



partageons les connaissances au profit des communautés rurales
sharing knowledge, improving rural livelihoods

Rural Radio Resource Pack

08/01

**DRYING AGRICULTURAL
PRODUCE**



CTA is funded by the
European Union

The Technical Centre for Agricultural and Rural Cooperation (CTA) was established in 1983 under the Lomé Convention between the ACP (African, Caribbean and Pacific) Group of States and the European Union Member States. Since 2000, it has operated within the framework of the ACP-EC Cotonou Agreement.

CTA's tasks are to develop and provide services that improve access to information for agricultural and rural development, and to strengthen the capacity of ACP countries to produce, acquire, exchange and utilise information in this area.

Rural radio

Radio remains, despite all the interest in the new ICTs, one of the most important communication tools in ACP rural communities. CTA began supporting rural radio back in 1991. Every year since then we've produced a set of Rural Radio Resource Packs (RRRPs).

Each pack is on a specific topic – anything from crop storage and cassava to small ruminants and soil fertility. The choice of topics depends on what ACP partners suggest. The number of topics covered has now reached 51. Inside each pack are materials for a radio programme on that topic – interviews on cassette or CD, a transcription and a suggested introduction for each interview, technical information on the topic, advice for how the pack can be used and a questionnaire for users to provide feedback to CTA.

You can find most of the RRRP material on CTA's Rural Radio website
<http://ruralradio.cta.int/>.

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This CD can be played in an audio CD player, and also contains pdf files of the written documents and the feedback questionnaire.



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Drying agricultural produce

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Drying agricultural produce

TECHNICAL INFORMATION

Introduction

In most African countries, agriculture is the engine of economic growth. But growing crops is only part of the story when it comes to making money and feeding the family. What happens after food cultivation and harvest is just as important. Profit is all about value addition – processing your crops or livestock into something that fits a niche market.

One way to add value to agricultural produce is to dry it. With the right equipment and knowledge, produce can be sold locally or even internationally for a good price. But there is a secret to good drying. It needs to be done effectively, thoroughly, and losing minimal vitamins that are so important in our food and that of our livestock.

A lot of the food that smallscale farmers grow can go to waste in the market because of surpluses at harvest time. So drying can be a very good method of food and nutrient preservation, as well as a way of increasing value and ultimately profits.

But drying fruits, vegetables, meat and fish is not without risk. Unlike other food products, dried produce can be eaten raw. And because they are raw, they are a source of food-borne infection. So hygiene at every stage – handling, drying, sorting and packaging – is critically important.

Some of the health and hygiene concerns when preparing and drying agricultural produce are covered in this pack. Using boiled water is important when washing foods before cutting and cooking them. You should make sure that you use separate areas for washing raw produce and cooking, because germs can be easily transferred.

This resource pack

Almost any kind of vegetables or fruit can be dried. Even meat and fish taste good when they are dry. In this pack, we can't possibly begin to cover all the different kinds of agricultural produce that can be dried! But we can explore the different ways that they can be dried, whether for sale locally or internationally.

We will look at some of the most effective methods of drying produce, and how to improve. For example, sun drying can be an effective way to preserve produce when the market is flooded with one particular food at harvest time, so that it can be saved and eaten when food is scarce. Listening to the interview on solar drying, you will realise that there are steps to enable you to make the most of dried agricultural produce – practical steps which you can pass on to your listeners.

Investment is needed to build solar drying technology, but once the structure is there, you can earn more from your dried produce. Other methods we will look at include pre-treatment of foods before preservation and drying animal fodder. In every case, the interviews aim to give advice on the most effective way of drying and selling the produce of smallscale farmers in your audience, so that they may be able to get a better income.

Sun drying

For centuries, sun drying has been a way of preserving and saving foods so that they can be eaten during times of scarcity. It is a cheap method of drying produce – sunlight is free and the only costs involve drying mats or platforms, and cutting equipment. But there are disadvantages

too. The temperature of sunlight cannot be controlled, leading to over- or under-dried goods. The weather is not always sunny, and sometimes the drying process can take several days.

Before sun drying, the fruits, vegetables or meat are selected, rinsed and sliced. They are then exposed to direct sunlight, turned periodically and tested to ensure that they are dry enough. It is important to make sure that all of the moisture has evaporated. If moisture remains, it can cause decay and encourage bacteria and dangerous microbes to form. To attract the most heat from the sun, lay your produce on black material – because black absorbs more sunlight than any other colour.

Sun drying exposes produce to dust and insects, so it is important to ensure that it is either raised off the ground or protected from the wind by plastic sheets or leaves. A simple way to create a raised platform is by using wood or bamboo sticks on which you can dry your produce. In ***Using the sun's rays***, Ismaila Senghore spoke to Peter Monnie from a fishing community on the beaches of the Gambia. He is using stalks from the 'rhun' tree to make a platform for drying fish.

Solar drying

Another way of using the sun's rays to dry food is solar drying. Instead of leaving produce in the heat to dry on its own, heat is trapped inside a box, and used to heat the produce enough to dry it, but not enough to cook it. Building a solar drier needs investment. Plastic sheets, wire mesh and wooden frames all need to be bought or found locally. But the technology is not expensive, and the value added to the produce could result in a good profit. In ***Investing in solar drying technology***, Winnie Onyimbo speaks to Margaret Mimoh, of Honey Care Africa Ltd to find out more.

Solar driers are wooden or metal frames, with sliding trays of with wire mesh – and these are what the sliced fruits or vegetables sit on when they are drying. The drier works by trapping heat inside the drawers which causes the moisture inside the fruits to evaporate. Because the process is done slowly, the produce should retain its colour, and almost all its nutrients.

The end product has a long shelf life, providing a source of vitamins and minerals when the fresh fruits themselves may not be in season. But there are other advantages too. Dried produce is easy to handle and package – making marketing and transportation much easier. Dried fruit is very popular in European countries, making them an attractive export. Although strict standards are applied for export goods, with the know-how and investment, solar drying could be a profitable business.

Pre-drying treatments

Before drying your produce, there are treatments that can be used to make the drying process more effective. Examples of natural ingredients used in pre-drying include soaking briefly in sugar or salt solution to reduce moisture content and prevent the growth of bacteria and fungi.

Blanching is the process of putting a piece of vegetable or fruit into boiling water for a short period of time, and then putting it in cold water to 'shock' it and stop the food from becoming fully cooked. There is also steam blanching, where a wire rack or sieve is placed inside a pot. The pot of water is brought to the boil, and the vegetables are placed in the wire rack, which is placed about 8 centimetres above the boiling water. This way the vegetables are not actually boiled.

Blanching can have many advantages. For example, it loosens the skin on tomatoes, making peeling easier, and it allows beans and green vegetables to retain their colour. But importantly, blanching kills bacteria and neutralises enzymes in the food, which otherwise remain active and can cause decay.

In ***Before the drying process***, Sylvia Jiyane talks to Tinashe Chikowore, from Environment Africa, about other things to consider before drying foods. He mentions the importance of separating washing areas from cutting areas to prevent the spread of germs and bacteria. Whenever you can, always use clean or boiled water to prepare the produce before drying. He also talks about the very first step – how to choose which vegetables or fruits you want to dry.

Methods of drying meat and fish

There are many reasons for drying meat and fish. The process does not only preserve the produce, but it also changes the flavour. Smoking, for example, can add a whole different taste to foods, and smoked products are often a delicacy because of the time taken to process them. But the main consideration when drying meat or fish is hygiene. Maintaining quality is very important because microbial infections caused by decay can cause serious illnesses in consumers.

The most popular product made from beef is biltong, and for the finest cuts, sirloin or steaks cut from the hip are used. Ideal drying conditions are in a breezy place away from direct sunlight but well-lit to prevent bacteria and fungus from forming. An electric lamp can be used but take care to keep the space breezy. Make sure that the meat is kept away from insects, pests and greedy humans who insist on eating the biltong before it is ready! The meat is safe when it is hard and dry. To find out more, listen to ***Drying and preserving meat***, where Martha Chindong speaks to Chofor Ndimofor of the Ministry of Secondary Education in Cameroon.

Preparing dried produce for export

There is a big international market for dried fruits and vegetables – especially in Europe. But European supermarkets have strict standards, which smallscale farmers often find too expensive to enforce, such as the European Retail Standards for Good Agricultural Practice, or EUREPGAP. Strict levels of hygiene, and accounting are important, so that those suppliers who buy dried products can see exactly how they were dried, sorted, and where they come from.

Investment in equipment is also needed. Plastic gloves are required for washing and slicing vegetables and fruits, and sorting sheds must comply with certain hygiene standards. These things cost money, and for a smallscale farmer, they are often impossible to afford. But by grouping together, farmers can form a cooperative and supply bigger markets. They can obtain credit, and use it to invest in the appropriate solar drying materials for example. From Ghana, Adu Domfeh sends this report – ***Dried ginger for export*** - about one organisation which has started selling the spice to Europe. Yogi Botanicals is one good example of a drying project that started small, but now has an international market.

Selling dried products for sale locally

Any buyer or consumer will tell you that one of the most important things to consider when supplying to local markets, is local demand – what your customers want. This is especially true of dried produce, because while dried mango may be very popular in Europe, for example, it may not be very popular in your local shop. If you cannot supply to local markets and you have already invested in solar drying technology, you may be disappointed. Before you grow or invest, do your research. When it comes to selling dried produce locally, you are in a better position than if you wanted to sell to export markets because you will have a good idea what people in your area like.

But that is not all you need to know when you want to produce something to sell in local markets. The best place to start, is to talk to the people you want to sell to. In ***Dried herbs and spices for the local market***, Busani Bafana speaks to John Daines, the owner of a restaurant called Art Groove. He wants to find out what kind of produce John buys for his restaurant, and why? These are the kinds of questions any business needs to answer if it wants to succeed. Market research is essential. Do your buyers want finely-chopped herbs or whole leaves? Do they want fancy packaging or will a simple bag do? For export, packaging can often be an important part of selling. Consumers often have a lot of choice between similar products and packaging can determine which they will buy. But in a place where spices or herbs may be scarce, packaging becomes far less important. What is the situation near you?

Smallscale drying enterprises

Starting up a business is a risky investment for anyone – which is why knowing the market is key. As already explored in ***Dried herbs and spices for the local market***, it is very important to

carry out research before borrowing money or growing fruits and vegetables to dry. Dried produce is not popular everywhere! Once the market has been researched, and the kind of produce you want to dry has been selected, the next step may be to look at credit options, or to form a group.

Drying products for feed and fodder

When forage is preserved by sun drying, it is called 'hay'. Many smallscale farmers make hay and store the crop residues to feed livestock during the dry season. Crops with thin stems and more leaves are best for making hay because they dry faster than crops with thicker stems. Grasses should be harvested for fodder before they flower because this is when they have the most nutrients. Although this also means less bulk, it does not mean lower profits.

The nutritional value of the dry fodder is higher than the fresh fodder, making it a more valuable commodity. In ***Feed and Fodder for livestock***, Baxter Zimba explains that farmers have to strike a balance between how much silage they make, when they harvest and how much nutritional value is retained in the silage. Fodder needs to be dried steadily and thoroughly.

Harvesting should be done when air humidity is low. After cutting, if forage is kept in moist conditions, it can go mouldy. The mould is very unpalatable and can cause mycotoxin poisoning in animals. Therefore, storage facilities are vital to ensure that the dried fodder does not go mouldy. If smallscale farmers can group together and invest in a moisture meter, they can measure the moisture content, which should be less than 15 per cent.

Using this Rural Radio Resource Pack

Using the sun's rays

You may want to use this interview with ***Investing in solar drying***, because the method of drying is similar, except that more equipment is needed. Remember that hygiene is an important part of drying produce, so you may want to combine this interview with the ***Pre-drying treatments*** topic which introduces hygiene tips.

Investing in solar drying technology

Investing in solar drying technology may be difficult. But with the right investment and inputs, solar drying can be very profitable – more profitable than the cheaper method of direct sun drying. It is therefore important that your farmers can get good advice about their options. If they are in financial difficulty already, they will not want to take unnecessary risks. Why not find a farmer who has made an investment in solar drying technology, and is now supplying bigger businesses? To hear about where to go next with marketing, combine this interview with ***A smallscale drying enterprise*** or ***Commercialisation of dried produce for the export market***. Maybe your listeners have formed a cooperative – and if they have not, could they group themselves together and create a fund to invest in the technology?

Pre-drying treatments

Although many farmers will already be familiar with drying techniques, this pack offers some practical advice on how to improve drying and preparation of produce. Many of the ingredients used in the pre-treatment of dried produce are natural, consisting of salt or sugar. There is also the technique of 'blanching', which means dropping the food in boiling water or allowing it to be steamed. You may want to invite a food hygienist to the studio to discuss with callers how they can sun dry safely. You can combine this interview with both ***Using the sun's rays*** and ***Investing in solar drying technology*** as they explain the next step in the sun drying process.

Methods of drying meat and fish

Smoking or drying not only preserves meat and fish – it changes the flavour too. In this interview Martha Chindong speaks to Chofor Ndimofor from the Ministry of Secondary Education in Cameroon who says that in some areas, dry meat is also a delicacy. Martha visits him at his home and finds him roasting a treat: rabbit. He suggests ingredients that can be used to spice up your meat, like chilli and ginger. Can your audience suggest local variations to try? You might

want to combine this interview with ***Pre-drying treatments***, for a more detailed look at the hygienic preparation of meat and fish. If there is a food hygienist in your area, you could invite him to the studio to share tips on how to store your meat safely.

Preparing dried produce for export

Many smallscale farmers operate alone. The purpose of this interview is to show that if farmers can group together and form associations or cooperatives, then they can sell to bigger companies. And selling to bigger companies may mean bigger profits. As Adu Domfeh finds out from the directors of Yogi Botanicals in Ghana, the standards are tough and investment is needed to buy technology. But by grouping together, there is a better chance of securing contracts with larger suppliers. Are farmers in your area already grouped together? Could you try conducting a phone-in to find out about the experiences of local cooperatives? Try broadcasting this interview with ***Dried spices and herbs for sale locally***, for farmers who do not want to supply to the export market, but instead want to supply locally.

Selling dried produce for sale locally

This interview shows how important it is to research local markets – such as restaurants – before trying to sell any kind of dried produce. You might want to invite restaurant owners onto your show to ask them what they look for when they source ingredients. Or you could invite other buyers – local shops or supermarkets – to share their buying preferences and standards with your audience. Why not combine this interview with ***Commercialisation of dried produce for export*** to compare requirements of different markets?

A smallscale drying enterprise

This interview with Rose Machange of Umangu Enterprises in Tanzania, provides an example of how a small business can work well. She explains why the idea of drying fruits to sell first came about, and how she and her group got the vital funding together. You may wish to combine this interview with ***Dried spices and herbs for sale locally*** and ***Investing in solar drying technology***, to give your listeners more ideas on how to get started. Can you invite a solar drying expert into the studio to speak to farmers? Or can you find a local smallscale drying enterprise willing to talk about their success story?

Feed and fodder for livestock

In ***Feed and fodder for livestock*** our correspondent Excello Zidana speaks to Baxter Zimba from the Department of Animal Health and Livestock Development in Malawi. He discovers that a vital part of drying hay is to ensure that it is dry enough to last well in storage. If any moisture is trapped in the hay while it is stored, mould or bacteria can cause serious illness and even death in livestock. Because this is so important to the health of livestock, you could invite a livestock health expert to the studio, to answer questions from your listeners on the best methods of drying and storing hay. You could also visit a farm and ask farmers how they usually test for moisture in the hay they are drying – can your listeners compare notes?

Other aspects of drying agricultural produce not covered in this pack

Hygiene

Although hygiene is briefly covered in this pack, it is a topic which could be addressed at length on its own. Hygiene touches on every aspect of the drying process, and as dried agricultural produce is not cooked, it is essential to ensure that fruits and vegetables are prepared in an hygienic environment.

Access to credit

Many of the ideas in this pack are aimed at smallscale enterprises. Businesses that have been initiated by groups of farmers who have had to invest their own money in the business. This is something that many smallscale farmers will be reluctant to do, and they therefore need advice on how to manage credit, and what the long-term earning opportunities of a drying agricultural produce may be. Also, drying agricultural produce may not be viable everywhere so it is

important that smallscale farmers seek advice before they invest.

Business planning

As mentioned above, dried agricultural produce is not popular everywhere. Once fruits and vegetables are dried they acquire a particular taste that is not always popular locally. So if production is aimed specifically at the export or tourist markets, the reality of supplying to that market must be considered before any investment is made.

Smoking and curing

While sun drying and solar drying are mentioned at length in this pack, smoking meat is only touched upon. Smoking is a popular way of ensuring that meat and fish can be stored and kept for the future. It also changes the flavour of the meat, making it a delicacy in many areas. It is possible to go into much more detail about these two ways of drying meat and fish.

Further information

Useful websites, online articles and fact sheets available:

This website offers some interesting examples of how smallscale farmers in rural communities can benefit from solar drying by forming their own cooperative.

<http://www.tropicalwholefoods.co.uk/>

This website offers details of drying seeds as well as how to develop and carry out solar drying practices.

<http://www.fao.org/docrep/T1838E/T1838E0v.htm>

Books

If you belong to CTA's network of broadcasters, you can receive, free of charge, books from our catalogue. For more information, send us a request at radio@cta.int

Drying foodstuffs, a practical manual that discusses drying foodstuffs, with emphasis on solar drying. Available from CTA: 1308. 442pp, ISBN 085199210 2

Non-CTA titles:

Making and using dried foods: Publisher: Storey Publishing, USA, 2004. ISBN: 0882666150. 192 pages. Available from CSIRO publishing, PO Box 1139, Collingwood, Victoria 3066, Australia. Fax: (03) 9662 7555 Tel: (03) 9662 7666

<http://www.publish.csiro.au/nid/18/pid/4756.htm>

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Drying agricultural produce

Using the Sun's rays

Cue:

Sun drying is the oldest method of drying agricultural produce. It's free, and it's effective. There are some disadvantages: the weather is not always hot, and roaming animals can sometimes get a juicy meal from your hard work. But, as Ismaila Senghore found out when he spoke to Peter Monnie, sun drying has its rewards.

With some added salt, all kinds of fish can be preserved through sun drying - from skate to the unusual-looking 'guitar' fish. By putting them on a platform of stalks from the 'rhun' tree, which is like a palm tree, the fish are protected from scavenging animals. Once dried they can be sold. Ismaila went to one fishing community on the windy beaches of Banjul in The Gambia, to find out more.

IN: "The people here are mainly...
OUT: ...Yes a glut."
DUR'N: 4'18"

BACK ANNOUNCEMENT: That was Ismaila Senghore talking to Peter Monnie in the Gambia. Adding salt, together with the heat from the sun, can preserve all kinds of fish - and fruits and vegetables too. The market may not always be good. But sun dried foods have the advantage that they can be stored, and eaten when resources are scarce. The interview comes from a resource pack produced by CTA.

Transcript

- Monnie** The people here are mainly fishermen so our women too, they also have involved themselves in it.
- Senghore** *Now let me know now the kind of fish that you dry here?*
- Monnie** Skate, skate fish or guitar fish as their form looks like a guitar. So we have named it guitar fish.
- Senghore** *The sea snails - you dry them here too?*
- Monnie** Yes we have them also here. We also dry them here. We also get them from the fishermen and we get them, we crack then we dry them. So it is also part of the activities.
- Senghore** *Now Peter, what are the procedures that you undertake in drying your fish? When you want to dry fish, where do you start from?*
- Monnie** Yes, when we want to dry the fish at least we bring the fish from the seashore and you bring them to our site. Then we off scale them, we scale them off. We remove some of the items in the fish.
- Senghore** *The intestines and so forth?*
- Monnie** Yes.
- Senghore** *And the gills?*
- Monnie** Yes the gills and the intestines. As you can see them you see we remove them and then after you wash them. Then you put them on the platforms.
- Senghore** *So in other words the only treatment that you apply is salting?*
- Monnie** Yes it is only salt because salt is the natural treatment.
- Senghore** *Now I have seen that you have various fish here spread on these platforms. Why do you have to put them on platforms, almost one metre high?*
- Monnie** Yes, you have to do so because we have some animals around us, donkeys, cattle and it is not safe to dry them on the ground.

- Senghore** *I can see that your platform seems to be very practical because it made of the stalks of rhun leaves and you have some tree cuttings that you have planted in the garden, you mounted your platform on these tree cuttings. Now you can see that there is space between the rhun sticks that allows some kind of air to blow from under through the fish. Now does that possibly help your drying, is it advantageous for the drying?*
- Monnie** *Yes it is very, very advantageous so that air can blow under it so that while the one that is facing the sun is drying, then the wind also is blowing under it so that they get dry at the same time.*
- Senghore** *Now how do you know that your fish is dry? Do you come to look at it from time to time?*
- Monnie** *Yes we are always at the site. When we dry them the next day we come and we turn them all around then it becomes fully dry.*
- Senghore** *Yes because the temperature may not be very hot from the sun. Sometimes you know it might not be very sunny. It means you have to come day by day to turn it over and over is it?*
- Monnie** *Yes that is why you turn them all around.*
- Senghore** *Ok, now that you come and inspect it every day to see whether it is dry now. When it is fully dry how would you know it is fully dry?*
- Monnie** *Yes because when it is dry the fish become very hard. When you break it you cannot, it cannot then everything becomes hard.*
- Senghore** *All right now if you would want to, for example, tell anybody to start this kind of venture anywhere in the Third World what kind of advice would you give them?*
- Monnie** *Yes the advice that I would give them is that it seems like tedious work but it is also helping our community.*
- Senghore** *Now Mr Monnie, when you come to selling your fish now where do you sell your fish and do you think it is lucrative business?*
- Monnie** *Yes after drying them we pack them, we wake up early in the morning around five o'clock and we send them to the roadside and then we take where we have the market there, then we sell. So we sell them locally.*
- Senghore** *And do you have a good revenue from it, is it lucrative like is it profitable?*
- Monnie** *Yes, sometimes it is profitable. If a lot of people in the market in a day, the market will not be all that impressive because a lot of the fish will be there. So sometimes you will sell...*
- Senghore** *There will be a glut?*
- Monnie** *Yes a glut. End of track*

Drying agricultural produce

Investing in solar drying technology

Cue:

Drying produce in the open air works. But in Kenya, Winnie Onyimbo discovers another way of drying fruits and vegetables that can fetch a good price at the market. She speaks to a lady who is passionate about solar drying technology. Margaret Mimoh is from Honey Care Africa Ltd, a cooperative which - as the name suggests - makes money from beekeeping.

But recently, members of her cooperative have decided to take up another initiative. They have decided to invest in solar drying technology to preserve and keep fruits all year round. Solar drying works by trapping heat inside a box or frame covered with plastic sheets, with a wire mesh base to allow air to circulate. The trapped heat causes the fruits or vegetables to lose their moisture, and dries them out – but the heat is not enough to cook them. Margaret Mimoh explains how it is done – starting with the selection process.

IN: "First you have to get..."
OUT: "...give it a longer shelf life."
DUR'N: 5'20"

BACK ANNOUNCEMENT: That was Winnie Onyimbo speaking to Margaret Mimoh from Honey Care Africa Ltd. Could investing in solar drying technology be worth it? The interview comes from a resource pack produced by CTA.

Transcript

- Mimoh** First you have to get ripe fruits, not over-ripened because if it's over-ripened then slicing will be a problem because it will get mashed. So what happens is you have to wash the fruit, then you peel it and then you slice it in small slices maybe three millimetres to about five millimetres thick and then you place them on the drier, on the drying tray and then you put them inside the drier itself then you leave it there to dry.
- Onyimbo** *I would like you to give me a brief explanation on what the solar drier that is used for drying looks like?*
- Mimoh** The structure that is used for drying fruit is a very simple one. It is sort of, we should say, like a frame, maybe one metre by one metre and then it is covered with netting mesh, black netting mesh and then with a clear polythene sheet. The reason why we have the black netting and the clear polythene sheet is heat is allowed to get into the drier itself through the sheet and then it is absorbed by the netting mesh which now allows the air to circulate into the solar drier easily and then it extracts the moisture from the fruits allowing them to dry.
- Onyimbo** *How big is it?*
- Mimoh** The bigness will depend on the quantity of fruits that you would like to dry, like drying three kilos of fruit you will need one metre by one metre square of the frame with about two or three drying trays inside it.
- Onyimbo** *So this is a kind of drier that you use to dry fruits, please explain to me what is this that I am seeing?*
- Mimoh** This is the polythene sheet, it is very simple and it is locally available. We are always careful to get the right material for drying because when sunlight passes through this, there might be some chemical reaction between the polythene and the heat under and the fruit.
- Onyimbo** *I am also seeing it is a bit different from the polythene that we are used to, this seems to be harder, harder to touch?*
- Mimoh** Yes it is hard because even if you put a very light one there will not be as much heat as possible that would go in and dry the fruit so we use these ones so that

you have more heat and also durability because you know when there is a lot of heat it tends to wear out. So we also do not want to be replacing like each and every time. The polythene sheet covers the three sides. You see on the three sides you have the polythene sheet and on the top side and then on the front side where you slide in the trays you have the netting mesh and this netting mesh - as I explained - it is locally available also in the market and it has to be black because black absorbs heat. Then when you open this (SFX opening drier) you have the trays. You slide them inside here and then you will be placing your fruits here on this tray here just the small pieces that you have cut, the slices you place them on the tray.

Onyimbo *What advantages does this solar drier have in comparison to drying fruits in the open sun?*

Mimoh There are aspects of health issues and hygiene. So if you basically maybe just take fruits and dry them in the open air of course you are exposing them to a lot of dust then maybe bacteria and those kind of things. And also the other thing is the nutritional value that is in the fruit will definitely be lost because it is exposed so it will not dry. There is no air circulating when you are drying in the open air.

Onyimbo *How about the time spent, is it faster drying in a drier than drying in the open sun?*

Mimoh When we have enough sunlight it would take a whole day, just one day, but if you do not really have good weather there is not enough sunlight it would take even two-to-three days to dry.

Onyimbo *Where can materials for such a solar drier be found by a smallscale farmer in Africa?*

Mimoh The materials are locally available in the market. So basically we say that they will need to be trained on how to fabricate the driers and how to go about the process of the drying. So it is not that the material is difficult to get, it is locally available in the market. The netting mesh in fact it is even used for tents.

Onyimbo *Are there any nutrients that are lost when drying?*

Mimoh In the fruits not really it is only the water that is lost during drying but most of the nutrients are maintained. So it is just as nutritious as the fresh fruit only that it does not have water. When you are drying it is only that you are removing water from it to give it a longer shelf life. *End of track*

Drying agricultural produce

Before the drying process

Cue:

Whether it's sun drying or solar drying that you want to practise, there are certain things you should do before you dry foods. In Zimbabwe, Sylvia Jiyane discovered some good tips for improving the drying process.

The process of steam blanching allows the fruit or vegetable to retain its colour during the drying process, and importantly, enhances the shelf life because it reduces the process of decay. But first, find out where to start. Before you do anything else, select your fruit or vegetables. And don't be tempted to pick ripe fruits that have fallen from the trees! They are often over-ripe and will not allow you to cut them properly. Here is Tinashe Chikowore, from Environment Africa in Zimbabwe, with some advice.

IN: "Select those that are still firm..."
OUT: ...actually much sweeter."
DUR'N: 4'52"

BACK ANNOUNCEMENT: So dried fruits such as mangoes, and vegetables like cabbage, can retain plenty of vitamins and minerals when they are dried – and they can keep for longer. That was Sylvia Jiyane talking to Tinashe Chikowore. The interview comes from a resource pack produced by CTA.

Transcript

Chikowore Select those that are still firm but that have ripened. So after selecting these mangoes you then have to wash the mangoes. We then have to wash our hands so that we can then proceed to cut our mangoes. So when you are peeling your mangoes we just have to remove the skin. We then have to cut, slice into portions just similar to those like of fresh fried chips. We add also a little bit of lemon juice so as to minimise the loss of the colour and then press them in the dryer or do the drying process.

Jiyane *So for how long can somebody be enjoying mangoes after they have dried them the way you explained?*

Chikowore Yes you can enjoy your mangoes well for up to three months or even more but also it depends with the manner in which you store your mangoes. Your mangoes, since they have been dried they can quickly catch some water from the surroundings and quickly get bad. So what you need to do is to keep them in an airtight container and this airtight container should also not allow light in so that even the nutrients that are inside are not damaged by the light.

Jiyane *So can one dry any type of mango?*

Chikowore Yes you can dry any variety or type of mango. You need to take caution that it is not juicy because if it is very juicy it implies that you won't even be able to cut it into nice manageable pieces. Any variety that is ripe and still firm that can be dried. So you need to separate the area or the place that you will be doing the selection with the place that you do the cutting before we then proceed to dry the mangoes. Why do we separate these areas? We want to minimise the transfer of the bacteria or the micro-organisms that will then spoil our end product.

Jiyane *So from the preservation methods that I have seen here is it something that a smallholder farmer can do?*

Chikowore Yes any smallholder farmer can do the drying.

Jiyane *And moving on to cabbage, what is crucial in drying cabbages?*

Chikowore Ok, it is also similar to mangoes. We also start with the selection process. We

have to select the healthiest cabbage because we want to keep this cabbage for quite a long time. So after selecting that cabbage we should first also wash it and also separate the area where we will be doing the washing. So we just cut the cabbage in a similar way as we would want to when we are preparing maybe a cabbage relish. Then after doing that we need to blanch these vegetables because vegetables are different from fruits, they have actually enzymes that are inside which actually can proceed to work on the vegetables. So we need to inactivate these enzymes so that we can keep the vegetable for quite a long time.

Jiyane *You have been mentioning traditional methods, this is the conventional methods and according to you the idea is to maintain some level of nutrients in the dried product?*

Chikowore The dried products, they have a lot of concentrated nutrients minerals, proteins and even a large portion of the carbohydrates. It is just traditional that people would have to first pre-cook the vegetables but this is a disadvantage because during the pre-cooking we will actually lose a lot of nutrients that are water soluble. So to minimise this, what we can do is do this blanching. We can actually collect a rack that can be placed inside the pot, then we place water under that rack, then we actually use the steam to inactivate the enzymes that are inside these vegetables. What we are just trying to urge our communities to move from the traditional methods of boiling vegetables for quite a long time so that they loose the nutrients.

Jiyane *Finally what are the cost implications of all these drying methods?*

Chikowore Maybe the major problem is only the marketing side. We need to work much more on the standards so that if we develop suitable standards that can actually promote the marketing of our vegetables because maybe the people are actually worried about the hygienic status of the food.

Jiyane *Would I be right to say that selling mangoes, dried or even cabbages as we discussed in the programme dried would be much more profitable than selling them in their raw form?*

Chikowore Actually selling the dried products is more profitable. For example, people would actually want, they will prefer much dried mangoes as opposed to fresh mangoes. The advantage being that the mangoes they are not sticky and they are actually much sweeter. *End of track*

Drying agricultural produce

Drying and preserving meat

Cue:

When it's available, fresh meat is a delicacy. But in some areas, dried meat is a delicacy too. In Cameroon, Martha Chindong went to the Ministry of Secondary Education to ask Chofor Ndimofor for some tips on drying meat.

Smoking and drying meat has been done for centuries – it's one of the oldest kinds of preservation. But, there are health concerns related to drying meat. As usual, preparation and washing needs to be done in a clean area, and boiled water should be used. And different kinds of meat will require different drying times and storage periods. But why dry meat at all? Martha Chindong finds out.

IN: "Well basically there are two reasons..."

OUT: "...when meat will be scarce."

DUR'N: 4'53"

BACK ANNOUNCEMENT: That was Martha Chindong speaking to Chofor Ndimofor of the Ministry of Secondary Education in Cameroon. It is always best to seek advice about how long it is safe to dry your meat or fish. If it decays, it can cause serious illness. The interview comes from a resource pack produced by CTA.

Transcript

Ndimofor Well basically there are two reasons. The first reason is that when meat is dried it is properly preserved and secondly it is a way of improving the taste of the meat. People consider dry meat as a delicacy.

Chindong *So which type of meat or fish are also best to dry?*

Ndimofor Well, as you see presently, I am in the process of drying a rabbit.

Chindong *What of fish?*

Ndimofor Yes fish, all kinds of fish can be dried, especially fish that is not too oily and which does not have a lot of water. We are thinking of fish like mackerel.

Chindong *So how do you just get started? Just describe one, how you get started with at least one? Maybe this here rabbit which I see in front of you?*

Ndimofor All right, in order to dry a rabbit, the first thing is you select a healthy rabbit, one that is not lean, one that is in good health. You kill it, you skin it and then you open it up. You actually open it up in such a way that it is spread out and you can use pieces of stick to get it well spread out so that it remains in shape. And then you salt it with brine; that is you put some salt in water and steep it in it for a while. You hang it out or you expose it in the sun to drip a little then you put it over the fire as you see me doing.

Chindong *So is that the same process you do for meat and fish?*

Ndimofor No, for meat you have to choose meat that does not have too much fat because too much fat will not enhance the drying process. Then the meat should be lean, it should not have too much fat and the best way is for you to slice it into strands. When you slice it into strands you treat it with brine in the same way. Sometimes in order to give added flavour you might like to spice it with other ingredients, maybe curry, maybe ginger then you hang it out to drip and then you put the strands either over a grill or you hang them from a hook or a rope over a fire, a smoke fire.

Chindong *Smoke fire like what we are seeing?*

Ndimofor Yes, what we are seeing, we are using the grill now. There is fire under the grill, not burning into flames but only producing the smoke and heat that go up to

dehydrate the meat and after some three or four hours the meat is well dehydrated and now you only leave it for sometime to get properly dried.

Chindong

Is it within the reach of smallscale farmers living in the villages?

Ndimofor

Yes, I think it is within the reach of smallscale farmers. I say it is within their reach because the materials are not expensive.

Chindong

So you have constructed it with what type of material?

Ndimofor

Burnt bricks and then he will need to have a good piece of grill which cannot be rusted. The best one within the reach of the people in the rural areas is the traditional everyday fire with which they prepare their meals. What they do is they prepare their meat or whatever animal they have to smoke or dry and just hang it over the fireplace.

Chindong

So, Mr Chofor Ndimofor, this meat that you have dried can keep for how long?

Ndimofor

Ah, it depends. If you really want the meat to keep for long it should be properly dehydrated. The only things is that you should avoid during that time, you should avoid it coming into contact with moisture.

Chindong

When it comes in contact with moisture can it be contaminated?

Ndimofor

Oh yes, when it comes in contact with moisture you know especially in rural areas there is this tendency that it can fall out of the containers and when it falls out of the containers onto the ground it can pick up dirt and germs and all kinds of things. When dry meat gets into contact with moisture maggots tend to infest it and it will reduce the quality and also the look of it and nobody would really like to eat it.

Chindong

What advice do you have for farmers? What message do you have for people who are interested in drying meat?

Ndimofor

Yes what I have to say is, you know in the first place why do we dry meat? We dry meat because there are certain seasons when you have abundance of meat. Use that opportunity to dry the meat and preserve it for when meat will be scarce. *End of track*

Drying agricultural produce

Dried ginger for export

Cue:

Drying fruits and vegetables preserves them and ensures that they retain all of their nutritional goodness. But there is another reason that drying fruits or vegetables can be rewarding – it can produce profit, especially if your organisation or farmers' group can export to International markets.

But as Adu Domfeh found out when he visited the Yogi Botanicals ginger exporting group, the standards are strict, and the work is hard. There are rules to follow for washing, slicing, drying and packaging – particularly for organic produce. But the task is not impossible – if you are hard working and able to get financial credit for investing in processing technology, you could reap the rewards. To explain more, director Daniel A. Mensah takes us on a tour through the processing yards of Yogi Botanicals.

IN: "I am Daniel A. Mensah...
OUT: ... to meet the international standard."
DUR'N: 5'50"

BACK ANNOUNCEMENT: That was Adu Domfeh reporting from Kumasi in Ghana. He was speaking to Daniel Mensah and Kojo Tera from Yogi Botanicals, a cooperative exporting ginger to Europe. The interview comes from a resource pack produced by CTA.

Transcript

Mensah I am Daniel A. Mensah and this is where we do our processing. This is our site, this is where we receive our ginger and then we process for exports.

Domfeh *So what do you consider when you want to dry these products?*

Mensah Yes what we consider is we need to have stages, we need to have labourers and then we need to get our necessary things for slicing and other things before we start our drying.

Domfeh *So what is involved in the drying of such produce?*

Mensah Actually, the only thing that we need is to get our stages ready, our plastic sheets and all the sacks ready for our drying and then after slicing we take it to the drying. When we dry we have people there as you can see yourself, they are disturbing the ginger like how they process cocoa and this should be a continual disturbance, maybe after three hours, every two hours they have to disturb the ginger so that it dries very quickly. It takes about three to four days to dry finally. You know we have to be very careful that we do not have any sun or any other bad materials within it so that it does not affect our international markets you know.

Domfeh *So talking about international market, what standards need to be met and how do you obtain certification, especially organic certification?*

Mensah Ok, concerning the international standards we have certifiers who will certify our produce throughout the world. We make sure that we have followed organic standards, to meet the standards. So this is where we store the fresh ginger and then here also we have about six women who work on sorting and then breaking of the ginger before we finally wash for slicing. So for now they have almost finished with the one that they have sorted out and they have also washed them all here. So we are coming to start some slicing right now.

SFX (Moving towards drying area)

Mensah We need to construct more stages, that is why we are even using the ground, the bare floor to dry the ginger. So we need more stages in order to expand our drying.

- Domfeh** *Is using the bare floor... is it ideal?*
- Mensah** That is why we have cleared all those spaces. We make sure that there is not anything that will contaminate the ginger. We lay the necessary things on the ground before we dry on it.
- Domfeh** *Can we get to the stand there to see basically what they are doing there?*
- Mensah** Yes of course we can.
- SFX** Walking.
- Domfeh** *Good afternoon. Is it difficult to do?*
- Worker** But it is ok!
- Domfeh** *So what are they all doing here?*
- Mensah** As you can see this is where we dry. They have gathered the ginger, they are collecting the ginger, they have to transfer after one day to the ground so that we have enough space to slice more for drying. We are using the solar as you can see we are using the sun energy to dry that is why purposely this Harmattan season getting to the rainy season we would not be able to process ginger. But for now and what we are doing, the technology we are using with these little machines we are able to process the quantity of ginger we need per day.
- SFX** (Washing the ginger)
- Domfeh** *So I can see the lady over there washing the ginger. Is it the ideal process?*
- Mensah** Yes, that is the ideal process. After washing with a washing machine we have to wash it for three times after which we dip it into hot water to kill the microbial all these things before we slice the ginger. So that is the ideal.
- Domfeh** *So that is why you have the fire over there burning?*
- Mensah** That is why we have the fire over there. We have boiling water.
- Domfeh** *So after washing she puts them inside this particular machine, what is this called?*
- Mensah** This is the washing concrete mixing machine as you can see but with our technology we have been able to use this thing to wash our ginger. So this is where we wash it first, it gets rid of all the sands and all the other particles before we transfer into the other bowls for them to wash with their hands. Because if they are supposed to wash with their hands alone it becomes very difficult to get rid of the sand particles and other things.
- Domfeh** *So from the machine it goes to?*
- Mensah** Yes, from the machine and washing here we go to the slicing. This ginger is completely washed and ready for slicing here. So this is our slicing machine and this slicing machine can slice over a hundred bags weighing 80 kilogrammes to 100 kilogrammes a day.
- Domfeh** *So from here it goes to the drying stand? Afterwards, what next?*
- Mensah** We package it, we put it in a nice package and then we put it at the warehouse until we get the total quantity that we need before we export it outside.
- Domfeh** *Does packaging mean a lot in this business?*
- Mensah** In our area I would say packaging it does not mean a lot but we need to be very strict because it is organic project. We need to make sure that what we are using to package does not have any contaminations and then we have our labels on it.
- Tera** My name is Kojo Tera.
- Domfeh** *And what do you do here?*

- Tera** Actually, I am the administrative and finance officer for the company.
- Domfeh** *What sort of investment do you need to go into this business of drying produce?*
- Tera** Concerning investment, we need maybe all the necessary things for the processing of the ginger. Maybe we need slicing machine, we need the washing machine and also we need stages for drying and other materials for the drying. And also some equipment for our workers and other important things needed for the processing of the ginger.
- Domfeh** *For people who want to go into this sector of drying produce for exports what advice can you give to them?*
- Tera** My little advice for them you know if only it is for export because it is going outside we need to work very hard to meet the international standard because if it does not happen you have your product there but then it is going to be cancelled, nobody is going to buy it and it will be a waste and a whole lot of you know debt will come. So we have to be very careful, if anybody wants to enter into this the only thing we need to do is to try as much as possible to meet the international standard. *End of track*

Drying agricultural produce

Dried spices for local sale

Cue:

What would our food taste like without flavouring? Can you imagine biltong without chilli? Or relish without pepper? In Zimbabwe, Busani Bafana investigates how restaurants use herbs and spices in their cooking to enhance the flavour in the food.

Busani spoke to John Daines, owner of the Art Groove restaurant in Bulawayo, to find out more. As he discovers, if no spices and herbs are available in the market – there are no alternatives. Nothing can replace the flavour or the colour that particular herbs and spices have. So, for smallscale farmers who produce them, there is a niche market. The secret is finding out more about it. If you are a smallscale farmer producing herbs and spices for the local market, listen in for a tour around the Art Groove restaurant to spice up your market – and hear some good tips about what restaurants near you might be after.

IN: "We use both herbs and...
OUT: ...fine or a coarse granule."
DUR'N: 5'54"

BACK ANNOUNCEMENT: That was Busani Bafana speaking to John Daines at the Art Groove restaurant in Bulawayo, Zimbabwe. If you are a smallscale farmer producing herbs and spices for local sale, find out what restaurants near you might want. You could see your market improve. The interview comes from a resource pack produced by CTA.

Transcript

Daines We use both herbs and spices as ingredients for a lot of our meals to enhance the flavour of our dishes and when we purchase these spices and herbs we look at what is available at the market at the time.

Bafana *Where do you buy your dried spices and your herbs?*

Daines We buy them wherever we can. Sometimes it is in a supermarket, sometimes it is at a wholesale centre in Bulawayo or often than not we get them in from Harare.

Bafana *Is this close to your restaurant? Is this, say, down the road or several kilometres away from your restaurant?*

Daines Yes, it can be as close as just around the corner. We buy what we can and what is available at the time.

Bafana *What standards, then, do you expect from your suppliers of dried spices and herbs?*

Daines From a herb point of view when we are looking at the different herbs that are available we look at the colour and obviously a herb is very much of a green colour because everything is a leaf, whether it can be chives, whether it can be rosemary or oregano, we have mint, herbs like that obviously the brighter and the green, the fresher they are. If they are brown and dull and yellow we know that they have been sitting for an age. And from a spice point of view if we look at something like paprika we are looking at the redness, a strong red colour is absolutely important as opposed to a yellow and orange colour. And the same for if we purchase something like chilli, we look at the hot, the hotness, I do not know if that is good English but we want to burn the mouth when we buy that! If it is dull in flavour we know that it is not of good quality.

Bafana *How then have you actually maintained these standards that you talked about?*

Daines I think we just use sight and smell really when we look at these products. We know what we are looking for when we are buying and we just make sure that that is what we look for otherwise we just leave it. You know it is really

important that we get good quality.

Bafana *What opportunities are there for smallscale farmers to supply businesses like yours?*

Daines One of the most common herbs that we purchase at this moment is something very simple called mixed herbs and it is just a basic mixture of dried herbs like oregano, marjoram, basil and those types of herbs and that is a very common ingredient to enhance the flavour of whether it is a soup or whether it is a gravy or a sauce or your meat and you actually simply cannot find it at the moment and we find ourselves actually purchasing the individual herb and rubbing and mixing them together.

Bafana *What kind of spices and herbs do you buy?*

Daines From the herbs I have already mentioned that there is basil, there is oregano, there is mint, there is chives, there is a whole array of herbs that are being used and on the spices side we have what a natural spice is like your paprika, like turmeric which is a root, like cumin, chilli, Bird's-eye chilli which is the very small chilli which is really, really hot and then we can also get a blend of spices.

Bafana *When these certain types of spices and herbs that you mentioned are not available, are there any alternatives?*

Daines No, there are no alternatives, you know they enhance the flavour of your food and if it is not there you just have to go without.

Bafana *Do you buy in bulk or say even for a month supply or a week's supply?*

Daines It can be like that even longer because you do not know when you are going to see it next.

Bafana *How long have you been buying these products yourself?*

Daines Well herbs and spices have been around for generations and I do not think there is not one restaurant or even a household that does not use them.

Bafana *What of the packaging of the spices and the herbs and could the packaging influence the reason to buy or not to buy?*

Daines Obviously the packaging can play an important part but I think we are not interested in the packaging because all it does is enhances the price.

Bafana *What is your advice to smallscale farmers who want to start selling dried spices and herbs but have no clue of where to begin?*

Daines I think that a little bit of investigating, they will see that there is a market and they just need to do a little bit of homework.

Bafana *I have been interviewing John away from the crowd actually of the restaurant but right now we will actually move into behind the scenes where the food is prepared so I can maybe sample some of these spices.*

SFX Kitchen

Bafana *We are actually behind the scenes in John's restaurant, where he prepares the meals, and he is about to explain to us about all the spices that he uses. John, go ahead.*

Daines This is a product called turmeric and it is a very much yellow spice as you can see and this is actually made from a root and it is purely used for colour and it has no flavour.

Bafana *For what meals do you use it with?*

Daines Well very much it is used for curries and spiced Indian food. This one is black peppercorns, this is one that is used everywhere, it is the most simplest spice that we get and it is just basically used as a flavouring. It is left on our tables in

the restaurant and it is very much used as an ingredient in our kitchen.

Bafana

It has a very strong aroma? There is black pepper and white pepper?

Daines

Black and white pepper and I know in South Africa you can get red and green as well just to enhance the colour as well.

Bafana

You also feel the texture of the spices?

Daines

Not really.

Bafana

Not really?

Daines

No, everything is ground very finely here and that is what we are looking at so that we don't see any residue in the product that we are making, so it blends into the meal.

Bafana

So tell me, do these spices come already prepared, you don't grind them yourself here?

Daines

Very much they come prepared except, obviously, for the peppercorns, which we can grind ourselves to how we want it, whether it's a fine or a coarse granule. *End of track*

Drying agricultural produce

A smallscale drying enterprise

Cue:

Starting up any business is hard work. But if you are sure of your market, then you can be successful. In this next interview, Lazarus Laiser spoke to one woman who has done her research – and it shows. With other women in her village, Rose Machege set up Umangu Enterprises in Tanzania, to sell dried vegetables to local businesses.

Its success has been inspiring, and now the group is thinking of expanding the business. But first they had to find credit and, as Rose explains, they needed to form a group and invest some money of their own in the enterprise.

IN: "The chairman of our village...

OUT: ...help dry a bigger amount."

DUR'N: 4'41"

BACK ANNOUNCEMENT: That was Lazarus Laiser speaking to Rose Machege of Umangu Enterprises in Tanzania. Small businesses can become bigger. But knowing your market – your customers and your buyers – is the first step. The interview comes from a resource pack produced by CTA.

Transcript

- Machege** The chairman of our village one day called a village meeting and said there is no women group in our village. So we called our friends and we agreed to start such a group.
- Laiser** *Where did you get the finances because always it is difficult to get the finances?*
- Machege** After setting our goals we talked and discussed how to start and then we decided to contribute the money in a business of selling the clothes for women house-to-house, and we got a profit and started a small garden and our profit grew.
- Laiser** *Did you get any benefits?*
- Machege** Yes we got, it is still going on and we are still going on with it, it is growing. We got a lot of benefits and we were able to build good houses; that is modern houses. This is our office we built from the profits we got and we are able to pay our school fees for all our children.
- Laiser** *I am still standing outside the Umangu Enterprises office with the chairperson Mrs Rose, and I am interested to know more about this process of drying vegetables and fruits that you say that you are dealing with here in the office and I can see some dried things here on the table, Rose.*
- Machege** As you can see, these are the vegetables taken from the gardens and we have already dried them.
- Laiser** *The vegetables are already dried and it has its greenish colour and looks like maybe somehow hard but this is ready just to eat?*
- Machege** Yes you can even taste.
- Laiser** *Is it sweet?*
- Machege** Yes it is very sweet.
- Laiser** *If I taste...*
- Machege** Yes, it is very nice.
- Laiser** *Um, ok it is very sweet yes, it is very sweet and you added salt in?*
- Machege** Yes, as you can see, as you have already tasted what we do is we use a simple

method of drying them to allow the duration of storage so that it will take long.

Laiser *Which type of greens are you dealing with?*

Machange We as Umangu Enterprise we dry all the greens found in our area. We have that knowledge on how to dry them but we have two types of green which are the soft and hard.

Laiser *Right, the green vegetables are varied into two types, they are hard and soft. Ok, how do you do now the drying process?*

Machange We bring the vegetables from the garden, we wash them, we wash them well in clean water, that is, and put on a clean place. We take a piece of a clean white cotton cloth and put on the greens and tighten it. After that we boil water and add salt on it. We then put the green tightened with the piece of cloth into hot water for about one minute if it's so soft and two minutes if it's too hard.

Laiser *Why do you add salt in this water?*

Machange We usually use salt because it helps to protect the greenish not to be lost because if it's lost the vitamins are lost therefore we dry vegetables with greenish if you eat you get all the vitamins. After boiling for one or two minutes we put in a dry place - a bed - and it stays there for one day or some hours. It depends on how hot the sun is and it is not advisable to dry them too much because it will lose its vitamins. After drying them well, we put on the nylon pack and keep safe. We use them in our homes and also we sell them to other people.

Laiser *And you have people who are coming to buy?*

Machange Yes, very many.

Laiser *Now also the mangoes I can see also that bucket you say that you have some mangoes inside that are in the process also for drying. This is another fruit that you are dealing with here. You said also you are dealing with tomatoes. These are the mangoes, so...*

Machange Yes, as you can see these are the mangoes from our own trees found in our farms. As you can see we have cut them into small pieces ready for drying. After the six weeks, we will add various spices to get a mango pickle ready to sell and for home use.

Laiser *Which is the starting point of drying?*

Machange We take the mango from the tree. Mind you they should be the mangoes which are ripe but did not drop down by themselves. We wash them and put on a dry place to drop water. After that we wash them with clean water and cut them into small pieces and weigh together with adding salt and put into bucket.

Laiser *Then after, how do you use these dried mangoes?*

Machange For our mango women group we sell them and get a good income. People usually come and buy from us. We can also use them by making mango pickles and we sell more money.

Laiser *Do you satisfy the market that is available? You said that you sell the product to other people.*

Machange No not at all. We have a big market and currently we did not manage to satisfy the market. We are only a few and we do not have many buckets to produce more but it is encouraging, the market is available.

Laiser *Which strategies now do you have to satisfy the market?*

Machange We are planning to sell and buy bigger buckets to help dry a bigger amount.
End of track

Drying agricultural produce

Feed and fodder for livestock

Cue:

Making hay is a vital activity for many smallscale livestock farmers. Hay is cut grass or legumes which have been dried and stored, so that they can be used as feed when other sources of food or pasture are not available. The grass is harvested at times when it is abundant, and then stored.

The drying process is very important when making hay, because it needs to keep for a long time. If the hay is not completely dry, then moisture will attract fungus and bacteria, and the hay will become poisonous. In this interview, Excello Zidana speaks to Baxter Zimba of the Department of Animal Health and Livestock Development in Malawi. He asks Mr Zimba's advice on how to make hay, and how to make sure that it is dry enough to be safe for use as livestock fodder. He beings by explaining that there are no rules to the art of making hay, but there is the need to 'strike a balance'.

IN: "We have to realise that..."

OUT: "...which they can supplement."

DUR'N: 4'28"

BACK ANNOUNCEMENT: That was Baxter Zimba speaking to Excello Zidana in Malawi. Do you know how to 'strike the balance'? What is the best time for making hay in your area? The interview comes from a resource pack produced by CTA.

Transcript

Zimba We have to realise that when the grass is too small and nutritive value is also in small quantities but when it is also too old, then the nutritive value also goes down. So we have to strike a balance. The balance is if the type of forage we are talking about or grass is almost getting ripe, that is the time when we can cut it down and preserve it.

Zidana *So we should be saying that the feed that has high nutritive value is good for maximising animal products like milk. How should drying of feeds be done to achieve this?*

Zimba The moisture content in the feed is reduced to a point where it is not being attacked by microbes for fear that it can get rotten. You can cut it down into small pieces, you can add some additives to make sure that the fermentation goes faster and it gets preserved.

Zidana *And obviously when this process is taking place temperatures, I am talking of ideal temperatures, need to be considered. But now if you look at the prices for the temperature meters are expensive, how can smallscale farmers test the temperatures when they are doing this process?*

Zimba People from experience, from the very old days, they know when it is hot, they know when it is cold, and so on. They know that if you ensile the green material and there is no air that goes in there the temperatures will go high. And when you are conserving silage the type of temperature that will be found there will not be a normal ambient temperature it will be above the room temperature. There is a saying that make hay while... while the sun is shining. Why that is being said is because hay making can only be successful when it is sun shining and the weather is dry and that when they have cut the grass and they have to dry it, make sure that no water or rains fall on it, they should remove it immediately to tripods. We call them tripods, these are very simple structures which they can use to dry off there. So that even when it rains during the night or the following day they will still get on the hang and then they will still get dry because the idea is to reduce the moisture content in that product so that the microbes are not able to decompose it.

- Zidana** *The forage that is cut and left in the moist conditions go mouldy and mouldy forages are unpalatable and even dangerous to livestock due to mycotoxin poisoning. Is there any technique for deciding the best time and even the season when harvesting can be done to prevent this?*
- Zimba** *If it is now getting mature you are forced, you have to preserve at that time so that you strike a balance on the amount of fodder and the amount of nutrients available in the product.*
- Zidana** *Now let's come to storage, when can storage be done and what is the ideal moisture content to consider when storing the dried feed and fodder?*
- Zimba** *Where we talk of green materials conserved like silage and so on you have to use the pits, these are simple dug-up structures and then after you have ensiled it you have removed the air, you have removed some microbes that means you are sure enough that the material is going to be conserved. So you ensile it, in other words you make sure you seal it completely, you cut off the air because the air sometimes you have problems of bacteria which spoil our material like silage.*
- Zidana** *As a technical man, now can you provide any advice to the livestock farmers and even those who have taken up preservation or conservation of feed as business on how they can make feeds that has high nutritive value?*
- Zimba** *We are supposed to advise our farmers to make sure that they supplement, they also have to conserve either types of feed materials. In other words, during the rainy season or even during the dry season, they have to pile up some other types of ingredients, like for instance maize bran, the rice bran and so on, which they can supplement. End of track.*