

Production of Puree and Watermelon (*Citrullus lanatus*) Juice Usable in Bread Making

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Abstract

The "watermelon sector" in the Sahelian countries is characterized by a double burden not only because of post-harvest losses but also because of a lack of processing technology. The objective of this work is to investigate the processing quality of watermelon in bread making. A mixture composed by wheat flour (type 55) and puree or juice from two watermelon varieties (Koloss and Kaolack) presented good results. Breads of good rheological and sensory qualities were obtained up to an incorporation rate of 30%.

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Background and Justification

The "watermelon sector" in the Sahelian countries is characterized by a double burden because not only a large quantity of the production is lost but the upgrading technologies are non-existent. The transformation of the watermelon remains the weakest link in the value chain whose interest in populations continues to be important. Indeed, watermelon is mainly used in the raw state that means; its flesh is directly consumed as such or simply transformed into juice. It should be noted that the juices obtained by transformation of the watermelon flesh occasionally occur at the level of households or small businesses that do not very often meet the quality requirements for the international market. Watermelon is rich in L-citrulline and L-arginine, two amino acids that play an important role in human metabolism [1-5]. There is a need to diversify the use of watermelon by creating added value that will benefit all actors of the sector, and consumers.

Different Forms of Watermelon Use

In many countries, watermelons are selected to produce a maximum of large seeds that are considered as food because seeds are extremely rich in protein, carbohydrate and fat. In Egypt the watermelon seeds are eaten roasted, grilled and/or salted.

El Badry et al [4] used powdered watermelon rinds in bread making. The objective of their study was to investigate the nutritional value of watermelon rinds in terms of dietary fiber, minerals and antioxidants. The results of their study showed that watermelon rinds are a good source of dietary fiber and minerals.

In the United States of America, watermelon is consumed as a snack, in fruit salad for breakfast or drink.

In India, watermelon seeds are also widely used in grilled form or transformed into flour and used in bread making. In China watermelon rinds are widely used in "watermelon frost", a therapeutic powder for the treatment of respiratory diseases.

Production of Puree and Watermelon Juice

Objective of the process

The objective of this work is to investigate the processing quality of watermelon in bread making.

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Steps and procedure of puree and watermelon juice production

Plant material: Watermelon (*Citrullus lanatus*) should be chosen according to the maturity criteria which are basically the heaviness and the sound of the fruit after tapping. The fruit should not be affected by any diseases.

Materials and methods/watermelon treatment: First, watermelon must be cleaned and completely hollowed, all components of the fruit (flesh, peels, juice, and seeds) except rinds collected. Flesh can be cut into small pieces to facilitate grinding. After two to three minutes of grinding, a red watermelon solution consisting of a mixture of juice, flesh and seeds is obtained. The grinding can be repeated twice to three times. The watermelon solution is filtered in order to separate watermelon juice and puree. Filtration can be carried out using a sieve (ASTM-E11 Prüf-Sieb) with an opening diameter of three mm and allowing only the watermelon solution to pass through. The volume of mixture obtained depends on the variety, the degree of maturation, the size and the weight of the watermelon. A watermelon of three kilos can contain up to two liters.

Packing and conservation: Puree and watermelon juice can be stored in a cold place (at 6°C) or frozen at -25°C. Quality packaging must be performed, black packaging in 60 µm thick high density polyethylene (HDPE) bags designed to resist tearing and moisture can be used [5-9].

Advantages of the Production Process of Puree and Watermelon Juice for Bread Making

This new technical approach of using watermelon in bread making brings nutrients, improves the protein nutritional quality of breads.



Figure 1 Milk bread with watermelon juice.

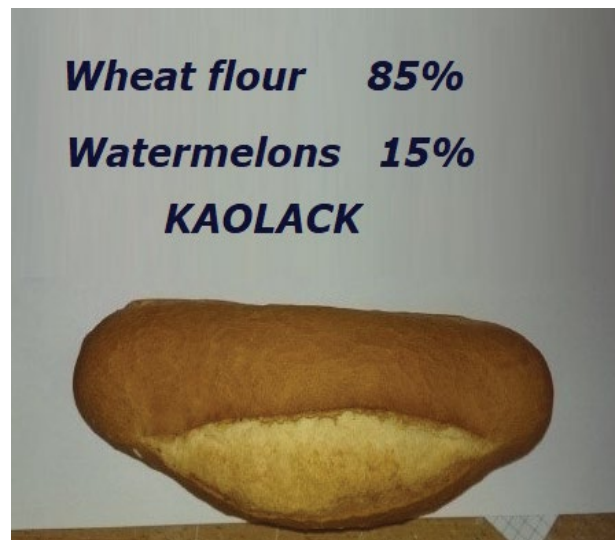


Figure 2 Bread with watermelon juice.

The bread making tests showed that a mixture of wheat flour (85%, 70%), with “Kaolack” or “Koloss” watermelon puree or juice (15%, 30%) presented good. In addition, the innovation here is that, the process allows using watermelon that contains 93% of water [5], instead of using running water.

The incorporation of watermelon puree or juice in wheat flour has some advantages in bread making:

- The reduction of running water used to hydrate the bread dough
- The reduction of wheat flour when watermelon puree is incorporated
- Watermelon puree and juice enhance the palatability of breads more than running water does
- The increase of nutrients such as vitamins, minerals, lycopene, L-citrulline and L-arginine in breads. Incorporation of lycopene into food products presents a health and nutritional interest due in recent years to the various studies showing its functional capacity to reduce the risk of many pathologies such as prostate cancer, colorectal cancer [2,11,12].

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