# THE NUTRIENT COMPOSITION AND DIETARY IMPORTANCE OF SOME VEGETABLE FOODS EATEN BY THE !KUNG BUSHMEN*

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Although it is commonly believed that Bushmen eke out a precarious living on whatever foods they can find, the findings of Lee[1] indicate that Bushmen in the Dobe area in the north-western region of Botswana have ample supplies of a wide variety of foods. The observations of this author regarding the inhabitants of this area have brought to light the fact that these Bushmen have an excellent knowledge of the most favourable local seasonal conditions for certain vegetable foods. No less than 85 different species of edible plants and wild fruits are known to them.

Lee[1] classifies these 85 foods as primary (1), major (8), minor (14), supplementary (32), rare (13) and problematic (17). The Bushmen are highly selective in their food habits and only 9 species of these plants constitute about three-quarters of their total vegetable diet. Three of them, viz. the *mongongo* or *mangetti* fruit (*Ricinodendron rautanenii*), the *tsi* bean (*Bauhinia esculenta*) and the tuber, *sa* (*Vigna dinteri*), will be discussed here.

## MORPHOLOGY

### *Mongongo or Mangetti*

The Bushmen in the Dobe area regard the fruit of the *mangetti* tree as their primary food. Story[2] states that the trees grow up to a height of at least 25 feet and that in winter, when they are bare, they resemble slender baobab trees. The trees, which usually form a woodland, are prolific fruit bearers. The reddish-brown fruits are elliptical in shape and are about 1½ in. long and 1 in. in diameter. The large stone is covered by a thin layer of flesh which is sweet tasting and has a mealy texture. The dry edible flesh does not readily decompose and is moderately hard and crumbly. It is usually cooked into a sweet porridge or soup, in which form it is normally eaten by the Bushmen.

The thick and extremely hard shell of the stone is deftly cracked by the Bushmen women between two stones to release the nuts, which are tasty and nutritious when eaten either raw or roasted. The Bushmen eat the whole roasted nuts or pound them in a mortar to a coarse meal, which is then mixed with one or more of several roots or with meat.

### *Tsi Beans*

Although the *tsi* bean is regarded as one of the major foods, it is not a popular item in the diet of the Bushmen in the Dobe area—the main reason being the uneven distribution of the plant in this area. In the neighbouring Nyae Nyae Pan area where the distribution is more uniform, this bean ranks with the *mangetti* as a primary food.

Story[2] describes the plant as a runner, growing in open grass veld, with its slender vines attaining lengths of up to 18 feet. The perennial tuber can weigh as much as 30 lb. after growing for about 10 years. The old tubers are rather fibrous but the young ones can be baked or boiled to make an excellent vegetable. However, the seeds of this plant are more important than the tubers.

The pods usually contain 2, but sometimes as many as 6, seeds which are about the size of a thumb-nail and are dark brown in colour when ripe. The shell of the seed, though not very thick, is hard but can be readily cracked. The bean does not taste pleasant when raw and has a slimy texture when chewed; as a consequence the seeds are never eaten raw. The slimy texture disappears after roasting and the bean then has a pleasant coffee-like flavour. The roasted seeds are pounded, then boiled with water and eaten as a porridge.

### *Sa Plant*

The *sa* plant is described as a leafy twiner which climbs trees and shrubs to a height of about 6 feet, producing numerous slender stems similar to those of runner-beans. The small bean-shaped seeds, which are borne in pods, are apparently not eaten. The branched system of roots about 9 in. below the surface of the soil bear swellings which vary in shape from spherical to ovoid to long—the length being 3 - 7 in. and the diameter about 1 in. Very small swellings may be found next to large ones, with the spacing between them varying from a fraction of an inch to a foot. These root swellings are eaten.

Lee[1] classifies the *sa* as one of the minor foods, but he also states that the Bushmen regard this food as very desirable. They eat the swellings raw or roasted and often pound them and mix them with *!gwaase*, an onion-like green shoot, *but never with meat*. It tastes refreshing and similar to, but better than, a potato.[3] Story[2] likened its flavour to that of raw beans. Thus it would appear to merit further investigation, with a view to stimulating its cultivation.

## NUTRITIVE VALUE

Let us now take a look at the nutrient composition of the 3 foods described above and the contribution which they could make to the diet of the Bushmen. In Table I the nutrient composition of the 3 foods (the samples analysed were collected by R. B. L. and M. W. in Botswana) are given. The flesh of the *mangetti* is a good source of carbohydrate and the sweet taste indicates the presence of sugars, but we have not determined the actual amounts present.

Both the *mangetti* nut and the *tsi* bean are excellent sources of protein (however, the biological value and digestibility of this protein have not yet been determined) and of fat, while the *mangetti* flesh and *sa* contain useful proportions of protein. Since the average weight of *mangetti* fruits (dry) is about 10 G—of which 3 G is flesh and 1·4 G is nut, the remainder being waste shells—an average of 150 nuts/day should supply about 60 G protein. Bushmen are reported to eat 100 - 300 nuts/day.

The average weight of the *tsi* bean is about 2·4 G, of which approximately 50% is edible, and 156 beans would therefore provide about 60 G of protein.

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TABLE I. NUTRIENT COMPOSITION OF THREE BUSHMEN FOODS

| Characteristics | | *Ricinodendron rautanenii* | | *Bauhinia esculenta* | | *Vigna dinteri* |
|---|---|---|---|---|---|---|
| | | *Dry flesh* | *Nut* | *Tuber* | *Nut* | *Nut* |
| Moisture | G/100 G | 13·4 | 4·8 | 83·3 | 5·2 | 78·4 |
| Ash | G/100 G | 5·7 | 4·0 | 1·7 | 2·9 | 1·0 |
| Protein (N × 6·25) | G/100 G | 6·6 | 28·8 | 1·5 | 31·6 | 3·0 |
| Fat (petroleum ether extract) | G/100 G | 0·6 | 57·3 | 0·3 | 36·1 | 0·1 |
| Fibre | G/100 G | 3·5 | 2·7 | 3·8 | 1·0 | 0·9 |
| Total carbohydrate (by difference) | G/100 G | 70·2 | 2·4 | 9·4 | 23·2 | 16·6 |
| Calorific value | G/100 G | 312 | 641 | 46 | 544 | 79 |
| Calcium | mg./100 G | 89·6 | 452 | 23·6 | 136 | 15·2 |
| Magnesium | mg./100 G | 195 | 432 | 21·8 | 258 | 58·0 |
| Iron | mg./100 G | 0·74 | 2·31 | 0·27 | 3·3 | 0·90 |
| Copper | mg./100 G | 0·45 | 1·35 | 0·13 | 1·0 | 0·20 |
| Zinc | mg./100 G | 1·39 | 3·08 | 0·49 | 3·8 | 0·40 |
| Sodium | mg./100 G | 1·01 | 2·15 | 15·0 | 89 | 16·1 |
| Potassium | mg./100 G | 1740 | 748 | 273 | 849 | 319 |
| Phosphorus | mg./100 G | 46·0 | 839 | 4·61 | 484 | 16·4 |
| Thiamin | mg./100 G | 0·28 | 0·22 | 0·02 | 0·94 | 0·09 |
| Riboflavin | mg./100 G | 0·11 | 0·13 | 0·003 | 0·82 | 0·05 |
| Nicotinic acid | mg./100 G | 0·12 | 0·42 | 0·19 | 1·86 | 0·86 |
| Vitamin C | mg./100 G | 8·51 | — | 4·0 | 2·68 | 9·82 |
| β-carotene | mg./100 G | — | — | 0·04 | 0·22 | 0·03 |

The tubers of the *tsi* and *sa* are valuable sources of water to the Bushmen in terrain where water is scarce.

It is apparent that the daily mineral requirements of humans could easily be met by the 3 foods, even if they were the only foods available.

Taking the *mangetti* as our example, 150 nuts would also supply the following percentages of the daily mineral requirements: calcium 118; magnesium 303; iron 48; copper 142; and phosphorus 220. The porridge or soup which is made from the flesh of these 150 *mangetti* fruits would add considerably to these minerals.

The 150 *mangetti* nuts would supply 39 and 15% of the daily requirements of thiamin and riboflavin, respectively. The nicotinic acid content is negligible. The porridge cooked from the flesh would also make a valuable contribution to the vitamin supply. As far as the vitamin supply is concerned, the *tsi* bean has a definite advantage over the *mangetti*, and *sa* is undoubtedly a very useful source of vitamin C. These 3 foods are, however, poor sources of β-carotene.

The oils of both the *mangetti* nut and the *tsi* bean are good sources of linoleic acid, one of the essential fatty acids. Calculated on the total fatty-acid content the oils contain respectively 43 and 25% linoleic acid.

It is apparent that it would be worth while to consider cultivation of these 3 foods for future supplementation of our food resources. We should also make use of the knowledge of the Bushmen and of the ability of these primitive peoples to adapt themselves to conditions of hardship forced upon them by the inhospitable terrain and unfavourable climatic conditions of their environment.

SUMMARY

Although the !Kung Bushmen living in the Dobe area in Botswana have a choice of 85 different species of edible plants, only one is classified as a primary food; 8 are classified as major, 14 as minor, 32 as supplementary, 13 as rare and 17 as problematic.

The primary food (the *mangetti* fruit—*Ricinodendron rautanenii*), one of the major foods (the *tsi* bean—*Bauhinia esculenta*) and one of the minor foods (*sa*—*Vigna dinteri*) are described. Their nutrient contents are given and their contribution to the daily nutrient requirements is discussed.

REFERENCES

1. Lee, R. B. (1966): 'The subsistence ecology of !Kung Bushmen', Ph.D. thesis, University of California, Berkeley, USA.

2. Story, R. (1958): *Some Plants Used by the Bushmen in Obtaining Food and Water*. Botanical Survey Memoir No. 30. Pretoria: Department of Agriculture.