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Review Article

An Overview of Approaches of Cassava Processing and Cassava Based Recipe Preparation in Ethiopia

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Abstract

Cassava (Manihot esculenta Crantz) is tuberous roots, drought tolerant, which is high in carbohydrate content and a cheap source of food. However it needs removal of toxic substance which is called hydrogen cyanide (HCN) which can be easily removed. There are two types of common preparation methods, preparing it by drying it in the sun and preparing it by boiling. Removing toxic cyanide by drying is less effective, however boiling is better method of removing cyanide from cassava roots. Cassava is used as a raw material in different food industries. In Ethiopia, there is cassava processing industry around Addis Ababa located at Dukem area. There are different trends of cassava based recipe preparations. Especially in Ethiopia there are exotic cassava based recipe items. Some of the trends in Ethiopia as formulated by Jimma Agricultural Research Center are; cassava bread with different flour compositions, cassava with corn flour composite recipe, cassava with teff flour composite recipe, Cassava syrup stew, Cassava porridge, Cassava biscuits and so on are exotic recipe with good sensorial values and proximate compositions. Due to its drought tolerant nature and nutritional excellence; cassava production, utilization and popularization is best strategy for food system resilience in the world wide.

Keywords

Biscuit, Bread, Cassava, Cyanide, Porridge, Proximate, Recipe, Toxic

1. Introduction

The main product of cassava (Manihot esculenta Crantz) is tuberous roots, which are high in carbohydrates and a cheap source of food that have enabled over 800 million people survive in Central America, Southeast Asia, and Sub-Saharan Africa [1]. The usage of cassava roots for industrial and human consumption has resulted in the production of a range of wastes, aptly dubbed cassava tuber wastes (CTW). Two types of these wastes are cassava peels (CAP) and cassava starch residues (CSR) [2]. It also doesn't need fertile soil. It grows simply in sandy soil in where crops don't harvest.

Its leaves are rich in minerals, vitamins, and protein and, if sufficiently detoxified, might greatly improve current starchy diets because they include certain harmful anti-nutritional components [3]. Its roots are also a good source of energy. Because of its drought tolerance, it is occasionally employed as a strategically important nutritional reserve crop in areas with unpredictable rainfall [4]. Its leaves are high in protein, minerals, and vitamins and, if properly detoxified, might significantly augment the present starchy diets as they include some toxic anti-nutritional components. Its roots are also a great source of energy [11].

Roots are a main source of carbohydrates, whereas cooked

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leaves are used as vegetables. Being a subsistence crop, cassava is vital for food security. While lacking in protein, roots and leaves do contain minerals and vitamin C [18]. Cassava nutritional and biochemical contents are similar to those of other well-known leafy vegetables. If cassava leaves are adopted as a leafy vegetable, the protein level might be sufficient. Consequently, the cassava types are excellent choices to be used in place of more common and unusual green crops [22]. In South America, Asia, and Africa, cassava is a major crop that contributes to industrial biomass, food security, and feed [8].

1.1. Physicochemical Properties

1.1.1. Hydrogen Cyanide (HCN)

HCN, the most toxic component of cassava, restricts its application in food products. In edible cassava flour, the acceptable limit of HCN is 10 mg/kg [5].

The total cyanide contents in fresh cassava tissues were determined using portable cyanide testing kits, and elemental nutrients were examined in dried plant tissue. The nutritional composition and cyanogenic potential varied between locales and cultivars; most cultivars have fresh weights of more than 100 parts per million of total cyanide, which makes them extremely toxic if not treated properly before consumption. Plant water status altered in relation to leaf cyanogenic and nutritional content, as determined by carbon isotope discrimination (δ13C) [6].

1.1.2. Color

When selecting a food product, people prefer the color of the meal. The color of cassava measured as lightness, redness/greenness, and yellowness/blueness [7].

1.1.3. Total Starch Content

Cassava flour has a lot of potential as a raw ingredient in the culinary sector [9].

1.2. Proximate composition

In comparison to leaves, roots had higher contents of protein (21.2 to 28.4g/100g), total carotenoid (234.1 to 987.9 g/g), fiber (16.1 to 22.9 g/100g), Ca (499.8 to 545.4 mg/100g), K (1193.4 to 1211.0 mg/100g), Mg (274.5 to 340.5 mg/100g), and Fe (129.1 to 146.1 mg/kg). Roots also had higher carbohydrate contents, ranging from 81.0 to 87.1 g/100g [11].

Compared to the roots, the protein level of cassava leaves is substantially higher. Despite the fact that the leaves contain much less methionine than the roots, the levels of all other necessary amino acids in the leaves are above the FAO's recommended reference protein diet. It follows that the protein found in cassava leaves is considered better than the protein found in soybeans. Cassava products, such leaf meal, can significantly boost their biological value by adding methionine or any other nutrient that is missing. The food industry frequently uses this method to prepare food for human consumption and animal feed [10].

Cassava, one of the most important tubers cultivated in Africa, accounts for around one-third of daily caloric intake. It is frequently consumed after peeling, washing, boiling, or drying and offers a number of nutritional benefits [21].

According to the study in Ethiopia as described by (Tagesse and Tesfaye, 2022), the exception of total carotenoid content, which was higher in variety qulle, kello exhibited a marginally superior nutritional profile than qulle in both the root and the leaves. In order to pick highly nutritious and healthy variations, it is required to examine diverse cassava germplasm and improve the processing method since genetic background and processing methods can have a major impact on the nutritional profile of cassava varieties [11].

There are several exotic and unique ways to prepare cassava recipes [12]. Although the traditional cassava recipe is popular in various African countries, it has its negative side effects [13], of these, clean preparation is challenging, and drying in wet weather is quite challenging. The enhanced cassava recipe, on the other hand, eliminates waste and delivers a high-quality product without these issues. [14]. Farmers will be encouraged to plant cassava since their produce will be taken over, which will decrease labor costs [15].

Currently, producers can boost their output because they have found a market for their goods with the development of a starch preparation and processing factory in the Dukem district of Ethiopia. [19]. A variation or omission from the prescribed sequence of cassava processing results in waste and toxicity [20].

2. Cassava Preparation and Processing for Cooking Recipe

Similar to sorghum, legumes, guava, and other crops, cassava also contains cyanides, albeit they can be eliminated. Furthermore, because of its increased water content, cassava deteriorates more quickly after harvest. This is the primary issue with the crop [16, 23]. However, by using effective cooking methods, cassava toxicity can be avoided and the product can be used without wasting. Cassava is 60-70 percent water and this preparation reduces the moisture content, allowing it to remain intact for longer [5]. It also reduces the amount of cyanide from 69.87-100% and prepares it in different ways to be used for food. The raw product prepared in this way is used for various purposes. For instance there is great potential for cassava flour to be used as a raw ingredient in various food industries [9, 17].

Jimma Agricultural Research Center utilized different recipes especially Soybean recipes and Cassava recipes. In this section we are concerned on advantages of cassava recipes utilization.

The main cassava processing is as follow. First peel the

cassava husk and wash it carefully. Then crush them to a very small size; to do this, poke the rough side of the tin with a nail. Soak in water for three to four days until it dissolved the cyanide in the cassava root. Squeeze the cassava to remove the water. Dry it with sun. Finally grind the dried cassava with grinding mill.

2.1. Preparation Methods of Cassava

There are two types of common preparation methods, which are the method of preparing it by drying it in the sun and the method of preparing it by boiling it.

Sun-drying is a less effective method in removing naturally occurring toxins, and if this toxic substance needs to be effectively removed, it is necessary to soak the prepared cassava in small quantities in water to dissolve the toxic substance and then expose it to the sun to evaporate. Therefore, the method of preparation by boiling was found to be better. However, the length of time we need will determine how well we can remove the toxins. For example, if we soak it for four hours, we will not be very effective, but if we soak it for 18 to 24 hours, we can remove up to 50 percent of the toxins. Therefore, to remove it completely, we have to soak the water for three to four days.

A. Sun drying method

First of all, the cassava is crushed. Dry the dried cassava in a clean container (kasha) in the sun; the cooking time varies according to the amount of cassava being served. It takes weeks to dry a whole cassava in sunlight, while a few days are enough to dry finger-sized pieces of root.

B. Method of preparation by fermenting in water

First, grind the cassava. Soak the grinded cassava in water. Take the cassava out of the water after it is cooked and softened; this action removes the toxicity. Squeeze the cassava to remove the water in it. Dry and digest the pressed cassava by the sun.

2.2. Cassava Cooking

Currently, although cassava can be prepared and used in different ways, the usual preparation in our current situation; Cassava is converted into flour and used in preparation of food recipes with different types of crops. To prepare cassava powder as mentioned above, wash and peel the cassava husks thoroughly and dry them in the sun. Then make sure it is thoroughly dried and turn it into powder by grinding it using a grain mill. This helps to mix the cassava flour with different grain flours to prepare foods such as Enjera, bread, soup, porridge, and so on. As Jimma Agricultural Research Center investigated, cassava and teff mixed flour enjera, cassava and barley mixed flour bread, cassava and sorghum mixed flour bread, cassava and wheat mixed flour enjera, cassava and chickpea mixed flour kitta, cassava and wheat mixed flour kitta, cassava kitta, cassava shiro (soup), cassava porridge, cassava biscuit and cassava flour and meat special foods. Children's biscuits and cassava have been used in the preparation of beet root leaves and meat. Here's how we can prepare and use these foods.

Making Bread with Different Cereal Crop Mixture

I. Teff with cassava flour

First measure two cans of cassava flour, two cans of teff powder, three cans of warm water and a cup of homemade yeast. Then mix the teff and cassava flour together. Massage with water. Again massage while adding little water. Add the yeast and knead it. Finally bake it. The bread does not dry for seven days. It looks like magna teff bread.

II. Cassava Barley Bread

Measure two cans of cassava flour, One and a half cans of barley flour and two cans of water.

Then Mix the cassava and barley flour together and blow. Soaking it with water, like wheat bread, including yeast. First, leave half a can of flour before baking and roll with the remaining flour before adding the dough. When it cools down, mix it with the dough and bake it as bread baking procedure.

III. Cassava and sorghum bread

Measure two cans of cassava flour, two cans of sorghum flour, a can of hot water, and cup of yeast. Mix the dough together and blow. Massage with warm water and wrap it. Dilute with the remaining water the next day. Add the home made yeast and knead it. Finally bake it.

VI. Cassava and corn flour recipe

Measure two cans of cassava flour, two cans of corn flour and two cans of warm water. First, blow the corn flour and rub it dry with a little water. Blowing the cassava and rubbing the mixture on the dry skin. Mix the yeast and rub it on the dry surface and Saving the package. The next day, knead it, leave the dough, mix it and bake it as teff bread.

V. Cassava wheat bread recipe

Measure two cans of cassava flour, two cans of wheat flour, two cans of water, a cup of yeast.

Mix and blow the powder. Massage while adding a little water to dry. Adding the yeast and fermenting it. The next day, soak it in water and bake it like teff bread.

VI. Cassava and chickpea flour recipe

Measure two cans of cassava flour, two cans of chickpea flour, a bottle of water, two soup spoons of oil and salt for taste. Blow the chickpeas and cassava and massaging them with water. Add oil and salt. It can be baked in an iron pan or a clay pan. It can be served with tea or milk for breakfast or as a snack.

VII. Cassava wheat bread

Measure two cans of wheat flour, two cans of cassava flour, glass of water, half a cup of homemade yeast. Blow wheat and cassava mixed together. Dry rub and add the yeast. Bake twice if there is a cough.

VIII. Cassava bread

Measure cassava flour (wet ground cassava). Add salt for taste. Add one tablespoon of oil and a little flour. Bake the bread with the desired utensil. After it is confirmed to be ripe, break it into small pieces and rub it with oil or butter and eat it.

IX. Cassava syrup stew

Measure three slices of raw chopped cassava, half a hawk, a pinch of pepper, a table spoon of oil/butter, and two glasses of water, onion, pepper, red root and carrot.

Cut the cassava into thin strips. Cut the red root in the same way. Grate the carrot in the same way. Mix the chopped things together and add lemon, oil and salt together, add onion and pepper and eat it with bread or kita.

X. Cassava porridge

Take cassava flour, Salt and butter, Pepper, chili or pepper. Water boils moderately, Salt is added. The powder is mixed with water separately and boiling water is added. When it is confirmed to be cooked, take it out and eat it, including butter and milk.

XI. Cassava biscuits for children

Take boiled cassava, Salt, red sugar to taste and Oil.

Mix and rub the softened cassava with salt or sugar. When the oil starts to boil in the pan, it can be baked in the form of biscuits and can be easily fed to children.

XII. Cassava with radish leaves

Measure two pieces of cassava sliced thinly, four chopped radish leaves, three medium onions, three tablespoons of oil, two cups of water, two peppers and salt to taste;

Saute the onion with the oil. Add water little by little and cook the onion. Wash and add the radish leaves. When the rice is tender, add the cassava and when it is cooked, it can be taken out and eaten.

3. Conclusion

Generally cassava is strategic crop due to its drought tolerability; it doesn't need fertile soil and management. As well as its recipe has nutritionally rich in high calorie. In Ethiopia, cassava recipe is becoming popular with different exotic dishes. Due to its advantages up on farming system and nutritional benefits, it is better to produce, utilize, demonstrate and popularize production and utilization of cassava recipe.

Data Availability Statement

Since this is a review work, data sharing is not applicable to this topic because no datasets were created.

Conflicts of Interest

The author declares no conflicts of interest.

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