

You are here: [Home](#) > [Disclaimer](#)

[← Back](#)

[Print](#) 

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---

**Search**  
[Publications](#) [About](#) [Publications:](#)  
[us](#) [TOF](#)   
[Home](#) [Help](#) [Contact](#)

You are here: [Home](#) > [Environmental Health](#) > [Energy](#) >

[← Back](#)

[Print](#) 

**Agro-  
Ecological  
Zones**

[more Images](#)

**Water**

Mar 24, 2010 - [Disclaimer](#)

[Search](#)

[Publications](#) [About](#)

us [TOF](#) 

[Home](#) [Help](#) [Contact](#)

You are here: [Home](#) > [Environmental Health](#) > [Energy](#)

[← Back](#)

[Print](#) 

**Agro-  
Ecological  
Zones**

[Images](#)

**Water  
Management**

Mar 24, 2010 - [Disclaimer](#)

[Search](#)

[Publications](#) [About](#)

us [TOF](#) 

[Home](#) [Help](#) [Contact](#)



You are here: [Home](#) > [Environmental Health](#) > [Energy](#)

[← Back](#)

[Print](#) 

**Agro-  
Ecological  
Zones**

Mar 24, 2010 - [Disclaimer](#)

**Water  
Management**

Information of [www.infonet-biovision.org](#)

**Soil  
Management**

**Sustainable  
and Organic  
agriculture**

Information of [www.infonet-biovision.org](#)

Information of [www.infonet-biovision.org](#)

**Conservation  
Agriculture**

**Agroforestry**

Information of [www.infonet-biovision.org](#)

**Processing  
and Value  
addition**

Information of [www.infonet-biovision.org](#)

[Energy](#)

---

## Information of www.infonet-biovision.org

---

**Search**

[Publications](#) [Publications:](#)

[us](#) [TOF](#) 

[Home](#) [Help](#) [Contact](#)

[← Back](#)

[Print](#) 

You are here: [Home](#) > Environmental Health

**Agro-  
Ecological  
Zones**

**Water  
Management**

**Soil  
Management**

**Sustainable  
and Organic  
agriculture**

**Conservation  
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**Lables and barcodes, Prepacking fruits and vegetables, Processing facilities, Juice making, Machinery and utensils**
  
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---

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---

**Search**  
[Publications](#) [Publications:](#)  
[us](#) [TOF](#)   
[Home](#) [Help](#) [Contact](#)

**You are here:** [Home](#) > [Plant Health](#) > [Fruit and vegetable processing](#) > [Methods for tomato preservation](#) [Back](#)

**Crops/ fruits/  
vegetables**

**Pests/  
diseases/  
weeds**

**Medicinal  
plants**

**[Fruit and  
vegetable  
processing](#)**

**Drying of  
fruit and  
vegetables**

**[Methods for](#)**

**Print** 



**Methods for tomato preservation**

**[more Images](#)**

**[How to start](#)**

**[How to make peeled tomato  
preserves](#)**

**[How to prepare tomato pulp](#)**

**How to start**

**[How to prepare dried tomatoes](#)**

**[Information Source Links](#)**

**With red tomatoes, it is easy to make preserves. With the help of**

**tomato**  
**preservation**

**Natural pest control**

**Cultural practices**

**these techniques, we shall prepare jars of peeled tomatoes and tomato pulp and dried tomatoes. With these preserves, we will be able to make red sauces and other preparations all year round, even when there are no more fresh tomatoes on the market.**



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**Picking:**

**Sunrise is the best time to pick tomatoes. They are still cool from the last hours of the night. Red, really red, these are the right tomatoes for us! They are the richest in vitamins. Very red, ripe but fairly firm with no black spots or blemishes, these tomatoes will make firstrate preserves.**



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**Transport:**

**To transport these fine fruits, we use basins or crates. But be careful not to put in too many at a time. Did you notice that the boxes are not completely full? So, when we put one on top of the other, the tomatoes underneath will not be squashed. Remember that we can't make good**



**preserves out of damaged tomatoes.**

**We've got to get our tomatoes quickly to the house. Our team is waiting to start.**



**Hey, we said "quick!" This is not the moment to stop for a chat! You may be in the shade, but your tomatoes are in the sun. They are going to go bad, man! And you can't make good preserves out of tomatoes that have been lying in the sun.**

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**Hygiene:**

**Let's start by washing our hands, without using scented soap: the scent clinging to the skin will give the tomatoes a bad taste.**



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**Cleaning the tomatoes:  
And then let's wash our tomatoes.**

**Choosing the tomatoes:  
Let's take the best ones to make  
peeled tomato preserves. So that  
they look nice, we choose tomatoes  
all more or less the same size. The  
others will be kept to make pulp or  
dried. Later on we will see how.**

[back to Index](#)

**How to make peeled tomato preserves**

**To begin with, we are going to explain how to prepare peeled tomato preserves.**

**Boiling the tomatoes:**



**Some washed tomatoes (10-15) are put into a bowl. They are dipped gently into boiling water for thirty seconds.**



**Loosen the skin:  
After thirty seconds, they are taken out of the cooking pot as quickly as possible with a sieve. They are plunged immediately into cold water for a few minutes. Immersion in cold water after the boiling water helps to loosen the skin.**

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**We peel tomatoes completely without leaving any skin on them. Now we want to preserve the peeled tomatoes.**

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### **Cleaning the jars:**

**The jars and the lids must also be clean. Let's wash them with hot water. If they are very dirty, we can rub them clean with sand or small pebbles. Everything is clean, so now the jars can be filled with the peeled tomatoes.**



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### **Filling the jars:**

**The tomatoes are packed in by tapping the bottom of the jar with one hand so the tomatoes are shaken down and fit snugly against each other.**

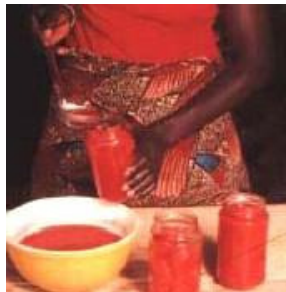
### **Adding lemon juice:**

**This is the moment to add to each jar a little**



**lemon juice without pips. Watch for the pips!  
The lemon juice is necessary for  
preservation. One coffee-spoonful per half-  
litre jar is enough.**

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**Adding hot pulp:**

**We also add some hot pulp to fill up the jar. The jar  
must not be filled right to the top! Leave about one  
centimetre of air underneath the lid.**

**Closing the jars:**

**Be sure to screw the lid on tightly.**

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**Preparations for sterilising the jars:**

**The jars are closed and must now be sterilized. The bottom of a pot is covered with straw. The jars are placed on it, and then more straw put in between the jars to prevent them from knocking against each other. A flat lid and a big stone on top of it will keep the jars steady and in place.**

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**Sterilizing the jars:**

**The pot is filled with water. The top jars must be at least two centimetres under the water. Now lit a fire and wait for the water to start boiling. It should boil for 45 minutes. 45 minutes for half-litre jars.**

**There's no point in boiling them any longer. After 45 minutes, the preserves are sterilized. Put out the fire and leave the jars to cool.**

**Finishing the peeled tomato preserves:**

**Next morning the jars are rinsed and dried. You can stuck a label on every jar with the name of the product, the name of the group or cooperative and the expiry date. Preferably, these jars should be kept in a cool, dark place. These preserves should be consumed within the year. They can be used to make sauces and other preparations when there are no fresh tomatoes on the market.**

**[back to Index](#)**

**How to prepare tomato pulp**

**We are now going to see how to prepare tomato pulp.**

**Preparations:**

**Let's take the tomatoes of different shapes and sizes that we put aside just now. You remember they were picked in the morning. They were not squashed during trasport, they were not left in the sun and they have been carefully washed. They must also be well drained.**

**Washing the jars and your hands:**

**The jars are washed with hot water and sand or small pebbles. Wash your hands before cutting the tomatoes. Soap is not necessary and it could leave a bad taste.**



**Cutting the tomatoes:**

**The tomatoes are cut in half and checked inside for any that might be rotten.**

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**Extracting the pulp:**

**The opened tomatoes go into a device called an extractor. It extracts the pulp. It separates the pulp from the seeds and the skin. If there is no extractor available, you can also cut the tomatoes into smaller parts.**





**Leave away the seeds and squash them. Put the squashed tomatoes through a sieve and repeat this several times to help crush the pulp and maximize the yield.**

**Pre-heating:**

**When all the pulp is collected, we pour it into a cooking pot. The pot is placed on the fire for what is called the pre-heating. It must simmer without ever boiling.**

**Adding lemon juice:**

**A small spoonful of lemon juice without pips goes into each clean, empty jar.**

**Closing the jars:**

**Now fill in the tomato pulp. The jar must not be filled right to the top! Leave about one to two fingers wide of air underneath the lid. Otherwise the jars can burst during sterilisation. Be sure to screw the lid on tightly.**

**Sterilising the jars:**

The jars with the pulp are sterilized in a pot, just as with the jars of peeled tomatoes, with straw, a big stone to hold them down, and water which will be boiled for 45 minutes. They can be sterilized at the same time as the other jars if there is enough room in the pot.

**Sterilization time:**

Size of container in litres	Temperature of the contents	Sterilization time
0.33	60°	40 minutes
0.5	60°	45 minutes
0.66	60°	55 minutes
0.75	60°	1 hour
1 litre	60°	1 hour and 10 minutes

**Keeping the tomato preserves:**

What are you up to? You're dipping your finger in the jar to find out if it's good? Of



**course it's good! But once the lid has been unscrewed, the tomatoes won't keep long: they must be used the same day. So open the jar only when you are ready to use the peeled tomatoes.**

**[back to Index](#)**

## **How to prepare dried tomatoes**

**We will now see how to prepare dried tomatoes. Whatever their shape, all red tomatoes are good for drying. Prepare only as many as can be dried at one time.**

### **Washing our hands:**

**Now and every time we handle food, let's not forget to wash our hands first.**

### **Washing and cutting the tomatoes:**

**We wash the tomatoes, cut them in half, lengthwise.**



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**Picking out the pips: Pick out the pips using our thumbs, without crushing the pulp.**

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**Drying the pips in the sun:  
These pips are left to dry in the sun. They will provide us with new tomato plants.**



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**Cut the tomatoes into slices:**

**We cut each half-tomato into slices one centimetre thick, as evenly as possible. Slices of the same thickness will take the same time to dry.**

**Just drying these tomatoes means that they can be kept for at least three months. But additional processing is necessary if we want to keep them longer.**

**How to preserve the tomatoes longer than three months:**

**Preparations:**

**To do that, first add to the water in the pot a soup-spoonful of salt and a soup-spoonful of preservative per litre of water (citric acid powder). This will prevent blackening of the tomatoes during the drying process. Then we boil it, stirring it with a wooden spoon.**

**"Blanching":**

We put the tomato slices in a piece of cloth or in a very clean basket, and plunge the whole thing into this boiling water for three minutes. This is called "blanching". Blanching means boiling of vegetables before drying them to kill the enzymes. So they will not spoil the food during drying. Then we drain them.

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The tomato slices are ready to be put in the dryer.

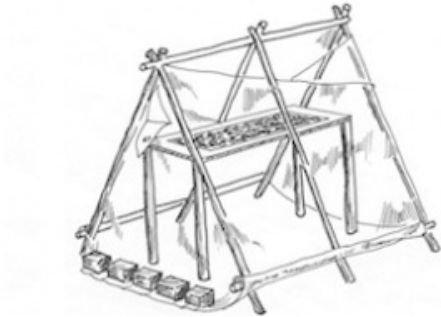


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There are several types of modern dryers, of varying sizes. The first one on the left side is a fixed solar dryer. The one on the right side is a simpler, cheaper to build and mobile. But the drying system is the same. First of all, the plastic retains the heat of the sun and, secondly, the air circulates inside, coming in at the bottom and going out at the top. The plastic or mosquito netting prevents flies and other insects to spoil the drying tomatoes.

**How to build a dryer:**

**The drawing shows another simple solar dryer.**



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**Drying the tomatoes:**  
Inside the dryers, the tomato slices will be placed on trays made of slatted plastic and mosquito netting. The tomato slices are spread out on the tray as evenly as possible.

**The dryer is shut immediately to protect the tomatoes from dust and flies. A**



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**dried basil leaf in the dryer will gives the tomatoes an extra flavour.**

**Two and a half days later, the tomatoes are dry. They are gathered up and are cooled off for half an hour in a shady place.**



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**They can then be put in polythene bags.**

**The bags of dried tomatoes are kept in cardboard boxes with straw to protect them from damp. In this way they will keep for a year.**





### **Cooking:**

**When we want to use the dried tomatoes, we soak them in cold water (for a maximum of two hours) before preparing a sauce. Use the water that the tomatoes have been soaked in for cooking, because there are nutrients from the tomatoes solved in this water.**

**They can also be ground into tomato powder. A soup-spoonful of this powder is enough for a sauce for six to eight people.**

**[back to Index](#)**

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[back to Index](#)

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[Search](#)

[Publications](#) [About us](#) [Publications:](#)

[us](#) [TOF](#) 

[Home](#) [Help](#) [Contact](#)

You are here: [Home](#) > [Plant Health](#) > [Fruit and vegetable processing](#) > [Drying of fruit and vegetables](#) [Back](#)

**Crops/ fruits/  
vegetables**

**Pests/  
diseases/  
weeds**

[Print](#) 

**Drying of fruit and vegetables**

**Medicinal  
plants**

**[Fruit and  
vegetable  
processing](#)**

**[Drying of  
fruit and  
vegetables](#)**

**Methods for  
tomato  
preservation**

**Natural pest  
control**

**Cultural  
practices**

**[more Images](#)**

**[General information on fruit and  
vegetable drying](#)**

**[Basic hygiene requirements](#)**

**[Recipes](#)**

**[Information Source Links](#)**

### **General information on fruit and vegetable drying**

**Drying of agricultural products is the oldest and widely used preservation method. Drying aims at reducing the water content as much as possible to stop microbial activities and deterioration. Moisture left in the dried foods varies between 2-30% depending on the type of food. In tropical countries, solar dryers can be used to dry fresh produce when average relative humidity is below 50% during drying period. Drying lowers weights and volume of the product hence lowers costs in transportation and storage. However, drying also lowers nutritional value of the product e.g. through loss of vitamin C. Drying can lead to changes of colour and appearance that might not be desirable.**

### **General procedure for fruits:**

- **Select firm ripe fruit**
- **Wash the fruits in clean water**

- **Peel and remove damaged and discolored parts**
- **Slice/cut into thin uniform slices or cubes**
- **Pre-treat with lemon juice or sugar solution**
- **Spread on trays and load into the dryer**
- **Control the temperature by opening the dryer door**
- **Pack the dried product in moisture-proof packs**
- **Store in a cool, dark, dry, well-ventilated place**

**Fruits like mangoes, pawpaws, guavas and bananas can easily be dried. However, they should be harvested at the right stage and ripeness. Hard ripe stage in mangoes, pawpaws and bananas gives best results. Avoid overripe or underripe fruits in order to obtain good products. To prepare the fruits for drying, wash them thoroughly with clean water. The fruits are peeled if necessary and cut into smaller uniform pieces to ensure faster drying. Stainless steel knives are recommended for peeling and cutting of the slices or pieces. To avoid discoloration and excessive vitamin losses, treatment with anti-oxidants like citrus (lemon) juice is done. Fruits like pineapples may require pre-cooking to soften fibrous tissue hence hasten drying. Drying is done on trays, which should be made of wood, fabric, plastic or sisal material. This is because metal materials may affect the drying product negatively e.g. copper destroys vitamin C, iron rusts, aluminium discolours fruits and corrodes.**

**Most fruits have natural acids and sugars which are preservatives therefore moisture contents of about 20% i.e. leathery and springy dry (not brittle) is good for storage. This is however dependent on the fruit or vegetable. After the correct stage of dryness is achieved the product should be removed from the dryer parked, and stored in a dry, dark store.**

**Vegetables: Vegetables like tomatoes, kales, cowpeas leaves, cabbages and pumpkin leaves can be dried. Tender healthy vegetables are selected for drying. To prepare the vegetables for drying, wash and remove old and damaged parts and then chop/slice for better drying.**

**Blanching A solution of water and salt is prepared (varying in strength depending on products) and boiled. The vegetables for drying are dipped into the hot boiled solution in a piece of clean cloth (or basket). Kale, other hard leafy vegetables and cabbages should be dipped in the hot boiling solution for 3 minutes while spinach and soft leafy vegetables require only 2 minutes. To avoid overcooking, boil the blanching water before dipping the vegetables. Dip the vegetables in cold water immediately after removing them from the boiled solution to prevent further cooking. After blanching the vegetables are spread on trays and dried, then parked and stored in dry, dark store.**

**Blanching is carried out to improve the quality by inactivating the enzymes, reducing the microorganisms, softening the vegetables, and preserve the natural colour of the green vegetables when they are dried.**

**NB: Some vegetables like garlic, coriander (dhania) and parsley should not be blanched.**

**[back to Index](#)**

### **Basic hygiene requirements**

**Food products are prone to contamination, which can affect the health of consumers. To have a good processed product, standards of hygiene must be followed and maintained during preparation, processing and storage.**

#### **Personal hygiene:**

- **Avoid rings, bangles and nail polish during processing.**
- **Wash hands carefully with soap and running water.**
- **Do not be involved in processing when you are sick and/or when having open wounds.**
- **Maintain personal cleanliness including body and clothes.**

- **Keep nails short and clean.**

### **Cleanliness of equipment and utensils**

**The equipment and utensils should be properly cleaned before and after use:**

- **Scrub wooden equipment, e.g. tables and benches, with soap water and brushes and then rinse thoroughly.**
- **Dry the utensils on a dish rack or wipe them dry with a clean cloth and store them in a dust free place**

**[back to Index](#)**

### **Recipes**

#### **Dried mangoes slices**

##### **Ingredients:**

- **Mangoes**
- **Lemon juice**
- **Water**

##### **Method:**

- 1. Select and weigh hard ripe fresh mangoes.**

- 2. Wash the fruits thoroughly in clean water.**
- 3. Peel the mangoes**
- 4. Slice the peeled fruits into thin uniform slices.**
- 5. Prepare lemon juice/water solution in the ratio of 1 part lemon juice to 20 parts of water.**
- 6. Deep the mango slices in this solution then arrange them on the trays (single layer).**
- 7. Load the trays in the dryer (the dryer should be facing the sun).**
- 8. Shift the trays in the dryer occasionally until the slices are dry.**
- 9. Unload the dryer for sorting and packaging of the dried slices.**
- 10. Pack the dried slices into moisture proof containers and store in a cool, dark place.**

### **Dried bananas**

#### **Ingredients:**

- **Hard ripe bananas.**
- **Lemon juice**
- **Water**

#### **Method:**

- 1. Peel the bananas.**
- 2. Cut thin longitudinal slices.**



- 3. Dip the slices in the diluted lemon juice (1 part lemon juice: 20 parts water). This step can be avoided if product is meant for young children.**
- 4. Arrange the slices in single layer on the trays.**
- 5. Load the trays into the dryer**
- 6. Shift the trays occasionally until the slices are dry.**
- 7. Unload the dryer**
- 8. Pack the dried bananas into moisture proof containers and store in a cool, dark place.**

**For more information on recipes see Online Farmer Training manual on drying of fruits and vegetables : <http://www.gtz-treecrops.org/Downloads/Manuals/Processing/Module3.pdf> (click [here](#)) and then scroll down using the "Page Down" button on the keyboard or click on the bar on the right side of the screen and drag down.**

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**back to Index**

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**Search**

**Publications** **About**

**us** **TOF** 

**Home** **Help** **Contact**

**You are here: Home > Plant Health > Fruit and vegetable processing**

**Back**

**Print** 

**Crops/ fruits/  
vegetables**

**Images**

**Pests/  
diseases/  
weeds**

**Medicinal  
plants**

**Fruit and  
vegetable  
processing**

**Drying of  
fruit and  
vegetables**

**Methods for  
tomato  
preservation**

**Natural pest  
control**

**Cultural  
practices**



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**Search**

**Publications** **About**

**us** **TOF**

**Home** **Help** **Contact**

**You are here: Home > Plant Health > Fruit and vegetable processing**

**Back**

**Print**

**Crops/ fruits/  
vegetables**

**Images**

**Pests/  
diseases/**

**Solar dryer**

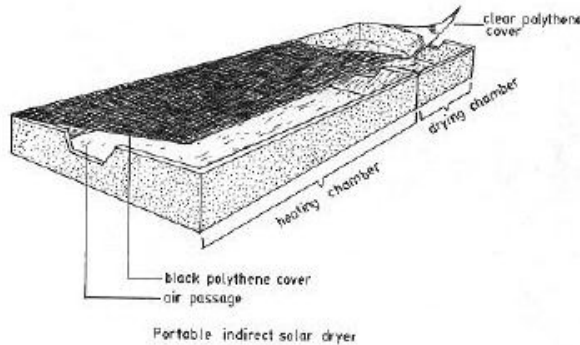
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**Medicinal plants**

**Fruit and vegetable processing**

**Drying of fruit and vegetables**

**Methods for tomato preservation**



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[Publications](#) [About](#)

[us](#) [TOF](#)

[Home](#) [Help](#) [Contact](#)

**You are here: [Home](#) > [Plant Health](#) > Fruit and vegetable processing**

**← Back**

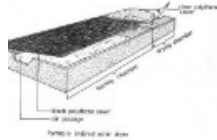
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**Crops/ fruits/ vegetables**

**Pests/  
diseases/  
weeds**

**Medicinal  
plants**

**Fruit and  
vegetable  
processing**



**Drying of fruit Methods for  
seed tomato**

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fruit and  
vegetables  
Methods for  
tomato  
preservation**

**nato preservation**

**Methods for tomato preservation**

**Natural pest  
control**

**Cultural  
practices**

**atoes, it is easy to make preserves. With the help of these techniques, we shall prepare jars of peeled tomatoes and tomato pulp and dried tomatoes. With these preserves, we will be able to make red sauces and other preparations all year round, even when there are no more fresh tomatoes on the market.**



**Picking:**

**Sunrise is the best time to pick tomatoes. They are still cool from the last hours of the night. Red, really red, these are the right tomatoes for us! They are the richest in vitamins. Very red, ripe but fairly firm with no black spots or blemishes, these tomatoes will make firstrate preserves.**

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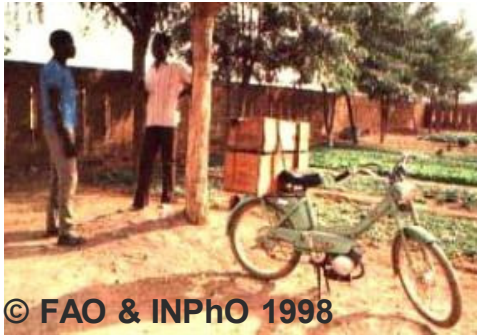
**Transport:**

**To transport these fine fruits, we use basins or crates. But be careful not to put in too many at a time. Did you notice that the boxes are not completely full? So, when we put one on top of the other, the tomatoes underneath will not be squashed. Remember that we can't make good preserves out of damaged tomatoes.**

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**We've got to get our tomatoes quickly to the house. Our team is waiting to start.**

**Hey, we said "quick!" This is not the moment to stop**



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**for a chat! You may be in the shade, but your tomatoes are in the sun. They are going to go bad, man! And you can't make good preserves out of tomatoes that have been lying in the sun.**



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**Hygiene:**

**Let's start by washing our hands, without using scented soap: the scent clinging to the skin will give the tomatoes a bad taste.**

**Cleaning the tomatoes:**

**And then let's wash our tomatoes.**

**Choosing the tomatoes:**



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### How to make peeled tomato preserves

**Let's take the best ones to make peeled tomato preserves. So that they look nice, we choose tomatoes all more or less the same size. The others will be kept to make pulp or dried. Later on we will see how.**

**To begin with, we are going to explain how to prepare peeled tomato preserves.**



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#### **Boiling the tomatoes:**

**Some washed tomatoes (10-15) are put into a bowl. They are dipped gently into boiling water for thirty seconds.**

#### **Loosen the skin:**

**After thirty seconds, they are taken out of the cooking pot as quickly as possible with a sieve. They are plunged immediately into cold water for a few minutes. Immersion in cold water**



**after the boiling water helps to loosen the skin.**



**We peel tomatoes completely without leaving any skin on them. Now we want to preserve the peeled tomatoes.**



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### **Cleaning the jars:**

**The jars and the lids must also be clean. Let's wash them with hot water. If they are very dirty, we can rub them clean with sand or small pebbles. Everything is clean, so now the jars can be filled with the peeled tomatoes.**

### **Filling the jars:**

**The tomatoes are packed in by tapping the bottom of the**



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**jar with one hand so the tomatoes are shaken down and fit snugly against each other.**



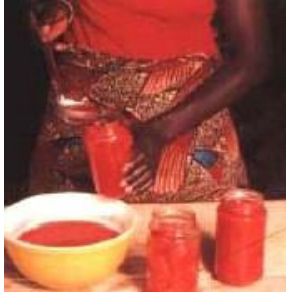
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**Adding lemon juice:**

**This is the moment to add to each jar a little lemon juice without pips. Watch for the pips! The lemon juice is necessary for preservation. One coffee-spoonful per half-litre jar is enough.**

**Adding hot pulp:**

**We also add some hot pulp to fill up the jar. The jar must not be filled right to the top! Leave about one centimetre of air underneath the lid.**



**Closing the jars:  
Be sure to screw the lid on tightly.**

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**Preparations for sterilising the jars:  
The jars are closed and must now be sterilized. The bottom of a pot is covered with straw. The jars are placed on it, and then more straw put in between the jars to prevent them from knocking against each other. A flat lid and a big stone on top of it will keep the jars steady and in place.**

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**Sterilizing the jars:**

The pot is filled with water. The top jars must be at least two centimetres under the water. Now lit a fire and wait for the water to start boiling. It should boil for 45 minutes. 45 minutes for half-litre jars. There's no point in boiling them any longer. After 45 minutes, the preserves are sterilized. Put out the fire and leave the jars to cool.

**Finishing the peeled tomato preserves:**

Next morning the jars are rinsed and dried. You can stuck a label on every jar with the name of the product, the name of the group or cooperative and the expiry date. Preferably, these jars should be kept in a cool, dark place. These preserves should be consumed within the year. They can be used to make sauces and other preparations when there are no fresh tomatoes on the market.

**How to prepare tomato pulp**

We are now going to see how to prepare tomato pulp.

**Preparations:**

**Let's take the tomatoes of different shapes and sizes that we put aside just now. You remember they were picked in the morning. They were not squashed during transport, they were not left in the sun and they have been carefully washed. They must also be well drained.**

**Washing the jars and your hands:**

**The jars are washed with hot water and sand or small pebbles. Wash your hands before cutting the tomatoes. Soap is not necessary and it could leave a bad taste.**



**Cutting the tomatoes:**

**The tomatoes are cut in half and checked inside for any that might be rotten.**

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**Extracting the pulp:**

**The opened tomatoes go into a device called an extractor. It extracts the pulp. It separates the pulp from the seeds and the skin. If there is no extractor available, you can also cut the tomatoes into smaller**



**parts. Leave away the seeds and squash them. Put the squashed tomatoes through a sieve and repeat this several times to help crush the pulp and maximize the yield.**

### **Pre-heating:**

**When all the pulp is collected, we pour it into a cooking pot. The pot is placed on the fire for what is called the pre-heating. It must simmer without ever boiling.**

### **Adding lemon juice:**

**A small spoonful of lemon juice without pips goes into each clean, empty jar.**

### **Closing the jars:**

**Now fill in the tomato pulp. The jar must not be filled right to the top! Leave about one to two fingers wide of air underneath the lid. Otherwise the jars can burst during sterilisation. Be sure to screw the lid on tightly.**

### **Sterilising the jars:**

**The jars with the pulp are sterilized in a pot, just as with the jars of peeled tomatoes,**

**with straw, a big stone to hold them down, and water which will be boiled for 45 minutes. They can be sterilized at the same time as the other jars if there is enough room in the pot.**

### **Sterilization time:**

<b>Size of container in litres</b>	<b>Temperature of the contents</b>	<b>Sterilization time</b>
<b>0.33</b>	<b>60°</b>	<b>40 minutes</b>
<b>0.5</b>	<b>60°</b>	<b>45 minutes</b>
<b>0.66</b>	<b>60°</b>	<b>55 minutes</b>
<b>0.75</b>	<b>60°</b>	<b>1 hour</b>
<b>1 litre</b>	<b>60°</b>	<b>1 hour and 10 minutes</b>

### **Keeping the tomato preserves:**

**What are you up to? You're dipping your finger in the jar to find out if it's good? Of course it's good! But once the lid has been unscrewed, the tomatoes won't keep long: they must be used the same day. So open the jar only when you are ready to use the peeled tomatoes.**



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## How to prepare dried tomatoes

We will now see how to prepare dried tomatoes. Whatever their shape, all red tomatoes are good for drying. Prepare only as many as can be dried at one time.

### Washing our hands:

Now and every time we handle food, let's not forget to wash our hands first.



### Washing and cutting the tomatoes:

We wash the tomatoes, cut them in half, lengthwise.

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**Picking out the pips: Pick out the pips using our thumbs, without crushing the pulp.**

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**Drying the pips in the sun:  
These pips are left to dry in the sun. They will provide us  
with new tomato plants.**

**Cut the tomatoes into slices:**

**We cut each half-tomato into slices one centimetre thick, as evenly as possible. Slices of the same thickness will take the same time to dry.**

**Just drying these tomatoes means that they can be kept for at least three months. But additional processing is necessary if we want to keep them longer.**

**How to preserve the tomatoes longer than three months:**

**Preparations:**

**To do that, first add to the water in the pot a soup-spoonful of salt and a soup-spoonful of preservative per litre of water (citric acid powder). This will prevent blackening of the tomatoes during the drying process. Then we boil it, stirring it with a wooden spoon.**

**"Blanching":**

**We put the tomato slices in a piece of cloth or in a very clean**



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**basket, and plunge the whole thing into this boiling water for three minutes. This is called "blanching". Blanching means boiling of vegetables before drying them to kill the enzymes. So they will not spoil the food during drying. Then we drain them.**

**The tomato slices are ready to be put in the dryer.**

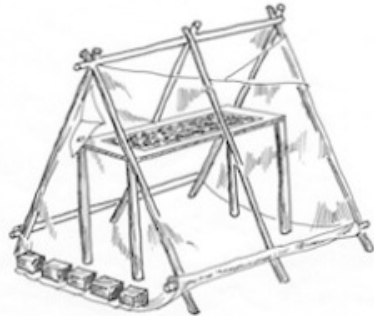


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**There are several types of modern dryers, of varying sizes. The first one on the left side is a fixed solar dryer. The one on the right side is a is simpler, cheaper to build and mobile. But the drying system is the same. First of all, the plastic retains the heat of the sun and, secondly, the air circulates inside, coming in at the bottom and going out at the top. The plastic or mosquito netting prevents flies and other insects to spoil the drying tomatoes.**

**How to build a dryer:**

**The drawing shows another simple solar dryer.**



### **Drying the tomatoes:**

**Inside the dryers, the tomato slices will be placed on trays made of slatted plastic and mosquito netting. The tomato slices are spread out on the tray as evenly as possible.**

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**The dryer is shut immediately to protect the tomatoes from dust and flies. A dried basil leaf in the dryer will give the tomatoes an extra flavour.**

**Two and a half days later, the tomatoes are dry. They are gathered up and are cooled off for half an hour in a**



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**shady place.**

**They can then be put in polythene bags.**

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**The bags of dried tomatoes are kept in cardboard boxes with straw to protect them from damp. In this way they will keep for a year.**



### **Cooking:**

**When we want to use the dried tomatoes, we soak them in cold water (for a maximum of two hours) before preparing a sauce. Use the water that the tomatoes have been soaked in for cooking, because there are nutrients from the tomatoes solved in this water.**

**They can also be ground into tomato powder. A soup-spoonful of this powder is enough for a sauce for six to eight people.**

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- **COPYRIGHT AND OTHER INTELLECTUAL PROPERTY RIGHTS: Food and**

**Agriculture Organization of the United Nations (FAO) and the Information Network on Post-Harvest Operations (INPhO) 1998. See an online filmstrip under <http://www.fao.org/docrep/S6570E/S6570E00.htm>**

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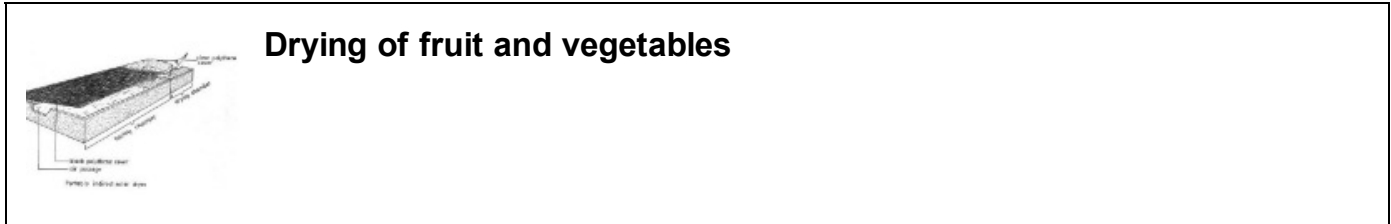
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## **Drying of fruit and vegetables**



### **General information on fruit and vegetable drying**

**Drying of agricultural products is the oldest and widely used preservation method. Drying aims at reducing the water content as much as possible to stop microbial activities and deterioration. Moisture left in the dried foods varies between 2-30% depending on the type of food. In tropical countries, solar dryers can be used to dry fresh produce when average relative humidity is below 50% during drying period. Drying lowers weights and volume of the product hence lowers costs in**

**transportation and storage. However, drying also lowers nutritional value of the product e.g. through loss of vitamin C. Drying can lead to changes of colour and appearance that might not be desirable.**

### **General procedure for fruits:**

- **Select firm ripe fruit**
- **Wash the fruits in clean water**
- **Peel and remove damaged and discolored parts**
- **Slice/cut into thin uniform slices or cubes**
- **Pre-treat with lemon juice or sugar solution**
- **Spread on trays and load into the dryer**
- **Control the temperature by opening the dryer door**
- **Pack the dried product in moisture-proof packs**
- **Store in a cool, dark, dry, well-ventilated place**

**Fruits like mangoes, pawpaws, guavas and bananas can easily be dried. However, they should be harvested at the right stage and ripeness. Hard ripe stage in mangoes, pawpaws and bananas gives best results. Avoid overripe or underripe fruits in order to obtain good products. To prepare the fruits for drying, wash them thoroughly with clean water. The fruits are peeled if necessary and cut into smaller uniform pieces to ensure faster drying. Stainless steel knives are recommended for peeling and cutting of the slices or pieces. To avoid discoloration and excessive vitamin losses, treatment with anti-oxidants like citrus (lemon) juice is done. Fruits**



**like pineapples may require pre-cooking to soften fibrous tissue hence hasten drying. Drying is done on trays, which should be made of wood, fabric, plastic or sisal material. This is because metal materials may affect the drying product negatively e.g. copper destroys vitamin C, iron rusts, aluminium discolours fruits and corrodes.**

**Most fruits have natural acids and sugars which are preservatives therefore moisture contents of about 20% i.e. leathery and springy dry (not brittle) is good for storage. This is however dependent on the fruit or vegetable. After the correct stage of dryness is achieved the product should be removed from the dryer parked, and stored in a dry, dark store.**

**Vegetables: Vegetables like tomatoes, kales, cowpeas leaves, cabbages and pumpkin leaves can be dried. Tender healthy vegetables are selected for drying. To prepare the vegetables for drying, wash and remove old and damaged parts and then chop/slice for better drying.**

**Blanching A solution of water and salt is prepared (varying in strength depending on products) and boiled. The vegetables for drying are dipped into the hot boiled solution in a piece of clean cloth (or basket). Kale, other hard leafy vegetables and cabbages should be dipped in the hot boiling solution for 3 minutes while spinach and soft leafy vegetables require only 2 minutes. To avoid overcooking, boil the blanching water before dipping the vegetables. Dip the vegetables in cold water immediately after removing them from the boiled solution to prevent further cooking. After**

**blanching the vegetables are spread on trays and dried, then parked and stored in dry, dark store. Blanching is carried out to improve the quality by inactivating the enzymes, reducing the microorganisms, softening the vegetables, and preserve the natural colour of the green vegetables when they are dried.**

**NB: Some vegetables like garlic, coriander (dhania) and parsley should not be blanched.**

## **Basic hygiene requirements**

**Food products are prone to contamination, which can affect the health of consumers. To have a good processed product, standards of hygiene must be followed and maintained during preparation, processing and storage.**

### **Personal hygiene:**

- **Avoid rings, bangles and nail polish during processing.**
- **Wash hands carefully with soap and running water.**
- **Do not be involved in processing when you are sick and/or when having open wounds.**
- **Maintain personal cleanliness including body and clothes.**
- **Keep nails short and clean.**

## **Cleanliness of equipment and utensils**

**The equipment and utensils should be properly cleaned before and after use:**

- **Scrub wooden equipment, e.g. tables and benches, with soap water and brushes and then rinse thoroughly.**
- **Dry the utensils on a dish rack or wipe them dry with a clean cloth and store them in a dust free place**

## **Recipes**

### **Dried mangoes slices**

#### **Ingredients:**

- **Mangoes**
- **Lemon juice**
- **Water**

#### **Method:**

- 1. Select and weigh hard ripe fresh mangoes.**
- 2. Wash the fruits thoroughly in clean water.**
- 3. Peel the mangoes**
- 4. Slice the peeled fruits into thin uniform slices.**
- 5. Prepare lemon juice/water solution in the ratio of 1 part lemon juice to 20 parts of water.**

- 6. Deep the mango slices in this solution then arrange them on the trays (single layer).**
- 7. Load the trays in the dryer (the dryer should be facing the sun).**
- 8. Shift the trays in the dryer occasionally until the slices are dry.**
- 9. Unload the dryer for sorting and packaging of the dried slices.**
- 10. Pack the dried slices into moisture proof containers and store in a cool, dark place.**

## **Dried bananas**

### **Ingredients:**

- **Hard ripe bananas.**
- **Lemon juice**
- **Water**

### **Method:**

- 1. Peel the bananas.**
- 2. Cut thin longitudinal slices.**
- 3. Dip the slices in the diluted lemon juice (1 part lemon juice: 20 parts water). This step can be avoided if product is meant for young children.**
- 4. Arrange the slices in single layer on the trays.**
- 5. Load the trays into the dryer**
- 6. Shift the trays occasionally until the slices are dry.**

**7. Unload the dryer**

**8. Pack the dried bananas into moisture proof containers and store in a cool, dark place.**

**For more information on recipes see Online Farmer Training manual on drying of fruits and vegetables : <http://www.gtz-trecrops.org/Downloads/Manuals/Processing/Module3.pdf> (click here) and then scroll down using the "Page Down" button on the keyboard or click on the bar on the right side of the screen and drag down.**

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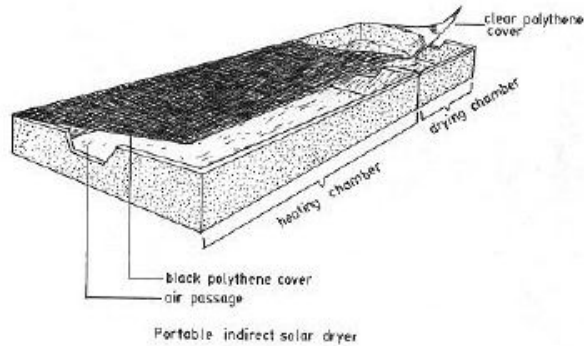
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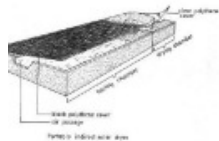
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