

THE NUTRIENT COMPOSITION OF SOME EDIBLE WILD FRUITS FOUND IN THE TRANSVAAL

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In 1939, a pamphlet was published by Verdoorn¹ in which she described more than 50 species of wild fruits found in the Transvaal and eaten by the White population. Some of these fruits are referred to by Quin,² who states that they are eaten by the Pedi of the Northern Transvaal and gives some information about their composition in respect of a few nutrients. No attempt appears to have been made, however, to carry out any systematic analyses on these fruits to determine their more important nutrient constituents. The Food Chemistry Division of the National Nutrition Research Institute has undertaken an analysis of 9 species of edible wild fruits, the results of which are reported here.

MATERIAL AND METHODS

The fruit subjected to analysis was obtained in the Pretoria vicinity unless stated otherwise. The weights of the samples analysed varied from 1 to 2 lb. (occasionally more), depending on the amount of edible portion present. For the purpose of analysis a dry weight of about 200 G of edible portion was aimed at. It should be noted that all the freeze-dried samples were hygroscopic and had therefore to be stored in glass or plastic bottles with tight-fitting screw caps. It was unfortunately not possible to determine the carotene content of the fruit in every case.

The standard chemical methods of the Food Chemistry Division of the NNRI were used to determine the nutrient composition of the samples. Nicotinic acid, however, was determined by a microbiological method.

Description of Fruits and Preparation of Samples for Analysis

Bequaertiodendron magalismontanum (Sond.). The ripe fruit of this shrub, commonly known as the 'stamvrug' or wild plum,^{1,3} is elliptical in shape, about 1 in. long, and bright red in colour. The purplish flesh, which exudes a milky sticky latex, has a sweet but astringent taste. Each fruit usually contains either one or two fairly large, smooth stones. An excellent jelly can be made from the ripe fruit. The attractive fruits are found in abundant clusters on the stems of the shrubs which grow throughout the Transvaal in areas characterized by outcrops of quartz or granite rocks.

The skins of the fruits were carefully removed and the fruits freeze-dried for about 24 hours. The dry flesh could then be easily separated from the stones and ground to a fine powder with the aid of a porcelain mortar and pestle.

Sclerocarya caffra (Sond.). This well-known fruit-bearing tree, which grows wild in the Transvaal and other areas, and was declared a protected tree in South Africa in 1951, is commonly known as the marula tree.¹⁻⁵ The ripe fruit, which has a pleasant apple-like odour, is light yellow in colour and about the size of a loquat. The skin is tough and leathery and the succulent, yellowish-white flesh, which adheres closely to the solitary stone, has a sour-sweet, guava-like flavour. The fruits are shed while still

immature, but ripen quickly on the ground. The marula tree is a prolific fruit-bearer. Quin² has reported that between December 1951 and March 1952, four trees on the Zebediela Estates in the Northern Transvaal yielded 91,272, 28,939, 21,667 and 21,967 fruits respectively.

The sample analysed was obtained from a farm in the Nylstroom district. The fruits were carefully peeled to ensure a minimal loss of juice, and freeze-dried for approximately 24 hours. The dried flesh could then be easily cut and scraped from the kernels with a sharp knife and ground to a fine powder with the aid of a pestle and mortar.

The stone or kernel of the marula fruit contains a small and highly palatable embryo which the Bantu regard as a delicacy. The kernel is, however, extremely hard and it is therefore difficult to obtain even a small quantity of the embryos. The sample of marula embryos analysed was obtained from a farm in Bechuanaland in November 1964, the embryos having already been extracted from the kernels.

Landolphia capensis. This fruit, commonly known as the wild apricot,^{1,3} outwardly resembles the apricot in colour and size, but differs from it in taste and texture. The skin is thick, leathery and easily detachable from the flesh, which adheres tightly in a rounded mass to several closely-packed stones. The dried flesh was ground in the usual way to a fine powder before analysis.

Strychnos pungens.^{1,3} This fruit, which is popularly known as the kaffir or monkey orange (klapper' in Afrikaans), is golden-brown in colour and about the size of an orange. The fruit contains several large seeds enclosed in a yellowish flesh which has a strong, pungent odour and is not particularly palatable. It should be noted that the seeds of these fruits are poisonous. A thin layer of flesh is also present on the inner side of the thick and hard, but easily broken shell. Samples of flesh were scraped from both seeds and shell and analysed separately without being subjected to freeze-drying.

Carissa macrocarpa or *grandiflora*.¹ This interesting wild fruit, which is actually indigenous to Natal, but is also found in the Transvaal, is popularly known as the 'amatungulu'. Its skin is cherry-red when ripe and the red flesh, which contains numerous small, flat seeds, has a delicious flavour which is at once sweetish and slightly sour. The fruits tend to be oval in shape, their length being usually about 1½ in. and their breadth about 1½ in. The skin is soft and edible and the fruit is often served as a dessert, but can also be made into a tasty jelly.

The individual fruits were cut into sections before freeze-drying, after which the dry flesh could as usual be easily separated from the seeds and powdered for analysis.

Adansonia digitata.^{1,4,5} This large and well-known tree, popularly known as the baobab (kremetart' in Afrikaans), bears fruit of exceptional size, their diameter being 3-4 in. and their length 5-8 in. Inside the hard wooden shell is a soft, whitish flesh containing numerous seeds. The

flesh, which can be used for the preparation of several different dishes, has a pleasant sour taste, and makes a refreshing drink when dried and mixed with water. (It is no doubt for this reason that the tree is also called the lemonade-tree.) The seeds are edible and a good source of protein, oil, calcium, phosphorus and thiamin.⁶

For the purpose of analysis, the shell and pips were removed from the flesh, which was analysed without being freeze-dried as its moisture content was low enough to permit pulverization without further drying.

Ximenia caffra. This fruit, known as the sour plum,¹⁻⁴ is attractive in appearance and orange to red in colour. It is round to oval in shape, both the diameter and the length varying between 1 - 1½ in. The reddish flesh has a rather sour taste, this being especially noticeable in the portion immediately surrounding the large stone, to which it is tightly adherent. According to Story,⁴ 'it is at its best when over-ripe, for it does not become soft and unpleasant as many fruits do, but dries slightly, becoming wrinkled in the process and more mellow, with the flavour of a prune'.

Although quite a small tree which grows to a height of no more than 8 ft.,² Quin² describes it as a prolific bearer and states that this is the only fruit subjected to drying by the Pedi and subsequently used in the preparation of various cereal porridges. The dried product can be stored for months.

The fruit was carefully peeled before freeze-drying, after which the dried flesh could be fairly easily removed from the stones. Even the dried flesh is rather sticky and hygroscopic, being therefore difficult to grind into a fine powder unless the humidity is exceptionally low.

Dovyalis caffra. The ripe fruit of this tree, popularly known as the kei-apple,^{1,2} bears fruit of a bright-yellow colour which is round or somewhat flattened in shape and 1 - 1½ in. in diameter. The succulent, bright-yellow flesh has a flavour resembling that of the pineapple, but being rather sour, is not eaten as a dessert. An excellent jam or jelly can, however, be prepared from this fruit. The Pedi use the juice on cereal porridges.

The skin can be removed from the fruit without difficulty, and after freeze-drying of the peeled fruit the seeds are easily separated from the flesh. The latter was ground to a fine powder before analysis.

Coccinia sessilifolia. Both the tuber and fruit of this vine, popularly known as the red gherkin, are edible,⁴ but

we analysed the fruit only. When ripe, the fruit is bright red in colour and about 3 in. long. The diameter is only about 1 in. It is sweet tasting, but rather insipid in flavour. According to Story,⁴ the fruits are more palatable when gathered green and cooked as a vegetable, their texture then being more firm and their flavour reminiscent of asparagus.

A sample of ripe fruit obtained from the Potgietersrust district was freeze-dried after the individual fruits had been cut into small pieces. The seeds were easily separated from the dried pulp and the latter was then ground to a fine powder for analysis.

RESULTS AND DISCUSSION

The composition of these fruits does not appear to differ much from the better-known domestic fruits except in so far as their vitamin-C content is substantially higher than that of domestic fruits. The high vitamin-C content of the wild fruits must undoubtedly contribute to their characteristic acidity, but as the total acid content of the fruit juices was not determined, the extent to which ascorbic acid is responsible for their sourness is at present uncertain.

The protein content of the sour plum and red gherkin is rather high in comparison with that of the other fruits analysed (Table I). The embryo of the marula nut has a particularly high protein content, and this would be more than doubled if the large amount of oil that is present were extracted. In this respect, therefore, it resembles the oil-seeds such as soya, groundnuts and others. The magnesium and phosphorus contents are also exceptionally high.

During 1951, a sample of marula embryo oil was analysed by Lighthelm *et al.*,⁷ who found an iodine value of 74.4 and oleic and linoleic acid contents of 66.7 and 7.2% respectively. Groundnut oil has an iodine value of about 100 and contains 40% and 36% of oleic and linoleic acid respectively. Marula embryo oil contains a high percentage of tocopherol (7.4 mg./G oil)⁷ which should delay deterioration due to oxidation.

The differences found in the thiamin and riboflavin contents of the flesh surrounding the seeds and that scraped from the inner side of the shell in the monkey orange are surprisingly large. The high figures obtained for the flesh adherent to the shell warrant further investigation, which

TABLE I. THE NUTRIENT COMPOSITION OF 9 SPECIES OF WILD FRUITS*

Contents of 100 G edible portion		Wild plum	Marula (fruit)	Marula (embryo)	Wild apricot	Monkey orange†		Amatungulu	Baobab	Sour plum	Kei-apple	Red gherkin
						A	B					
Moisture	G	77.7	91.7	4.0	64.0	66.8	70.9	79.7	7.0	67.2	85.9	82.3
Protein	G	0.9	0.5	30.9	1.0	1.6	0.8	0.5	3.0	3.1	0.4	2.1
Fat	G	0.4	0.1	57.0	0.2	0.7	0.1	1.1	0.3	1.3	0.4	0.2
Ash	G	0.5	0.2	4.2	0.6	0.9	1.2	0.7	5.1	1.4	0.3	1.4
Fibre	G	1.3	0.5	2.4	0.8	8.6	6.2	1.6	8.7	0.7	0.3	1.3
Carbohydrate (by difference)	G	19.2	7.0	1.5	33.1	21.4	20.8	16.4	75.9	26.3	4.7	12.7
Calcium	mg.	20.0	6.2	106	11.1	30.3	45.5	22.6	387	5.9	4.8	37.9
Magnesium	mg.	0.19	10.5	467	28.9	26.2	31.6	19.5	180	2.0	0.4	2.2
Phosphorus	mg.	11.7	18.7	836	8.5	23.3	31.5	26.2	41.9	14.5	10.5	24.1
Iron	mg.	0.69	0.10	0.42	0.34	0.91	0.18	0.56	2.20	0.20	0.14	0.20
Copper	mg.	0.23	0.04	1.99	0.25	0.15	0.15	0.21	—	0.10	0.06	0.20
Sodium	mg.	40.6	Trace	338	Trace	2.60	1.79	1.58	—	4.60	9.50	4.90
Potassium	mg.	533	54.8	677	180	5.10	681	298	—	737	606	685
Thiamin	mg.	0.07	0.03	0.04	0.03	0.10	2.74	0.08	0.57	0.04	0.01	0.19
Riboflavin	mg.	0.03	0.05	0.12	0.53	0.74	1.85	0.08	0.16	0.04	0.05	0.13
Nicotinic acid	mg.	1.64	0.25	0.71	1.89	2.31	1.78	0.31	1.78	0.81	0.30	—
Vitamin C	mg.	14.1	67.9	—	60.1	21.9	21.6	74.1	213	22.5	117	24.5
Carotene (α + β)	I.U.	—	—	—	—	84	—	—	—	369	71.8	538

*For botanical names see text.

†A = flesh surrounding the seeds.

B = flesh on the inside of the shell.

will be undertaken as soon as the fruit becomes available in the new season.

The amatungulu is not only attractive in appearance and taste, but has also the high vitamin-C content which appears to be a characteristic feature of wild fruits. Since almost 95% of the fruit is edible it would also constitute a useful source of calcium, magnesium and phosphorus if eaten in sufficient amounts. The possibility of cultivating this fruit on a wider scale should be investigated.

In view of its low moisture content, the flesh of the baobab constitutes an excellent source of vitamin C and a good source also of calcium and thiamin, since relatively small quantities of the fresh fruit would supply significant amounts of these nutrients. The kei-apple, despite its high moisture content, can also be regarded as a good source of vitamin C. The α and β carotene content of this fruit proved to be surprisingly low and we did not attempt to identify the constituent responsible for the intense yellow colour of the flesh.

SUMMARY

The nutrient content of 9 species of wild fruits growing in the Transvaal was determined in our laboratories. In order to simplify the removal of the flesh from the stones, the fruits were in most cases freeze-dried after peeling. The powdered samples were stored in plastic or glass bottles with tight-fitting screw caps to prevent the absorption of moisture.

The results of the analyses are presented in the form of a table. The most outstanding characteristic of all the wild fruits analysed is their high vitamin-C content.

The amatungulu appears to be a fruit which deserves wider cultivation than occurs at present.

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