

EVALUATION OF METHODS OF ROASTING MACADAMIA NUT

Since the development of rancidity in Macadamia nut was a problem encountered in both experimental and commercial processing in 1954 and 1955, it was decided to investigate other methods in addition to those recommended by Maltzau and Ripperton (1939) in order to determine whether the keeping quality of the kernels could be improved.

Initially, three methods of roasting were tried, viz.,

(1) Deep-frying in refined coconut oil in a similar manner to that reported by Leverington (1962). On this occasion a domestic deep frier was used, and temperature control was not so good as with the gas-fired system used previously, resulting in cooking times being reduced to about 10 min.

(2) Dry roasting in a hot-air oven (without forced draught) for 45 min as recommended by Moltzau and Ripperton (1939).

(3) Dipping in melted refined coconut oil before roasting in a hot-air oven as in (2).

After roasting, the kernels were cooled, salted, packed in glass vacuum jars and stored at room temperature. Control samples were stored at 0°F.

When examined several days after processing and at other times during the initial storage period of 2 months, the oven-roasted kernels (Treatment 2) were inferior in appearance and eating quality to the other two lots, which were quite attractive. After 2 months there was a gradual development of rancidity or staleness in both *Macadamia integrifolia* and *M. tetraphylla* types when deep-fried (Treatment 1), but there was no marked difference in the keeping quality of the two types. The oven-roasted samples (Treatments 2 and 3) did not develop rancidity when stored for 12 months at room temperature.

The development of rancidity in deep-fried samples was due to the difficulty of controlling the temperature, cooking times in some cases being thereby reduced, resulting in the inside of the kernel being incompletely cooked even though the outside was the desired rich golden-brown shade. This result substantiated the theory proposed in 1954 (Leverington 1962) that the poorer keeping quality of *M. teirophylla* was the result of the lower cooking temperatures normally used for this type.

Without forced-draught air circulation, oven-roasting was too time-consuming and did not produce even colouring of the kernels. The slower cooking in oven-roasting, however, tended to reduce the development of rancidity.

In order to overcome the heat penetration problem associated with the earlier roasting trials, a preheating experiment was carried out with samples of both B6 (*M. integrifolia*) and G5 (*M. tetraphylla*) which had been carefully selected for quality. Three techniques were adopted, viz.,

(1) Kernels at room temperature roasted normally in deep frier for 12–15 min.

(2) Kernels preheated in an oven at 220°F for 20 min before normal deep-frying as in (1).

(3) Kernels preheated in coconut oil heated to 220°F before transferring to deep frier and proceeding as in (1).

After four months' storage at room temperature there was no significant difference in quality. This suggests that provided the time of deep frying is 12 min or more no purpose is served by preheating.

Hamilton and Storey (1956) reported that Macadamia nuts (presumably *M. integrifolia*) can be cooked by roasting at 260–290°F for 8–15 min. A number of experiments in which *M. integrifolia* kernels were processed within these conditions indicated that by roasting for less than 12 min at temperatures in excess of 275°F, early rancidity of the kernel is likely to occur.

Observations made over a period of years, particularly in the commercial field, indicate that *M. integrifolia* processed kernels are consistently higher in quality, but that *M. tetraphylla* kernels are variable in quality and frequently develop rancidity much quicker than the other type. Iodine and acid values of the natural oils present in both types and in hybrids have failed to show any chemical reason for the difference in keeping quality.

The time/temperature relationship therefore appears to be the most important factor in the prevention of rancidity. The problem is now being attacked from a different angle by departing from the normal deep frying with its associated temperature control as well as cooking-oil rancidity problems. The nuts are now being processed in a rotary nut roaster where a high quality product is produced by roasting for 25 min and then coating with cold hydrogenated coconut oil, which gives the deep fried appearance and taste as well as acting as an adhesive for salt. These investigations are now in progress and will be the subject of a later paper.

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