CHEMICAL NOTES (14)

THE CURING OF CASHEW NUTS FOR EXPORT

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ENQUIRIES have been received by the Department from time to time, on the method of curing cashew nuts for export. In S. India the cashew nut industry is well organised and a fairly considerable trade in the commodity has already been established with the United States of America and Europe. The methods adopted in that country have been studied on a laboratory scale in the Chemical Division with a view to determining whether they could be modified or improved upon in any way. The results obtained are briefly referred to in this note which deals mainly with the curing processes as practised in S. India. These are as follows :

(1) *Removal of the pericarp or shell.* (a) *Roasting.*—The cashew nut has a very tough pericarp or shell which contains a caustic oil and makes the shelling of the nut a troublesome process. Roasting of the nuts is adopted in India to render them brittle and less caustic to the skin when broken. The oil is thereby removed, even partially. The roasting is done in open iron pans over a small circular earthenware furnace. Small quantities of nuts are treated at a time and the period of roasting is about a minute. The rinds of the previously shelled nuts serve as fuel. Great care is taken that the nuts are not over-roasted or the kernels would be browned and thus rendered unsaleable abroad. Excessive roasting is prevented by throwing water on to the pans to extinguish the fumes. Several of these furnaces are operated together and the smells emanating are so acrid and unpleasant that the factories have to be situated far away from the residential areas.

In order to ascertain whether the method of roasting in the open could be replaced by heating in an oven, trials were made in the Chemical Laboratory with the heating of the nuts

in an electric oven at different temperatures and for varying times. It was found that temperatures below 100° C. were insufficient as the nuts continue to be tough and leathery. Heating at 120° C. for half an hour makes the shells somewhat brittle, but some of the kernels are partly discoloured. A temperature of about 115° C. would perhaps be more suitable from the standpoint of discolouration of the kernels. Tests with a roasting machine in S. India showed that it had the same defect of browning a higher percentage of kernels than would be the case in the open pan roasting method. Heating at high temperatures of short duration is preferable to heating at lower temperatures of longer duration, as the kernels are not then discoloured. If the furnaces could be operated in one shed so designed as to cause the suffocating gases to be drawn up a chimney by suction, the nuisance might be avoided to some extent. But the cost of installation of such an arrangement would be fairly high and may considerably increase the cost of production.

(*b*) *Shelling.*—The roasted nuts are next shelled. This is a very skilled operation and in S. India is mostly done by women and boys with a sort of wooden mallet. The greatest care is required in shelling if kernel breakages are to be reduced to the very minimum. The kernels are removed from the shell with a wire prong.

(*c*) *Inner Coat Removal.*—It is essential for export purposes to remove the pink to reddish brown inner coat. In India this is done by spreading the nuts on wire gauze trays in hot air rooms under controlled temperatures. Heating at a temperature of about 120° F. for three hours is generally found to be best under Indian conditions. As this optimum temperature will vary with the climatic conditions and the nature of the nuts, it is not surprising to note that under local conditions a temperature of about 155° F. has been found more suitable. At higher temperatures the kernels become too brittle. The drying of the kernels, besides removing the inner coat, removes any excess moisture in them and thus prevents the tendency to mouldiness in storage. The use of wire gauze trays tends towards a discolouration of the kernels at points of contact with the metal. Some suitable textile fabric may be substituted if necessary. The seed coat is removed soon after the kernels are taken out of the oven. This operation is also done

by hand. Delay in peeling renders the process more difficult. After peeling the kernels are spread on the floors indoors, when they absorb some moisture and become less brittle. An actual determination showed a gain in weight of about 1 per cent. moisture in two hours.

(*d*) *Grading.*—Cashew nuts are graded into : (1) *wholes* or completed kernels ; (2) *halves* consisting of one cotyledon only; (3) *brokens*, the broken kernels ; (4) *rejects* or *spoilts*. Only grades (1) and (2) are exported, but the latter fetch much lower prices than the wholes. The brokens are sold locally and the rejects are used as poultry food together with the seed coats.

(*e*) *Packing.*—In India the well-dried, graded kernels are packed in 25-lb. tins. The nuts were until recently filled into the tins which were then charged with carbon dioxide gas and sealed. This practice has now been given up, as it was regarded as objectionable by importers. The filled tins are instead vacuumised through a small hole in the lid, which is then hermetically sealed. Experiments carried out in the Chemical Laboratory showed that cashew nuts were well preserved in vacuum or in carbon dioxide for as long a period as two years. Further, clean, well-dried nuts when well filled in hermetically sealed containers were found to keep satisfactorily for a period of over a year. The risks of damage in storage are however too great to advise the adoption of this practice commercially.

BY-PRODUCTS OF CASHEW

There are a number of by-products of cashew which should find some use locally. These are the rind oil, the seed coat and rejected kernels, the juice of the pedicel or soft fruit and the gum.

The rind oil when required, is obtained by heating the nuts in inverted earthern pots and collecting the oil that drains. As so obtained the oil is a dark, viscid liquid with a characteristic smell and caustic action on the skin. Its chief constituents are anarcadic acid, gallic acid and cardol. Only 12-15 per cent. of oil is obtained, though the rind itself contains about 35 per cent. of the by-product. Experiments done locally show that if rind oil is the primary consideration, it could be extracted by placing the nuts in a funnel-shaped container and heating the latter in an oven at a temperature of 120° C. or higher for a period of three or four hours. Pricking the nuts facilitates the

removal of the oil. The kernels, though somewhat browned, may find a sale locally. The oil can also be prepared from the shells obtained by cutting the thoroughly-dried nuts, as is occasionally the practice locally. The oil is used as a wood-paint, for treating fishing nets, etc., and when of good quality has found use in the manufacture of bakelite. The demand for the oil abroad is however small now and its present price in India is so low that it would not be profitable to prepare the oil at the expense of the kernel. It should be possible to obtain the oil by heating the nuts under reduced pressure, but the outlay on plant will probably render the process uneconomic. A very good quality oil has been obtained by extraction of the shells with solvents, but the cost will be prohibitive on a commercial scale.

The thin, pinkish-coloured testa or seed coats together with the broken kernel tips form a good poultry food. Analysis of a sample in this laboratory gave the following percentage results : water 8·1, proteins 7·6, fat 12·3, carbohydrates 59·2, fibre 11·0, ash 1·8. Its nutritive value is therefore high.

A gum obtained from incisions in the tree is reported to be insect-proof, due probably to traces of cardol. It could therefore be used for book-binding.

The pedicel or soft part of the fruit is used in the West Indies, Goa and elsewhere for the preparation of a spirit by the fermentation of the juice extracted from it. The juice contains about 8-12 per cent. of reducing sugars and has anti-scorbutic properties. The question of the manufacture of an alcoholic drink is however one which will be governed by Excise Regulations.

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