HOW FARMERS CAN REDUCE THE EFFECTS OF DROUGHT ON FOOD PRODUCTION IN THE LOWLANDS

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Most of Papua New Guinea receives plenty of rain for growing food crops, although some areas are not so wet. Even in areas with high rainfalls, there are years when the rainfall is low and this can damage food crops. When the rainfall is very low for several months, this is called a drought. In 1972 many peoples' gardens were affected or even ruined. A lot of people were hungry in that year.

In this article I want to point out some things farmers in the lowlands can do to stop drought having such a bad effect on their food crops. If peoples' gardens are ruined, they will have to spend their money buying rice or food from other areas, or the Government will have to help them. But if they do certain things every year, such as planting a little of certain crops, droughts will not have such an effect on them when they do occur. Most of the ideas in this article are things that village people in different areas do already. Not all ideas are known by every gardener everywhere, so they are written down here.

There are differences between crops that can be used by farmers to reduce the effect of drought. There are also differences between varieties for each crop. Here we will mostly be talking about differences between crops rather than between varieties. This is because not much is known by scientists about differences in drought resistance between varieties of our food crops. Nevertheless differences between varieties for any one crop are important and farmers and didimen should take notice of how different varieties react to dry conditions. For example, if a certain variety of taro grows better than other varieties in a drought, farmers should remember this and plant a little more of that variety than usual every year.

When we talk about the differences between crops or varieties, it is not suggested that farmers should change over to growing another crop or variety completely, but that every year they should grow some of the crops or varieties that are not so affected by drought. Then when there is a drought, they can use food from these crops if their usual food crop is damaged by the dry conditions.

Farmers can think about planting some of the following types of crops to reduce the effect of droughts.

1. *Crops whose food can be stored in the plant*

The most important food crops, such as sweet potato, taro and bananas, have to be eaten fairly soon after they mature or they will go bad. Food of some other crops can be left in the ground or the plant for a long time after it matures without going bad.

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Such crops are useful to have planted because they can be eaten whenever drought or other problems like insects damage the main food crop.

Food of the following crops can be stored in the ground or on the plant:

Sago
Swamp taro *(Cyrtosperma)*
Cassava
Paragum taro *(Alocasia)*
Chinese taro *(Xanthosoma)*

The harvesting date for Chinese taro is more flexible than taro tru, but if it is left in the ground too long, the cormels begin to sprout. To find out the differences between the different kinds of taros, look at the articles on taros in *Liklik Buk*. Even if these crops are never needed as an emergency food, they can always be fed to the pigs who won't refuse them!

Young sago palms, East Sepik Province. Sago is a valuable food in times of drought. Photo by author.

2. *Drought resistant crops*

There are certain crops that are not so affected by very dry conditions. We call these drought resistant. Some of these are:

Cassava
ABB bananas
Pineapples

Cassava is a very tough crop and can grow even when there is not a lot of water in the soil. The ABB bananas are able to grow better than other types of bananas and other crops under dry conditions. Villagers in dry areas know this and plant a lot of these bananas. For example, in parts of the Markham Valley the main food is the Kalapua banana. In dry areas of the Gazelle Peninsula people plant many Yava bananas. Kalapua and Yava are both ABB bananas. To find out how to identify the ABB bananas from other types, see the article in *Harvest*, Volume 3, number 2, (Bourke 1976). An easy way to tell ABB bananas is that they have a lot of white wax on the stems and hardly any black marks.

3. *Wetland crops*

Crops that grow in wet places will not be so affected by drought if the water always stays there. Some of these crops are:

Sago
Swamp taro *(Cyrtosperma)*
Taro tru *(Colocasia)*
Rice *(Oryza sativa)*
Kangkong *(Ipomoea aquatica)*
Salat (water cress)

Sago, swamp taro and kangkong are the most useful of these for escaping the effects of drought because they grow in swampy areas. Swamp taro can be grown in water that is a bit salty. Most

Swamp taro - another very useful emergency food supply. This crop at Vudal is 5 years old and can be harvested as needed.
Photo by E. Pais.

varieties of taro tru and rice only grow in flowing water, although some varieties grown overseas do produce in water that is not flowing.

4. *Tree Crops*

Tree crops are useful for providing food in a drought because the roots usually go down a long way in the soil and they can get water for growing even if the top of the soil is dry. Compare the roots of a coconut with sweet potato! It usually takes a long time from flowering to fruit maturity for tree crops, so that fruit or nuts growing in good times might be ready for harvest in a drought. Of course, damage to growth in a drought affects the tree for up to several years, but by then short lived crops are providing food.

Some useful tree crops that give food are:

Coconuts
Breadfruit
Tulip *(Gnetum gnemon)*
Fruit and nut trees such as galip, talis, okari, aila, pandanus, guava, laulau and mango
Avocado

There are many more fruit and nut trees that are grown in Papua New Guinea. The disadvantage of most for drought foods is that they produce food only in certain seasons and this is usually a few months after a dry period.

5. *Crops that can be stored after harvesting*

In places that have a long dry season every year, the usual way people have food all year is to grow some crops that can be stored after harvesting. Some of these crops are:

Yams *(Dioscorea alata)*
Mami *(D. esculenta)*
Corn *(Zea mays)*
Rice *(Oryza sativa)*
Peanuts and other grain legumes

In many parts of Papua New Guinea that have a long dry season every year, people grow yams and mamis. These can be stored for many months. Usually the longer the time to maturity for yams and mamis, the shorter is the storage life. Yams store better than mamis. These are really good crops for areas that have a long dry season every year, but not so good where there is a drought only sometimes.

Grain crops like corn, rice and peanuts, are difficult to store in climates that are usually wet and hot, like most of the lowlands. Some people have suggested that growing more grain crops is one way of providing food for droughts, but I do not think this is very suitable for Papua New Guinea.

As well as growing some crops other than the usual main food, other things can be done to reduce the effect of drought. Some of these things are :

1. *Gathering wild crops*

Many people gather food from the bush when their gardens are destroyed by drought. Wild products like sago, limbum palm, ferns and wild buai are just some of the things that are collected. Young people in many areas are not learning so much about wild products as their parents and grandparents and some of this knowledge is being lost.

2. *Gardening in different areas*

Sometimes, but not very often, it is possible to have gardens in different areas so that when one area is having a drought, the other area is receiving enough rain. An example of this is the north and south coasts of New Britain where the seasons are the opposite.

Another similar thing that people do is to have trading relations with clans that are in different rainfall areas. When it is too dry in one area, people exchange or buy food from another area that is not having rainfall problems. This is done in many places in Papua New Guinea. An example is the Lelet Plateau of New Ireland and the nearby coastal area.

3. *Storage in mounds*

Another way of storing crops after they have been harvested is in mounds. Experiments have been done in the highlands and at Keravat on this. In the highlands sweet potato could be stored for 40 or 50 days but not longer than this. At Keravat it was found that sweet potato could be stored for one month, but not two or three months. The highland work is described in an article by T. Aldous in the 1975 Food Crops Conference Proceedings.

This method is not suitable for storing food in case a drought occurs because the food can only be stored for a short time.

4. *Irrigation*

When farmers bring water to their crops to help them grow, this is called irrigation. It is common in really dry places in other countries. Some farmers used to irrigate their taro in parts of the Gulf, Madang, Milne Bay and Morobe Provinces and on the Gazelle Peninsula, but this has been dying out in recent years.

Making irrigation channels to carry water is a lot of hard work and is more suitable to areas where the same ground is farmed every year. In some places it might be possible to irrigate gardens using pipes made from bamboo to bring water from a stream to gardens.

Building a mound to store sweet potato in a trial at Keravat. It was possible to store tubers for 1 month, but not 2 months. Storage in mounds is not a suitable way of reducing effects of drought in PNG. Photo by author.

The author examines a variety of cassava at Keravat. Cassava is drought tolerant and can be harvested as needed. Photo by E. Pais.

5. *Saving Planting Material*

In a bad drought it is not possible to plant new gardens, but it is important that the planting material be kept alive to plant the new gardens when the rain comes. This is especially important for taro because it takes so long to build up planting material and it is easily affected by drought.

Taro setts can be planted in swampy areas and often crops like sweet potato and bananas can be kept alive in damp places such as next to a creek. During the dry season on New Ireland it is common to see a lot of taro planted in swamps or springs. Of course there is no problem with yams and mamis - they can be easily stored for up to 6 months in dry places like garden houses.

6. *Planting After the Drought*

Often it is not during a drought that people are hungry, but after the rain has come and they are waiting for the new gardens to produce food. It is a good idea to plant some quick maturing crops as soon as the new gardens are planted.

Corn can be eaten 10 to 12 weeks after planting. Some of the "wan mun" sweet potato varieties (such as K9) have some tubers as early as 7 weeks after planting. Snake bean (yardlong bean), mung bean and cowpea start to bear in 9 to 10 weeks which is faster than winged bean or peanuts (13 to 14 weeks or longer).

CONCLUSIONS

The things that people can do to reduce the effect of drought depends on what is available locally. Farmers cannot plant sago and swamp taro if there are no swamps! Whether an area has a long dry season every year or no dry season, the best thing to do is still the same - and that is to plant some extra crops that have been mentioned in this article, such as sago, swamp taro, cassava, ABB bananas, yams, mamis and coconuts.

It is too late to do much when the drought comes. The time to think about making suggestions to the village people is now, so that if a drought comes, they have food.

In this article we have been talking about reducing the effect of droughts, but many of the ideas are useful in case crops are destroyed by insect or disease attack, flooding or strong winds.

FURTHER READING AND REFERENCES

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