Low-cost wooden seed dryers increase seed purity in Tanzania

Farmers in Africa usually dry their vegetable seeds under the sun. Seeds of African eggplant, spider plant, and tomato, pods of cowpea and other legumes, and whole plants of Ethiopian kale with lots of mature pods are usually spread on the ground and sun-dried. This process is prone to contamination by dust, other foreign materials and waste during and after drying, along with accidental mixing of labels.

To improve the seed processing operation and produce good quality seeds, AVRDC - The World Vegetable Center's Regional Center for Africa in Tanzania has designed low-cost wooden seed dryers by using locally available materials. The dryers are kept indoors; therefore, they allow seed drying during the rainy season.

There are two sizes of wooden seed dryers. The small type is 2.43 m in length, 1.2 m in width and 1 m in height with no drawers. The large type is 5.5 m in length, 0.96 m in width and 1.25 m in height; it can accommodate 12 drawers that are 5.5 m in length, 0.5 m in width and 0.21 m in height. The bottom of each drawer is nylon mesh supported with wire mesh.

Right: African eggplant seeds (above) and mature pods of Ethiopian kale (below) dry on the ground under the sun.
The small dryer is portable and easy to move from one place to another while the large dryer is ideal for stationary use in farmhouses. Both dryers serve the same purpose of drying small (e.g. amaranth), medium (e.g. cowpea), and large (e.g. sword bean) vegetable seeds. These dryers can also be used to dry leafy and tree vegetables such as Moringa.

After extraction, the seeds are placed in nylon bags, labeled and pre-dried on a table covered with nylon or wire mesh. This is to remove excess water from the newly-extracted seeds and avoid dripping into the dryers. It also keeps the seeds away from the ground to avoid dust and other impurities. After pre-drying, the seeds are transferred to the dryers.

Both types of dryers are powered by small motors that blow cool air into the dryers to dry the seeds. There is no heating device to warm the air; hence, the air temperature that goes into the dryers is roughly the same as the air temperature inside the room. For small seeds like amaranth, drying takes one week and for medium to large seeds such as cowpea and pumpkin, it takes 1-2 weeks. Based on previous tests, 8-11% moisture content of the seeds can be achieved.

Though these seed dryers are not ideal, they are cheaper than imported dryers. The materials for the dryers are locally available and the designs are simple enough to be easily used by local carpenters. AVRDC displayed the dryers during the 2010 Agricultural Trade Fair (Nane-nane) in Arusha, Tanzania and has received several inquiries about their design after Nane-nane.

Source and photos:
Marilyn Belarmino, AVRDC - The World Vegetable Center, Regional Center for Africa, Tanzania

Small type of wooden seed dryer: the top portion is supported by nylon mesh with wire mesh and the seeds inside nylon bags are placed on it for drying
Improved nursery technologies for increasing the survival of onion seedlings in West Africa

Onion is a very important crop in West Africa and is usually sown in October-November and harvested in February-March. Under hot (35-40°C) and humid (70-75% relative humidity) climatic conditions in the rainy season (June to September), the harvested onion bulbs can not be stored more than six months and usually rot before October. Therefore, the price in the markets from October to January is very high and not affordable for most consumers. The conventional onion nursery practice is to sow the onion seeds directly into the soil without any sterilization and protection from heavy rain. Under the high humidity, 100% loss of onion seedlings can occur. It is a big challenge for farmers to produce early maturing onion to meet the market demand.

To produce early maturing onion and increase the seedling survival rate during the rainy season, farmers from Kirina Village have modified the conventional onion nursery practice. Kirina Village is located in southern Mali, about 45 km away from the capital city of Bamako, and 80% of its farmers grow onion. Farmers usually choose the land near the house for onion seedling preparation and directly sow the seeds into the field in August, which is the peak rainy time. Some farmers raise up the seedling beds by using wooden sticks and poles in overlapping arrangements as the base of the beds, and stones as underlying support to elevate them. During this period, farmers set up arch staking above the beds by using locally available wooden sticks, covered by plastic netting to avoid damage from insects, chickens, rabbits, mice, and toads, and put on black plastic mulch when it rains. As soon as the rain stops, the black plastic mulch is
removed. This can avoid rainfall damage to the seedlings and secure the seedling survival rate up to 50-60%. The surviving seedlings then can be transplanted to the field in mid-September and the bulbs can be harvested in December.

AVRDC - The World Vegetable Center’s subregional office for West and Central Africa in Mali has developed an improved seedling preparation method by using locally available metal or bamboo framed cages. Before building the cages, the soil is sterilized through solarization for three weeks to minimize levels of bacteria, fungi, nematodes and insect pests. After that, the cage framework is set up above the sterilized soil by using metal or bamboo sticks. The frame is covered with netting on each lateral side, and then transparent plastic is put on the top of the cage to prevent damage from rain splashes to the seedlings. During the dry season (March to May), the plastic cover can be replaced with netting. This technique is proven to be useful for onion seedling preparation in both dry and wet seasons. The seedling survival rate can be up to 70% in the wet season and 80-90% in the dry season. The subregional office has demonstrated the advantages of this technique to the onion farmers in Kirina Village. Farmers plan to do the soil sterilization before sowing the seeds and use transparent plastic instead of black plastic mulch to improve their nursery system for raising better quality onion seedlings at higher quantities for early onion production.

January to obtain a very good price in the market. The price is US$2/kg of onion bulbs—about 20 times higher than at peak supply. Early onion production indeed brings more profit and income to the farmers in Kirina Village.

Source and photos: Albert Rouamba, AVRDC - The World Vegetable Center, Subregional Office for West and Central Africa, Mali
Homemade tomato and pepper slices, powder, and pickles in Uzbekistan

In Uzbekistan, tomato and pepper are popular crops cultivated in the field from May to September. Tomato can be grown in the greenhouse from October to April. However, the expense of heating systems is too high and the produce is only good enough for fresh consumption. To extend consumption during the off-season by the local population in rural areas, several unique and simple methods of tomato and pepper processing have been used for centuries to save nutrients and specific taste qualities of the fruit.

The hottest period of the summer (July-August, air temperature 38-45°C and 30% humidity, no rainfall) is the best time to dry ripe tomato and pepper fruits after harvesting. The following steps show you how Uzbek people make dried tomato slices at home.

1. Slice ripe tomato fruit into pieces, place slices on the plate and sprinkle salt on top of tomato slices abundantly.
2. Put the plate with tomato slices on the rooftop or on the table in an open area in the yard for sun drying and better air circulation in day and night for 1.5-2 weeks. Turn over the slices every 4-5 days to avoid mold growth.
3. String the dried tomato slices when their color turns to dark red, firm but not too dry and hang in a cool room.

The dried tomato slice is called qoqi in Uzbek and it is widely used in various dishes in Central Asia. The most common way to use the dried tomato slice is to garnish soup. Put the dried tomato slices into boiling soup, then take them out and place them on a small dish when they turn soft. Add a little soup or boiled water and grind the pulp with a spoon. Finally, pour the ground tomato slices into the soup again for adding pinkish color and special aroma.

For drying hot pepper fruit, prepare the whole fruit or the fruit with seeds removed, string the fruit and then hang them in the shade under an awning for drying. The fruit can be dried in two weeks; then continue hanging them in the same place until the cool season. For drying sweet pepper fruit, cut in half, remove the seeds and dry for 1-2 weeks under the sun as in steps 2 & 3 for drying tomato fruit.

The dried tomato, hot and sweet pepper slices and fruit can be milled to powder for convenience of use; this powder is commonly sold in local markets. This can be easily done in the family by using different kinds of mortars. Repeatedly grinding 2-3 times can produce finer powder. Tomato and pepper powder is widely used in the preparation of various national dishes as well as in combination with other local spices to give the food a unique taste.
Home canning is also common in each family. The following steps show you how to prepare pickled tomato at home.

1. Select tomatoes with firm pulp and thick skin, well-preserved shape and color for canning.

2. Wash jars and tin lids, and sterilize in boiling water for 3-5 minutes.

3. Wash tomato fruit and place into the jars with washed dill, garlic and other favorite spices.

4. Pour boiling water into jars and put the tin lids on the top, and then pour out the water when it turns cold.

5. Repeat step no. 4.

6. Refill with pre-cooked and boiling hot marinade (mixture of 60g salt and 30g sugar in 1-liter water) and then tap the side of the jars to get the air bubbles out. The volume of marinade should be calculated before canning in accordance with the total amount of fruit and jars. For one 3-liter jar, 1.4 liters of marinade is needed.

7. Cover the jar with a lid and screw it on tight.

8. Place the jars upside down immediately on a thick and heat-insulated blanket and then tightly cover with a blanket to keep the jars hot for 20 hours. Afterwards the jars can be stored at room temperature for a long period.

The processed products, such as dried tomato, hot and sweet pepper slices and powder, and pickled tomato, bring an additional income to the households in the countryside. In recent years, these powder products have become an important export for Uzbekistan.

Source and photos:
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