SMALL-SCALE SPICE PROCESSING

Introduction

The processing and trade of spices has always been an important industry. The spice trade still has a significant impact on the economy of many countries eg Grenada, Sri Lanka and Indonesia. Small-scale processing of spices can be economically and socially successful.

Correct harvesting time

It is not possible to produce a good spice product from low quality harvested material. The main obstacle to correct harvesting is the crop being picked immature. This is usually due to fear of theft or the farmer requiring money urgently. However, every effort should be made to wait until the spices are fully mature.

Cleaning

The crop should be cleaned before processing. The first stage is to remove dust and dirt using a winnowing basket. This can be made locally from bamboo, palm or other leaves. Someone used to this work can remove the dust, dirt and stones quickly and efficiently (eg they could clean 100kg of pepper in an eight-hour day). Small machines are available for cleaning but they are rarely cost effective.

After winnowing the crop needs to be washed in water, all that is needed is two or three 15 litre buckets. For larger quantities a 1m³ sink/basin with a plug hole needs to be constructed. This can be made out of concrete. However, the water must be changed regularly to prevent recontamination of spices by dirty water. Only potable water should be used.

Drying

This is by far the most important stage in the process to ensure good quality spices. Inadequately dried produce will lead to mould growth. The sale value of mouldy spices can be less than 50% of the normal value. In addition the growth of food poisoning bacteria on some spices is a real danger if proper washing and drying is not carried out.

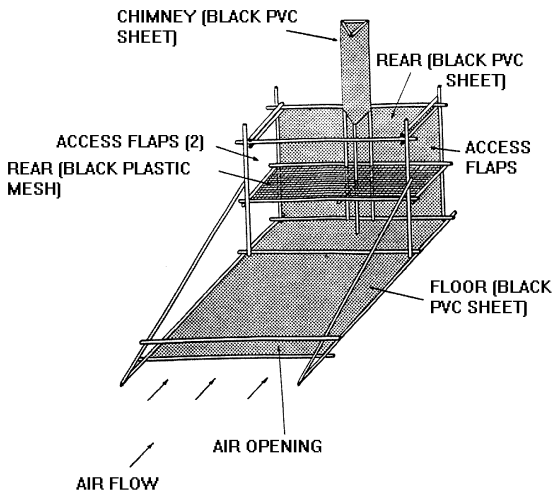

Figure 1: Cabinet Solar Dryer

Drying during the dry season

During the dry season, sun drying is usually adequate to dry the produce. The simplest and cheapest method is to lay the produce on mats in the sun. However, there are problems associated with this method. Dust and dirt are blown onto the crop and unexpected rainstorms can re-wet the crop.

A solar dryer avoids these problems. The simplest type is the cabinet solar dryer, see Figure 1, which can be constructed out of locally available materials (eg bamboo, coir fibre or nylon weave).

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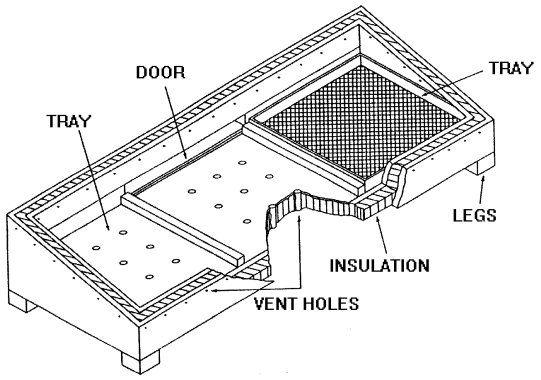

Figure 2: Excell Solar Dryer

For larger units (over 30kg/day) an 'Exell Solar Dryer' could be used, see Figure 2. However, the construction costs are greater and a full financial evaluation should therefore be made to ensure that a higher income from better quality spices can justify the additional expense.

Drying during the wet season

During the wet season or times of high humidity, which often coincides with the harvest of the spices, a solar dryer or sun drying can not be used effectively. An artificial dryer that uses a cheap energy source is necessary. This may be a wood or husk burning dryer or a combined wood burning and solar dryer. Figures 3-5 show a combined wood burning and solar drier which is based on the McDowell Dryer and has been used in Sri Lanka.

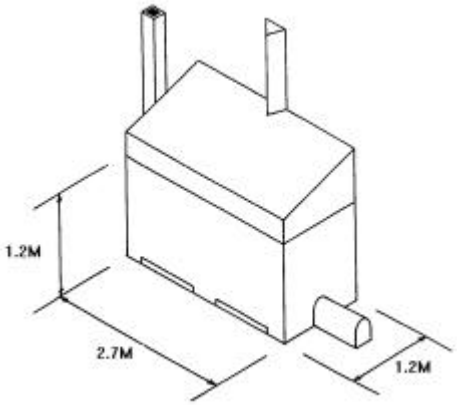

Figure 3: Combined Dryer Showing solar upper section

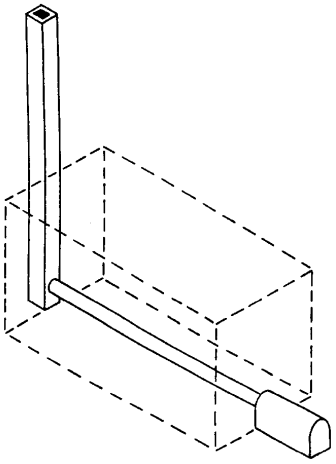

Figure 4: Wood burning section

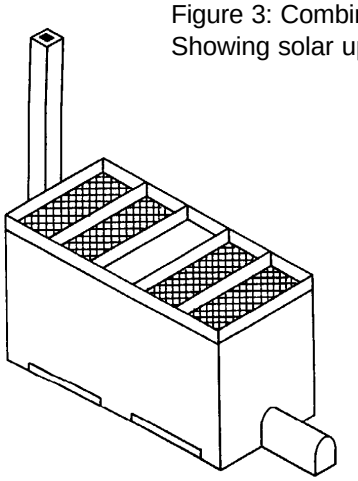

Figure 5: Food trays

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The crop should not be overheated (eg the maximum air temperature for drying pepper and cardamom is 50ºC). Neither should it be overdried (the final moisture contents for various spices are shown in Table 1).

Spice	Maximum final moisture content % (wet basis)
Mace	6.0
Nutmeg, cloves	8.0
Tumeric, coriander	9.0
Cinnamon	11.0
Pepper, pimento, chillies, ginger	12.0
Cardamom	13.0

Table 1: Spice moisture content

The drying of certain spices requires special conditions. For example cardamom has to be dried in the dark so that the green colour is retained.

Grading

Spices can be graded by size, density, colour, shape and flavour. Machines are available for larger scale production units.

Grinding

Grinding may also add value but must be done carefully as there are difficulties. A whole, intact product can be easily assessed for quality whereas a ground product is more difficult. There is a market resistance to ground spices due to fear of adulteration or the use of low quality spices. This can only be overcome by producing a consistently high quality product and gaining the confidence of customers.

For small-scale production (up to 100kg/day) manual grinders are adequate. Small Chinese or Indian models designed for domestic spice grinding are suitable. A treadle or bicycle could be attached to make the work easier.

For larger scale production a small, powered grinding mill is needed and models are available that can grind 25kg/hour. A grinding mill needs to be placed in a separate and well ventilated room because of the dust. Great care is needed to ensure uniform sized pieces/powders after grinding and also to prevent heating of spices during grinding.

Packaging

The packaging requirements depend on: 1) the type of spice, 2) whether it is ground or intact and 3) the humidity of storage. Most intact spices will store adequately in sacks/boxes if the humidity of the air is not too high. Ground spices can also be stored without special packaging if humidity is low but over long periods there is a loss of flavour and risk of contamination and spillage.

It is therefore better to store spices in a barrier film such as polypropylene (essential in areas

of high humidity) to provide an attractive package, retain spice quality and prevent contamination and losses. If polypropylene is not available, cellulose film is adequate if it is heat sealable. Polythene is a poor substitute and should only be used for short term storage as it allows the flavour/aroma of the spices to escape.

Equipment suppliers

Note: This is a selective list of suppliers and does not imply ITDG endorsement.

Hand operated mills

Hand operated grinding mill
Tissa Industries
71 Sunetra Devi Road
Kohuwela
Columbo
Sri Lanka

Turma grinder
Hindustan Engineering Company
25/31 Ropewalk Street
Fort
Bombay
India

Small domestic mill
ETS Champenois
Chamamoulley
France

Atlas No 1 handpower grinding mill
R Hunt & Co Limited
c/o Bentall Simplex Industries Limited
Foxhills Industrial Estate
Scunthorpe
DN15 8QW
United Kingdom

UK Type No 2 hand mill
Cecozo
P O Box 9
Ibarachi City
Osaka 567
Japan

Tissa brand 6" grinder (with motor)
Tissa brand 12" grinder (with motor)
Tissa Industries
71 Sunetra Devi Road
Kohuwela
Columbo
Sri Lanka

Cibler FFC 15 (with motor)
Cibler FFC 23 (with motor)
Jimo Agricultural Machinery Works
Shandong Province

China

Pulco star grinder (with motor)
Sabo Engineering Rajastan
Kuchaman Road
Rajastan 341 509
India

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