

Risks Presented in Macadamia

Rancidity

Rancidity can be defined as an unpleasant taste and smell of foods containing fats or oils. This occurs when the oils present in the nuts undergo oxidation (oxygen attack triglycerides) or hydrolysis (addition of water) releasing components such as peroxides, hydrocarbons, aldehydes, ketones, and free fatty acids. These reactions are triggered by heat, light, metals, enzymes or oxygen.

The most commonly measured compounds to indicate Lipid oxidation and Hydrolysis are peroxides and free fatty acids respectively. Peroxide value will give an indication of early oxidation as it will decline as the oxidation progresses.

The control of temperature, moisture and oxygen are then essential to prevent quality deterioration and rancidity. Higher temperatures can increase the oxidative reaction on lipids as well as the exposure to oxygen. High Relative Humidity will produce adsorption of moisture by the almonds, activating lipases enzymes.

Microbiological Contamination

As the nuts come into contact with the orchard floor (described in *Macadamia: Harvesting and Processing*), air, birds, insects, etc. they are at risk of microorganism contamination. Some of these microorganisms can simply cause spoilage, however, others can cause pathogens. For instance: Salmonella is nowadays of great concern. It inhabits the intestines of birds, animals, and humans. Also, it can be found in open waters, waste piles, soil, etc. The conditions allowing for Salmonella spp. to grow and multiply are extensive, and therefore, it can survive all along the chain. There are several guidelines that can be followed in order to prevent and control the spread of the bacteria starting from the orchard and through packing. These include orchard history and floor management, water sources and quality, soil nutrition, wildlife and bird management, workers' hygiene, fumigation, etc. The macadamia nuts will go through a drying and UV sanitation step (discussed in *Macadamia: Harvesting and Processing*) as a kill step for any micro contamination.

Infestation

Although there are a number of pests that can attack or damage the macadamia trees themselves, not all will have an impact on the nut meat itself. Some pests that do damage the nut are nut boring pests such as *Cryptophlebia batrachopa* or moths such as *Spectrobates ceratoniae*. These pests can burrow into the husks and feed on the nuts themselves, causing early nut drop and damage to the nut

and overall crop (1). Proper orchard hygiene can help to decrease the risk of pest damages.

Physical Contaminants

Shell fragments:

Although the nuts go through sorting processes that separate the cracked shells from the nuts, it is possible for shell fragments to continue through this process. Although there is a risk of pieces of shell continuing along the process, further sorting and visual inspection will help to remove this from the finished product.

Others:

Nuts coming in contact with the orchard floor are subject to physical contamination – foreign materials that can cause illness or injury, such as stones, glass and metal in food products. These can be removed at the processing site by sorting, metal detectors and visual inspection.

References:

1. <http://chindikanikaseka.blogspot.co.uk/2012/01/macadamia-in-malawi-its-pest-and.html>
2. <http://www.fda.gov/Food/FoodScienceResearch/LaboratoryMethods/ucm084406.htm>