Plants Gathered as Foodstuffs by the Transkeian Peoples

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SUMMARY

Some plant foodstuffs eaten by Transkeian inhabitants are listed. A brief discussion of the food value of such plants and a warning on the possible toxicity of some of them, is given. A plea is made for further investigation into the use of these plants under varying conditions of cultivation, with a view to encouraging an easily available source of protein, mineral and vitamin supplement to the basic cereal diet.

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A rural society with close ties to the land must subsist largely on what nature provides. In the Transkei, indigenous edible plants play a major role in providing a mineral, vitamin and protein supplement to a diet low in essential proteins[1] and sometimes provide the bulk of food intake in the lean months before crops are reaped, or in drought years. Wild and cultivated fruits form a minor part in their diet, but green leaves and shoots, as well as roots, bulbs, etc., are a major food source.

Every Xhosa housewife must be able to distinguish the wild edible plants which she uses to supplement a usually monotonous carbohydrate diet, since she and her children rarely eat meat when the men are away. In the past, men have spurned these extras. They have insisted on having meat, beer and/or porridge; the women and children have eaten the left-overs to which have been added *imifino* (leaves of plants cooked as a potherb). These wild plants are seasonal, but the variety (see Table I, available on request from the author) ensures availability throughout the year, and leaves of certain plants, e.g. *Solanum 'nigrum'*,* are dried and kept for winter use. The children eat wild berries and roots while herding the cattle.

The influence of changed conditions, of increased population and decreased soil fertility on the eating habits is evident by the increased use of *imifino* among men, the most popular being the leaves of the *msobosobo* (*Solanum nigrum* complex).

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*There are several species of *Solanum* in southern Africa belonging to a complex of plants often identified as *Solanum nigrum*. However, it now seems unlikely that true *Solanum nigrum* occurs in this area, though the identity of the species making up this '*Solanum nigrum* complex' is uncertain.

The usual method of preparing *imifino* is to cook it in a minimum of water and then crumble mealie meal over it while it is boiling so as to make a thick green paste. Sometimes one or two types of plants are cooked together. On the other hand, there are a number of leaves which are used sparingly as condiments cooked with other foods, and thus eaten by the whole family. Two of these are recent introductions to the Transkei, namely, the leaf of the potato (*Solanum tuberosum*) and the peach (*Prunus persica*). They impart a bitter taste to the food which is relished by these people. Some of the most popular potherb plants are not indigenous to South Africa, namely, species of *Amaranthus* (pigweed, hanekam), *Chenopodium* (goosefoot, hondebessie), *Sonchus* (sow thistle, melkdissel) and *Urtica* (stinging nettle). They are, however, now widely distributed over the country as they are in other parts of the world.

A popular dish, *imithwane*, consists of the terminal shoots, tendrils, leaves and small unripe fruits of such plants as pumpkin, watermelon and kaffirmelon, and other members of the squash family. This is eaten by all Transkeians, White and Black.

Of the indigenous plants, the blackjack (*Bidens pilosa*), *Taraxacum* and *msobosobo* (*Solanum 'nigrum'*) are ubiquitous. *Msobosobo* is a popular plant because the leaves are much sought after as a potherb, and even dried for winter use. The tiny purplish berries are eaten raw or cooked as jam by all racial groups in the Eastern Cape. Where available, the stem and leaves of the arum lily (*Zantedeschia aethiopica*) are also cooked as potherbs.

Another use for the leaves of some plants is to brew them as tea, e.g. *Helichrysum nudifolium*, *Lippia javanica*, and *Mentha aquatica*.

SUPPLEMENTS TO STAPLE DIET

Fox[2] has pointed out that a 'complex diet allows considerable elasticity in its make-up, whereas the simple diet as eaten by the Bantu is dependent upon adequate and almost continuous supply of a few foodstuffs possessing complementary properties'.

With the decreasing availability of animal protein the value of these naturally occurring plants as a supplement to the staple maize diet can not be over-stressed. Maize is deficient in B complex vitamins, niacin and riboflavin. It is low in good-quality protein and amino acids and totally lacking in vitamin C. The refining of maize further reduces the food value.[3] A thorough investigation into the food value and toxicity, if any, of these plants should be undertaken before sophistication reaches the point where such

plants are spurned, forgotten and replaced by, perhaps, less nutritious foods.

In 1936 Levy *et al.*[1] analysed some of the common edible leaves and found these plants to be a valuable source of several important food constituents, more particularly of mineral salts and vitamin C. The leaves were found to be rich in calcium, which is notoriously low in a mainly cereal diet. The iron and vitamin C levels exceeded those for the more commonly cultivated vegetables and fruit, including citrus. Even when dried, if this is done quickly, the vitamin C content remains high.

Shanley and Lewis[4] in 1969 investigated the food value of commonly eaten plants in Natal, including *Amaranthus, Sonchus,* and *Chenopodium* species and *Bidens pilosa.* They determined the total protein content and the lysine, tryptophan, cystine and methionine content of the plant leaves in order to estimate the value of the protein of these plant leaves as a supplement to maize meal protein. In all cases the protein score of the maize meal/leaf mixture was markedly higher than that for maize alone, indicating the usefulness of these wild plants.

TOXICITY

Useful food plants under differing conditions of soil and climate can become toxic. For instance the *indumbe* (*Colocasia antiquorum*), which is eaten by the Zulu and in the northern districts of the Transkei, is very rich in protein, starch and vitamin B. It is high in calcium and said to be protective against dental caries. Nevertheless, it has been reported to cause congestion of the adrenals and glomerulonephritis when eaten in large quantities at the end of the season, i.e. after storage for some time. The toxin (sapotoxin) is neutralised by a concomitant high cholesterol diet or addition of raw adrenal.[5]

There have been conflicting reports on the toxicity of even some of the most popularly eaten plants, e.g. *Amaranthus* and *Chenopodium* species, which are widely used as food in many parts of the world, and even cultivated in India and Iran and parts of Africa. This toxicity, it seems, may depend upon the soil and the season, and has been reported for garden vegetables as well.

Nitrate Accumulators

Plants absorb nitrogen from the soil either in the form of the cation, ammonium salts, or the anion, nitrates. Certain plants have a preference for one or the other, but this can also be influenced by factors of soil, pH, aeration, etc. Plants which generally have a preference for nitrates and actually accumulate them, sometimes in lethal quantities, include certain garden vegetables, as well as *Amaranthus, Chenopodium, Urtica, Erigeron, Rumex* and *Tribulus* species, all of which are popular as food in the Transkei. *Solanum nigrum* and many others, including *Nicotiana tabacum,* also tend to accumulate nitrates. Nitrates would seem to accumulate where there are deficiencies of manganese and molybdenum[6] and the concentration of nitrates is apparently increased by frost and drought. The effect of nitrate poisoning seems to become greater when a large amount of such plants is eaten over a short period.[7]

Nitrate-nitrogen is prominent in young and immature stages of most of these plants, reaching its highest percentage just before blooming. When plants are grown on manure, nitrate-nitrogen is found even in the mature stages.[8]

Rimington and Quin[9] found the lethal factor causing 'geeldikkop' in sheep to be the abnormal pigment, methaemoglobin, and the agent responsible, inorganic nitrite, chiefly potassium nitrite, formed from pre-existing nitrate under the influence of an enzymic oxidation reduction system.

Toxicity varies widely in different species and different plants of the same species. The important point is that the degree of toxicity of the plant is determined by soil, climate and the nature and intensity of light, as well as the season and stage of development of the plant. Toxicity to animals is determined by the species of the animal, the sex and size, amount of foodstuff eaten and concomitant diet.[10]

This nitrate poisoning has been somewhat belaboured for several reasons: firstly, there are conflicting opinions regarding toxicity of plants; secondly, unfavourable external conditions may affect the enzyme systems of plants. Again, the accumulation of nitrates and nitrites of edible plants is of great importance, because if the oxidation reductase enzyme system can not function due to some deficiency of trace elements in the soil, these accumulated products may possibly unite with secondary and tertiary amines to form nitrosamines which are highly carcinogenic substances.[11]

It is believed by many Transkeians that when the leaves of *Amaranthus* and *Chenopodium* species turn red they must be avoided because, it is alleged, anyone eating such plants will go mad. (There is actually a folklore antidote to this disease — the boiled ear of a goat!)

Toxic Alkaloids

A very popular plant already mentioned is *Solanum nigrum* (*msobosobo*). There are conflicting reports in the literature as to the toxicity of this nutritious and popular plant. Toxicity has, for example been reported from Germany and America.[5] It is common knowledge in South Africa that the unripe fruit is poisonous: the active ingredient is solanine and a mydriatic alkaloid.[5] Yet it has been observed in the Transkei and Lesotho[12,13] that the green berries are often picked with the young shoots and leaves for cooking and for eating with ripe fruit. Whether they are removed before cooking is a matter of individual taste and hard to determine. The toxicity of the berries decreases with ripening and ripe fruits form a valuable source of Vitamin C and carotene.[5]

The morphology of this plant appears to vary with location, e.g. those growing in gulleys and old homestead sites, *umsobo wamanxiwa,* vary from those grown on more fertile soil. Whether these are different species of *Solanum nigrum,* or whether their morphological differences are due to changed soil conditions is a subject

worth investigating. Dr. Schütte of Cape Town grew the same seeds of *Solanum nigrum* on different media. The plants grown in a molybdenum-deficient medium produced a luscious growth, whereas those grown on a fully-nutrient medium produced a somewhat smaller and straggling plant.[14] Watt and Breyer-Brandwijk record cases of poisoning with this plant, yet it is so universally used that apart from possible difference in genetic composition one must consider whether the same conditions which appear to influence morphology may in fact determine toxicity.

Other members of the *Solanum* family generally considered by the White population of South Africa to be poisonous are *Solanum incanum, S. aculeastrum* and *S. aculeatissimum*. All are known by the Xhosa name *umthuma*, and are commonly used by children, herding cattle in the fields, to sour milk.[13,15] Solanine apparently is an active principle in the plant and recent work[11] has revealed the presence of nitrosamines, already mentioned as strong carcinogens.

A large group of toxic plants used as food and medicine in the Transkei is *Senecio*. One species, *Senecio coronatus*, is given as a decoction to babies to drink during weaning.[16] It is well known that most of the plants of this species contain a number of highly toxic alkaloids which are liver toxins and which have produced hepatomas in experimental animals.[17,18]

Under normal conditions in the country, the leaves of plants are picked and cooked immediately. However, it is worth while to point out that wilting increases the hydrocyanic acid (HCN) in leaves and poisoning by HCN has been reported,[5] particularly from ingestion of the leaves of the peach (*Prunus persica*).

Irritation

The concentration of the silica content of leaves is increased with wilting.[19] Some commonly eaten plants, e.g. *Sonchus, Amaranthus* and *Solanum* species, were ashed. The residue consisted of crystals of various kinds including epidermal phytolyths of silica and intact prickles or stinging hairs.[20,21] A popular edible plant is the stinging nettle (*Urtica urens*); this has been used in Europe for a long time. The chemically irritative properties of this plant are possibly destroyed by cooking; however, there remains a high content of salicylic acid and the prickles, reinforced with silica, are not destroyed by cooking. Both the arum lily and the *indumbe* (*Colocasia antiquorum*) have raphides of calcium oxalate in their stems and leaves, which, when eaten, could cause irritation of the gullet.

DISCUSSION

The nutritive value of a number of edible plants which grow in the Transkei makes them an important supplement to the basic maize diet. Other plants eaten are toxic, e.g. those of the *Senecio* family, and those members of the *Solanaceae* which collectively are called *umthuma*. Some of the most important food plants are nitrate accumulators under certain soil and climatic conditions. These plants should be investigated under varying conditions if we are to understand the factors which influence toxicity. We should encourage optimum conditions, prevent the use of incorrect fertilisers and eliminate the use of possible toxic plants. The food value of some of the more popular plants has been investigated but there are many more which have not, including many indigenous roots and fruits.

It would be worth while seriously to consider the use of this cheap, ubiquitous drought-resisting and acceptable form of nutritious foodstuff before we decide to mechanise agriculture and use weed-killer, and perhaps end up with a barren earth and food too expensive to be readily available to our rapidly increasing populations.

NOTES ON THE TABLES*

The plants mentioned in the tables have been collected over the past 10 years by the staff of the Bantu Cancer Registry, mainly by Mrs Matshabela, a herbalist. A few were collected by Miss Maree while we were engaged in a nutrition investigation in Mount Ayliff. Plants mentioned from other sources have not been included. Some of the earlier material collected by Dr Burrell contained some very macerated material which was painstakingly worked on and identified by Mrs Brink of the Albany Museum. All the plants have been sorted, listed and filed by Mrs Sheila Bishop, and are housed in the East London Museum. Native names of plants with their dialect, where known, have been inserted. Some obvious synonyms for these names have been omitted and the most commonly used names have been underlined. Sometimes it has been difficult to identify specimens in poor condition which accounts for the occasional query.

*Available from the authors on request.

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