

**BIOCHEMICAL AND TECHNOLOGICAL
STUDIES WASTES OF SUGAR BEET**

By

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5. SUMMARY

Sugar beet pulp fiber (SBPF) which produced from the sugar beet blended with the commercial wheat flour as an attempt to produce special bread with high content of fiber and low content of phytic acid. The percentages of S.B.P.F. addition were 0, 1.5, 3, 4.5, 6, 9 and 12%.

Chemical composition for S.B.P.F. were determined. Rheological properties of the different blends, and bioethanol production during fermentation were carried out. The effect of addition S.B.P.F. to wheat flour on water absorption was calculated. Bread baking of balady and pan were carried out and the produced bread were evaluated. The main obtained results could be summarized as follows:

1-Chemical composition of sugar beet pulp were determined by Near-Infra Red (NIR) Spectroscopy apparatus, indicated that:

Moisture content %, fat content %, crud protein %, fiber content %, ash content % and total carbohydrate were recorded 7.61%, 0.53%, 10.50%, 17.55%, 6.04% and 57.77% respectively.

2-Determination of cellulose, hemicellulose and lignin content in sugar beet pulp:

a- The range of cellulose content scored 25-32% and the average was recorded 29%.

b. The maximum value of hemicellulose content was Appeared 28%, the minimum value was 22% and the mean value showed up 25%.

c. Lignin content recorded that 1% for the smallest value, 5% for the highest value and 3% for the mean value.

3-Determination of reducing sugars:

Results showed that the total reducing sugar in sugar beet pulp, the maximum yield of total reducing sugar yield 124.80 mg/g was obtained in 1% H₂SO₄. The minimum yield of total reducing sugar yield 70.20 mg/g was obtained in 3% H₂SO₄.

4- Estimation of bioethanol:

a- Qualitative estimation:

➤ After fermentation process, bioethanol production was examined by Jones reagent (K₂Cr₂O₇+H₂SO₄). Ethanol was oxidized into acetic acid with potassium dichromate in the presence of sulfuric acid and gave blue-green color. The results of bioethanol reaction with Jones reagent were showed yellow color with control and sample before fermentation but it was green color with sample after fermentation.

b-Quantitative estimation by HPLC:

▪ Ethanol yield from sugar beet pulp:

The hydrolysis of sugar beet pulp was performed using dilute H₂SO₄ further fermented to ethanol using *S. cerevisiae*

S288c and it was found that the ethanol yield of 50.96 mg/g substrate corresponded to a productivity ethanol yield of 0.71 (mg/g / h).

8- From the results obtained from the Farinograph, it is clear that adding beet sugar fiber increases the percentage of water absorption of flour - and that percentage increases with the increase in the percentage of added fibers.

- Increase the mixing time and the development time of the dough by increasing the percentage of beet sugar fiber addition.

- The dough stability time is reduced by increasing the percentage of added fibers.

9- From the results obtained from the Extensograph, it is clear that both the Resistance to extension of the dough and the proportional number increased by increasing the percentage of added beet sugar fiber. On the other hand, the Extensibility and area under the curve (energy) increased by increasing the percentage of added fiber.

10- The addition of beet sugar fibers led to a delay in the staling, either in flat bread or pan bread (toast), but the effect of addition was clearer in the case of pan bread than in flat bread.

11- Adding sugar beet fiber to flour to produce flat bread and pan bread showed a total sensory acceptance for both types of bread produced - and the best results obtained were at the level of addition of 6% of beet fiber to the production of flat bread and the level of addition of 3% for the production of pan bread.

From the previous study it becomes clear that there are great benefits when using sugar beet fiber, both from the environmental point of view by disposing of those wastes or from the technological point of view by using these residues to increase the percentage of fiber and some minerals and the general acceptance of bakery products when using 3% of the fiber to bread flat bread and 1.5% in pan bread.