PREPARATION OF READY TO EAT PASTA FROM *ARTOCARPUS HETEROPHYLLUS* (JACKFRUIT) AND ITS PROXIMATE ANALYSIS

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Abstract : Jackfruit (*Artocarpus heterophyllus*) is one of the major edible foodstuffs rich in carbohydrates and fiber. This study investigated the reduction of postharvest losses of jackfruit by value addition. The raw material used in this pasta making is jackfruit pulp and jackfruit seed and watermelon seeds (improve the nutritional value). Jackfruit pulp and seeds and watermelon seeds are dried and grinded for the preparation of pasta. Different variety of pasta such as jackfruit pulp, jackfruit seed and it is also incorporated with watermelon seeds. This pasta is made up of jackfruit pulp powder, jackfruit seed powder and watermelon seed powder and semolina. The proximate composition and cooking characteristics of developed pasta were determined. Sensory evaluation is done by the 9 point Hedonic scale. The jackfruit pulp pasta is selected as the best composite with carbohydrates (50.12%), protein (7.82 %), and ash (4.8 %). However, there was no significant difference in moisture content among this pasta. The best selected formulation exhibited water absorption capacity is about 5.5 and the cooking time and cooking loss is lower than the other combinations. The colour of pasta is formed by the presence of watermelon seeds. In conclusion, value added jackfruit pulp pasta has a higher potential for commercialization as a ready to eat food for the consumers with busy lifestyles.

IndexTerms – **Jack fruit, pasta, watermelon seeds.**

I. INTRODUCTION

Pasta is an extruded dough product of Italian style food similar to spaghetti. The demand for pasta is increasing because of the convenience for cooking, palatability and extended shelf life. The World Health Organization (WHO) and Food and Drug Administration (FDA) identified pasta as a suitable vehicle for incorporation of nutrient supplements [1]. Pasta has low amounts of dietary fibre, vitamins, essential amino acids and minerals and during milling to make semolina there is some loss of these components [2].

"Dried pasta" must be produced with water and durum wheat (i.e., semolina, coarse semolina, or whole meal semolina) common wheat (*Triticum aestivum L.*) can be used for pasta production, it is well-known that only durum semolina can assure the best product quality, in terms of dough rheological properties, cooking quality and consumer acceptance [3].

It is reported that about 14.3 million tons of pasta are produced annually worldwide. Pasta plays a key role in the Mediterranean Diet. WHO (the World Health Organization) and FAO described pasta as a healthy, sustainable, and quality food model. Pasta generally is very nutritious, due to its low amount of fats and readily digestible carbohydrates. Moreover, pasta can supply healthy components, such as fibre or prebiotics. The low cost and long shelf life of pasta make it popular with many diverse groups of consumers.

Jackfruit tree (*Artocarpusheterophyllus*) belonging to genus Artocarpus is a well-known perennial tree in Sri Lanka. Jackfruit originated in India and is commonly known as "Kos" (Sinhala) and "Pala" (Tamil) in Sri Lanka [4]. Jackfruit is one of the commonly consumed foods in Sri Lanka from the ancient time. It is a non-seasonal fruit and had a major contribution to the food supply of the people and their livestock when there were short supplies of staple food grains [5]. Edible parts of jackfruit tree consist of immature, mature and ripe fruits. Mature fruit is the largest tree-borne fruit, having up to 35 kg weight, 90 cm length, and 50 cm diameter [6]. The fruit contains a large number of fleshy bulbs, spikes and seeds which is covered by the fleshy white cotyledon.

Jackfruit is a good source of digestible carbohydrate, vitamin A and protein. Jackfruit meal has low glycaemic index due to presence of higher fiber content, slowly available glucose, intact starch granules in seeds and influence of different sources of carbohydrates [7]. Further, jackfruit is rich in minerals, bioactive phytochemicals, polyphenols, carotenoids, flavonoids and it is devoid of saturated fats and cholesterol.

I. RESEARCH METHODOLOGY

Sample collection

Raw materials procured for the study were jackfruit pulp, jackfruit seed, watermelon, semolina. The raw materials such as jackfruit were collected from Kozhikode (Kerala) and the other ingredients were collected from local market from Coimbatore. It is then peeled off, sliced, dried and powdered to get jackfruit pulp powder, jackfruit seed powder and watermelon seed powder.

Preparation of flour samples

Jackfruit pulp and jackfruit seeds were separated from mature jackfruits by removing the surrounding hard outer layer and fleshy white pulps. The watermelon seed were collected from the fruit and washed with water. The collected samples are dried at oven for few hours and were ground blender and packed in polyethylene covers.

Production of pasta

Pasta was prepared from jackfruit pulp, jackfruit seed and watermelon seed and the combination of both. Raw material (jackfruit pulp, jackfruit seed, watermelon seed, and semolina) were weighed using weighing balance and mixed well. Then it blended with required amount of water and kneaded for 2-3 minutes to obtain unleavened dough. Then the dough again mixed and well and roll and make it for the required shapes. Then the pasta is boiled for 1 minute in boiling water and drained out and dried at a temperature of 600°C in a tray and placed in a hot air oven for 6-7 hours to a moisture content of 8-9%. Then it is packed in polyethylene covers and sealed for further quality analysis.

Sensory evaluation

Sensory evaluation of developed pasta samples was conducted using Hedonic scale. The sensory evaluation of cooked jackfruit pasta involved assessing various attributes using a 9-point hedonic scale. The sensory scores obtained for attributes such as appearance, taste, colour, flavor, odour, texture, elasticity, adhesiveness, mouthfeel, and overall acceptability were subjected to statistical analysis.

Determination of proximate composition

Moisture content, protein, carbohydrate, ash contents of different pasta were determined using different methods. The main function of carbohydrate is supplying energy to the body. This is done by the phenol H_2SO_4 method. The main function of protein is to build and repair tissues and also body use protein to make enzyme, hormones and other body chemicals. Protein is an important building block of bones, muscles, cartilage, skin and blood. This is done by Lowry's method. The ash content in food is simply burning away of organic content, leaving inorganic minerals to determine the amount and type of minerals in food, to estimate the amount of minerals. Moisture content is one of the most important analyses performed on a food the moisture contents of food various greatly. The propensity of microorganism to grow in foods depends on their water content and for this reason many foods are dried below the critical moisture content.

Determination of cooking characteristics

Water absorption

This was determined using methods described by Ocloo et al., 2010 [8]. One gram sample was weighed into 25 ml graduated conical centrifuge tubes and about 10 ml of water added. The suspensions were allowed to stand at room temperature (30 ±2°C) for 1hour. The suspension was centrifuged at 2000 rpm for 30 minute. The volume of water on the sediment was measured and the water absorbed expressed as percent water absorption based on the original sample weight.

Cooking time

The cooking quality of pasta was assessed using the methodology described by Ojure and Quadri in 2012 [9]. Ten grams of pasta were cooked in 150 ml of boiling water in a covered beaker. To determine the cooking time (min), a piece of pasta was removed every 2 min and compressed between two glass slides. The pasta was considered optimally cooked when the centre became transparent or when they were fully hydrated.

Cooking loss

Cooking loss (%), which is a crucial indicator of pasta quality, was quantified following the procedure outlined by Debbouz and Doetkott (1996). After cooking, the drained water was collected and dried in pre-weighed petri dishes. The dishes were then placed in an oven at 105°C for overnight drying. The weight of the resulting dry residue was measured (W2 g) to determine the cooking loss percentage.

Cooking loss (%) = W2 x 100, where W_1 is the initial weight of the pasta

IV. RESULTS AND DISCUSSION

Sensory evaluation

The highest mean score for appearance (8) was obtained for the sample of jackfruit pulp pasta and the second score was obtained for jackfruit seed pasta. Similarly, the highest mean score for taste (9) was obtained for the sample of jackfruit pulp pasta and the second score was obtained for jackfruit seed pasta and the lowest for the combination pasta.

The highest mean score for colour (9) was obtained for the sample of jackfruit pulp pasta and the two other samples have similar score (7). Jackfruit pulp pasta have the highest score for the flavor (8) and the other two pasta has similar score (6).The highest mean score for texture (9) and the lowest for the combination pasta (7).The highest score for mouthfeel has jackfruit pulp pasta (8) and the second is jackfruit seed pasta.

By this sensory evaluation, the overall acceptability is 8.5, 7.1, 6.3 with respectively jackfruit pulp, jackfruit seed and combination pasta. Therefore, the jackfruit pulp pasta maybe considered superior when compared to other pasta.
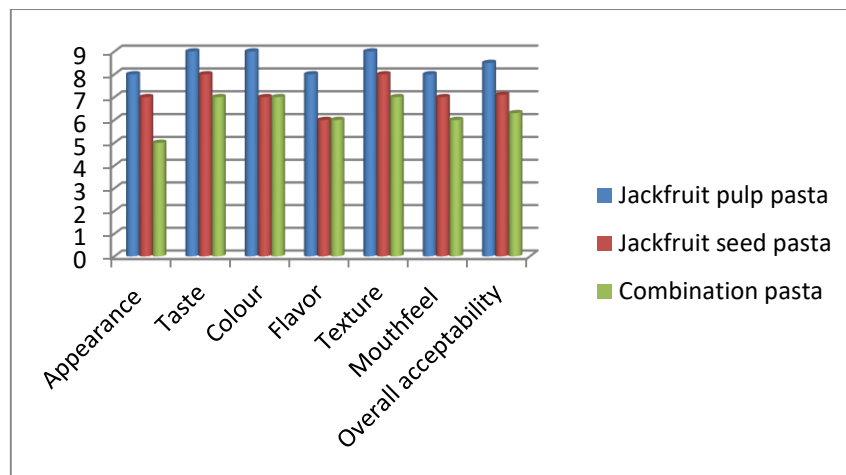
Graph 1: Sensory Evaluation of pasta

Proximate composition

　　　The best selected developed pasta is Jackfruit pulp pasta incorporated with watermelon seed this possessed the highest quantity of jackfruit pulp. Lakmali et al, 2021 reported that the considerable amount of protein, minerals are present in pulp. Thus the higher content of protein and ash were determined in pasta developed in the pasta developed from composite formulation of jackfruit pulp pasta than the others. The lowest percentages of protein were measured in jackfruit seed pasta. There is no difference in moisture content except the combination pasta. Moisture content in combination pasta is higher. Carbohydrate content was reduced by 50.12%, 45.61% in jackfruit pulp and jackfruit seed pasta respectively, compared to the combination pasta. Similar observation was reported on carbohydrate content of jackfruit seed flour incorpoted biscuit formulation [10].

Cooking characteristics of pasta

Water absorption capacity

　　　Water absorption capacity (WAC) or water holding capacity (WHC) consists of adding water or an aqueous solution to material, followed by centrifugation and quantification of the water retained by the pelleted material in the centrifuge tube [11]. According to "Lakmali et al. (2021)" high values of water absorption capacity are important to help maintain the moisture content of products.

Cooking time

　　　A higher cooking time for pasta typically means that it requires more time to reach the desired level of doneness. Pasta with a higher cooking time may need to be boiled for a longer period to achieve the desired texture, ensuring that it is fully cooked and tender. According to "Lakmali et al. (2021)" cooking time of pasta is 8.65 minutes but in this pasta cooking time is about to 10 minutes.

Cooking loss

　　　A higher cooking loss for pasta means that a greater amount of the pasta's weight is lost during the cooking process. This can be an indication of poor quality or improper cooking techniques. High cooking loss can result in a loss of texture, flavor, and overall quality of the pasta.

Conclusion

　　　Development of jackfruit pulp pasta incorporated with watermelon seed was successful and it was selected as the best composite flour for jackfruit based pasta production. The best formulation was further tested and confirmed as the most suitable formulation using proximate composition, cooking characteristics and consumer acceptability test. The jackfruit pulp pasta contains comparatively higher nutrient content and consumer acceptability than other formulations. Development of an extruded product from seasonal fruits helps to minimize the postharvest losses. It also helps in the proper utilization of nutrients by adding variety to consumer's plate.

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