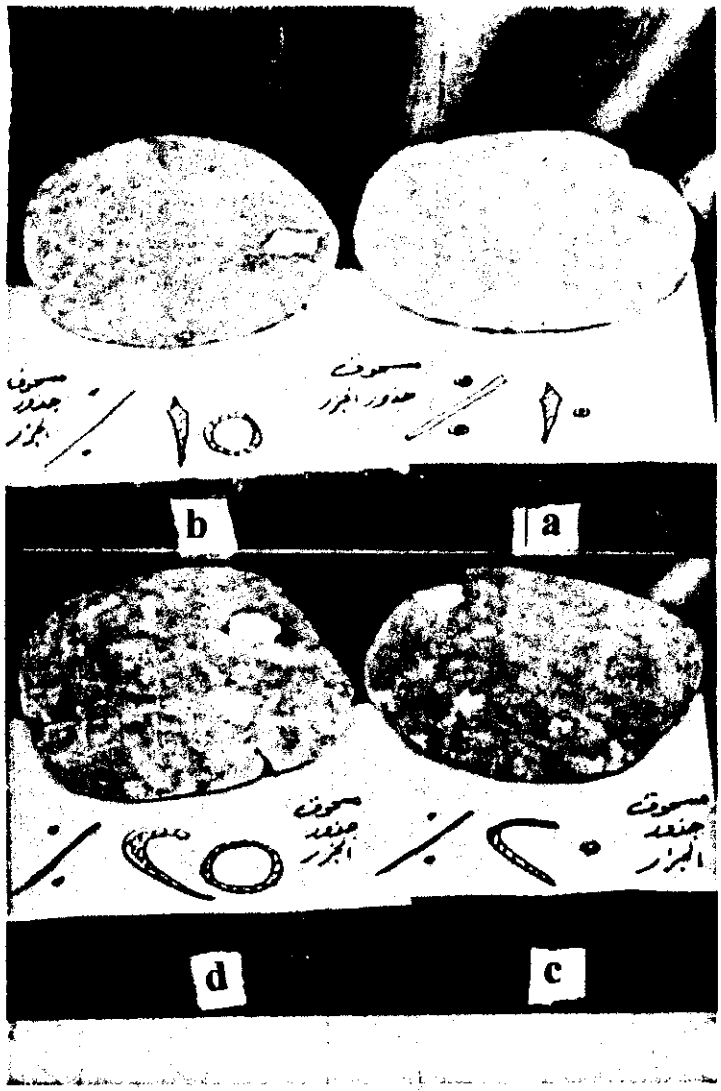


Fig. (6) : Balady bread made from wheat flour (72% ext.) and carrot roots powder with different ratios :

(a) wheat flour 90% + 10% carrot roots powder.

(b) wheat flour 85% + 15% carrot roots powder.

(c) wheat flour 80% + 20% carrot roots powder.

(d) wheat flour 75% + 25% carrot roots powder.

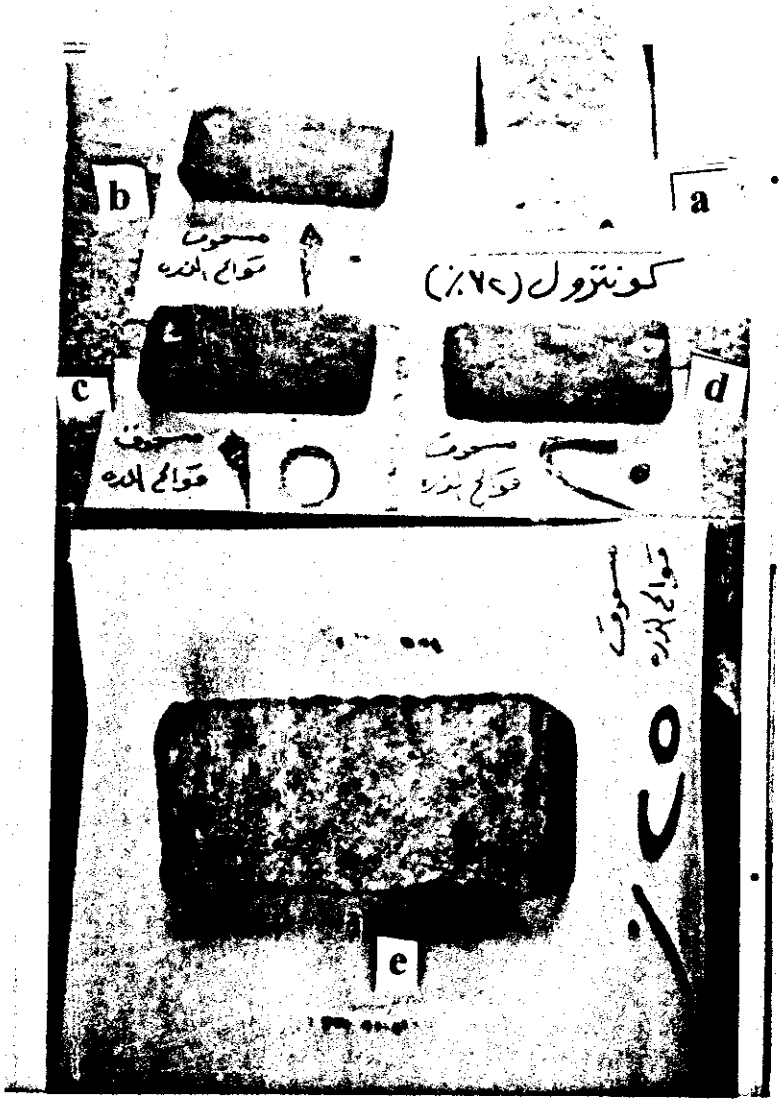


Fig. (7) : Toast bread made from wheat flour (72% ext.) and corn cobs powder with different ratios :

(a) wheat flour 72% ext.

(b) wheat flour 90% + 10% corn cobs powder.

(c) wheat flour 85% + 15% corn cobs powder.

(d) wheat flour 80% + 20% corn cobs powder.

(e) wheat flour 75% + 25% corn cobs powder.

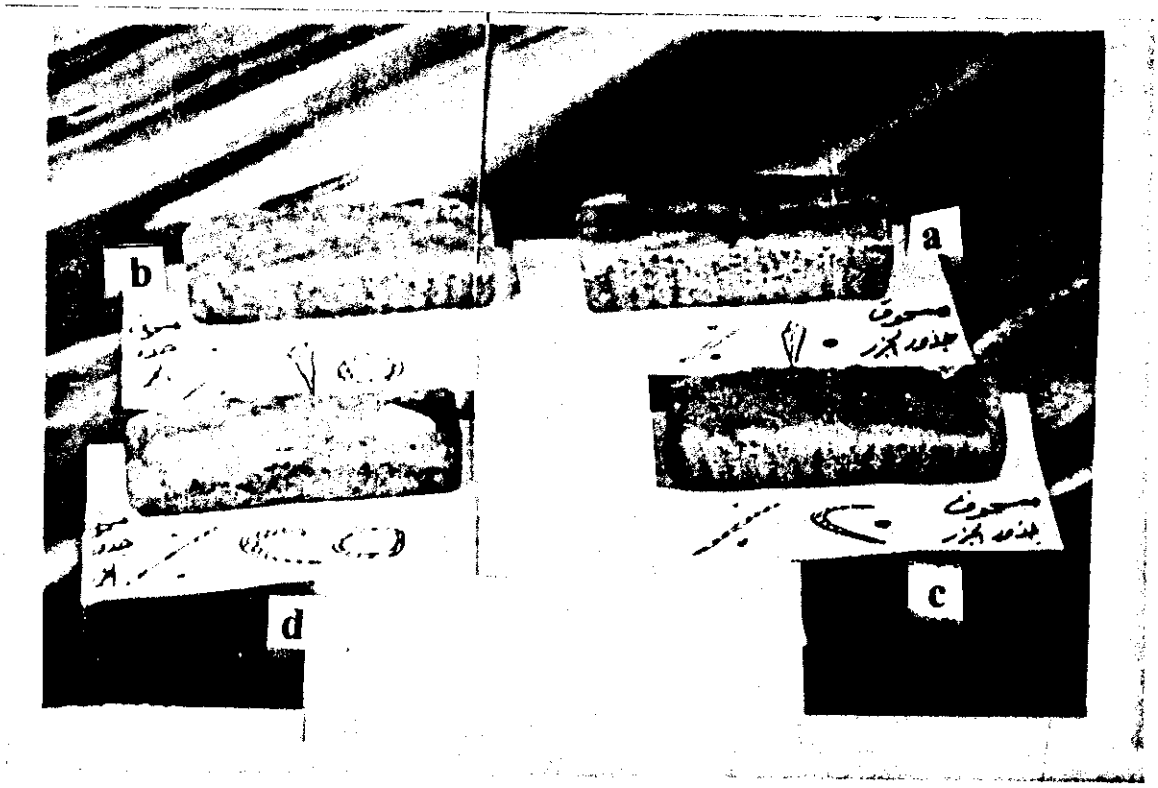


Fig. (8) : Toast bread made from wheat flour (72% ext.) and carrot roots powder with different ratios :

(a) wheat flour 90% + 10% carrot roots powder.

(b) wheat flour 85% + 15% carrot roots powder.

(c) wheat flour 80% + 20% carrot roots powder.

(d) wheat flour 75% + 25% carrot roots powder.

The results showed that balady bread supplemented with 10% corn cobs powder showed no difference in crust color, Aroma , taste , texture and overall acceptability compared with control and other blends. However, toaste bread produced from blend containing 25% corn cobs powder had the highest weight (254.2g) and specific volume (1.81) and score (11), comparing with control. On the contrary, balady bread supplemented with 15 and 20% corn cobs powder showed significance difference in crust color, Aroma, taste , texture and overall acceptability compared with control.

Gradual reduction was noticed in all the parameters as the ratio of corn cobs powder increase. These may be attributed to their blends need more mixing and fermentation time according to their high values of dough development time, stability and energy. These results are in accordance with those obtained by Soliman (1997) and El-Sayed (1998).

The data in table (14) show that balady bread supplemented with 15, 20, and 25% carrot roots powder showed lowest values in crust color, Aroma, taste, texture and overall acceptability compared with control.

Table (13) Quality properties of balady bread blends made from replacing wheat flour 72% extraction by corn cobs.

Blends		Weight	Crust	Aroma	Taste	Testure	Total score
Wheat flour 72 ext. %	Corn cobs %	gm	10	10	10	10	40
100	-	120.30	9	10	10	9	38
90	10	121.77	8	8	8	5	29
85	15	120.60	6	7	7	5	25
80	20	112.10	5	5	5	4	19
75	25	111.31	4	4	5	4	17

Table (14) Quality properties of balady bread blends made from replacing wheat flour 72% extraction by carrot roots.

Blends		Weight	Crust	Aroma	Taste	Testure	Total score
Wheat flour 72 ext. %	Carrot roots %	gm	10	10	10	10	40
100	-	120.30	9	10	10	9	38
90	10	134.88	7	4	8	6	25
85	15	134.74	7	3	6	4	20
80	20	126.66	5	2	4	3	14
75	25	139.87	3	1	2	2	8

Table (15) Quality properties of toast bread blends made from replacing wheat flour (72% extraction) by corn cobs:

Blends		Crust color	Aroma	Taste	Texture	Total score	Weight	Volume	Specific volume
Wheat flour 72 ext. %	Corn cobs %	10	10	10	10	40	Gm	CC	CC/G
100	-	10	10	10	10	40	224.61	680	3.03
90	10	8	8	8	8	32	229.83	580	2.52
85	15	7	7	6	6	26	240.69	540	2.24
80	20	5	5	4	4	18	249.8	500	2.00
75	25	3	4	2	2	11	254.2	460	1.81

Table (16) Quality properties of toast bread blends made from replacing wheat flour (72% extraction) by carrot roots:

Blends		Crust color	Aroma	Taste	Texture	Total score	Weight	Volume	Specific volume
Wheat flour 72 ext. %	Carrot roots %	10	10	10	10	40	Gm	CC	CC/G
100	-	10	10	10	10	40	224.61	680	3.03
90	10	8	4	8	6	26	235.95	510	2.17
85	15	7	3	6	4	20	246.45	440	1.79
80	20	5	2	2	3	12	240.79	410	1.70
75	25	3	1	1	2	7	248.65	360	1.45

IV.6.Improvement Of high fiber bread quality.

The above results revealed that flour replacement by fiber source (corn cobs or carrot roots powder) weaked dough properties and reduced bread quality.

To improve bread making quality and acceptability scores, addition of L-ascorbic acid was choiced according to its safety and utilization in several countries in bread improvement (Humpolikova and Hampl 1988)

L-Ascorbic acid was added to the mixtures in levels 50, 75, 100, 125 and 150 p.p.m. beside the control.

IV.6.1. Effect of L-ascorbic acid addition on the rheological (farinograph and extensograph) properties:-

Tables (17,18,19 and 20) and Figs (9 , 10 , 11 and 12 a,b,c,d,e,f) shows the effect of L-ascorbic acid addition on the rheological parameters of the two fiber mixtures under investigation in replacement level 15% from fiber source.

Addition of L-ascorbic acid to each of the two mixtures resulted in a marked improvement in the quality of dough. The addition of L-ascorbic acid to the mixtures showed an increament each of dough development time, dough stability, resistant to extension, proportional number and dough energy accompanied by a reduction in dough weakening and dough extensibility.

These results are in agreement with those a obtained by Humpolikova and Hampl (1988).

The dough improving properity effect of L-ascorbic addition is due to its oxidation product dehydro –L- ascorbic acid. L-ascorbic

acid is oxidized by atmospheric oxygen under the infleunce of both a heat- Labile enzyme or a heat- stable catalyst. The oxidation product dehydro L-ascorbic acid can oxidize glutathione under the influence of a specific enzyme (Bloksma, 1973).

Also, the experiments results showed that L-ascorbic acid 100 p.p.m was the suitable addition level to flour-corn cobs mixture (15%) to obtain the highest improvement rheological properties.

IV.6.2.Effect of L-ascorbic acid addition on the bread quality and sensory evaluation :

Results in tables (21, 22, 23 and 24) and Figs (13,14,15 and 16) reveal that L-ascorbic acid addition improved the quality of balady and toast bread made from flour corn cobs 15% mixture concerning toast bread, crust color , aroma, taste, texture and specific volume were imporved as L-ascorbic acid addition rate was increased to 150 p.p.m quality parameters of balady bread made from flour-corn cobs 15% mixture showed the same trends. In general it could be concluded that addition of L-ascorbic acid at level 100 p.p.m improve bread making quality and improved over all sensory acceptability scores.

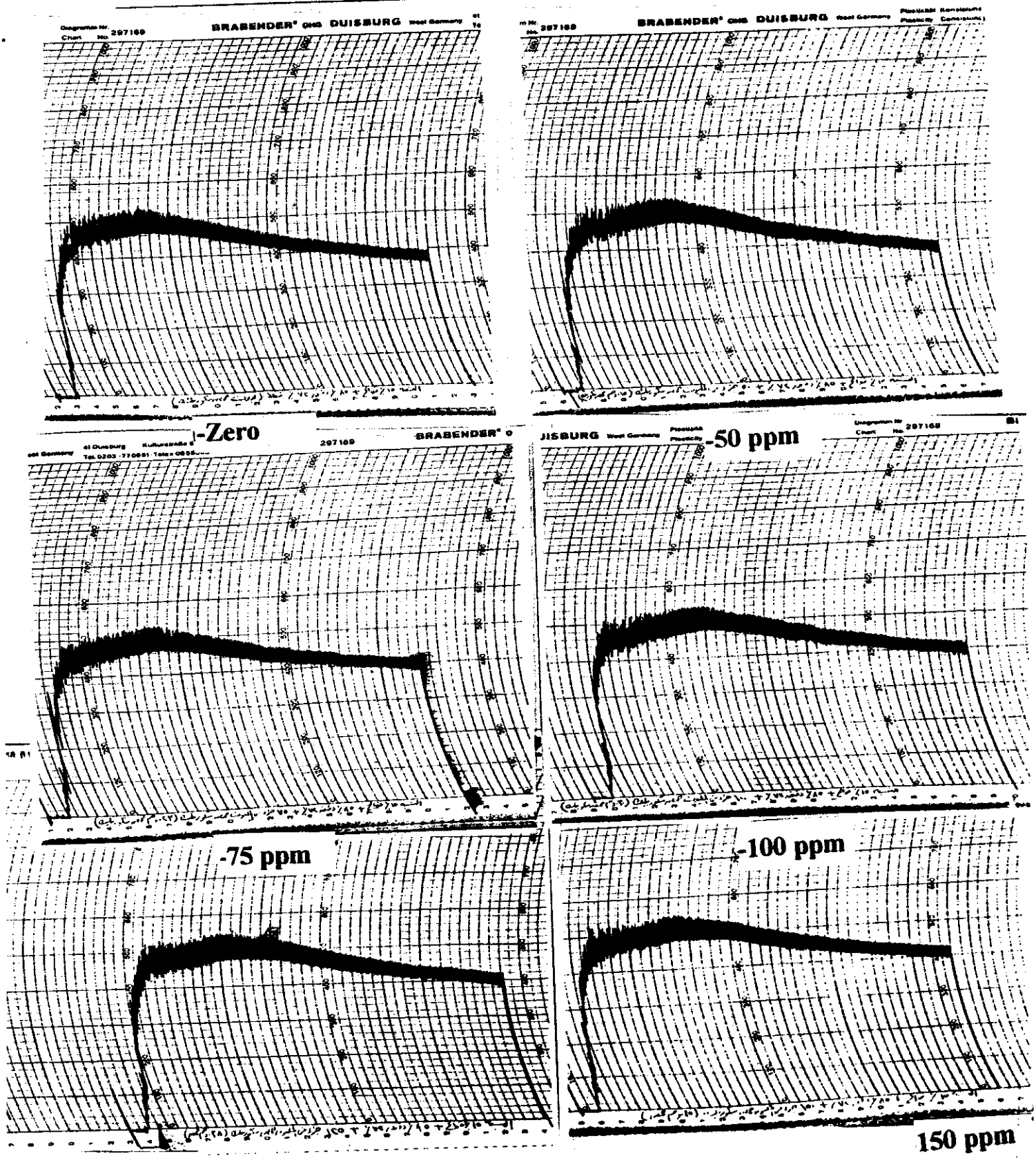
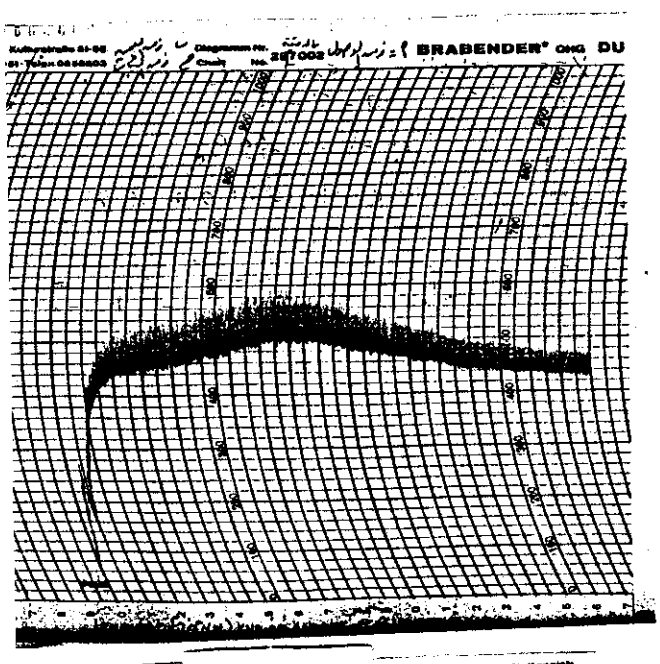
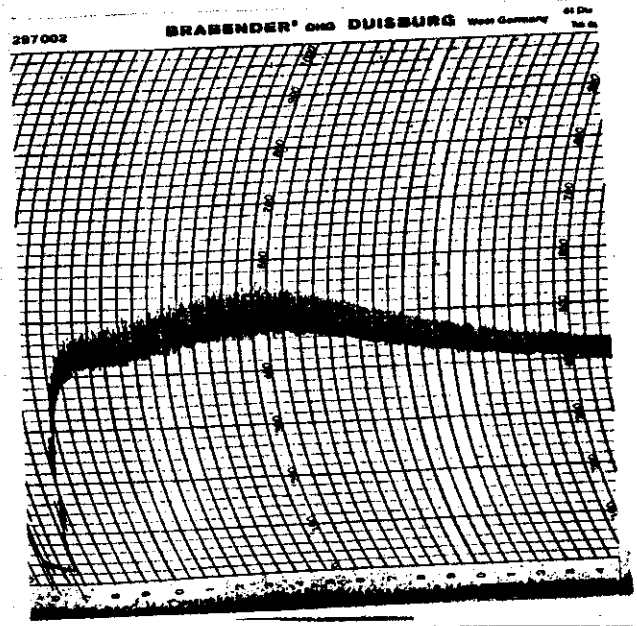
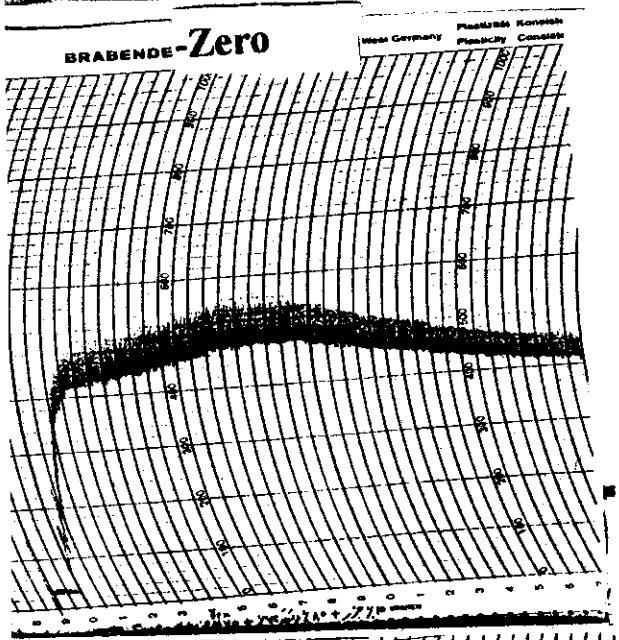
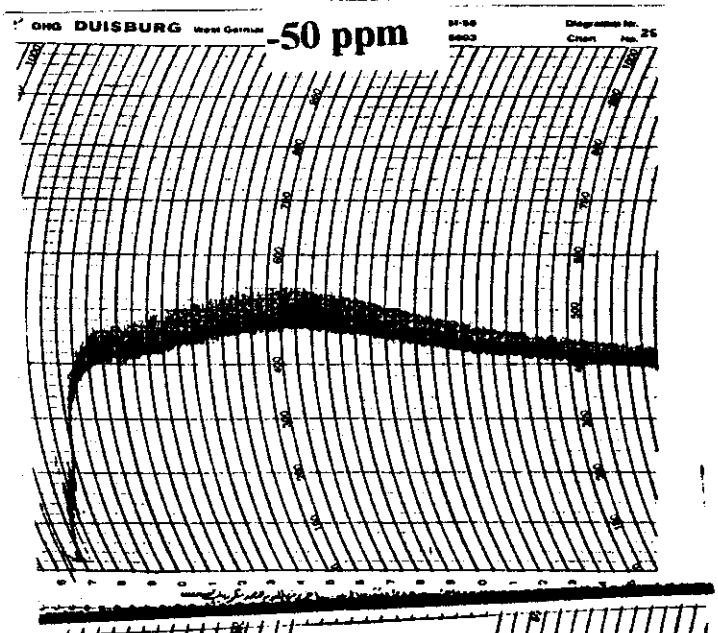


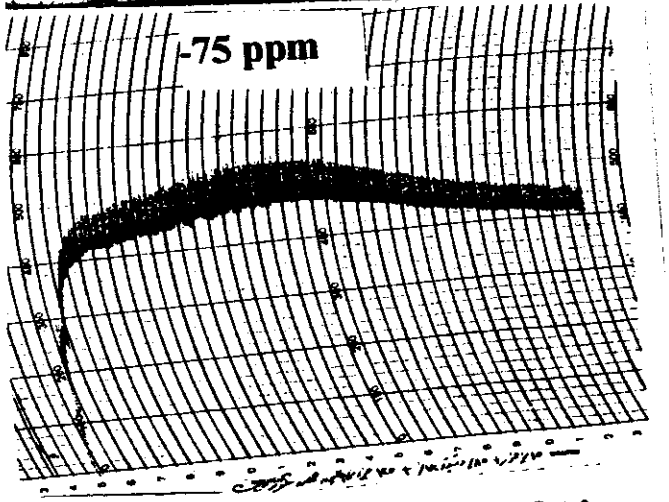
Fig (9). The farinograph character of wheat flour (72% ext.) and corn cobs powder mixture (85 : 15) after addition of L-ascorbic acid

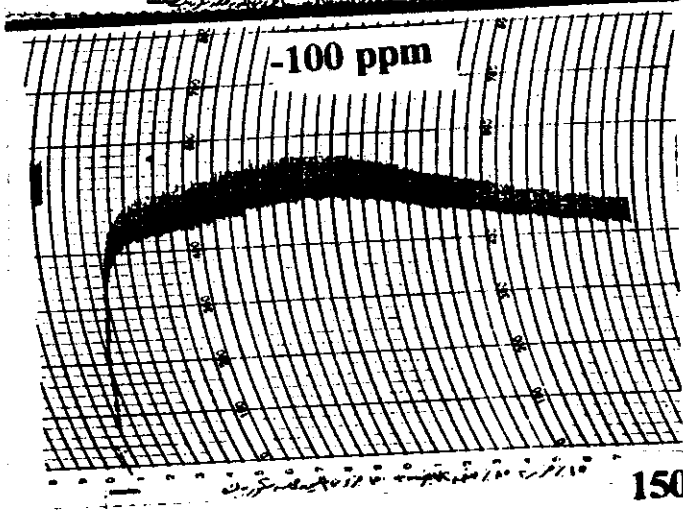








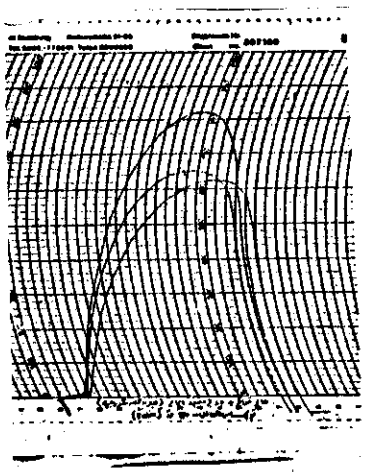




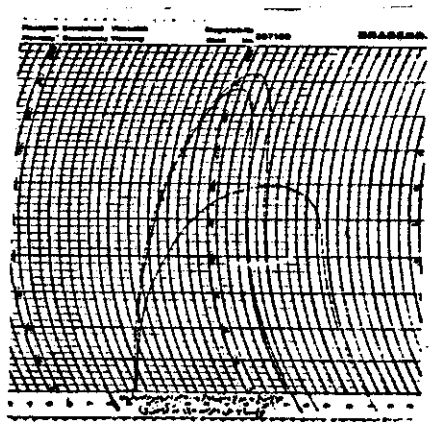
-125 ppm

150 ppm

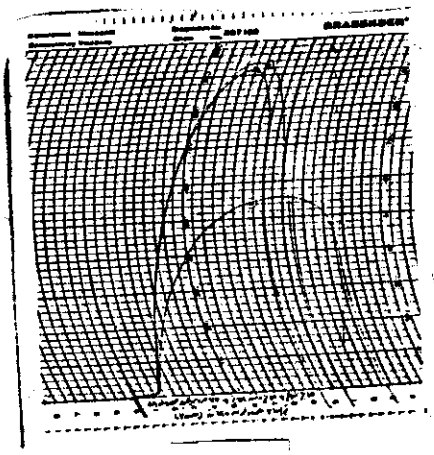
Fig (10). The farinograph character of wheat flour (72%ext.) and carrot roots powder mixture (85 : 15) after addition of L-ascorbic acid



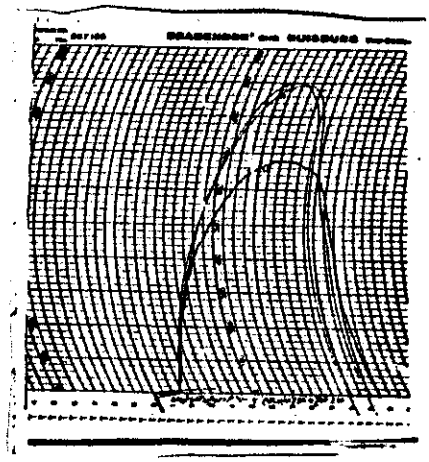
-Zero



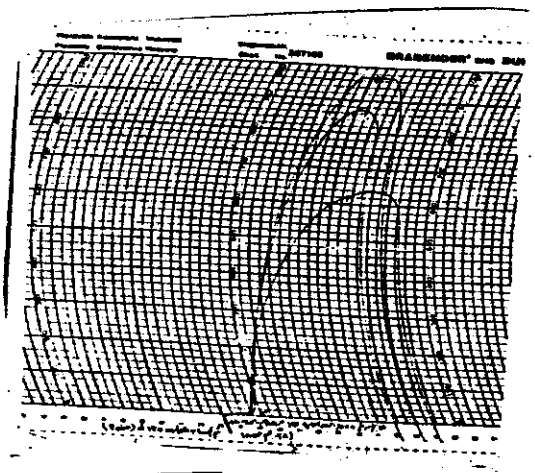
-50 ppm



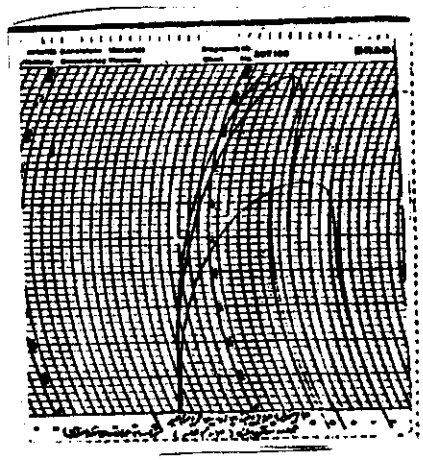
-75 ppm



-100 ppm

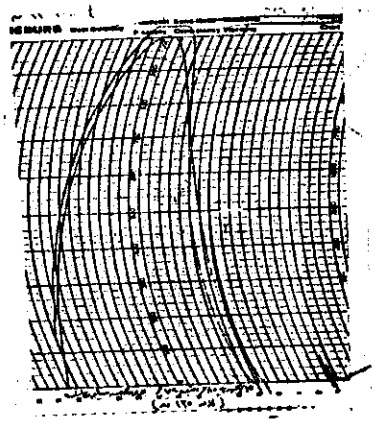


-125 ppm

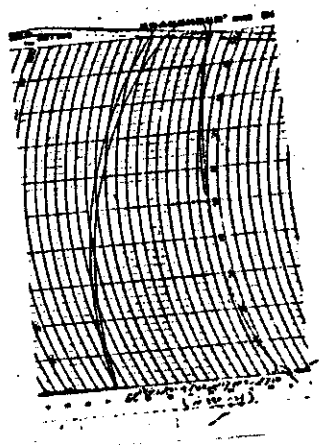


150 ppm

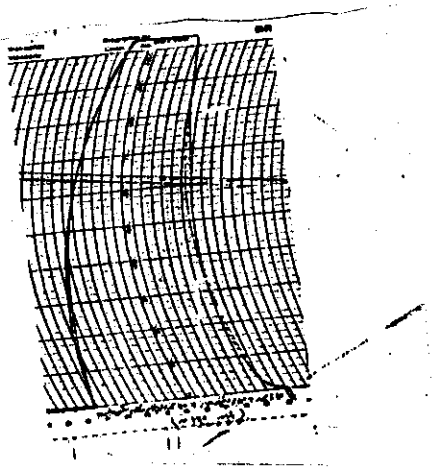
Fig (11). The extensograph character of wheat flour (72%ext.) and corn cobs powder mixture (85:15) after addition of L-ascorbic acid



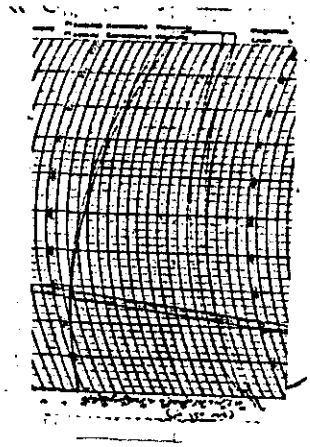
-Zero



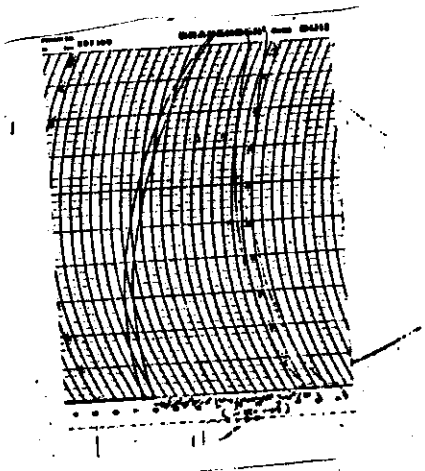
-50 ppm



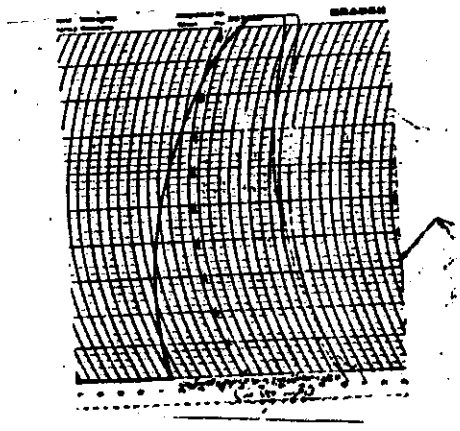
-75 ppm



-100 ppm



-125 ppm



-150 ppm

Fig (12). The extensograph character of wheat flour (72%ext) and carrot roots powder mixture (85 : 15) after addition of L-ascorbic acid

Table (17) Effect of adding ascorbic at both wheat flour(72%extraction) with mixture corn cobs powder on the farinograph test:

Recipe mixture		Ascorbic acid (ppm)	Water absorption (%)	Arrival time (min)	dough development time (min)	Dough stability (min)	Dough weakening after 10 min. (B.U)	Dough weakening After 20 min. (B.U)
Wheat flour 72%	Corn cobs (%)							
85	15	-	61.7	2	5.5	7	40	120
85	15	50	61.7	2.5	6	8	-	115
85	15	75	62.3	3	6.5	7	-	100
85	15	100	62.9	2	6.5	8.5	-	100
85	15	125	62.2	2	6	8.5	-	105
85	15	150	62.7	2.5	6.5	8.5	-	105

Table (18) Effect of adding ascorbic acid at both wheat flour (72% extraction) with mixture carrot roots powder on the farinograph test:

Recipe mixture		Ascorbic acid (ppm)	Water absorption (%)	Arrival time (min)	dough development time (min)	Dough stability (min)	Dough weakening after 10 min. (B.U)	Dough weakening After 20 min. (B.U)
Wheat flour 72%	Carrot roots (%)							
85	15	-	62	6	5	6	20	-
85	15	50	63	4.5	7	6.5	30	-
85	15	75	63	3.5	8	7	30	-
85	15	100	63	5	7	7.5	30	-
85	15	125	63	5	7	8	30	-
85	15	150	62.5	3	7	8.5	20	-

Table (19) Effect of adding Ascorbic acid at both wheat flour (72% extraction) with mixture corn cobs powder on the extensograph test:

Recipe mixture			Dough extensibility (E) m.m	Resistances to extension (R) *B.U)	Proportional number (R/E)	Dough energy Cm^2
Wheat flour 72% ext.	Corn cobs %	Ascorbic acid (ppm)				
85	15	-	105	680	6.5	112.4
85	15	50	75	840	11.2	84.6
85	15	75	75	870	11.6	92.8
85	15	100	85	860	10.1	96.4
85	15	125	85	970	11.41	106.4
85	15	150	70	965	13.8	80

Table (20) Effect of adding Ascorbic acid at both wheat flour (72% extraction) with mixture carrot roots powder on the extensograph test:

Recipe mixture			Dough extensibility (E) m.m	Resistances to extension (R) *B.U)	Proportional number (R/E)	Dough energy Cm^2
Wheat flour 72% ext.	Carrot roots %	Ascorbic acid (ppm)				
85	15	-	95	900	9.47	125
85	15	50	80	940	11.7	108
85	15	75	85	940	11.05	121
85	15	100	85	980	11.5	121
85	15	125	90	1000	11.1	121
85	15	150	90	1000	11.1	118

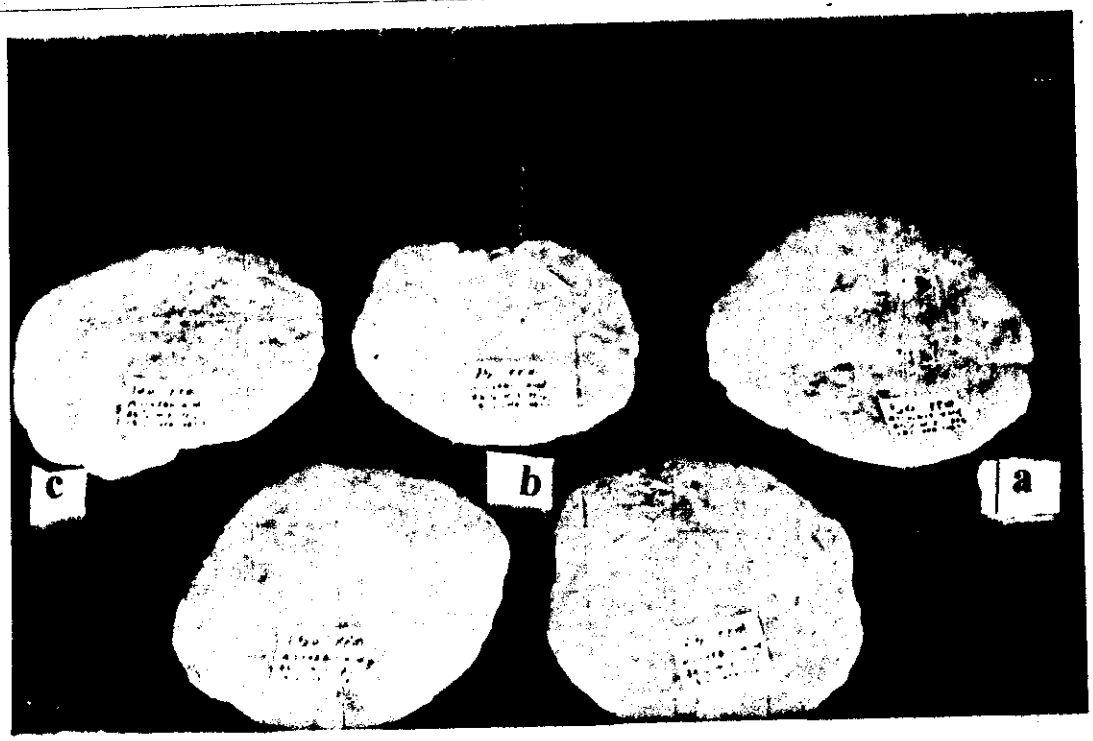


Fig (13) Balady bread made from wheat flour(72% ext.)and corn cobs powder (85 : 15%) and different ratios of ascorbic acid (PPm) :

(a) 50 PPm

(b) 75 PPm

(c) 100 PPm

(d) 125 PPm

(e) 150 PPm

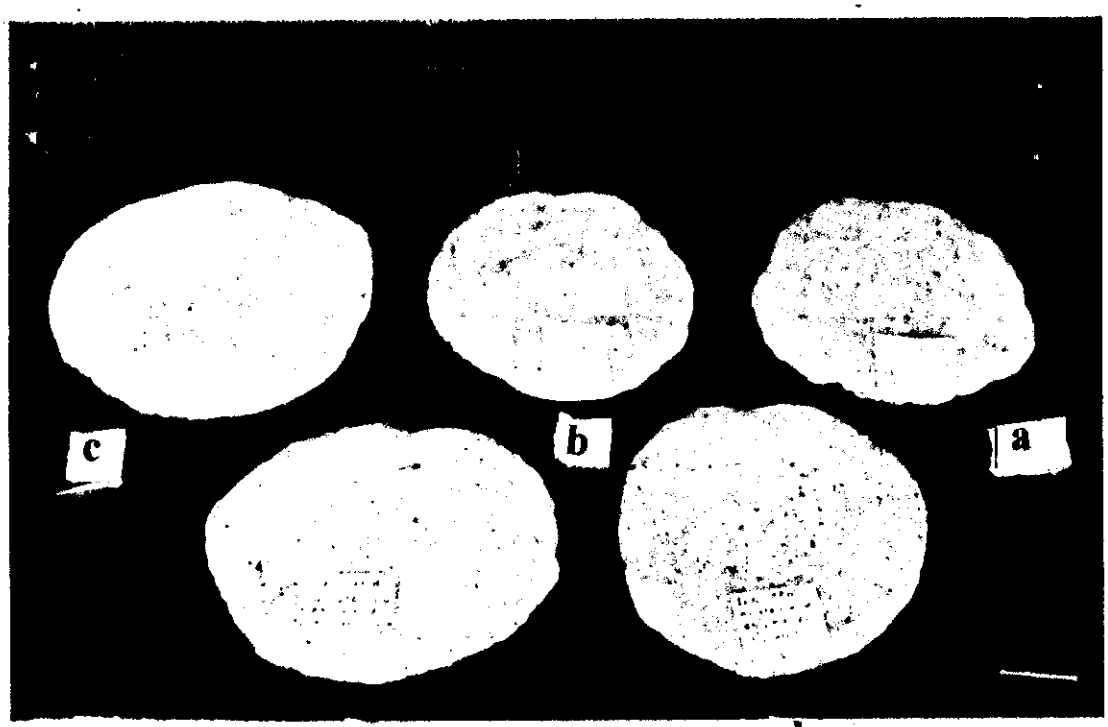


Fig (14) Balady bread made from wheat flour (72% ext.) and carrot roots powder (85 : 15%) and different ratios of ascorbic acid (PPm) :

(a) 50 PPm

(b) 75 PPm

(c) 100 PPm

(d) 125 PPm

(e) 150 PPm

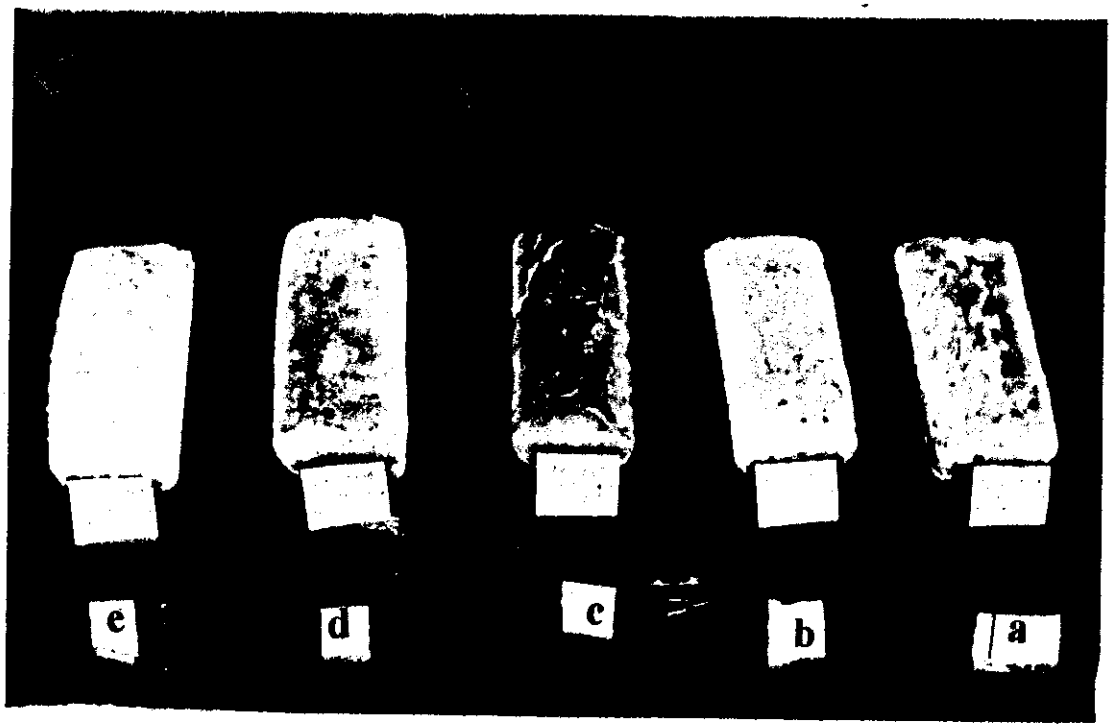


Fig (15) Toast bread made from wheat flour (72% ext.) and corn cobs powder (85 : 15%) and different ratios of ascorbic acid (PPm) :

(a) 50 PPm

(b) 75 PPm

(c) 100 PPm

(d) 125 PPm

(e) 150 PPm

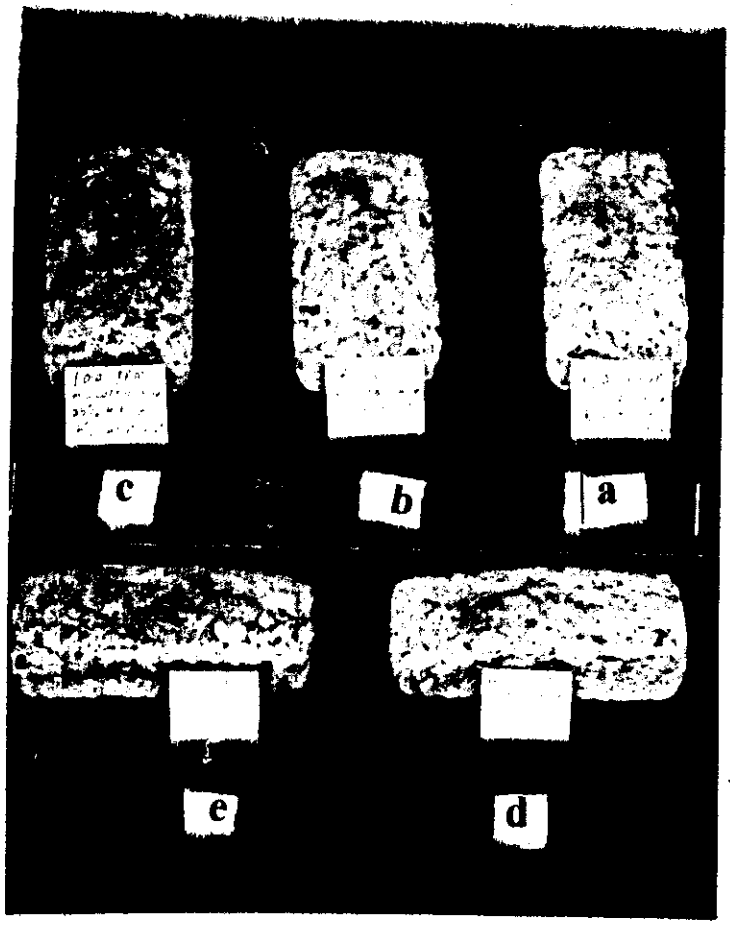


Fig (16) Toast bread made from wheat flour(72% ext.)and carrot roots powder (85 : 15%) and different ratios of ascorbic acid (PPm) :

(a) 50 PPm

(b) 75 PPm

(c) 100 PPm

(d) 125 PPm

(e) 150 PPm

Table (21) Effect of adding ascorbic acid at both wheat flour (72%extraction) with mixture corn cobs powder on the organoloptic properties of balady bread.

Recipe mixture			Weight	Crust	Aroma	Taste	Texture	Total score
Wheat flour 72%	Corn cobs (%)	Ascorbic acid (p.p.m)	Gm	10	10	10	10	40
85	15	-	122.81	6	7	6	6	25
85	15	50	139.11	8	8	7	7	30
85	15	75	143.21	8	8	8	7	31
85	15	100	155.81	8	9	8	8	33
85	15	125	153.22	9	9	9	8	35
85	15	150	167.31	9	9	9	9	36

Table (22) effect of adding ascorbic acid at both wheat flour (72% extraction) with mixture carrot roots powder on the organoloptic properties of balady bread.

Recipe mixture			Weight	Crust	Aroma	Taste	Texture	Total score
Wheat flour 72%	Carrot roots %	Ascorbic acid (p.p.m)	Gm	10	10	10	10	40
85	15	-	136.75	4	2	4	5	15
85	15	50	146.23	5	4	3	4	16
85	15	75	150.11	5	6	5	4	20
85	15	100	177.20	6	7	6	5	24
85	15	125	180.33	7	7	7	6	27
85	15	150	186.14	8	8	7	7	30

Table (23) Effect of adding ascorbic acid at both wheat flour (72% extraction) with mixture corn cobs powder on the organoloptic properties of Toast bread

Recipe mixture			Crust color	Aroma	Taste	Texture	Total score	Weight	Volume	Specific volume
Wheat flour 72%	Corn cobs %	Ascorbic acid (p.p.m)	10	10	10	10	40	Gm	Cc	CC/Gm (Cm3/Gm
85	15	-	3	4	4	3	14	335	515	1.53
85	15	50	5	4	4	4	17	345	650	1.88
85	15	75	6	5	5	4	20	343	650	1.90
85	15	100	7	6	6	6	25	331	700	2.11
85	15	125	8	7	8	7	30	327	700	2.14
85	15	150	9	8	9	8	34	363	800	2.20

Table (24) Effect of adding ascorbic acid at both wheat flour (72% extraction) with mixture carrot roots powder on the organoloptic properties of Toast bread

Recipe mixture			Crust color	Aroma	Taste	Texture	Total score	Weight	Volume	Specifi volume
Wheat flour 72%	Carrot roots %	Ascorbic acid (p.p.m)	10	10	10	10	40	Gm	cc	CC/Gm (Cm3/Gr
85	15	-	5	2	4	4	15	335	480	1.43
85	15	50	5	3	4	4	16	336	510	1.52
85	15	75	6	4	5	4	19	339	570	1.68
85	15	100	7	5	6	5	23	337	630	1.87
85	15	125	8	6	8	5	27	340	660	1.94
85	15	150	8	6	9	6	29	338	690	2.00