

Smallholder Horticulture

in
ZIMBABWE



edited by
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and
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INDIGENOUS FRUIT TREES AND FRUITS IN ZIMBABWE: SOME PRELIMINARY RESULTS FROM A SURVEY IN 1993-94

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ABSTRACT

Indigenous fruits have long been collected from the wild and formed part of the diet. Their importance is greatest in drought seasons because of the drought tolerance of the trees which bear them. As part of a programme on the development of drought-tolerant fruit tree crops a survey on indigenous fruits was conducted in 1993/94 with the help of the Agricultural Technical and Extension Services (AGRITEX).

Uapaca kirkiana (Shona: muzhanje) and *Strychnos species* (Shona: mutamba, muzhumwi, man'ono, and hakwa) were found in almost all natural regions. *Ziziphus mauritiana* (Shona: musau) was confined to parts of Mashonaland. *Sclerocarya birrea* (Shona: mupfura or shomho) was mainly found in the drier areas.

Most of the indigenous fruit trees are found in forests or grazing areas but the popularity of *Ziziphus mauritiana*, *Azanza garkeana* (Shona: mutohwe) *Uapaca kirkiana*, *Strychnos sp.*, *Ximenia sp.*, (Shona: tsvanzva or nhengeni) *Ficus sp.* and *Vangueriopsis lanciflora* (Shona: muganacha) is shown by their frequent presence around homesteads and in the main cultivated fields. *Ziziphus mauritiana*, *Uapaca kirkiana* and *Berchemia* (Shona: nyii) fruits are sold on local markets.

The seasons of the fruits availability is spread throughout the year e.g. *Ziziphus* in winter, *Uapaca*, some *Ficus* and *Strychnos* in the spring and early summer and *Vangueria* and *Sclerocarya* in late summer and autumn. *Azanza* is eaten in summer in Natural Region (NR) V and in winter and winter-spring in NR III and IV.

Despite their consumption most of the people surveyed were less interested in the indigenous fruits than in the conventional exotic fruits. The perceived disadvantages of the indigenous fruits were:

1. Difficulties in propagation
2. Lack of improved planting material: a low proportion of flesh to seed and low yields
3. A long period before the trees come into crop and slow growth rate
4. Lack of production information
5. Free availability in the forests discourages planting.
6. A poor "image" and low demand

In contrast some respondents pointed out the following advantages:

1. Ease of establishment
2. Adaptation to the harsh environment
3. Minimal management requirements

4. Some fruit trees are fast growing and high yielding with a good demand for the fruits
5. The trees are multiple-purpose and their use could help preserve the environment.

This survey-derived information is being used in the development of a research programme which includes work on selection of improved genotypes and on propagation methods.

INTRODUCTION

Wild indigenous fruits play a very important part in the household food economy of many Zimbabwean families. The fruits are collected from forests and trees of favoured species are left in the fields when forests are cleared for cultivation (Campbell *et al.*, 1991). They are also planted near homesteads. The fruits are likely to be of considerable nutritional importance, especially to children, and in drought years can be an important source of food because the trees, with their deep root systems and frequently deciduous habit which adapts them to dry winter conditions, can continue to produce fruits even when drought prevents the establishment and growth of annual field crops. General observation has shown them to be productive in the wild in conditions where exotic fruit trees such as apple, peach, citrus, guava and even mango would need irrigation.

Many indigenous fruit trees also provide traditional medicines and wood for carvings, fence posts, timber and fuel as well as food (Tredgold, 1986). They are not, however, planted by small-holder farmers to anything like the same extent as exotics. In view especially of their tolerance of the harsh environmental conditions of many communal areas it was, however, decided to proceed with a programme targeted at their development as crop plants, especially for low input horticulture. Such programmes have successfully "domesticated" fruits and nuts like blueberries and macadamia nuts elsewhere within living memory and some of the important pre-requisites for this already exist.

Firstly some of the fruits from the wild are already marketed on roadsides and in major towns. Secondly there is already good evidence of potential for selection of cultivars with improved horticultural characteristics of yield, fruit size etc. Some such cultivars already exist in other countries as selections from species which also grow in the wild in Zimbabwe or as selections within closely allied species while diversity within the wild populations in Zimbabwe has been noted. In order to carry out effective programmes of assessment of "improved" cultivars imported from elsewhere, collection for selection from the wild, and large scale introduction of selections it was thought useful to carry out a survey of the present distribution of indigenous fruits in Zimbabwe, of their uses and farmers attitudes towards them. Results from some aspects of the survey relating to a few key species are presented here. For compactness only the Latin and Shona (S) names are given: alternative Shona, Ndebele and English names are given by Tredgold (1986).

MATERIALS AND METHODS

The survey was carried out by means of questionnaire forms distributed to AGRITEX

level. Data on only a small proportion of the species and questions can be given here for reasons of length.

The natural regions are agro-ecological zones classified primarily in terms of decreasing amounts and increasing variability of rainfall from NR I with more than 900-1000 mm of reliable rainfall to NR V with less than 450 mm of erratic rainfall (Chasi and Shamudzarira, 1992).

RESULTS

These are presented for (1) *Uapaca kirkiana* (S: muzhanje) which is among the most popular fruits in Zimbabwe and is widely sold. (2) *Strychnos spinosa* and *S. cocculoides* (S: mutamba and muzhumwi) which are very commonly distributed and feature as a drought food (3) *Sclerocarya birrea* (S: mapfura) which is used to make a traditional drink, a porridge and more recently in South Africa to make a liqueur. It has been subjected to selection for improved fruit size and proportion of flesh in the latter country (4) *Azanza garkeana* (S: mutohwe) and *Ziziphus mauritiana* (S: musau) which is actually an exotic which Palgrave (1993) considers to have spread up the Zambezi valley from Mozambique, to which it originally came from the Middle East or India and has become naturalized. It is of particular interest because there has been considerable recent work on the selection of improved cultivars of this plant in India where it is a fairly major fruit crop for the most arid regions.

Distribution by farming type; altitude, natural region and rainfall

Results are given in Tables 1, 2, 3 and 4. They confirm previous conclusions that *Uapaca kirkiana* is found at medium altitudes, in good rainfall areas free of frost, that *Sclerocarya birrea* and *Ziziphus mauritiana* are found mainly in the lower altitude, drier areas while *Strychnos spinosa* and *S. cocculoides* and *Azanza garkeana* are much more widespread and less exacting in their climatic requirements.

Table 1. Distribution by type of farming (number of wards with presence)

	<i>Uapaca kirkiana</i> (muzhanje)	<i>Strychnos</i> * (mutamba)	<i>Sclerocarya birrea</i> (mapfura)	<i>Azanza garkeana</i> (mutohwe)	<i>Ziziphus mauritiana</i> (musau)
Communal area	26	56	52	93	10
Resettlement	2	13	8	15	0
Small-scale					
Commercial	4	7	4	12	1

**Strychnos spinosa* and *S. cocculoides*

Geographical distribution

Uapaca kirkiana was most commonly reported from Mazowe, Makonde, Chikomba, Gutu, Hurungwe and Zaka, *Sclerocarya birrea* from the Lowveld and Matebeleland while *Ziziphus mauritiana* was restricted to Rushinga, Mutoko and Mudzi in conformity with suggestions that it has spread into Zimbabwe from Mozambique. Although not picked up in the survey, *Ziziphus mauritiana* is also found in towns such as Harare

Table 2. Distribution by altitude (number of wards with presence)

Altitude	<i>Uapaca kirkiana</i> (muzhanje)	<i>Strychnos</i> * (mutamba)	<i>Sclerocarya birrea</i> (mapfura)	<i>Azanza garkeana</i> (mutohwe)	<i>Ziziphus mauritiana</i> (musau)
Under 600 m	0	2	5	7	3
600–800 m	13	41	38	62	4
800–1 000 m	4	12	12	22	3
1 000–1 200 m	8	13	6	19	1
1 200–1 400 m	6	7	1	8	0
1 400–1 600 m	0	0	0	0	0
1 600 m+	1	1	1	3	0

Strychnos spinosa* and *S. cocculoides*Table 3. Distribution by natural region (number of wards with presence)**

Region	<i>Uapaca kirkiana</i> (muzhanje)	<i>Strychnos</i> * (mutamba)	<i>Sclerocarya birrea</i> (mapfura)	<i>Azanza garkeana</i> (mutohwe)	<i>Ziziphus mauritiana</i> (musau)
NR IIa	9	7	1	6	0
NR IIb	6	6	0	7	0
NR III	10	20	5	22	2
NR IV	5	31	32	56	8
NR V	2	11	26	28	0

Strychnos spinosa* and *S. cocculoides*Table 4. Distribution by rainfall level (number of wards with presence)**

Rain	<i>Uapaca kirkiana</i> (muzhanje)	<i>Strychnos</i> * (mutamba)	<i>Sclerocarya birrea</i> (mapfura)	<i>Azanza garkeana</i> (mutohwe)	<i>Ziziphus mauritiana</i> (musau)
Under 400 mm	0	4	9	9	1
400–600 mm	12	46	49	80	10
600–800 mm	11	20	6	24	0
800–1 000 mm	7	5	1	6	0
1 000 mm+	2	1	0	1	0

**Strychnos spinosa* and *S. cocculoides*

where trees have resulted from seeds thrown away after consumption as well as deliberate introduction.

Distribution within the wards

This is shown in Table 5. *Ziziphus mauritiana* was found as a homestead tree in all 11 of the wards where it was present but only found in the main fields and forests in 7 cases each. This is in keeping with its exotic origin and apparently deliberate introduction to homesteads. All of the others are much more associated with the

than the homesteads although the high incidence in main fields suggests that they are considered too valuable to cut down. The low incidence of *Uapaca kirkiana* in homesteads may reflect difficulties in propagation.

Table 5. Distribution within the land use systems — sites of incidence within the wards

Sites	<i>Uapaca kirkiana</i> (muzhanje)	<i>Strychnos</i> * (mutamba)	<i>Sclerocarya birrea</i> (mapfura)	<i>Azanza garkeana</i> (mutohwe)	<i>Ziziphus mauritiana</i> (musau)
Homesteads	5	14	15	40	11
Main Fields	16	49	42	65	7
Forests	30	54	50	94	7
Total Wards	32	76	64	120	11

**Strychnos spinosa* and *S. cocculoides*

Ripening periods

The ripening periods of these fruits is spread throughout the year.

Sclerocarya birrea ripens during the late summer and autumn months, *Ziziphus mauritiana* during the winter and *Uapaca kirkiana* and *Strychnos spp* during the winter and early summer. *Azanza garkeana* growing in Manicaland was reported to be eaten during the summer in NR V but in winter and winter-spring in NR III and NR IV.

Farmers attitudes

There was little evidence from the survey that farmers are keen to grow these fruits in comparison with growing the conventional exotics. The reasons given were similar in all provinces:

- (a) Propagation is difficult.
- (b) There is no improved planting material.
- (c) The trees have a long non-cropping (juvenile) stage and a slow growth rate.
- (d) They are already abundant in the forests.
- (e) There is no production information available.
- (f) They have low or unknown food value.
- (g) They have little edible flesh in relation to seed.
- (h) Yields are low.
- (i) There is low demand and a small available market.
- (j) They are associated with the poor.

Similar adverse perceptions of indigenous fruits have been noted in a survey in Zambia (Kwesiga and Mwanza, 1995).

Conversely some respondents mentioned ease of establishment, adaptation to the local conditions, amply available seed, low management requirement, high yields and nutritive value and multi-purpose use.

CONCLUSION

The survey has yielded very useful results in terms both of helping to identify sites

strategies for their development. Emphasis will be on selection, demonstration, and provision of "improved" cultivars and technologies for their propagation.

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OBJECTIVES OF SCOUTING

Scouting (Stebbins and Mahar (1987), Mills (1993) has not been developed to a high degree in horticultural crops, and thresholds or action levels of most pests and diseases have not been established. In this respect, the smallholder horticultural grower's main objectives of scouting his crops would be:

1. To record the first occurrence of the pest in the crop. It is essential that the pest be noticed and correctly identified as soon after its appearance as possible so that correct measures are taken before much damage is done. An example is that of *Heliothis armigera*, (American bollworm) a pest of peas. If scouting is done and eggs are found in a crop, spraying can then be done immediately so that when eggs hatch, the exposed first instar larvae will come into contact with the chemical already sprayed on the plant. In such cases the chemical will have been given fairly good chances of success, being directed to the most vulnerable stage of the pest.
2. To determine possible or pending outbreaks of pests. The *Heliothis* example will suffice in this case. Eggs found in a crop will be a good indication of a possible outbreak of this pest so precautionary measures against such an outbreak can be carried out immediately.
3. To use reactive sprays in the case of an outbreak. In the case of diseases, preventive sprays can be carried out if the grower is aware of the diseases that normally affect his crop during different times of the year.
4. To check the efficacy of any sprays applied. The results of any spray made can only be assessed by scouting the crop after it has been applied. Resistance to pesticides by the pest can also be checked by scouting.
5. To record the occurrence of new pests. Scouting is essential not only to establish the status of the pest but also to look for beneficial insects and peculiarities in the field such as plant disorders, nutritional problems, water problems and any other abnormalities.

TRAINING

AGRITEX could be responsible for the training of smallholder horticultural growers. Such training should be cheap and simple to execute. Alternatively training could be done at the Cotton Training Centre in Kadoma where several courses in cotton scouting are conducted every year. Such training could be very relevant to smallholder horticultural growers since cotton attracts many insect pests that we get on horticultural crops and the basic principles of scouting are the same for almost all crops. After training at the Cotton Training Centre, a scout could then receive specific training on relevant crops. The Cotton Training Centre in Kadoma has good facilities and experienced personnel for scout training.

Insect pest and disease identification should be a major subject of any training program that the scout undergoes. In many cases growers are able to notice pests in their crops but fail to identify them and may end up using the wrong chemicals.

An example of mistaken identity was when a group of smallholder growers who had problems with red-spider mites on their tomato crop saw symptoms of yellowing

and mottling on upper surfaces of leaves but, failing to see the tiny creatures underneath the leaves, they thought their crop was being affected by a terrible disease.

Other useful subjects to be covered in scout training courses include: timing of scouting, scouting frequencies of different crops, scouting pattern, how to examine individual plants and scouting for specific pests.

Practical scouting exercises help in assessing scouts who are undergoing training. It is important that scout training should be conducted in a language that all scouts will understand. Who should be trained? From a smallholding, any literate member can be trained.

OTHER MANAGEMENT STRATEGIES FOR PEST CONTROL

Smallholder growers resort to chemical spraying as the only solution to pest/disease problems. They should be encouraged to use a variety of other crop management practices that help to keep pest populations low so that they can cut down on chemical costs and hazards.

Crop rotations: ideally most horticultural crops should not be planted on the same land from one season to another. Neither should different crops attacked by the same insect pests and diseases follow one another. Good crop rotation helps in reducing pests from building up in a field from one season to another. For most crops a rotation of at least three years should be employed. As an example a visit was made to some irrigation schemes in Mashonaland Central where beans and peas are grown for export. A pea crop that was grown in 1994 after beans suffered severely from nematodes.

Mulching: this can help in weed control and also in the control of some insect pests like thrips in beans. Since thrips feed on the plant but pupate in the soil, pupation can be prevented or interrupted by the mulch.

Cropping patterns: it is also good that one crop is not grown in the same field throughout one growing season to avoid build up of pests and diseases. Where sequential sowings of the same crop are made, they should be scheduled so that the first planting is on the down wind end of the site and subsequent plantings are planted progressively upwind because pests like the tiny red spider mites and disease spores can be carried by the wind. This has helped many pea growers in combating a disease called *Ascochyta*.

Crop hygiene: good crop hygiene practices help in reducing pest populations. Weed control should be properly done as many weeds are alternative hosts or provide shelter for pests.

It was observed at quite a number of smallholdings that weeding was done late because of labour shortage resulting in the crops suffering severely from the weeds and insect pests. Destroying or removing crop residues soon after harvesting helps in breaking pest life cycles. Areas around crops should be cleared to provide a barrier and to eliminate alternative hosts for pests and diseases.

Use of certified or disease free planting material

Because of shortages on the market and the high cost of seeds for most horticultural crops, some smallholder horticultural growers tend to generate their own seed or

material. It is of paramount importance that certified disease free plant material be used all the time when available on the market even if it is expensive.

There are some smallholder horticultural growers who are aware of some of the above mentioned and other cultural practices but have underrated their importance. If current extension work to these growers included teaching them these simple cultural practices, they could be included in their pest management programs.

CONCLUSIONS

The benefits of crop scouting are under-estimated by many smallholder horticultural growers and so the pests reduce yields. Scouting provides a major solution in controlling smallholder growers' pest problems. Extension workers should provide scout training as a routine. The use of cultural practices in combination with chemicals will help the smallholder growers cut down on chemical costs and hazards.

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