

Ascorbic Acid Content of Baobab Fruit

IN the course of investigations into the nutritional value of traditional African foodstuffs, samples of the fruit of the baobab (*Adansonia digitata* L.) were taken for analysis. This tree, which is particularly noteworthy for the massive girth which its boll eventually attains, is widespread in the low-veld areas of Southern Rhodesia, and the pulp or matrix surrounding the seed in the fruit capsule is commonly chewed or sucked by the indigenous population, or made into a pleasant acidic drink, thus giving rise to the colloquial name of 'cream of tartar' tree.

While there appears to be some difference of opinion regarding the composition of the pulp¹, I have found no recent references in the literature regarding its nutritional value, and it was therefore decided to carry out ascorbic acid assays.

Samples of fruit, which had been collected by the inhabitants, were taken from a kraal in the Kariba gorge area of the Zambesi valley. The fruit was broken open and the seeds and pulp removed. The pulp was scraped from the seeds and ground to give a fine yellow-white powder passing through a B.S.S. No. 60 sieve.

The moisture content was determined and the pulp assayed for ascorbic acid by the 2:6-dichlorophenol-indophenol visual titration method, as originally described by Bessey and King², and also by the 2:4-dinitrophenylhydrazine method of Roe and Oesterling³, in this case determining reduced ascorbic acid, dehydroascorbic acid and diketogulonic acid. In both cases, the technique described by the Association of Vitamin Chemists⁴ was followed.

The figures obtained on the pulp were as follows:

Indophenol method:	328 mgm. ascorbic acid/100 gm.
2:4-Dinitrophenylhydrazine method:	307 mgm. ascorbic acid/100 gm.
Moisture content:	11.8 per cent

Fairly reasonable agreement between the methods suggested that no appreciable amounts of interfering substances were present, and that the bulk of the vitamin was present in the reduced form.

The relatively high concentration of ascorbic acid present in the pulp suggested that further investigations be carried out, as the fruit is available where fresh fruit and vegetables are normally difficult to obtain. Further samples of baobab fruit were therefore obtained, in this case from the Sabi Experimental Station. Fruit was collected from ten trees, and the pulp obtained from the fruit of each tree was bulked and prepared for analysis as with the previous sample. No attempt was made to differentiate between the degrees of ripeness of the different fruit capsules.

The analytical figures obtained from the fruit pulp were as follows:

	Ascorbic acid (mgm./100 gm.)	Moisture (per cent)
Minimum	175.0	10.0
Maximum	445.4	13.1
Mean	306.2	10.9

The results confirmed the view that the baobab fruit is an important source of ascorbic acid; and, in fact, the concentration of this vitamin in the baobab is one of the highest in any food in Southern Rhodesia.

Further investigations are in progress to establish the optimum ripeness for maximum ascorbic acid content, and also the stability of the vitamin on

keeping, as the fruit is likely to remain on the tree for long periods before dropping.

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¹ Watt, J. M., and Breyer-Brandwijk, M. G., "The Medicinal and Poisonous Plants of Southern Africa" (E. and S. Livingstone, Edinburgh, 1932).

² Bessey, O. A., and King, C. G., *J. Biol. Chem.*, **103**, 678 (1933).

³ Roe, J. H., and Oesterling, M. J., *J. Biol. Chem.*, **152**, 511 (1944).

⁴ "Methods of Vitamin Assay", edited by the Assoc. Vitamin Chem., Inc., 2nd edit. (Intersci. Pub., Ltd., 1951).

'Self-Cure' in Nematode Infestations of Sheep

EARLIER studies with sheep infested with *Haemonchus contortus* or with *Trichostrongylus colubriformis*¹⁻³ showed that the 'self-cure' phenomenon was caused by the intake of infective larvæ by sheep rendered hypersensitive as a result of previous infestations. The hypersensitive reaction was evidenced by a transient rise in blood-histamine within four days, by the development of skin-sensitivity to an antigen prepared from larvæ and by the development of œdema in the portion of the alimentary tract infested.

To obtain more direct evidence about the 'self-cure' reaction, selected sheep were anaesthetized by intravenous injection of 'Kemithal', which does not disturb infestations with *H. contortus*, the abomasum was exposed by laparotomy, massive doses of exsheathed larvæ were injected into the abomasum, and the reaction of the organ was observed for several hours.

In two worm-free lambs, which had not been exposed to infestation previously, the abomasum remained flaccid and normal for the whole period of observation. In two hypersensitive sheep infested with *H. contortus*, the abomasum showed increased peristalsis and segmentation within 10 min. of injection and, within 1 hr., was pale and œdematous and had contracted in diameter. The reaction commenced to subside in 1½-2 hr. Both sheep showed 'self-cure'; in one the worm egg-count fell from 3,500 eggs per gm. of fœces to 0 in four days, and in the other, from 3,600 eggs per gm. to 400 in seven days. There was no increase in blood-histamine within 4 hr. of the injection of the larvæ. The abomasum was collected from two other hypersensitive sheep at the height of the reaction after the injection of larvæ. No deviation from normal values of histamine could be demonstrated in extracts of the abomasal wall, although the presence of œdema was confirmed by histological examination.

The reaction of several sheep, resistant to *H. contortus*, was examined in the same way and was found to be similar to that of the infested sheep.

It was also reported previously³ that the intake of *H. contortus* larvæ produced 'self-cure' both of an infestation with the same species or with *T. colubriformis* which infests the duodenum. Further work showed that the intake of *H. contortus* larvæ will also cause 'self-cure' of infestations with other abomasal parasites such as *Ostertagia circumcincta* and *T. axei*, and that the intake of larvæ of these two species will cause 'self-cure' of infestations with *H. contortus* or with *T. colubriformis*.