Field Reports

The dasheen itch factor and approaches to reducing its effect

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The 'dasheen' form of taro is a staple food grown in tropical regions all over the world. Although it is nutritionally superior to potato in a number of ways, it contains high levels of oxalates which cause itching when dasheen is handled, and can be dangerous when consumed. This article describes the treatments and options for processing dasheen which can reduce the oxalate levels and result in a variety of safe food products.

Keywords: dasheen, taro, oxalates, food processing, reformulation.

TARO IS A COMMON NAME for the corms and tubers of plants in the aroid family and the 'dasheen' form of taro is a perennial, tropical plant mostly grown as a root vegetable for its edible starchy corm, which is a staple in African, Oceanic, Caribbean, Latin American, and Asian countries. The 'itching factor' in dasheen is due to the presence of high levels of oxalates in both the corm and leaves, present as insoluble calcium oxalate crystals. It may be used as a defence mechanism, making consumption by animals and pests less likely because of the plant's irritation and toxicity. The needle-like crystals are usually found in structures called raphides and druses. They are potent irritants that can puncture the skin and cause intense itching and swelling. When eaten, they cause itching of throat and mouth, swelling, and difficulty in swallowing and breathing. Some symptoms can last for several weeks and death is possible in extreme cases (consumption of 5–10 g of oxalates), due to renal failure. Even with survival from severe cases, there can still be permanent kidney damage or failure.

A number of strategies have been tried to reduce the oxalate content and resulting itching factor, including 'low-itch' varietal selection, drying and milling, soaking in water, salt, acetic acid or sodium hydroxide solutions, and cooking and reforming/extruding. These all show some level of effectiveness and can be incorporated to varying

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degrees in the processing of dasheen into chips. It has been found that in practice the use of a dilute acetic dip after peeling the corms, and also for treating exposed or irritated skin, was very effective in reducing the irritation experienced by workers.

Dasheen is much harder and more brittle than Irish potato (white potato), possibly because of the higher starch and fibre content, and thus presents a greater challenge to processing into chips. There is a tendency for the slices to crack and jam slicers; and they can deform or break the cutting blades. Handling is also difficult as the raw product is very slippery. However dasheen is superior to Irish potato in a number of ways and thus presents opportunities for non-traditional uses: it has three times the dietary fibre content of potato; it has a low glycaemic index compared with potato and is therefore an attractive alternative starch source as it will not cause rapid elevation of blood sugar levels; and it contains significant amounts of minerals such as calcium, magnesium, manganese, and vitamins B, C, and E.

Measures to reduce oxalate levels

There is little available data on reducing oxalate levels in dasheen products: some authors claim that only boiling will reduce the intrinsic itch factor (Njintang et al., 2003). Varieties with higher oxalate levels require longer boiling, while others propose methods such as soaking in a salt solution prior to cooking (Beyer, 2010). The use of a small amount of baking soda has also been recommended, possibly as the sodium ions replace the calcium in the oxalate and allow leaching from the corm. Traditional methods have centred on selection of lower oxalate varieties (dry land or 'hillside' plants seem to have lower levels than the 'swamp' type) or cooking methods. The practice in some areas is to quickly cook for a short while, then drain off the water and finish cooking with additional water or coconut cream. Mashing the cooked or raw corms is also commonly practised, followed by baking, boiling, or frying. Fermentation is also used, as with Hawaiian poi, to reduce the oxalate levels. The key factors seem to be a sufficient time/temperature treatment combined with physical disruption of the material.

Strategies for oxalate reduction include:

- *Drying, milling and reformulation*. It has been shown that drying the material either before or after boiling tends to reduce oxalate levels to a degree. This, however, would mean investment in steaming and drying facilities and may not be practicable unless production of dasheen flour is envisaged.
- *Soaking corms or slices prior to processing*. There are claims that soaking overnight in cold water can reduce calcium oxalate

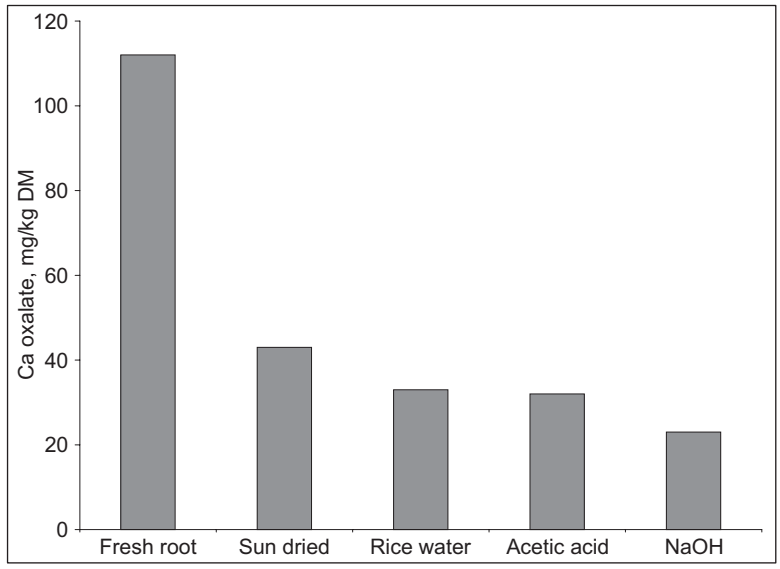

Figure 1. Effect of different treatments on oxalate content of giant taro corms
Source: Pham SyTiep et al., 2005

levels prior to processing. Some processors in Jamaica have tried this with some reduction in the itching effect. Trials in Vietnam also showed a large reduction in oxalate levels in the giant taro (*Alocasia macrorrhiza*), which contains even higher levels of oxalate than dasheen (Figure 1). The corms were cut into 3 mm slices before soaking in rice water, 3 per cent acetic acid or 3 per cent sodium hydroxide. As noted by Beyer (2010), the effects of soaking do not penetrate far into the flesh, hence the need for slicing. The use of vinegar has been proven effective in stopping itching caused by contact during processing.

- *Pre-cooking/blanching*. For chip-making, it may be practicable to soak chips as a part of the blanching process to achieve oxalate reduction. The hot water may speed up oxalate removal and the effect of adding salt or acetic acid to the blanching water could also be evaluated. Blanching would also reduce surface starch, sticking, and excessive browning of product; and given the hard, brittle nature of dasheen, a short blanching stage might also assist in slicing.
- *Cooking and reformulation*. Cooking using steam before or after pulverization and reforming/extrusion under pressure is another possibility. If viable, several problems would be eliminated: namely, slicing difficulties, reduced itching factor, and the ability to use small or oddly-shaped corms. One promising area would

be development of extruded puffed snacks, similar in form to 'corn curls'.

Conclusion

There are a number of strategies that could reduce the oxalate content and resultant itching factor, including drying and milling/reforming if dasheen flour is being considered as a product; soaking the raw material in water, 3 per cent acetic acid, 3 per cent sodium hydroxide, or 3 per cent salt solution, particularly if dasheen is thinly sliced, which effectively reduces oxalate levels by as much as 75 per cent; pre-blanching can reduce oxalate and starch levels; precooking and extruding/reforming can be considered to produce dasheen-based snacks.

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