TECHNICAL NOTES

A NEW METHOD OF ROASTING MACADAMIA NUT

The commercial processing of Macadamia nuts commenced in Australia in 1954, using the basic principles laid down by Moltzau and Ripperton (1939) with some refinements recommended by Leverington (1958, 1962). Leverington (1958) reported that *Macadamia tetraphylla* was more prone to rancidity development than *M. integrifolia.* In view of the fact that rancidity problems were still being encountered in the commercial processing of the nuts, the roasting technique was again examined in 1960 and it was concluded that deep frying could have the following disadvantages:—

(1) The high temperature of deep frying accentuates rapid rancidity development in the cooking oil even though fresh oil is continuously added to make up for the absorption in the nuts. The oil therefore has a limited life.

(2) As the processing of Macadamia nut is a small industry in Australia, laboratory facilities are not available to keep a constant check on the oil quality. Consequently there is a tendency to discard oil which may otherwise be still usable or to use oil for longer periods than is desirable.

It was felt that it should be possible to overcome these problems if roasting techniques other than deep frying could be devised. The technique of oven roasting which was briefly reported by Leverington (1962) is now fully described.

Design of Equipment

A domestic rotissarie was adapted in a manner similar to that reported by Miller (1960). The experimental unit is shown in Figures 1 and 2.

A cylindrical drum 12 in. long and 6 in. in diameter was constructed of stainless steel, the curved surface being perforated along its entire length with $\frac{1}{4}$-in. holes at $\frac{1}{2}$-in. centres. In order to load or discharge the kernels from the cylinder *via* a hinged lid in the end, it was necessary to remove the drum from the rotissarie. One end of the cylinder was fitted with an octagonal shaft which engaged with the motor drive, giving a rotational speed of 6 r.p.m. This agitated the kernels sufficiently without the necessity for fitting vanes inside the drum. The other end rotated on a stainless-steel thermostat pocket which was drilled at the tip to enable a copper-constantan thermocouple to protrude into the centre of the drum. By experiment this was found to be

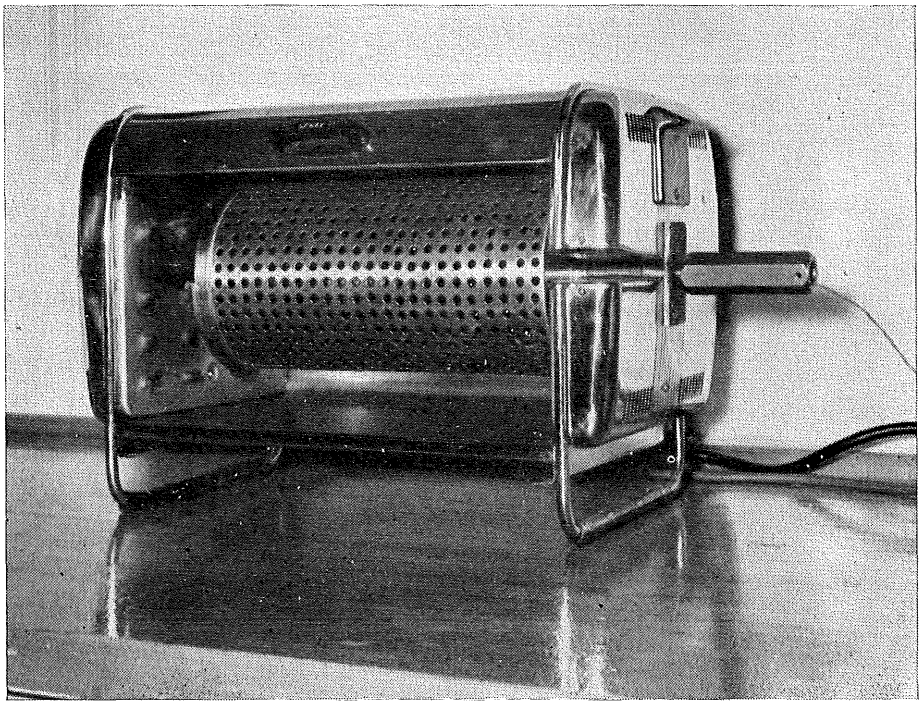

Fig. 1.—Rotary Macadamia nut roaster with glass door removed.

the only satisfactory control point. A very accurate bimetallic thermostat was found unsatisfactory, as sensitivity was lost due to the use of the pocket. Temperature control was obtained by the use of a thermocouple connected to an electronic recorder which controlled a 1500-W bar element at the top of the rotissarie. This technique permitted a very fast come-up time (5 min) and maintained accurate temperature control, fluctuations amounting to not more than $\pm$ 2°F. Control temperatures used were 260°F for *M. tetraphylla* and 275°F for *M. integrifolia.*

Load

Although the equipment operated satisfactorily with loads up to 2½ lb of kernels, any further weight resulted in the thermocouple being covered and accurate temperature control being lost. Some breaking of the kernels occurred during roasting, the small pieces falling through the drum. However, it was considered that the percentage lost in this way was negligible.

Procedure

The roaster was heated up to operating temperature, the drum removed, filled with 2½ lb of kernels and then refitted into the rotissarie as quickly as possible. Within 5 min the oven had reached operating temperature again and

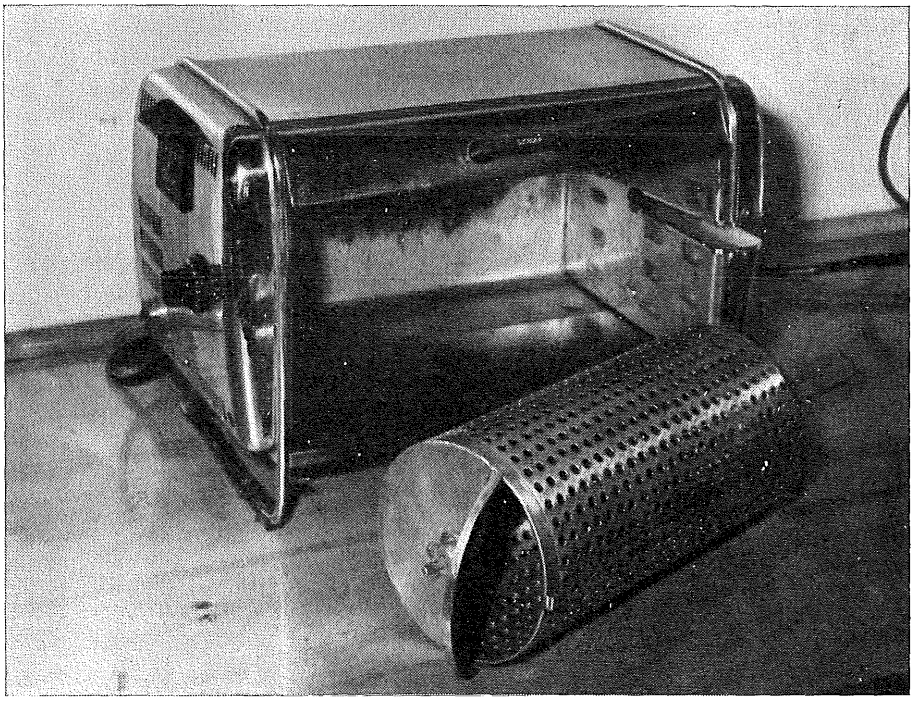

Fig. 2.—Rotary Macadamia nut roaster with glass door removed and cylinder detached.

roasting was continued for another 15, 20 and 25 min. At the end of this period the drum was removed and the kernels discharged into a deep bowl, where they were coated with a little hydrogenated coconut oil and then allowed to cool to 100°F before salting. They were packaged shortly afterwards in vacuum jars and stored at room temperature.

Observations

The samples cooked for 20 min did not have the characteristic roasted flavour and soon became rancid. The 30-min cook charred the kernels slightly. The 25-min cook gave a very attractive product which was considered equal in quality to the normal deep-fried product. The comparisons made of the shelf life of rotary-roasted (25-min) and deep-fried nuts indicated that they both kept for about the same period when stored under identical conditions. This was later confirmed by Winterton (1962), who used a modified thio-barbituric acid test to follow the development of rancidity in nuts roasted by the two methods.

Rotary roasting of Macadamia nut kernels for 25 min in the unit described above produces a product equal in quality to oil-roasted kernels, and prevents the hazards associated with deep frying such as peroxidant contamination and

the use of rancid oil. It is considered that a commercial roaster could be constructed by scaling up the unit described, but its capacity would need to be twice that of a deep fryer, since roasting times are twice as long. Rotary roasting should permit a greater standardization of the quality of the final product, as temperature control would be more precise.

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(Received for publication November 14, 1962)