



Ministry of Agriculture, Livestock, Fisheries and Cooperative

PRESERVE FOODS AND AVOID FOOD WASTAGE DURING COVID 19

INTRODUCTION



Households can maintain healthy eating during COVID 19 pandemic by ensuring constant availability of nutritious foods. This can be achieved by prolonging the shelf life of perishable foods. This enables households maintain social distancing by reducing the frequency of market visits. Preserving foods also avoids food loss and saves money spent on food.

Fresh green leafy vegetables and fruits start to lose their quality immediately after harvest, becoming damaged, wilted and eventually rotten due to;

1. Enzymes within fruits and vegetables
2. Exposure to micro-organisms (including bacteria and mould). Sources of microbes:
  - Dirty water
  - Dirty hands
  - Coughs, colds and diseases
  - Dirty equipment
  - Over-ripe and damaged fruit
  - Exposure to animals, insects, and rodents
  - Exposure to animal and human waste (feces)
3. Environmental factors, including temperature, moisture and sunlight

Storing fresh vegetables and fruits in cool conditions allows them to stay in good condition for a longer period. Drying fresh vegetables and fruits reduces bulkiness and weight, eases storage and transportation and avoids wastage. Drying and storing fruits and vegetables provides families with a better diet throughout the year and can be a source of income.

**PROCEDURES OF PRESERVING VEGETABLES AND OTHER FRESH FOODS**

Fresh food	Storage and preservation guide
<p><b>Dark green leafy vegetables:</b>                      cowpeas leaves, managu, mitoo, terere, Sukuma – wiki, pumpkin leaves e.t.c.</p>	<p><b>Cooling leafy vegetables for household use</b></p> <ol style="list-style-type: none"> <li>1. Discard wilted, discolored or blemished leaves.</li> <li>2. Wash the vegetables with clean, cool running water to remove dirt and any other contaminants. They keep fresher if washed before storage.</li> <li>3. Allow water to drain out</li> <li>4. Wrap in paper towel or non-woven carrier bag and put in airtight container or sealed plastic bag and store in the refrigerator or cooling pots (Figure 1 and 2). The vegetables remain fresh as long as they have no moisture. Paper towel or the non-woven carrier bags absorbs the moisture.</li> </ol> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Figure 1: Paper towel</p> </div> <div style="text-align: center;">  <p>Figure 2: Non-woven carrier bag</p> </div> </div> <ol style="list-style-type: none"> <li>5. The vegetables can be stored for 2 weeks</li> </ol> <p><b>Note:</b> do not mix leafy vegetables and fruits in the same container during storage. Some fruits produce chemicals that make the vegetables turn yellow</p>

	<p><b>Freezing vegetables for a longer period</b></p> <p><b>Freezing:</b> dark green leafy vegetables can be blanched and frozen. This requires boiling the whole or cut up pieces of the vegetable for 1-2 minutes and then immediately place in cold water to stop the cooking process. Blanching will also keep vegetables from getting freezer burn. The vegetables are then put in storage containers and stored in the freezer. Frozen vegetables will be fine for up to one year.</p>
<p><b>Tomatoes:</b></p>	<ul style="list-style-type: none"> <li>• Ideally, tomatoes should not be washed before storage because they have a natural protective coating and washing will make them spoil faster. This practice can work well if tomatoes are from own production in areas with limited exposure to contaminants. <i>If tomatoes are stored before washing do not mix them with clean foods during storage.</i></li> <li>• During COVID 19 pandemic, households should always wash tomatoes before storage especially if they are acquired from markets where they are exposed to various contaminants.</li> <li>• Store tomatoes with the stem scar facing up to reduce softening and darkening of the fruit, store at room temperature away from direct sunlight. This will help them ripen evenly.</li> <li>• Once they are ripe, they can be placed in the fridge or cooling pot, however cooling makes them loose flavor and so they should be removed from the fridge or cooling pot a few hours before preparation to allow them to restore their original flavor.</li> </ul> <p><b>NB:</b> Wash tomatoes just before you eat or prepare them</p>
<p><b>Carrots:</b></p>	<ul style="list-style-type: none"> <li>• Remove carrot tops/stems, clean them well, drain off moisture and put in a plastic container or non - woven carrier bag and store in cooling pots or in the refrigerator.</li> <li>• The carrots can last for 3-4 weeks.</li> <li>• Storing carrots with fruits will make carrots taste bitter. Carrots absorb odors from apples and pears. They can also easily rot if</li> </ul>

stored with fruits that produce chemicals that cause ripening such as ripe bananas, avocados, melons etc.

### Storage in boxes



- Choose a shallow cardboard box, wooden box, or crate. Line the bottom with newspaper, or similar material, and spread a thin layer of moist sand, untreated sawdust or wood shavings.
- Remove carrot tops/stems, clean them well, drain off moisture and arrange the carrots side by side on the covering material. The carrots should not touch each other (Figure 3). Position the carrots so that they lie head to toe.
- Hide the carrots with more covering material and repeat until the container is full. Finish with a layer of covering material to exclude light. Store in a cool, preferably dark place such as a store or spare room for 1 month or more depending on temperature. Use as required, ensuring the remaining carrots are kept covered.
- This method is ideal if temperatures are cold or very cool. If it is not very cold, regularly check saw dust to ensure it is not getting warm as this may affect the freshness of the carrots. Alternatively use moist sand.



Figure 3: Arranging carrots on sawdust

### Other tips of storing fruits and vegetables

	<ul style="list-style-type: none"> <li>• Do not store ripe bananas, melons and apples together with carrots, potatoes and cucumber. Doing so will lead faster ripening and spoilage.</li> <li>• Do not store cucumbers with bananas, melons, tomatoes, apples.</li> <li>• Except for leafy greens, fresh fruits and vegetables have a natural protective coating and should not be washed before storing. Washing will make them spoil faster.</li> </ul>
<p><b>Onions:</b></p>	<ul style="list-style-type: none"> <li>• Onions should be stored in a single layer, in mesh bag in a dry, cool, dark, well ventilated location.</li> <li>• This way they can last for 3 to 4 weeks.</li> <li>• Onions should not be refrigerated.</li> <li>• Onions should not be store with apples, pears and vegetables as they absorb odor from the fruits and moisture from the vegetables, which can make them decay.</li> <li>• Onions can be regularly spread in the sun to dry, this way, they last longer.</li> </ul>
<p><b>Irish potato</b></p>	<p><b>General guidelines of storing Irish potato for consumption:</b></p> <ul style="list-style-type: none"> <li>• Brush off any excess soil</li> <li>• Do not store bruised/damaged Irish potato, instead, use them quickly to avoid wastage.</li> <li>• Do not refrigerate potatoes since the water inside freezes and spoils the potato.</li> <li>• Store potatoes in a dark place. Light cause potatoes to produce poisonous chemical that makes them turn green. If potato turn green cut off the green parts before use.</li> <li>• Store in gunny bag/paper sacks (Figure 4 and 5), leave the neck slightly open for moisture to escape.</li> <li>• Do not use plastic bags as they make the potatoes sweat and turn rotten.</li> </ul>

	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Figure 4: Gunny bag</p> </div> <div style="text-align: center;">  <p>Figure 5: Paper sack</p> </div> </div> <ul style="list-style-type: none"> <li>• After the potatoes have been in the store for about a month, empty them and check for signs of damage or insects</li> </ul>
<p><b>Sweet potatoes and yams</b></p>	<ul style="list-style-type: none"> <li>• Store Sweet potatoes and yams whole.</li> <li>• Store uncovered at room temperature in a dry, cool, dark and in a well-ventilated location.</li> <li>• Do not be mix with fruits such as avocado during storage as this causes them to rot.</li> <li>• Can be stored up to 2 weeks in this condition.</li> </ul>
<p><b>Cassava</b></p>	<p><b>Traditional Methods:</b></p> <ul style="list-style-type: none"> <li>• Bury the roots in trenches covered with plant material and soil.</li> <li>• Pile the roots in heaps and keep them moist by watering them daily.</li> <li>• Apply a thick coating of soft clay or mud.</li> <li>• Keep small quantities of cassava in water.</li> </ul> <p><b>Note:</b> The practices limit moisture loss and only extends the storage life for a few days.</p> <p><b>Improved low-cost storage methods including:</b></p>

### Storage in boxes lined with moist sawdust or wood shavings

- a. Put alternate layers of sawdust and cassava roots, starting and finishing with a layer of sawdust (can also use wood shavings or peat) (Figure 6). The material must be moist not wet
- b. The roots remain acceptable after four weeks in store, provided the roots were packed immediately on the day of harvest



Figure 6: Lining a box with pile/sawdust for cassava storage

### 2. Storage in plastic containers or plastic film wraps

- a. Cassava roots are kept in an airtight plastic container or a plastic film wrap can be stored for two to three weeks. This method can be applied in urban setting.

3. **Urban** – Store peeled cassava root in water in the refrigerator. This way, it will last for 1 month if you change the water every two days. You can also wrap tightly with a cling film and freeze for several months.



<p><b>Grain and pulses storage:</b> Rice, dry maize, wheat, millet, sorghum, dry pulses</p>	<p><b>Storage in sacks/bags</b></p> <ol style="list-style-type: none"> <li>1. It is recommended that households use hermetic bags.</li> <li>2. The bagged grains must be kept off the ground to prevent spoilage by moisture and/or termites.</li> <li>3. Bags can be placed on low platforms or tarpaulins; but if there is a risk of damage by rodents or other animals, high platforms fitted with rodent barriers should be used</li> <li>4. If there is a risk of rain during the temporary storage period, the bags should be covered with waterproof sheeting</li> <li>5. Second-hand sacks must be thoroughly cleaned and disinfested before use.</li> </ol>
<p><b>Pulse e.g.</b> Dolico (Njahi), beans, lentils, green grams, pignon peas, cowpeas, soya bean, split peas</p>	<p><b>Tips for storing pulses for household consumption.</b></p> <ol style="list-style-type: none"> <li>1. Dry pulses: store dry pulses in airtight containers away from light and heat. This way, they can be stored up to 1 year</li> <li>2. Cooked pulses. After pulses have cooled completely, drain any excess liquid and store in single serving portions in sealed airtight containers or freezer bags. They can be stored in the freezer up to 6 months.</li> <li>3. To thaw frozen pulses or meals, place in refrigerator overnight or warm over gentle heat just before preparing</li> </ol>

## PRESERVING FRESH GREEN LEAFY VEGETABLES AND FRUITS USING COOLING POTS

When water evaporates from a surface it has a cooling effect. You can use this fact to make a simple cooling unit. This technology only works in areas with dry air and low humidity, such as arid areas.

### Materials needed

1. Two clay pots, one smaller than the other so it fits inside the large one. There are several designs for the pot cooler, it depends on what materials are available locally.



2. Sand.
3. Water.

### Construction method

1. Place sand in the bottom of the larger clay pot. Sit the small pot inside the large one and fill the space between the two with sand or earth.
2. Soak the whole structure in water, then place in the breeze so that the wind causes the water to evaporate. The evaporation causes the inside of the pot to cool down.
3. Carefully harvest/buy vegetables and fruits and wash them with clean water to remove any dirt, sand, stones, or other impurities.
4. Loosely pack the vegetables or fruits in approved plastic storage bags or non-woven carrier bags.
5. Place fruit and vegetables inside the pot and cover the two pots with a wet muslin cloth or a damp sack to keep it cool.



Figure 7: Example of pot in pot cooling