Composite Flour Composition from Taro (*Colocasia esculenta*) and Lesser Yam (*Dioscorea esculenta*)

FIELD OF THE UTILITY MODEL

The present utility model relates to food compositions, particularly to a gluten-free composite flour derived from root crops. More specifically, the utility model relates to a flour composition comprising taro (*Colocasia esculenta*) flour and lesser yam (*Dioscorea esculenta*) flour suitable for bakery applications such as cake production.

BACKGROUND OF THE UTILITY MODEL

Gluten-free flour products have gained increasing attention due to the growing demand for alternative bakery ingredients and the need to utilize locally available agricultural resources. Conventional gluten-free flour formulations commonly rely on rice flour, corn starch, tapioca starch, or commercial multi-component flour blends. However, many of these products require several ingredients, functional additives, or stabilizing agents in order to achieve acceptable baking performance.

Various patents and published patent applications disclose composite flour compositions derived from plant-based materials. For example, US Patent 11,963,536 describes composite flour systems incorporating plant flour combined with oils, proteins, and encapsulating materials to improve texture and functional properties in food products. Such systems involve relatively complex formulations requiring multiple additives.

Other technologies disclose the use of different tuber crops for flour production. For instance, JPH11225703A describes food materials produced from taro or related aroid tubers as a principal ingredient for flour-based products. While this reference demonstrates the use of taro in flour-based food compositions, it does not disclose a composite flour system combining taro with lesser yam for bakery applications.

Similarly, a Philippine publication titled A Composition of Composite Flour from Taro, Purple Yam and Rice Beans discloses a composite flour derived from taro, purple yam, and rice beans intended to enhance the technological quality of flour products.

However, such compositions involve multiple crop ingredients rather than a simplified two-component tuber-based flour composition.

Although these technologies demonstrate the use of tuber crops and composite flour systems, many existing formulations involve multi-component blends, complex additives, or cereal-based mixtures, and frequently serve only as partial substitutes for wheat flour.

Root crops such as taro (Colocasia esculenta) and lesser yam (Dioscorea esculenta) are widely cultivated in tropical regions and contain high levels of starch suitable for flour production. Despite their availability and favorable functional characteristics, their combined use as a simple composite flour composition consisting essentially of two root crop flours capable of replacing wheat flour in bakery applications has not been widely disclosed.

Accordingly, there remains a need for a simple, stable composite flour composition derived from locally available tuber crops that can function as a wheat flour alternative while maintaining suitable physicochemical and functional properties for bakery products such as cakes.

SUMMARY OF THE UTILITY MODEL

The present utility model relates to the technical field of composite flour composition comprising taro flour and lesser yam flour. The flours are blended in predetermined proportions to obtain a composite flour suitable for bakery applications. In certain embodiments, the taro flour and lesser yam flour are blended in ratios selected from approximately 25:75, 50:50, or 75:25. The resulting composite flour composition preferably exhibits a moisture content not greater than about fourteen percent (14%) and a water activity below about 0.60, thereby improving storage stability and product quality.

The composite flour composition may further exhibit physicochemical characteristics including a moisture content of approximately 7–8%, water activity of about 0.49–0.51, pH of about 6.2–6.3, and bulk density of about 0.80–0.92 g/mL.

The utility model therefore provides a practical technical solution to the need for a simple and locally sourced composite flour composition capable of serving as an alternative to wheat flour while maintaining desirable functional properties for baking applications.

DETAILED DESCRIPTION OF THE UTILITY MODEL

The present utility model discloses a composite flour composition derived from taro (*Colocasia esculenta*) and lesser yam (*Dioscorea esculenta*). The flour composition is prepared from finely milled taro flour and finely milled lesser yam flour, which may be produced using conventional drying and milling processes for root crops.

The composite flour is formed by blending taro flour and lesser yam flour in predetermined proportions. In one embodiment, the flour blend may be prepared in ratios including:

- about 25% taro flour and 75% lesser yam flour
- about 50% taro flour and 50% lesser yam flour
- about 75% taro flour and 25% lesser yam flour

The resulting composite flour composition may exhibit the following physicochemical characteristics:

- Moisture content: about 7–8%
- Water activity: about 0.49–0.51
- pH: about 6.2–6.3
- Bulk density: about 0.80–0.92 g/mL

These properties contribute to improved storage stability and functional performance of the flour when used in bakery formulations. The composite flour may be used as a complete or partial substitute for wheat flour, particularly in cake formulations and other bakery products.

The present utility model is applicable in the food processing and bakery industries, particularly in the production of gluten-free flour ingredients derived from locally available root crops. The composite flour composition may be produced by small-

scale food processors, cooperatives, and commercial food manufacturers using conventional milling and flour blending equipment.

The flour may be incorporated into bakery formulations such as cakes, pastries, and other flour-based products. The use of taro and lesser yam as primary raw materials promotes the utilization of locally cultivated crops and contributes to the development of alternative flour sources that reduce dependence on imported wheat flour. Because the composite flour consists essentially of two root crop flours and does not require complex additives or specialized processing ingredients, it is suitable for both small-scale and commercial production within the food manufacturing sector.

In one preferred embodiment, 5 kilograms of taro flour and 5 kilograms of lesser yam flour are prepared from dried and finely milled taro (Colocasia esculenta) and lesser yam (Dioscorea esculenta) tubers.

The flours are sieved through a fine mesh sieve to ensure substantially uniform particle size. The taro flour and lesser yam flour are then blended in a 50:50 ratio using a mechanical flour mixer for approximately 10–15 minutes to obtain a homogeneous composite flour.

The resulting composite flour typically exhibits moisture content of about 7–8%, water activity of about 0.49–0.51, pH of approximately 6.2–6.3, and bulk density of about 0.80–0.92 g/mL.

The composite flour may then be packaged in airtight containers and used as a 100% replacement for wheat flour in cake formulations, producing baked products with acceptable texture, flavor, and structural properties.