

## SOME PRELIMINARY OBSERVATIONS ON THE FOOD OF ELEPHANT IN THE TSAVO ROYAL NATIONAL PARK (EAST) OF KENYA

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### SUMMARY

The background to this study is discussed. In the last five years elephant have caused a change in vegetation from dense bush to open country over large regions near the permanent water supplies in the Tsavo Royal National Park (East) of Kenya. Much destruction has also been caused, or aggravated, by fire. (See Map 1).

In the 1961 drought, rhinoceros appeared to have suffered from competition with elephant for food, to the point of starvation, but there did not seem to be serious competition in normal dry seasons, such as 1962. In the drought the destruction of trees and bushes by elephant occurred to a far greater extent than during the dry season of 1962.

The records of plants eaten apply specifically only to the areas where the data were collected (see Map 2), but probably in a more general manner to the Park as a whole. These plants, with their observed relative importance, are listed in Appendix I. It is emphasised that this study is as yet only in a preliminary stage, and should continue for several years, before final conclusions can be drawn.

Elephant were found to eat a few plants in bulk at a particular time, such as grasses, creepers and herbs, along with smaller quantities of other material such as bark and leaves. Grasses were always of varying importance. Bark and leaves formed a larger proportion of the food in the dry season than in the rains, but were always eaten to some degree. The plant species of which the feeds were composed varied seasonally and annually. Certain apparently suitable plants were not eaten.

Many food plants were analysed, and a few of these results are briefly mentioned. It appears possible that the eating of bark is a search for calcium, as the barks consumed are very rich in this mineral. Feeding behaviour is briefly described.

### INTRODUCTION

Although this study covers a period of nearly eighteen months, it must be emphasized that the authors were unable to devote

as much time as they would have liked to this work, as it could only be carried out as and when normal routine duties permitted. The records, are, therefore, by no means as complete as they would otherwise have been.

It is obvious that in order to make a thorough survey of all the food plants eaten by elephant, it would be necessary to obtain the services of a large team of trained observers distributed throughout the whole area, over a period of several years. As the personnel required for this task were not available, the authors were only able to cover a small portion of the Park (Map 2). However, since information on this subject is so scanty, it is hoped that the data accumulated so far may be of value.

### DESCRIPTION OF THE AREA

The Tsavo Royal National Park (East), which covers some 5,000 square miles, lies roughly midway between Kenya's two largest towns, Nairobi and Mombasa.

Most of the Park is flat country, between 1,000 and 2,000 feet above sea level, with small isolated rocky hills. It is traversed by two permanent rivers, the Tsavo and the Athi-Galana, and several seasonal rivers, the most important of which are the Tiva and the Voi. Geologically, the greater part of the area lies on basement system rocks, but the Yatta plateau is of Tertiary-Recent volcanic origin. In most parts the soil is dark red sandy loam, with stretches of "black cotton" in areas of impeded drainage. (Butler, 1959).

The rainfall is low and very variable. Much of the park receives less than 10 inches annually in some 80 years out of 100, while the whole region on average receives less than 20 inches. "As an extreme example, Tsavo station, which lies in the slightly better watered area, received only 2.46 inches of rain during the whole of 1934, and 5.31 inches in 1943." (Glover, 1963).

### Vegetation

The vegetation over most of the area consists of *Commiphora-Acacia* mixed woodland with occasional larger trees, the most

frequent of which are *Delonix elata*, *Melia volkensii* and the baobab, *Adansonia digitata*. Very common small trees are *Sterculia rhynchocarpa*, *S. africana*, *Lannea alata*, *Platycephalum voense*, *Boscia sp.* and *Boswellia hildebrandtii*. Prominent bushes are *Cordia gharaf*, *Grewia spp.*, *Bauhinia taitensis*, *Terminalia orbicularis* and *Premna resinosa* (Dale and Greenway, 1961). *Sericocomopsis pallida* is a very common shrub. The "black cotton" soil areas are usually open grassland. The Galana and Tsavo rivers are fringed by *Populus ilicifolia*, *Acacia elatior*, *Hyphaene coriacea* (Doum Palm), *Tamarindus indica*, *Newtonia sp.*, and species of fig.

The more important grasses include *Chloris myriostachya*, *C. gayana*, *Cenchrus ciliaris*, *Panicum deustum*, *P. meyerianum*, *P. maximum*, *Dactyloctenium giganteum*, *Brachiaria deflexa*, *B. leersioides*, *B. serrifolia*, *Aristida spp.*, *Eragrostis spp.* and *Tetrapogon spp.* (Bogdan, 1958; Edwards and Bogdan, 1951).

The legumes *Indigofera spp.*, *Tephrosia spp.* and *Crotalaria spp.* occur widely. In the rainy season the creepers *Ipomoea mombassana*, *Ipomoea spp.*, *Thunbergia gurkeana*, *Cucumis spp.* and allied genera and others may cover much of the country, while short-lived herbs, including *Heliotropium steudneri*, *Commelina benghalensis*, *Digera alternifolia* and *Tribulus terrestris*, also occupy extensive patches of ground.

### Fauna

The Park is noted for its population of elephant and black rhinoceros. Recent aerial surveys show that at times up to 7,000 elephant are present in the Eastern section. Over 30 other species of the larger mammals are also found there. These include not only those with a wide distribution, such as lion, leopard, buffalo, eland, giraffe, zebra, Coke's hartebeest and impala, but also less well known species associated with dry country, such as fringe-eared oryx, lesser kudu and gerenuk. Tsetse fly infest much of the area.

### BACKGROUND TO THIS STUDY

The National Parks authorities have been concerned for several years over the extent of the damage to the vegetation caused by elephant. It was not until the drought of 1961, however, when rhinoceros died in

large numbers, that attention was actively focused on this problem.

Conditions during this drought were very severe. Near the Galana river there was no grass, most of the trees had been smashed and the herbs and shrubs were eaten down to stumps. The large-scale destruction of baobabs and the ringbarking of *Acacia elatior* by elephant was particularly noticeable.

The rhinoceros, having a restricted permanent browsing territory, was dependent on areas near permanent water, which were the very parts which suffered most devastation by elephant. Elephant, however, could forage much further afield or even move out of the area altogether, and so did not suffer serious losses. It seemed probable that the rhinoceros were suffering from competition with elephant for food, and were dying of malnutrition.

The Trustees of the Royal National Parks sought advice from several experts, and it was decided that steps should be taken to study the movements and numbers of elephant in the Park and in the neighbouring areas from which they might migrate. In addition, it was considered important to learn what elements of the vegetation were used as food, and what effect this was having on the habitat. It is with the latter study that this paper is concerned.

### CHANGES IN THE HABITAT

Most of the Park was formerly covered by dense bush but in the last five years, in some large regions, this has either been almost completely destroyed or else been drastically thinned. The damage near the few permanent water supplies has been caused by elephant, the rocky nature of the ground having excluded fires. On the eastern side of the Park, however, fires started by honey-hunters, poachers and other intruders have been a primary cause of the loss of bush. Each year the fires sweep further into the Park and their damaging effect is increased owing to elephant having broken up the thickets. In many places this change has been followed by an increase in plains animals such as the zebra, oryx and Coke's hartebeest, while rhinoceros, lesser kudu and other bush dwellers have almost disappeared from the areas where fire has practically destroyed the cover. (See Map 1).\*

\*Recently the National Parks have constructed about 100 miles of fire breaks, in order to combat this problem.

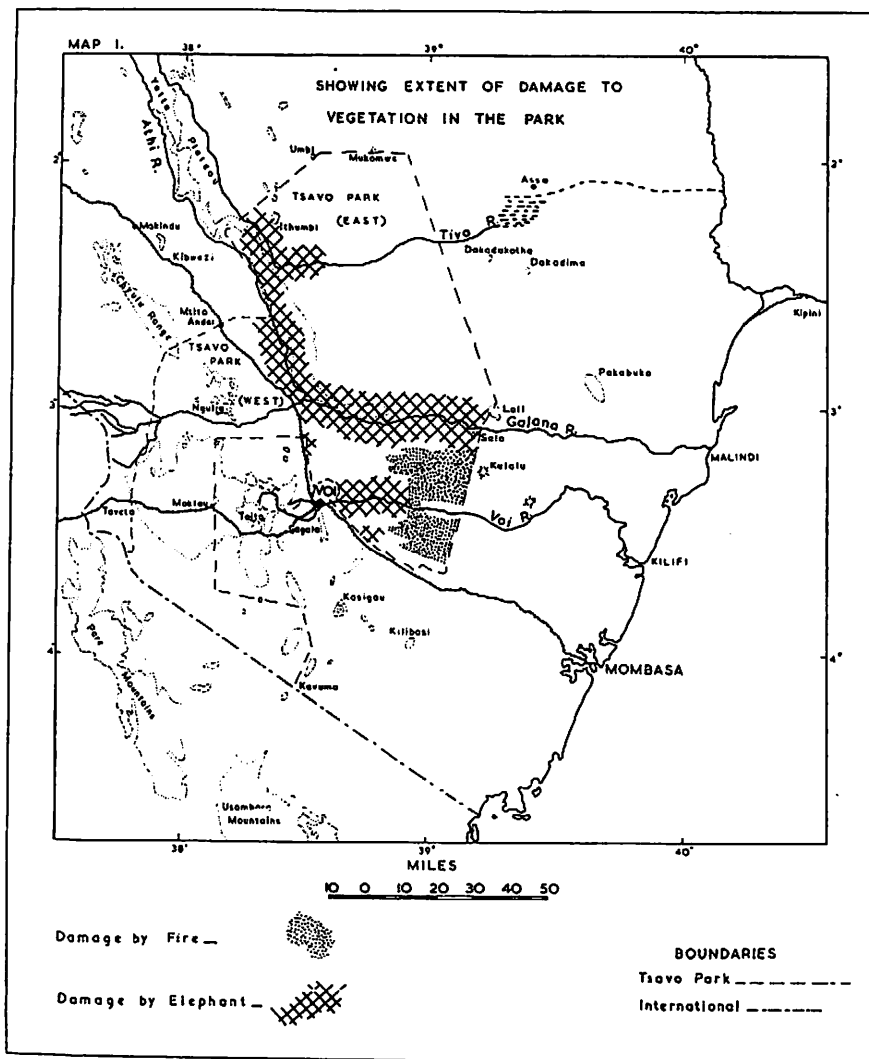


Fig. 1. A typical family group in what was formerly *Commiphora* woodland.

#### METHODS

The principal method adopted to discover what vegetation was eaten by elephant was visual observation, because the examination of stomach contents and faeces, whilst providing a very useful guide, is not wholly satisfactory in this type of country. Many species of plant are extraordinarily difficult to identify, particularly in the dry season when most of those in an arid region like the Tsavo Park are leafless. Identification is even more difficult when the plants are in the stomach and have been masticated. Faeces were, however, examined on several occasions. Identifiable traces of the food being eaten at the time, such as pieces of grass, seeds and bits of twig were found. Nevertheless, the mass of the material is not specifically distinguishable, and obviously the least digested parts of the diet assume a disproportionate importance and may give a misleading result. There may also be a tendency to place undue emphasis on the more easily recognized items.

The routine adopted was to make obser-

vations through binoculars, and to follow up by examining the vegetation after the animals had moved on. It was usually possible to approach within 50 yards without undue risk of disturbing the elephants. It is almost always obvious which plant has been eaten, as the damage to the plant is apparent, and freshly chewed pieces are left lying about. A record was made of the plant and its apparent popularity as a food, with notes on the date, name of the observer, number of animals seen, place, part of plant eaten, growth stage of plant, frequency of plant, other plants being eaten at the same time, type of country, season, soil and any other points of interest. Each species of plant was given a number and pressed specimens were made for identification and for the reference collections. Subsequent records of utilization as food were placed with the pressed specimens in the collection. When possible, monthly assessments of the plants eaten by elephants were made. In this manner, information on which plants were being eaten and their relative importance is slowly being built up.