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THE USE OF AND TRADE IN INDIGENOUS EDIBLE FRUITS IN THE BUSHBUCKRIDGE SAVANNA REGION, SOUTH AFRICA

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The use, processing, cultivation and trading of indigenous edible fruits was recorded across a rainfall gradient in the Mpumalanga lowveld. Three transects, each consisting of one village in a relatively high rainfall zone, one village in a low rainfall zone, and one intermediate, were sampled by means of 20 households per village. Nearly all households made use of indigenous edible fruits to some extent, with households in the wettest region using the greatest diversity of fruits. The duration of availability of selected species was increased through drying, storing and processing the raw fruits for later consumption. Such activities were more common in the drier regions relative to the wetter villages. Just less than half the respondents maintained indigenous fruit trees within their homestead or arable fields, whereas more than 65% grew exotic commercial fruit species. Many respondents traded in edible fruits, but very few obtained a significant income in this way. Nonetheless, even casual trading provided vital supplementary income for low-income households.

KEY WORDS: Edible fruits, income, processing, drying, storing, rainfall, diversity, South Africa

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INTRODUCTION

Indigenous edible fruits are commonly consumed by rural populations throughout the developing world, including southern Africa (Fox and Norwood-Young, 1982; Malaisse and Parent, 1985; Zinyama, Matiza and Campbell, 1990). Fruits are eaten whenever available as a supplementation to the diet (Zinyama, Matiza and Campbell, 1990), particularly by children (Campbell, 1987; Shackleton *et al.*, 1995). The high nutrient and vitamin value of many indigenous fruits (Malaisse and Parent, 1985) make them particularly important contributors towards a balanced diet for children and adolescents.

Indigenous fruits also represent a potential source of income for underdeveloped rural communities. This may be supplementary income, or the major income for the household, demonstrated by the presence of indigenous fruit trees within fields cultivated for other crops (Campbell, 1987; Grundy *et al.*, 1993; McGregor, 1993; Shackleton *et al.*, 1995), in a typical agroforestry system. Whilst their presence does not signify that the owner of the field trades in indigenous fruits, it does indicate that they are of sufficient importance to the household for them to occupy space that could be used for arable crops.

The real value of indigenous edible fruits as a food source, and possibly as an income source, is particularly pronounced during periods of drought (Campbell, 1987). During such times there is increased reliance on indigenous plants by the entire family. Thus, it can be hypothesised that the more uncertain the environment in which people live, the greater will be the adoption of strategies by communities and individuals to extend the availability or longevity of the resource, with attempts to supplement the household diet and income through use of indigenous fruits.

Within this framework this study sought to document the indigenous fruits used by rural populations in a portion of the lowveld region of the Mpumalanga Province, South Africa; to determine the practices that are employed to extend the availability and/or longevity of the fruits; to evaluate income-generation activities from fruits, and to investigate the influence of decreasing mean annual rainfall on the use of and practices surrounding

indigenous edible fruits. This was part of a larger research investigation into indigenous natural resource management practices towards evaluation of multipurpose landuse options for the region (*see* Shackleton, 1996).

STUDY AREA

The Bushbuckridge region of the Mpumalanga Province covers approximately 1,912 km^2 and is densely populated by impoverished rural communities, relocated there during the previous era of apartheid. The precise number of villages is difficult to determine because of satellite settlements administratively attached to, but spatially slightly separate from, larger population concentrations. There are at least 65 definable settlements usually bearing the name of the surveyed and demarcated "farm" unit on which each is situated. Village size varies from less than 100 homesteads to more than 800. The current population density is about 146 persons per km^2 in the drier east and 303 persons per km^2 in the wetter west. Assuming there is no substantial exodus, the population of the area is expected to double in the next 20 to 25 years (Dolan, Twala and Russo, 1992).

There is a marked gradient of decreasing rainfall from west to east (Figure 1). Against the Drakensberg escarpment in the west the mean annual rainfall (MAR) is approximately 1,200 mm, decreasing to 550 mm in the east. Mean annual temperature is approximately 22°C, and frost is rare.

The terrain is flat to undulating, being underlain by potassic granites and grandiorite. The most extensive soil types are shallow sandy lithosols, except towards the base of the slope where deeper duplex soils are common. Closer to the escarpment deep, apedal (unstructured) soils prevail.

Paralleling the rainfall gradient, two broad vegetation types are evident, Lowveld Sour Bushveld in the wetter west, grading into Lowveld towards the east (Acocks, 1988), approximately along the 800 mm isohyet (line of equal rainfall). The tree stratum is dominated by members of the Combretaceae (*Terminalia sericea, Combretum collinum, C. hereoense, C. zeyheri* and

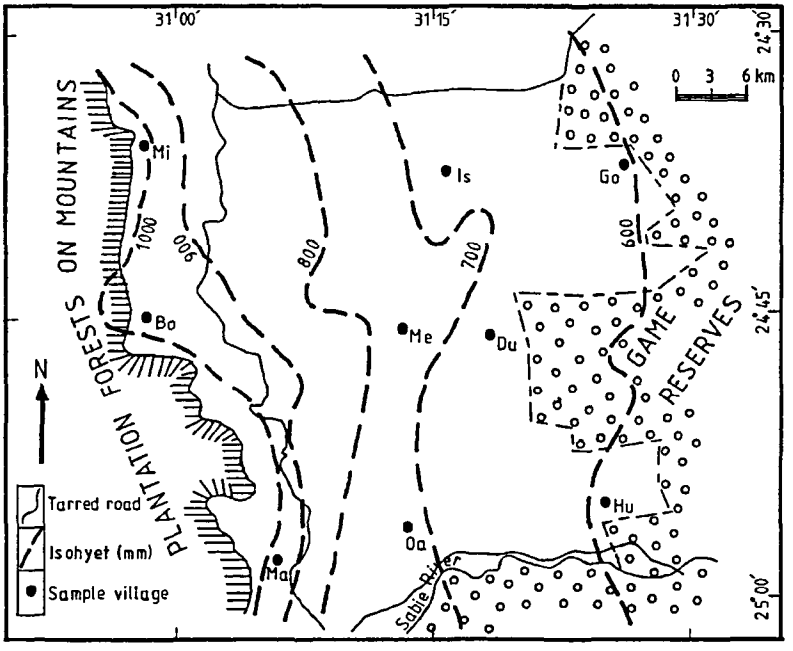

FIGURE 1 Map of the study area. (See text for full village names).

C. apiculatum) and Mimosaceae (*Acacia nilotica, A. gerrardii, A. ataxacantha, A. caffra, A. sieberana, Albizia harveyi, Albizia versicolor* and *Dichrostachys cinerea*), although local dominance varies considerably (see Appendix I for vernacular and English nomenclature).

METHODS

A household survey using a structured questionnaire was administered in nine villages during the rainy seasons of 1992/93 and 1993/94. Because of the strong rainfall gradient across the study area, it was stratified into three rainfall zones, and three villages were selected evenly throughout each zone to ensure adequate coverage of the region climatically and geographically. Only the rainfall stratification is considered in this paper. Thus, the nine

villages were sampled in three transects across the prevailing west-east rainfall gradient. The three westernmost villages (Miloro, Boelang and Marite), closest to the mountains, had the highest MAR (between 950 and 1,150 mm per annum). The easternmost villages (Gottenburg, Dumphries and Huntington) had the lowest MAR (between 560 and 630 mm per annum). The three intermediate villages (Islington, Merry Pebble Stream and Oakley) had a MAR ranging from 660 to 720 mm per annum (Sellick and Bonthuys, 1990).

In each village, 20 households were randomly selected, resulting in a total sample of 180 households. If occupants of a selected homestead were absent a neighbouring homestead was visited. However, as not all respondents answered all the questions, the number of respondents (sample size) varied from question to question. Usually, the woman responsible for cooking the household meals was interviewed, but frequently other family members also contributed information or corrected the principal respondent. Plant specimens were collected when available.

The interview schedule was developed with local input and refined by an iterative pilot process, before the formal survey commenced. The interview schedule was administered in the local language (Tsonga or Sepedi). Respondents were requested to list all edible indigenous fruits they used. Information on the availability and frequency of consumption of the most commonly used species was also collected, as well as details of species stored and dried, cultivated, or traded.

All statistical analyses of percentage values used an arcsin transformation (Sokal and Rohlf, 1981). One-way ANOVAs were conducted where appropriate to test the response of several variables to the rainfall gradient. Where a significant difference was detected pairwise comparisons of means were performed using Least Significant Differences. Differences in frequency distributions were analysed using a Kolmogorov-Smirnov test. Two-by-two tables and subsequent Chi-squared tests were performed to investigate the relationships between different patterns of behaviour with respect to use of indigenous fruits. Botanical nomenclature follows Gibbs Russell and colleagues (1985, 1987). English and vernacular names are provided in Appendix I.

RESULTS

Species Used

A total of 54 edible fruit species was recorded across all nine villages. This included the use of nectar from the flowers of three species, *Dombeya rotundifolia, Schotia brachypetala* and *Aloe marlothii.*

Up to 20 fruit species were used by any single household, although most households across all villages used between six and ten species. The most commonly eaten fruits included: *Diospyros mespiliformis* (64%), *Sclerocarya birrea* (59%), *Vangueria infausta* (57%), *Carissa edulis* (47%), *Annona senegalensis* (41%) and *Strychnos spinosa* (39%). A selection of fruits from certain restricted habitats such as riverine forests or mountainous areas was eaten in places where these were accessible.

The total number of fruit species used per village increased with MAR ($F = 5.04$; d.f. = 2; $p = 0.05$) (Figure 2). Also, indi-

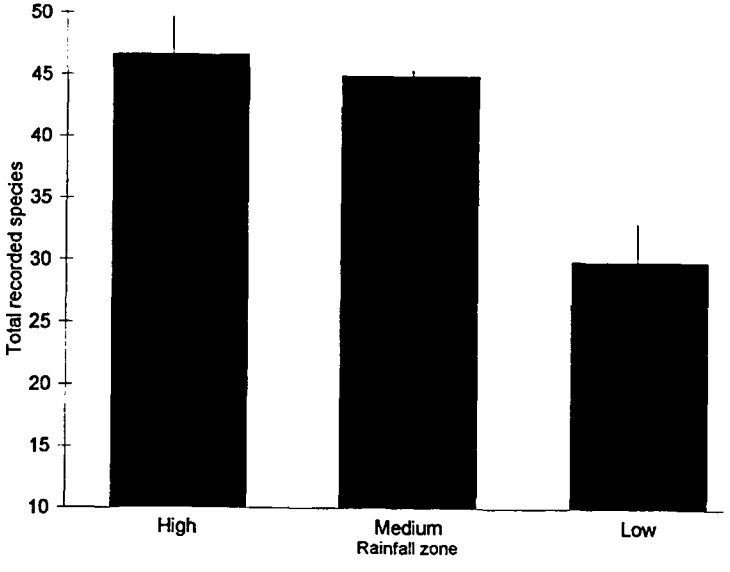

FIGURE 2 Number of fruit species used in villages according to rainfall zone, Bushbuckridge region, South Africa.

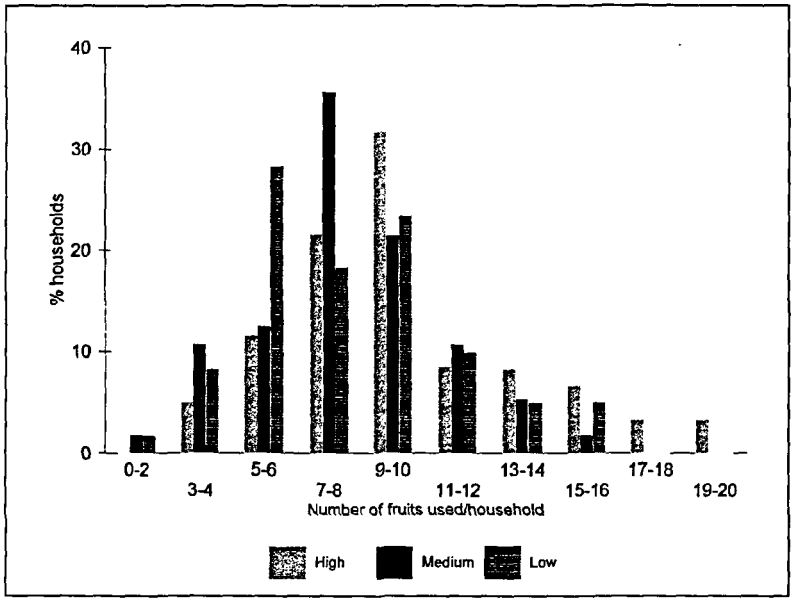

FIGURE 3 Frequency distribution of number of fruits used per household, Bushbuckridge region, South Africa.

vidual households in the three villages with the highest MAR used the greatest variety of fruit species per household (Figure 3), with some using up to 20 different fruits. By comparison, the maximum number of fruit species used in the driest villages and villages of medium MAR was 16 and 15, respectively. The drier villages had a more even distribution of fruit species used, with most households using between five and ten species. The frequency distribution curves of fruit species used were significantly different at high and low MAR ($D = 0.3$; $p < 0.0005$) and at high and medium MAR ($D = 0.21$; $p < 0.05$). However, there was no significant difference in frequency distribution of species used for villages of low and medium MAR ($D = 0.18$). There is a positive correlation ($r = 0.26$; $p < 0.005$) between the number of fruits used per household and the number of indigenous edible herbs used per household (Dzerefos *et al.*, 1995).

Species used were affected by their proximity to the village or homestead. Generally, 62% of respondents of the entire sample

felt that the most desirable indigenous fruit trees were not readily accessible within the immediate vicinity of the villages. Old people in particular complained that indigenous fruits had become a pleasure reserved for the young and energetic who could walk long distances.

More than 10% of respondents considered each of the following seven species as being largely inaccessible in the vicinity of the villages: *Annona senegalensis, Carissa edulis, Diospyros mespiliformis, Sclerocarya birrea, Strychnos spinosa, Syzgium guineense* and *Vangueria infausta*. These seven species are of particular value in that fruits of these species were also identified as being available during drought (see Table V).

Frequency of Consumption

During the fruiting season, *Carissa edulis* was reported to be the most frequently consumed fruit, being eaten every day on average. *Annona senegalensis, Vangueria infausta, Sclerocarya birrea, Strychnos spinosa* and *Diospyros mespiliformis* were eaten between four to five times per week. Adults often suggested that they were probably underestimating their children's consumption as children frequently gathered and ate indigenous fruits whilst herding cattle, walking to and from school, or playing.

Commercial fruits (grown locally and further afield, except apples) such as bananas, mangoes, oranges and apples were consumed less frequently than indigenous fruits, between two to three times per week. Some respondents remarked that they could seldom afford to buy commercial fruits. The popularity of indigenous fruits seemed to be well entrenched: 72% of respondents affirmed that young people (18 to 25 year olds) still enjoy indigenous fruits as much as their parents. Indeed, children are the primary collectors and consumers of wild fruits, with the possible exceptions of those used in income-generating activities, mainly *Sclerocarya birrea, Strychnos madagascariensis* and *S. spinosa* (Shackleton and Shackleton, 1997). Only 17% felt that dietary preferences were moving away from indigenous fruits.

Indigenous fruits were primarily eaten for taste and to a lesser extent because they were easily located and freely available (Table I).

TABLE I
Reasons given for the frequent utilisation of indigenous fruits, Bushbuckridge region, South Africa

Reasons	% of total responses
Taste*	55
Common and good taste*	31
Common*	11
Health	0.4
Economic	3

(*denotes prompted responses).

Drying, Processing and Storing

Most indigenous fruits were eaten fresh, but 41% of the respondents also dried and stored selected species for future consumption (Table II). The incidence of preparation of stores by drying was found to be significantly higher in drier areas (50%) compared to areas having medium (24%) and high rainfall (20%) ($F = 11.53$; d.f. = 2; $p < 0.05$), even with the high variability in such practices between villages within the high rainfall zone.

TABLE II
Percentage of households drying and storing indigenous edible fruits ($n = 177$), Bushbuckridge region, South Africa

Rainfall	High			Medium			Low			
Villages	Bo	Mi	Ma	Oa	Me	Is	Go	Du	Hu	Mean
Strychnos madagascariensis	0	5	10	20	20	10	15	25	15	13
Sclerocarya birrea	10	20	5	0	0	5	55	0	5	11
Strychnos spinosa	0	0	5	5	5	0	5	5	15	4
Vangueria infausta	0	0	5	0	5	0	5	5	5	3
Ficus sycomorus	0	0	0	5	0	5	0	10	5	3
Annona senegalensis	0	0	5	5	0	5	0	5	0	2
Diospyros mespiliformis	5	0	0	0	0	5	0	5	0	2
Carissa edulis	5	5	0	0	0	0	5	0	0	2
Flacourtia indica	0	0	0	0	0	0	5	5	0	1
% of households	11	20	30	20	26	26	60	45	45	
Mean for rainfall zone		20			24			50		41

The fruit most frequently dried and stored was *Strychnos madagascariensis* (by 13% of the total respondents). Apart from its use as a winter food source it is also used to settle stomach ailments. Variable reports of storage time for the dried pulp were given, ranging from two months to five years.

Sclerocarya birrea fruits were processed and stored in a variety of ways. The protein-rich kernels were extracted and stored by 11% of the respondents. These are roasted or eaten raw and can be stored for up to four months. This appears a surprisingly short period considering that the oil is reported to be very stable and has been used as a meat preservative (Holtzhausen, 1994). The fruit pulp is made into jam, juice and beer which prolongs the availability of the resource. The local beer made from *Sclerocarya birrea* fruits can be sealed in clay pots or plastic containers and buried for up to three years.

About 4% of those interviewed prepared *Strychnos spinosa* for storage, responding that it can be stored for up to three months.

Cultivation

A greater number of respondents grew commercial fruit trees (68%) than indigenous fruit trees (46%) (Table III). Amongst the respondents growing indigenous species *Sclerocarya birrea* was cultivated by more than half, probably because of its traditional sacred value, its drought resistance and the popularity of the beer fermented from the fruits. Its sacred value probably evolved from the importance of its fruits in local cultures and

TABLE III

Percentage of households growing indigenous ($n = 171$) and commercial ($n = 178$) fruit trees, Bushbuckridge region, South Africa

Rainfall	High			Medium			Low			
Villages	Bo	Mi	Ma	Oa	Me	Is	Go	Du	Hu	Mean
Indigenous	60	30	20	60	74	47	35	35	50	46
Mean for rainfall zone		37			60			40		
Commercial	75	68	90	95	67	72	60	60	25	68
Mean for rainfall zone		78			78			48		

diet, but requires investigation. In addition, 18 types of commercial fruit trees were grown, including citrus, avocadoes, apples, pears, guavas, bananas, mulberries, papaya and mangoes.

Generally, indigenous fruit tree cultivation was found to be most prominent in villages with a moderate MAR, where 60% of the respondents cultivated indigenous fruit trees and 78% grew commercial fruit trees. In the villages with the highest MAR, 37% and 78% of the respondents grew indigenous and commercial fruits trees, respectively, whereas in low MAR villages only 40% and 48% of the respondents grew indigenous or commercial fruit trees, respectively. There was a high variability from village to village, especially within the high rainfall zone.

There was no association ($X^2 = 0.27$; $p < 0.61$) between cultivation of indigenous fruit trees and drying and storing of indigenous fruits.

Income Generation

Fifteen percent of all respondents reported selling indigenous fruits (Table IV). More respondents from the high rainfall villages traded (18%), although this was not statistically significant ($F = 0.35$; d.f. = 2), because of the wide inter-village variation in the high and low rainfall areas. Of those trading in indigenous fruits, most (73%) restricted their selling mainly to the summer months. Only 9% traded throughout the year and 18% sold only during the winter months.

The most commonly traded fruits, either raw or processed, were *Strychnos madagascariensis* (42.3% of those trading), *Annona senegalensis, Carissa edulis, Sclerocarya birrea* and *Vangueria*

TABLE IV

Percentage of households selling indigenous fruits ($n = 177$), Bushbuckridge region, South Africa

Rainfall	High			Medium			Low			
Villages	Bo	Mi	Ma	Oa	Me	Is	Go	Du	Hu	Mean
	30	5	20	16	22	10	5	10	20	
Mean for rainfall zone		18			16			12		15

infausta (all 11.5%). Other species included *Strychnos spinosa, Trichilia emetica, Syzgium guineense*, and three unknown species. Selling price per fruit ranged from R 0.50 to R 1.50 (US$ 0.14–0.41) depending on species, fruit size and quality (local currency = Rand). On average, traders in indigenous fruits earned about R 87 (US$ 24.84) per month, although income for some was as low as R 20 (US$ 5.48). Nearly all traders earned less than R 100 (US$ 27.40) per month (Figure 4), although the most profitable indigenous fruit business reported an income of R 3,000 (US$ 821.92) per month and involved selling of *S. birrea* beer during winter. The high variation in income may be a reflection of return per effort. Thus, those reporting very low incomes may simply sell fruits on a casual, *ad hoc* basis, and not as a primary commercial venture. Trading in edible fruits is almost exclusively the domain of women, and is regarded as a vital source of income for widowers, or households where the husband does not work (Shackleton *et al.*, 1995; Shackleton and Shackleton, 1997).

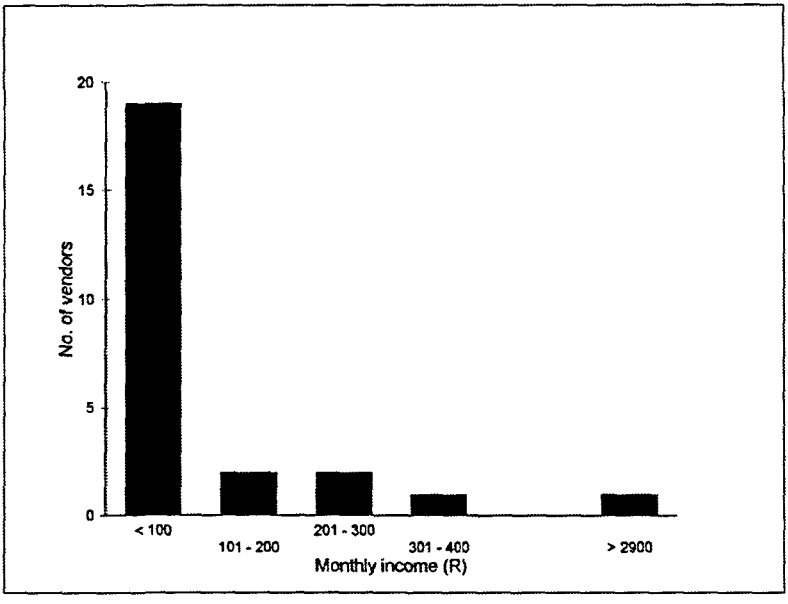

FIGURE 4 Mean monthly income for households trading in indigenous fruits, Bushbuckridge region, South Africa.

It appears that respondents did not cultivate indigenous fruits with a mind to selling them, since there was no significant association between cultivation and selling ($X^2 = 2.41$; $p < 0.15$) across the entire sample, although one was evident for households in the dry villages ($X^2 = 4.76$; $p < 0.05$) only. However, it was noteworthy that there was a positive association ($X^2 = 6.78$; $p < 0.01$) between trading in indigenous fruits and indigenous edible herbs. Thus, households trading in one will probably also trade in the other. This suggests that those who have learnt the financial benefits of trading in one type of indigenous plant will readily adopt trading in other resources too.

Availability during Drought

Thirty percent of the respondents reported that indigenous fruits can still be found during drought (Table V). The species perceived to be the most drought resistant was *Sclerocarya birrea*, being

TABLE V

Percentage of households reporting the availability of commonly used indigenous fruits during drought ($n = 179$), Bushbuckridge region, South Africa

Rainfall	High			Medium			Low			
Villages	Bo	Mi	Ma	Oa	Me	Is	Go	Du	Hu	Mean
Sclerocarya birrea	15	15	10	45	11	15	20	5	10	16
Diospyros mespiliformis	5	10	10	35	0	0	5	0	15	9
Strychnos madagascariensis	0	5	0	20	16	0	5	10	0	6
Strychnos spinosa	5	0	0	0	21	0	15	0	5	5
Ficus sycomorus	0	10	0	0	0	20	5	0	5	4
Syzgium guineense	0	0	10	10	0	0	5	0	0	3
Carissa edulis	5	0	0	0	0	5	5	0	0	2
Antidesma venosum	0	0	0	0	0	5	0	0	10	2
Vangueria infausta	0	0	10	0	5	0	0	0	0	2
Trichilia emetica	0	0	0	0	0	0	0	0	10	1
Annona senegalensis	0	0	0	0	5	0	0	0	5	1
% of households mentioning at least one fruit species	26	25	10	55	30	25	40	15	35	
Mean for rainfall zone		20			37			30		30

mentioned by 16% of the respondents. Some respondents commented that the fruits borne during droughts had less juice than during normal rainfall periods. Other species which were reported to produce fruits despite drought were: *Diospyros mespiliformis* (9%), *Strychnos madagascariensis* (6%), *Strychnos spinosa* (5%), *Ficus sycomorus* (4%), *Syzgium guineense* (3%), *Carissa edulis* (2%), *Antidesma venosum* (2%), *Vangueria infausta* (2%), *Trichilia emetica* (1%) and *Annona senegalensis* (1%).

Trends in Availability over Recent Years

Generally, the most common perception was that the six most commonly used fruit species have declined in abundance over the past six to seven years (Table VI). Of those who perceived

TABLE VI

Perceived changes in the availability of six commonly eaten fruit species over the last six to seven years ($n = 179$), Bushbuckridge region, South Africa

Rainfall	High	Medium	Low	Mean
Increased availability				
Sclerocarya birrea	14	7	20	14
Diospyros mespiliformis	9	14	12	11
Vangueria infausta	7	5	8	7
Annona senegalensis	9	4	5	6
Carissa edulis	9	5	3	6
Strychnos spinosa	0	7	8	5
Decreased availability				
Diospyros mespiliformis	32	31	40	34
Vangueria infausta	31	24	27	27
Sclerocarya birrea	24	24	23	24
Carissa edulis	19	28	25	24
Annona senegalensis	15	23	23	20
Strychnos spinosa	22	17	22	20
No change in availability				
Sclerocarya birrea	17	21	18	19
Vangueria infausta	19	28	7	18
Diospyros mespiliformis	22	19	10	17
Carissa edulis	23	19	7	16
Strychnos spinosa	5	16	10	10
Annona senegalensis	8	16	5	10

(Values are expressed as a percentage of the responses received in each village).

a decline (36%), 70% thought that it was related to population pressures and a concomitant increase in demand for fuelwood, arable land, living space, building materials, carving materials and traditional medicine, and 23% blamed other factors, such as inadequate rainfall, high temperatures or religious waywardness (the primary religions in the area are mainstream and independent denominations of the Christian faith). In contrast, 17% believed there had been an increase in indigenous fruit abundance over the last six to seven years and attributed the trend to tribal tradition conveying an inherent respect for fruit trees as opposed to trees that are chopped for timber and fuelwood. A further 23% replied that they had not detected a change in the availability of fruits in the last six to seven years, while 24% said they were unable to answer the question.

DISCUSSION

This study has indicated that the local communities in the Bushbuckridge region of Mpumalanga remain strongly reliant on local indigenous edible fruits to supplement their diet and household income. From a sample of 180 households from nine separate villages, only a single household was encountered that did not make use of at least one indigenous fruit. Most households used between five and ten fruits. This is achieved through harvesting fruits from communal lands, from cultivated fields and from around the homestead.

Taste appears to be the overriding factor in the popularity of indigenous fruits. Campbell (1987) also commented that in Zimbabwe taste was of prime importance for determining indigenous fruit use, even surpassing ease of collection. The excellent nutritional value of indigenous fruits, which often exceeds that of commercial varieties (Wehmeyer, 1966), was not recognised by respondents as a reason for widespread consumption. This may have been underestimated as the response was not prompted. Malnutrition among children and teenagers is perceived to be a major health problem in the area, second only to inadequate water supplies (Dolan, Twala and Russo, 1992). The importance of indigenous fruits during the formative years is highlighted

by Campbell (1987) in Zimbabwe, and Cunningham (1988) in KwaZulu/Natal, South Africa.

A significant proportion of the interviewees practised several strategies to increase local availability (such as cultivation), and longevity of the resource (such as drying). The proportion of households using, cultivating and processing fruits differed across the rainfall gradient, as well as between villages within a particular rainfall zone. There was an increasing number of species used with increasing rainfall. This is possibly because of the occurrence of a greater diversity of species under moister conditions. A greater proportion of respondents dried and stored edible fruits in the driest villages than the wet or intermediate villages. This is probably a response to greater environmental uncertainty and a shorter fruiting season, but may also be a reflection of differential availability, across the rainfall gradient, of fruits suitable for drying. However, with the greater diversity of plant species in the moister regions (Sonnenberg, 1993), this appears unlikely. The greatest proportion of households trading in indigenous fruits was encountered in the wettest villages, and the least in the driest villages. The high variation between villages indicates that such practices are not simply a reflection of annual rainfall alone. Local differences in fruit availability, human population densities, livestock browsing pressures, and so on, must also play an important role that warrants further investigation to develop predictive capacity.

The findings of this study are contrary to Fox and Norwood-Young's (1982) observation that drying of indigenous fruits was not a widespread practice in southern Africa. Cunningham (1988) noted that drying and storing of fruits was a common custom amongst the Thembe Thonga in order to increase the commercial value of indigenous fruits (*Sclerocarya birrea, Strychnos madagascariensis* and *Vangueria infausta*) by storing them for resale in winter when alternative, commercial foodstuffs were in short supply.

Junod (1927) commented that the Tsonga did not practice fruit tree cultivation apart from the occasional *Sclerocarya birrea* which was sometimes planted in gardens. In contrast, the present study indicated that a variety of indigenous fruit trees were

maintained: *Berchemia discolor, Bridelia mollis, Diospyros mespiliformis, Ficus* species, *Sclerocarya birrea, Strychnos spinosa, Trichilia emetica* and *Vangueria infausta*. However, cultivation may have been interpreted by respondents as any tree found within the homestead area or field, whether actively planted and tended or not. Thus, trees established through natural regeneration are simply left *in situ*, as has been recorded in Zimbabwe (Grundy *et al.*, 1993). However, previous work in the Bushbuckridge region found that fruit tree cultivation was frequently practised (Griffin *et al.*, 1992), although quantitative data on the species were not collected.

Traditionally, when land was cleared for crops or trees felled for fuel the edible fruit bearing species were left in place. Fruit trees in rural areas of Zimbabwe have always been regarded as sacred (Campbell and du Toit, 1988). However, as favoured fuelwood species decrease around villages inhabitants, of necessity, turn to fruit trees as a fuel source (Shackleton, 1993; Shackleton and Prins, 1992; Shackleton *et al.*, 1995). The decline in availability of indigenous fruits is also compounded by an increasing number of people competing for a limited supply of fruits.

In light of the high population densities in this region, it is hypothesized that this considerable use of indigenous edible fruits could be jeopardising the sustainability of the resource, resulting in unreliable supply rates in the short-term. However, this does not appear to be the case as perceived by local residents. Of those respondents expressing an opinion (76%), 52% felt that the availability of edible indigenous fruits had remained the same or actually increased over the last six to seven years. There was a strong perception that young people still use indigenous fruits to the same extent as their parents, if not more.

The income-generation potential of edible indigenous plants is valued, with 15% of respondents trading in indigenous fruits. However, income is highly variable, and is clearly related to effort expended. Price per fruit is size-dependent as also noted by Malaisse and Parent (1985) in the Zambezi area for *Strychnos* and *Parinari* fruits. In light of the perceived sustainability of resource supply under current population pressures, it is possible that income generation options could be developed further.

Increased cultivation and agroforestry are possible options to facilitate sustainable production rates, and thereby reliable incomes for most months of the year. However, some effort will be required to overcome problems of water shortages and animal browsing whilst the trees are small (Griffin *et al.*, 1993), as well as areas of localised resource depletion (Shackleton *et al.*, 1995). A well developed trade in indigenous fruits was reported in the Condo area of Zimbabwe, where almost a quarter of the respondents reported selling, and over 50% estimated that they bought indigenous fruits more than three times a year (Campbell, 1987). The drought tolerance of several indigenous species makes them ideal targets for income generating opportunities. The availability of indigenous fruits during drought has been reported in Zimbabwe (Campbell, 1987; Wilson, 1989).

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APPENDIX I
ENGLISH AND VERNACULAR NAMES

Botanical name	English name	Vernacular name
Acacia ataxacantha	Flame Thorn	Rithathawa
Acacia caffra	Common Hook-thorn	
Acacia gerrardii	Red Thorn	Mbhota
Acacia nilotica	Scented Thorn	Mbhota-mkulu
Acacia sieberana	Paperbark Thorn	Mololo
Albizia harveyii	Common False-thorn	Mxangwa
Albizia versicolor	Large-leaved False-thorn	Mvhangazi
Aloe marlothii	Mountain Aloe	Mhanga
Annona senegalensis	Wild Custard-apple	Maphovana
Antidesma venosum	Tasselberry	Tshongo
Berchemia discolor	Brown ivory	
Bridelia mollis	Velvet sweetberry	Maguava ya nhova
Carissa edulis	Numnum	Ntshuguri
Combretum apiculatum	Red Bushwillow	Xikukutsu
Combretum collinum	Weeping Bushwillow	Ndzhuva
Combretum hereoense	Russet-leaved Bushwillow	Xikhavi
Combretum zeyheri	Large-leaved Bushwillow	Fufu
Dichrostachys cinerea	Sicklebush	Ndzhenga
Diospyros mespiliformis	Jackelberry	Ntoma
Dombeya rotundifolia	Wild Pear	Xitlhave
Ficus sycomorus	Sycamore Fig	Nkuwa
Schotia brachypetala	Weeping Farmers-bean	Xinopinopi
Sclerocarya birrea	Marula	Nkanyi
Strychnos madagascariensis	Spineless Monkey-orange	Mkwakwa
Strychnos spinosa	Green Monkey-orange	Masala
Syzgium guineense	Water Pear	Nqozi
Terminalia sericea	Silver Cluster-leaf	Nsusu
Trichilia emetica	Natal Mahogany	Nkuhlu
Vangueria infausta	Wild Medlar	Mapyila