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DIETARY PREFERENCE OF THE ROTHSCHILD'S GIRAFFES (*Giraffa camelopardalis rothschildii)* TRANSLOCATED TO RUMA NATIONAL PARK, KENYA.

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ABSTRACT

Without monitoring of animal behavior and the productivity of their environment, the success of a translocation cannot be properly ascertained, nor can important lessons be learned. This study investigated habitat utilization of the translocated Rothschild's giraffes in Ruma National Park. Feeding giraffes were observed with an 8x40 pair of binoculars and plants eaten were collected, tagged, pressed and identified. For each plant species, "food- records" were summed and expressed as a percentage of all observations. Habitat preference and preference rating of plants were determined by the Nue *et. al.* method (1974). Fifty three woody plant species were recorded along transects using a modified form of the Point Centered Quarter technique. The giraffes ate forty two species but only eight were preferred. Preferred habitats were the *Balanites aegyptiaca* and the *Acacia drepanolobium* wooded grasslands (PR = 6.941; PR = 1.300 respectively). The Northern part of the Park had a much higher intensity of use indicating that the giraffes may adversely affect their food supply by over utilizing preferred food plants in their small home ranges. As wild populations continue to be limited in size and distribution, they will increasingly require the intensive levels of management commonly applied to only captive populations.

Keywords: Dietary composition, Food preference, Habitat preference

INTRODUCTION

Increasing pressure for agricultural land has reduced the ranges of wild animals in Africa (Nesbit-Evans, 1970). Attempts have been made to translocate threatened species to other areas where they could re-establish themselves. Translocation refers to the moving of wild-captured animals for release into the wild at a second site (Stanley-Price, 1989). By the 1940's the only significant concentration of the Rothschild's giraffes in Kenya remained on a private farm at Soy (Lewa Downs Farm) where their numbers were estimated at 200 (Kakuyo, 1980). Lewa Downs Farm was initially 7,200 hectares. About 5,200 hectares were sold to the Ministry of Defense in 1976. The remaining land was given for settlement resulting in the confinement of the giraffes to a small area. This resulted in severe browsing pressure on woody plants leading to stunted growth forms (Kakuyo, 1980).

In 1983, twenty eight Rothschild's giraffes (twelve females and sixteen males) were translocated to Ruma National Park by the former Kenya Game Department. One female died on transit. Ruma is a "terrestrial island" surrounded by dense human settlements (Muthuri, 1993). Management of "island" populations requires close monitoring of the ecological effects and habitat requirements of the animal species in question. Rothschild's giraffes are poorly represented in National Parks in East Africa (Field and Ross, 1976). Prior to this study, no research effort had been directed to investigate the fate of the translocated giraffes in Ruma National Park. It is upon this background that this study was initiated to

provide ecological baseline data on selected aspects of this sub-species.

STUDY APPROACH

Study area

Ruma National Park covers an area of approximately 120km^2 within Lambwe Valley in Mbita district, South Nyanza, Kenya. The park lies 17 Km South West of Homabay town within latitudes $0^0 30^0$ and $0^0 45^0$ South and longitudes $34^0 1$` and $34^0 10$`East.

Determination of dietary composition

Feeding giraffes were observed with the aid of an 8x40 pair of binoculars (Leuthold, 1970; Moore-Berger, 1974; Kakuyu, 1980). This method is appropriate because they almost exclusively feed above ground level and therefore plants browsed can be recognized and identified at some distance. In doubtful cases a preliminary identification was checked on the spot after the animal(s) had moved on. Plants eaten by the giraffes were collected, tagged, pressed and identified at the Moi University Herbarium. Identification and nomenclature follows the works of Coe and Beentje (1991) and Beentje (1994).

Determination of availability of food plant species

A modified form of the Point Centered Quarter (PCQ) technique was used which does not require laying out of plot boundaries, is not time consuming and eliminates personal error from judging whether boundary individuals are inside or outside (Mueller Dombois & Ellenberg, 1974; Waweru, 1991).

Vegetation in Ruma National Park was grouped into four communities depending on species composition after Muthuri (1993) as follows: *Balanites aegyptiaca* wooded grassland, *Acacia drepanolobium* wooded grassland, *Acacia seyal* woodland and the riverine vegetation community (Fig.1). In each community, systematic sampling was employed to choose areas which were most representative of the vegetation type (Cochran, 1977).

Transects varied in length depending on the width of the vegetation community. The minimum length was 50m and the maximum was 300m. Each transect was subdivided into 10m intervals and the points marked. The first point was always zero and was not sampled. At each sampling point, four quarters were established through a cross formed by two lines; one the compass direction and the second line ran perpendicular to the compass direction through the sampling point. Working in a clockwise manner, the quarters were numbered one to four starting from the compass direction. In each quarter, one plant of each species nearest to the sampling point was measured. The vegetation parameters measured were the distance to the midpoint of the plant from the sampling point and the height of the plant from the ground. These measurements were recorded in a field notebook and transferred to data forms later.

Food Preference

When one giraffe fed on one individual plant it was recorded as one "food-record". If one giraffe browsed on three separate individuals of plant species x, this was counted as three "food-records". If three animals simultaneously or subsequently fed on the same plant, this constituted three "food-records" for that species. For each plant species, the records were summed up and expressed as a percentage of all observations (Leuthold, 1970; Kakuyo, 1980). This method does not give a precise measure of the weight or volume of each plant species consumed but when compared with the relative availability of the plant species in each vegetarian community, it provides an indication of the relative importance in the diet of the various plant species (Kakuyo, 1980). To establish whether a particular plant species was preferred over others, a preference rating value was calculated for each species using the method of Nue, Byers and Peek (1974)

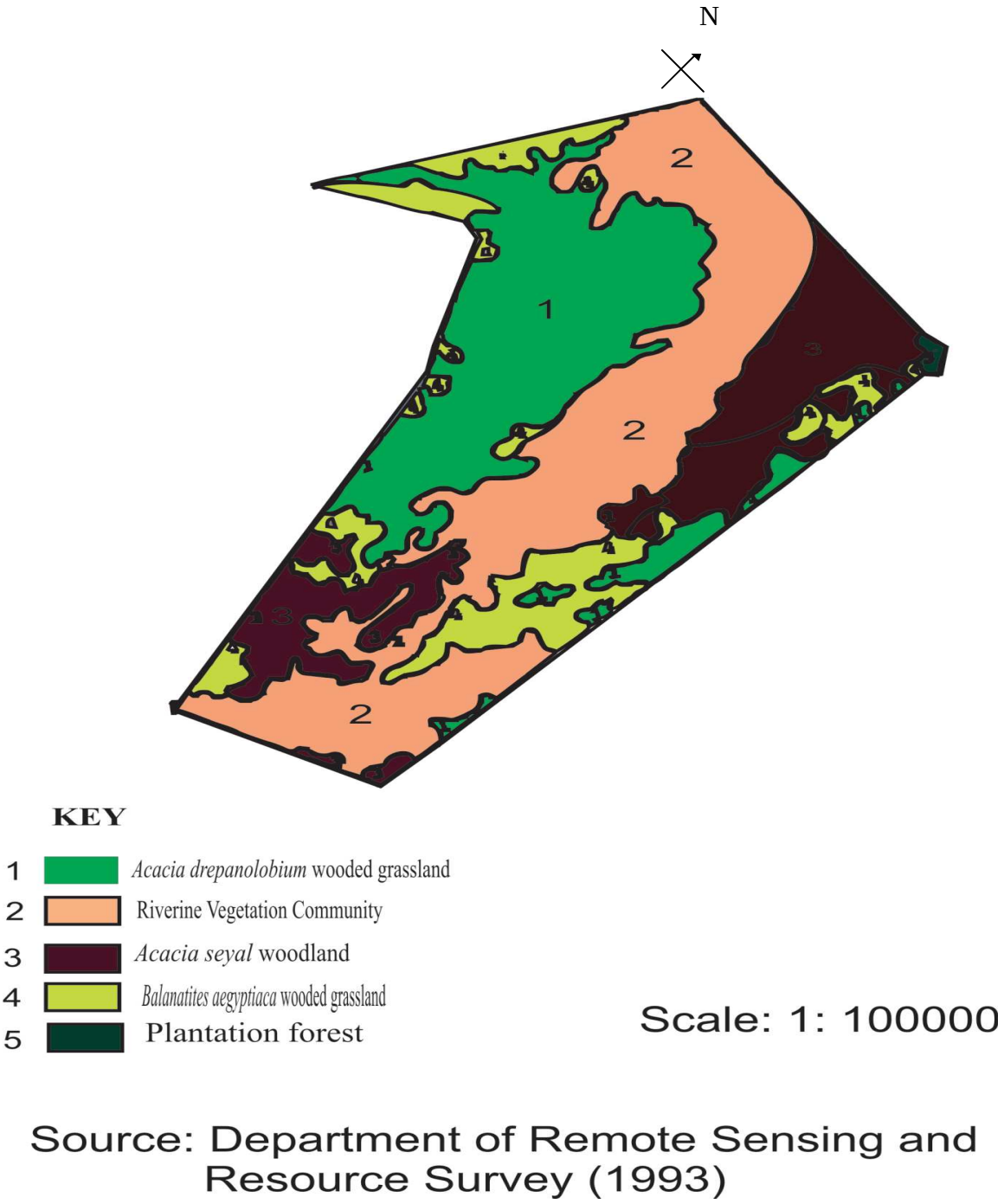

Figure 1: Vegetation Distribution in Ruma National Park.

Data Analysis

Availability of woody plant species

The formulae for PCQ were used for data analysis as follows (Mueller-Dombois and Ellenberg, 1974):

i) Total density of all species =

Unit area/ (Mean point to plant distance)^2

ii) Relative density =

$$\frac{\text{Individuals of a species}}{\text{Total individuals of all species}} \times 100$$

iii) Density =

$$\frac{\text{Relative Density X Total density of all species}}{100}$$

iv) Frequency =

$$\frac{\text{Number of points at which species occurs}}{\text{Total number of points sampled}}$$

v) Relative Frequency =

$$\frac{\text{Frequency value for a species}}{\text{Total of frequency values for all species}} \times 100$$

Habitat preference and preference rating of food plants

The Neu *et al*. method (1974*)* was applied using the following formula

$$\text{C.I.} = P_{ui} \pm Z\left(1 - \frac{\alpha}{2K}\right)\sqrt{\frac{P_{ui}(I-P_{ui})}{n}}$$

where: C.I = the confidence interval of use proportion (95%)

P_{ui} = Habitat used proportion

Z= Bonferroni z – statistic [Z (0.0056) = 2.53]

α = 0.05

K = No. of categories

n = sample size

NB: If the C.I of use proportion does not incorporate the available proportion, it is preferred if C.I. is higher and avoided if C.I. is lower. It is neither avoided nor preferred (eaten by chance) if C.I. incorporates the available proportion.

RESULTS

Habitat Selection

Table 1 shows the habitat types, proportion of number of sightings, proportion of area available, preference ratio (PR), confidence interval of use proportion and conclusions reached following the Neu *et al.* method (1974). The most preferred habitat of the giraffes was the *B.aegyptiaca* wooded grassland (PR = 6.941). The other preferred habitat was the *A. drepanolobium* wooded grassland (PR = 1.300). Both the *A. seyal* woodland and the riverine vegetation community were avoided by the giraffes.

Dietary composition

A total of 27,839 food records were obtained from the four vegetation communities. A total of 562 hours were spent watching the feeding giraffes. The giraffes were observed to eat 42 plants species. Table 2 indicates that in the *B. aegyptiaca* wooded grassland a total of nineteen plant species were browsed on. *B. aegyptiaca* had the highest representation in the diet. Other important species were *Harrisonia abyssinica, A. Seyal, Rhus natalensis, Ocimum suave, Ozoroa obovata and Crotalaria axillaris* in that order. In the *A. seyal* woodland, a total of thirty six plant species were browsed on. *A. Seyal* had the highest representation in the diet. Other important species were *A. polyacantha, R. natalensis, A. elatior, Grewia bicolor, A. abyssinica* and *Solanum incanum* in that order.

In the *A. drepanolobium* wooded grassland, a total of twenty nine plant species were browsed on. *A. drepanolobium* had the highest representation in the diet. Other important species were *A. Polyacantha, B. aegyptiaca, R. natalensis, A. kirkii, A. seyal* and *A. gerrardii* in that order. In the riverine vegetation community, a total of 35 plant species were browsed on. *A. seyal* had the highest representation in the diet. Other important species were *A.*

polyacantha, A. abyssinica, R. natalensis, G. bicolor, B. glabra and A. elatior in that order. In all the four vegetation communities, *A. seyal and R. natalensis* were eaten in significant proportions. *A. polyacantha* was the second most important plant in all the vegetation communities except in the *B. aegyptiaca* wooded grassland where the giraffes did not feed on it.

The *A. seyal* woodland and the riverine vegetation community had the highest number of plant species browsed while in the *A. drepanolobium* and the *B. aegyptiaca* wooded grasslands, the giraffes browsed on comparatively fewer plant species. *Acacia* species accounted for a highest percentage of giraffe food in the *A. seyal* woodland (47.01%),

A. drepanolobium wooded grassland (71.52%) and riverine vegetation community (52.91%). In the *B. aegyptiaca* wooded grassland, *Acacia* species accounted for only 11.61% of the giraffe diet. *A. polyacantha* was important in the giraffe diet in each vegetation community except in the *B. aegyptiaca* wooded grassland where it was not recorded. *A. seyal* was also important in the giraffe diet in each vegetation community. In all the vegetation communities, *A. kirkii* and *A. brevispica* appeared to be less important than other *Acacia* species.

Relative availability of food plant species

Table 3 shows the percentage frequency of woody vegetation species in each vegetation community. In the *B. aegyptiaca* wooded grassland, twenty three woody plant species were recorded along the sampling transects. *B. aegyptiaca* had the highest representation. Other species which occurred in significant proportions were *Asparagus racemosus, O. suave, C. axillaris, S. incanum, Lantana trifolia* and *Leonotis nepetifolia* in that order. In the *A. seyal* woodland, a total of forty three woody plant species were recorded along the sampling transects. *A. seyal* had the highest representation. Other species which occurred in significant proportions were *R. natalensis, Cordia ovalis, O. suave, Sesbania sesban, L. trifolia, H. abyssinica* and *A. lahai* in that order.

In the *A. drepanolobium* wooded grassland, a total of thirty seven woody plant species were recorded along the sampling transects. *A. drepanolobium* had the highest representation. Other species which occurred in significant proportions were *A. seyal, B. aegyptiaca, A. racemosus, A. abyssinica, O. suave* and *R. natalensis* in that order. In the riverine vegetation community, a total of fifty one woody plant species were recorded along the sampling transects. *R. natalensis* had the highest representation. Other species which occurred in significant proportions were *Diospyros abyssinica, A. seyal, O. suave, G.bicolor* and *H. abyssinica* in that order.

O. suave was highly represented in all the four vegetation communities. *R. natalensis* and *A. seyal* occurred in significant proportions in all the vegetation communities except in the *B. aegyptiaca* wooded grassland. *A. racemosus* was well represented in the
A. drepanolobium and the *B. aegyptiaca* wooded grasslands. *L. trifolia* occurred in significant proportions in the *B. aegyptiaca* wooded grassland and *A. seyal* woodland.
H. abyssinica was well represented in the *A. seyal* woodland and the riverine vegetation community. Both the *A. seyal* woodland and riverine vegetation community had a large number of woody plant species recorded along the sampling transects. The *B. aegyptiaca* and *A. drepanolobium* wooded grasslands had comparatively fewer species recorded along the sampling transects.

Food preference

Tables 4 to 7 compare the proportion of food records in the giraffe diet, proportion of occurrence of plant species in the field, their preference ratio, confidence interval of use proportion and conclusions reached in each vegetation community following the method of Neu *et al.* (1974). Plant species which were recorded in the field but were not observed to be eaten by giraffes were not given a preference rate value.

In the *B. aegyptiaca* wooded grassland thirteen plant species were avoided. The most preferred plant species was *H. abyssinica* (PR = 7.136). Other preferred species were *B. aegyptiaca* (PR = 2.992), *A. seyal* (PR = 2.514) and *R. natalensis* (PR = 1.705). *A. drepanolobium* was neither preferred nor avoided. In the *A. seyal* woodland ten plant species were avoided. The most preferred plant species was *A. polyacantha* (PR = 13.250). Other preferred species were *A. abyssinica* (PR = 2.188), *S. incanum* (PR = 2.000), *D. abyssinica* (PR = 1.833), *G. bicolor* (PR = 1.842), *A. elatior* (PR = 1.741), *Abutilon mauritianum* (PR = 1.667), *R. natalensis* (PR = 1.292) and *Carrisa edulis* (PR = 1.222). Fifteen plant species were neither preferred nor avoided.

In the *A. drepanolobium* wooded grassland twenty one plant species were avoided. The most preferred plant species was *A. polyacantha* (PR = 9.300). Other preferred plant species were *A. gerrardii* (PR = 2.444), *A. kirkii* (PR = 1.867), *R. natalensis* (PR =1.677) and *A. drepanolobium* (PR = 1.323). *G. bicolor* and *Erythrina abyssinica* were neither preferred nor avoided. In the riverine vegetation community fourteen plant species were avoided the most preferred plant species was *A. polyacantha* (PR = 7.789). Other preferred plant species were *A. abyssinica* (PR = 3.581), *A. gerrardii* (PR = 3.000), *A. elatior* (PR = 2.727), *Leonotis nepetifolia* (PR = 2.500), *E. abyssinica* (PR = 2.429), *A. seyal* (PR = 2.197) and *A. lahai* (PR = 1.769). Twelve plant species were neither preferred nor avoided.

Tables 4 to 7 show that plant species for which giraffes showed the highest preferences had a low representation in the field for example *H. abyssinica, R. natalensis* and *A. seyal* in the *B. aegyptiaca* wooded grassland, *A. polyacantha* and *A. abyssinica* in the *A. seyal* woodland and riverine vegetation community and *A. polyacantha, A. kirkii* and *A. gerrardii* in the *A. drepanolobium* wooded grassland. Preference values for some plant species varied from one vegetation community to another for example *R. natalensis* ranked fourth in the *B. aegyptiaca* and *A. drepanolobium* wooded grasslands, eighth in the *A. seyal* woodland and was avoided in the riverine vegetation community. *A. seyal* ranked third in the *B. aegyptiaca* wooded grassland and seventh in the riverine vegetation. It was avoided in both the *A. seyal* woodland and *A. drepanolobium* wooded grassland.

Plants with the highest representation in the field appeared to be less preferred by the giraffes for example *A. racemosus* and *O. suave* in the *B. aegyptiaca* wooded grassland, *A. seyal* and *C. ovalis* in the *A. seyal* woodland, *A. seyal* and *B. aegyptiaca* in the *A. drepanolobium* wooded grassland and *R. natalesis* and *D. abyssinica* in the riverine vegetation community.

Table 8 shows the food preference of giraffes in Ruma National Park as a whole. Twenty eight plant species were avoided. *A. drepanolobium* (PR= 3.948) was the most preferred plant species. Other plant species, which were preferred were *A. gerradii* (PR =3.400), *B. aegyptiaca* (PR= 2.569), *A. kirkii* (PR=2.286), *A. abyssinica* (PR=1.538), *C. axillaris* (PR=1.556), *H. abyssinica* (PR= 1.359) and *A. polyacantha* (PR= 0.888). Six plant species were neither preferred nor avoided.

DISCUSSION

Habitat selection

While chance and inherent aggregation may lead to restricted dispersion (Taylor and Taylor, 1979), special habitat requirements are likely to be the major cause of patchy distribution of higher vertebrates. The four vegetation communities/habitats in Ruma National Park were not equally utilized. The giraffes preferred the *B. aegyptiaca* and the *A. drepanolobium* wooded grasslands. These plant communities provided abundant browse resources to the giraffes. The microspatial dispersal of animals is influenced by the availability of food (Duncan, 1983; Hart and Hart, 1989; Taylor, 1989). The giraffes avoided the *A. seyal* woodland and the riverine vegetation community because they would end up spending more time trying to find their way about and less time would be spent on feeding. Optimal foraging theory postulates that animals should feed in such a

way as to gain the most calories per unit time spent feeding (Melecheck and Balph, 1987). Discrimination in choice of habitat is one means of optimal foraging.

Dietary composition

The introduction of the giraffes to a new and varied vegetation structure free from browsing pressure enabled the giraffes to utilize a wide range of woody plant species. Of the fifty three woody plant species recorded along the sampling transects, the giraffes ate forty two species. Considering Ruma National Park as a whole, only eight were preferred (Table 8). Similar findings were reported for Lake Nakuru National Park where thirty four species were eaten by giraffes but only eight were preferred (Kairu, 1993). Herbivores rarely eat all the food available to them; they feed selectively preferring certain high quality foods and avoiding others (Underwood, 1977).

In Ruma National Park, the higher the abundance of a species in a given vegetation community, the higher were the chances that it was eaten more frequently than others. However, preference values for the most commonly occurring species were very low. Their high representation in the giraffe diet did not reflect a true picture of the giraffes' preference for them. Plant species for which giraffes showed the highest preferences had low representation in the field. This suggested that the giraffes had the ability to select food. The same was reported of giraffes in Soy and Lake Nakuru National Park (Kakuyo, 1980). *A. gerrardii* has been reported to be a highly preferred giraffe food species in Maralal (Nesbit-Evans, 1970), Kidepo Valley National Park, Uganda (Field, 1976) and Lake Nakuru National Park (Kakuyo, 1980). In Ruma National Park, *A. gerrardii* was also preferred; however, *A. drepanolobium* and *A. polyacantha* had higher preference ratings (Table 8). *A. drepanolobium* provided the bulk of the giraffes' food in Ruma National Park throughout the study period. Wyatt (1969) recorded similar observation in the Nairobi National Park. The giraffes spent relatively little time browsing on an individual tree and the gall-ants of *Crematogaster* genus which swarm over their faces might serve to confine their attention to a single branch (Kingdon, 1979), thereby preventing overbrowsing. In Ruma National Park, *A. lahai*, *A. seyal* and *A. brevispica* were avoided (Table 8). In Lake Nakuru National Park, *A. hockii* and *A. seyal* appeared to be less important than other *Acacia* species in the giraffe diet (Kakuyo, 1980).

Over one hundred plant species have been recorded in the giraffe diet and the choice of plants is determined by local and seasonal availability but the numerous species of Mimosaceae provide the bulk of their forage (Kingdon, 1979). Even in the Genus *Acacia*, some species are avoided and others are eaten rarely and some are visibly more difficult to feed on (Kingdon, 1979). The more obvious factors influencing the giraffes' preference for certain woody plant species and not others are the presence of aromatic substances, the abundance and size of leaves, the shape of the thorns, the physical accessibility of a tree and its growth form (Kingdon, 1979)

Availability of food plant species

The distribution and amount of plant species eaten by the giraffes in Ruma National Park was relatively uneven. Spatial heterogeneity is the rule in natural communities; high density patches of plants are interspersed with low density or even empty areas (Crawley, 1983). The *A. seyal* woodland and the riverine vegetation had higher densities of woody plant species than the *A. drepanolobium* and the *B. aegyptiaca* wooded grasslands. Uneven distribution is possibly as a result of differences in densities of herbivores, shading effect, soil structure and water availability (Kairu, 1993).

Table 1: Habitat preference of giraffe in Ruma National Park (Neu *et al.*, 1974)

Habitat	**Habitat used proportion (P_U)**	**Habitat available proportion (P_A)**	**Preference ratio (P_U / P_A)**	**Confidence Interval of use proportion**	**Conclusion (Preference ranks)**
Balanites aegyptiaca wooded grassland	0.118	0.017	6.941	0.093-0.143	Preferred
Acacia drepanolobium wooded grassland	0.524	0.403	1.300	0.485-0.563	Preferred
Acacia seyal woodland	0.203	0.246	0.825	0.171-0.235	Avoided
Riverine vegetation	0.155	0.330	0.470	0.127-0.183	Avoided

Legend

P_U - Proportion of number of sightings

P_A -Proportion of area available

Table 2: Composition of giraffe diet in each vegetation community in Ruma National Park

SPECIES	* % FREQUENCY IN THE DIET			
	BAWG	ASW	ADWG	RV
Erythrina abyssinica	-	0.77	1.10	1.69
Eurphobia candelabrum	-	-	-	-
Rhus natalensis	7.45	8.36	5.19	6.04
Scutia myrtina	-	2.50	0.65	2.07
Caesalpinia decapetala	-	-	-	-
Harrisonia abyssinica	31.37	2.02	1.21	2.52
Dovyalis macrocalyx	-	0.87	-	1.47
Capparis cartilaginea	-	0.67	-	0.76
Carrisa edulis	-	2.18	-	0.36
Cordia ovalis	1.08	2.40	-	0.84
Grewia bicolor	0.29	3.46	1.23	3.39
Phyllanthus ovalifolius	-	1.99	0.73	0.67
Lantana trifolia	0.73	0.99	0.27	0.83
Lantana camara	-	-	-	-
Solanum incanum	0.55	3.24	1.19	0.95
Salanum sessilistellatum	-	0.99	-	0.58
Ozoroa obovata	1.66	0.67	-	0.30
Ozoroa insignis	-	0.58	0.70	0.16
Acacia lahai	-	3.11	0.42	2.27
Acacia brevispica	-	0.96	-	2.87
Acacia polyacantha	-	15.92	18.64	14.84
Acacia seyal	8.79	17.24	2.78	16.69
Acacia drepanolobium	2.82	0.87	43.00	-
Acacia abyssinica	-	3.46	1.67	11.11
Acacia elatior	-	4.71	-	2.98
Acacia kirkii	-	0.74	2.81	-
Acacia gerrardii	-	-	2.20	2.15
Pterolobium stellatum	-	0.93	-	0.58
Kigelia Africana	-	-	-	-
Ormocarpum trachycarpum	-	-	0.40	-
Diospyros abyssinica	-	3.30	-	5.09
Balanites aegyptiaca	36.82	1.12	5.40	0.73
Balanites glabra	-	0.48	-	3.39
Delonix elata	-	-	-	-
Dombeya torrid	-	-	0.49	-
Ximenia americana	0.76	1.63	0.56	0.84
Ficus sycomorus	-	-	-	-
Lannea schweinfurthii	-	0.58	-	2.04
Tennatia sennii	-	-	-	1.53
Sesbania sesban	0.38	2.27	1.25	-
Ficus lutea	-	-	-	-
Indigofera species	0.47	1.70	0.74	0.81
Cassia afrofistula	-	-	-	-
Albizia coriaria	-	-	-	-
Crotalaria axillaris	1.66	1.25	0.79	2.68

TABLE 2: CONTINUED

SPECIES	*** % Frequency In The Diet**			
	BAWG	**ASW**	**ADWG**	**RV**
Leonotis nepetifolia	0-70	-	0.76	2.53
Abutilon mauritianum	-	2.47	1.40	-
Asparagus racemosus	0.93	2.05	1.69	1.78
Ocimum suave	2.21	2.79	1.35	1.60
Crotalaria lachnaphora	0.38	-	0.81	-
Hibiscus flavifolius	0.96	0.74	0.58	0.87
Geniosporum rotundifolium	-	-	-	-
Vernonia lasiopus	-	-	-	-
Total*	100.01	100.01	101.01	100.01
n**	3436	3121	14530	6752
Total no. of hours***	97	111.5	233	120.5

Legend

Vegetation communities

BAWG = *Balanites aegyptiaca* wooded grassland

ASW = *Acacia seyal* woodland

ADWG =*Acacia drepanolobium* wooded grassland

RV = Riverine vegetation

*= All values are percentages of the sum total of the records analyzed in each column.

** = Total food records in each vegetation community.

*** = Total number of hours of feeding observations in each vegetation community.

Table 3*:* Percentage frequency of woody vegetation species in each vegetation community in Ruma National Park

SPECIES	* % FREQUENCY IN THE DIET			
	BAWG	ASW	ADWG	RV
Eurphobia candelabrum	0.88	-	0.44	0.53
Rhus natalensis	4.39	6.53	3.08	9.04
Scutia myrtina	-	2.37	1.54	4.55
Caesalpinia decapetala	-	-	-	0.79
Harrisonia abyssinica	4.39	3.27	2.20	4.62
Dovyalis macrocalyx	-	1.34	0.88	4.42
Capparis cartilaginea	-	1.34	-	0.53
Carrisa edulis	-	1.78	-	1.78
Cordia ovalis	2.63	4.01	-	0.99
Grewia bicolor	3.51	1.93	1.10	4.88
Phyllanthus ovalifolius	3.51	3.12	1.54	0.99
Lantana trifolia	5.26	3.41	1.32	0.92
Lantana camara	2.63	2.82	2.20	2.90
Solanum incanum	6.14	1.63	2.00	1.52
Salanum sessilistellatum	-	1.19	1.32	0.73
Ozoroa obovata	-	0.74	0.66	0.92
Ozoroa insignis	5.26	1.63	1.10	0.59
Acacia lahai	-	3.27	1.32	1.32
Acacia brevispica	-	0.89	-	2.84
Acacia polyacantha	-	1.19	2.00	1.91
Acacia seyal	3.51	20.92	6.81	7.59
Acacia drepanolobium	2.63	0.89	32.53	0.13
Acacia abyssinica	-	1.63	3.30	3.10
Acacia elatior	-	2.67	-	1.12
Acacia kirkii	-	0.89	1.54	0.40
Acacia gerrardii	-	-	0.88	0.73
Pterolobium stellatum	-	0.74	-	0.46
Kigelia africana	-	-	0.66	0.33
Ormocarpum trachycarpum	-	-	0.88	-
Diospyros abyssinica	-	1.78	0.88	7.85
Balanites aegyptiaca	12.28	1.48	6.59	1.85
Balanites glabra	-	-	-	3.17
Delonix elata	-	-	0.44	0.20
Dombeya torrida	0.88	0.59	0.88	0.73
Ximenia americana	2.63	1.19	0.88	0.59
Ficus sycomorus	-	0.30	-	0.46
Lannea schweinfurthii	-	1.19	-	4.09
Tennatia sennii	-	-	-	2.31
Sesbania sesban	3.51	3.41	2.64	0.99
Ficus lutea	-	0.59	-	0.26
Indigofera species	3.51	1.93	1.76	0.92
Cassia afrofistula	-	0.74	-	0.33
Albizia coriaria	-	0.74	-	0.53
Crotalaria axillaris	6. 14	1.34	2.20	-

TABLE 3: CONTINUED

SPECIES	* % FREQUENCYIN THE FIELD			
	BAWG	ASW	ADWG	RV
Leonotis nepetifolia	5.26	1.04	2.00	0.99
Abutilon mauritianum	-	1.48	2.20	3.50
Asparagus racemosus	7.02	2.52	3,73	1.72
Ocimum suave	6.14	3.86	3.08	5.35
Crotalaria lachnaphora	4.37	-	1.10	0.53
Hibiscus flavifolius	3.51	-	1.54	0.79
Geniosporum rotundifolium	-	1.63	-	0.46
Vernonia lasiopus	-	2.97	-	1.06
Total*	99.99	100.02	101.1	99.97
n**	114	674	455	1515

Legend

Vegetation communities

BAWG = *Balanites aegyptiaca* wooded grassland

ASW = *Acacia seyal* woodland

ADWG = *Acacia drepanolobium* wooded grassland

RV = Riverine vegetation

* = All values are percentages of the sum total of the records analyzed in each column.

** = Total sampling records in each vegetation community

Table 4: Food preference of giraffes in *Balanites aegyptiaca wooded* grassland in Ruma Park

Plant species	Habitat used proportion ratio.(Pu) i.e. proportion of food records	Habitat available Proportion (P_A) ie. Proportion of occurrence in field	Preference Ratio Pu/P_A	Confidence interval of use proportion	Conclusion
Erythrina abyssinica	-	-	-	-	-
Eurphobia candelabrum	-	0.009	-	-	-
Rhus natalensis	0. 075	0.044	1.705	0.064-0.086	Preferred
Scutia myrtina	-	-	-	-	-
Caesalpinia decapetala	-	-	-	-	-
Harrisonia abyssinica	0.314	0.044	7.136	0.294-0.334	Preferred (P)
Dovyalis macrocalyx	-	-	-	-	-
Capparis cartilaginea	-	-	-	-	-
Carrisa edulis	-	-	-	-	-
Cordia ovalis	0.011	0.026	0.423	0.007-0.015	Avoided (A)
Grewia bicolor	0.003	0.035	0.086	0.001-0.005	Avoided
Phyllanthus ovalifolius	-	0.035	-	-	-
Lantana trifolia	0.007	0.053	0.132	0.003 - 0.011	Avoided
Lantana camara	-	0.026	-	-	-
Solanum incanum	0.006	0.061	0.098	0.003-0.009	Avoided
Salanum sessilistellatum	-	-	-	-	-
Ozoroa obovata	0.017	-	-	0.011 -0.023	
Ozoroa insignis	-	0.053	-	-	-
Acacia lahai	-	-	-	-	-
Acacia brevispica	-	-	-	-	-
Acacia polyacantha	-	-	-	-	-
Acacia seyal	0.088	0.035	2.514	0.076 -0.100	Preferred
Acacia drepanolobium	0.028	0.026	1.077	0.021 - 0.035	Neither P nor A
Acacia abyssinica	-	-	-	-	-
Acacia elatior	-	-	-	-	-
Acacia kirkii	-	-	-	-	-
Acacia gerrardii	-	-	-	-	-
Pterolobium stellatum	-	-	-	-	-
Kigelia Africana	-	-	-	-	-
Ormocarpum trachycarpum	-	-	-	-	-
Diospyros abyssinica	-	-	-	-	-
Balanites aegyptiaca	0.368	0.123	2.992	0.347 -0.389	Preferred
Balanites glabra	-	-	-	-	-
Delonix elata	-	-	-	-	-
Dombeya torrida	-	0.009	-	-	-
Ximenia Americana	0.008	0.026	0.308	0.004 -0.012	Avoided
Ficus sycomorus	-	-	-	-	-
Lannea schweinfurthii	-	-	-	-	-
Tennatia sennii	-	-	-	-	-
Sesbania sesban	0.004	0.035	0.114	0.001 -0.007	Avoided
Ficus lutea	-	0.006	-	-	-
Indigofera species	0.017	0.019	0.895	0.011 - 0.023	Neither p nor A
Cassia afrofistula		0.007	-	-	
Albizia coriaria	-	0.007	-	-	-
Crotalaria axillaris	0.012	0.013	0.923	0.007 -0.017	Neither P nor A

TABLE 4: CONTINUED

Plant species	Habitat used proportion ratio. (Pu) i.e. proportion of food records	Habitat available Proportion (P_A) ie. Proportion of occurrence in field	Preference Ratio Pu/P_A	Confidence interval of use proportion	Conclusion
Ficus lutea	-	-	-	-	-
Indigofera species	0.005	0.035	0.143	0.002-0.008	Avoided
Cassia afrofistula	-	-	-	-	-
Albizia coriaria	-	-	-	-	-
Crotalaria axillaris	0.017	0.061	0.279	0.011-0.023	Avoided
Leonotis nepetifolia	0.007	0.053	0.132	0.003-0.011	Avoided
Abutilon mauritianum	-	-	-	-	-
Asparagus racemosus	0.009	0.070	0.129	0.005-0.013	Avoided
Ocimum suave	0.022	0.061	0.361	0.016-0.028	Avoided
Crotalaria lachnaphora	0.004	0.044	1.000	0.001-0.007	Avoided
Hibiscus flavifolius	0.010	0.035	0.286	0.006-0.014	Avoided
Geniosporum rotundifolium	-	-	-	-	-
Vernonia lasiopus	-	-	-	-	-

Table 5: Food preference of giraffes in *Acacia seyal* woodland in Ruma National Park

Plant species	Habitat used proportion ratio. (Pu) i.e. proportion of food records	Habitat available Proportion (P_A) ie. Proportion of occurrence in field	Preference Ratio Pu/P_A	Confidence interval of use proportion		Conclusion
Erythrina abyssinica	0.008	0.010	0.800	0.004	-0.012	Neither P nor A
Eurphobia candelabrum	-	-	-	-		-
Rhus natalensis	0.084	0.065	1.292	0.071	- 0.097	Preferred
Scutia myrtina	0.025	0.024	1.042	0.018	- 0.032	Neither P nor A
Caesalpinia decapetala	-	-	-	-		-
Harrisonia abyssinica	0.020	0.033	0.606	0.014	-0.026	Avoided
Dovyalis macrocalyx	0.009	0.013	0.692	0.005	-0.013	Neither P nor A
Capparis cartilaginea	0.007	0.013	0.538	0.003	-0.011	Avoided
Carrisa edulis	0.022	0.018	1.222	0.015	- 0.029	Preferred
Cordia ovalis	0.024	0.040	0.600	0.017	-0.031	Avoided
Grewia bicolor	0.035	0.019	1.842	0.027	- 0.043	Preferred
Phyllanthus ovalifolius	0.020	0.031	0.645	0.014	- 0.026	Avoided
Lantana trifolia	0.010	0.034	0.294	0.005	- 0.015	Avoided
Lantana camara	-	0.028	-	-		-
Solanum incanum	0.032	0.016	2.000	0.024	-0.040	Preferred
Salanum sessilistellatum	0.010	0.012	0.833	0.005	-0.015	Neither P nor A
Ozoroa obovata	0.007	0.007	1.000	0.003	-0.011	Neither P nor A
Ozoroa insignis	0.006	0.016	0.375	0.003	-0.009	Avoided
Acacia lahai	0.031	0.033	0.939	0.023	- 0.039	Neither P nor A
Acacia brevispica	0.010	0.009	1.111	0.005	-0.015	Neither P nor A
Acacia polyacantha	0.159	0.012	13.250	0.142	-0.176	Preferred
Acacia seyal	0.172	0.209	0.823	0.155	-0.189	Avoided
Acacia drepanolobium	0.009	0.009	1.000	0.005	-0.013	Neither P nor A
Acacia abyssinica	0.035	0.016	2.188	0.027	- 0.043	Preferred
Acacia elatior	0.047	0.027	1.741	0.037	- 0.057	Preferred
Acacia kirkii	0.007	0.009	0.778	0.003	-0.011	Neither P nor A
Acacia gerrardii	-	-	-	-		-
Pterolobium stellatum	0.009	0.007	1.286	0.005	-0.013	Neither P nor A
Kigelia africana	-	-	-			-
Ormocarpum trachycarpum	-	-	-			-
Diospyros abyssinica	0.033	0.018	1.833	0.025	-0.041	Preferred
Balanites aegyptiaca	0.011	0.015	0.733	0.006	- 0.016	Neither P nor A
Balanites glabra	0.005	-	-	0.002	-0.008	-
Delonix elata	-	-	-	-		-
Dombeya torrida	-	0.006	-	-		-
Ximenia americana	0.016	0.012	1.33	0.010	- 0.022	Neither P nor A
Ficus sycomorus	-	0.003	-	-		-
Lannea schweinfurthii	0.006	0.011	0.545	0.003	-0.009	Avoided
Tennatia sennii	-	-	-	-		-
Sesbania sesban	0.023	0.034	0.676	0.016	-0.030	Avoided
Ficus lutea	-	0.006	-	-		-
Indigofera species	0.017	0.019	0.895	0.011	- 0.023	Neither P nor A
Cassia afrofistula		0.007	-	-		
Albizia coriaria	-	0.007	-	-		-
Crotalaria axillaris	0.012	0.013	0.923	0.007	-0.017	Neither P nor A

TABLE5: CONTINUED

Plant species	**Habitat available Proportion (P_A) ie. Proportion of occurrence in field**	**Preference Ratio Pu/P_A**	**Confidence interval of use proportion**	**Conclusion**
Leonotis nepetifolia	0.010	-	-	-
Abutilon mauritianum	0.015	1.667	0.018-0.032	Preferred
Asparagus racemosus	0.025	0.840	0.015-0.027	Neither P nor A
Ocimum suave	0.039	0.718	0.021-0.035	Avoided
Crotalaria lachnophora	-	-	-	-
Hibiscus flavifolius	-	-	0.003-0.011	-
Geniosporum rotundifolium	0.016	-	-	-
Vernonia lasiopus	0.030	-	-	-

Table 6: Food preference of giraffes in *Acacia drepanolobium* wooded grassland in Ruma Park

Plant species	Habilat used proportion ratio. (Pu) i.e. proportion of food records	Habitat available Proportion (P_A) ie. Proportion of occurrence in field	Preference Ratio Pu/P_A	Confidence interval of use proportion		Conclusion
Erythrina abyssinica	0.011	0.009	1.222	0.009	-0.013	Neither P nor A
Eurphobia candelabrum	-	0.004	-	-		-
Rhus natalensis	0.052	0.031	1.677	0.047	- 0.057	Preferred
Scutia myrtina	0.007	0.015	0.467	0.005	-0.009	Avoided
Caesalpinia decapetala	-	-	-	-		-
Harrisonia abyssinica	0.012	0.022	0.545	0.010	- 0.014	Avoided
Dovyalis macrocalyx	-	0.009	-	-		-
Capparis cartilaginea		-	-	-		-
Carrisa edulis	-	-	-	-		-
Cordia ovalis	-	-	-	-		-
Grewia bicolor	0.012	0.011	1.091	0.010	- 0.014	Neither P nor A
Phyllanthus ovalifolius	0.007	0.015	0.467	0.005	- 0.009	Avoided
Lantana trifolia	0.003	0.013	0.231	0.002	-0.004	Avoided
Lantana camara	-	0.022	-	-		-
Solanum incanum	0.012	0.020	0.600	0.010	- 0.014	Avoided
Salanum sessilistellatum	-	0.013	-			-
Ozoroa obovata	-	0.007	-	-		-
Ozoroa insignis	0.007	0.011	0.636	0.005	-0.009	Avoided
Acacia lahai	0.004	0.013	0.308	0.003	-0.005	Avoided
Acacia brevispica	-	-	-	-		-
Acacia polyacantha	0.186	0.020	9.300	0.178	-0.194	Preferred
Acacia seyal	0.028	0.068	0.412	0.025	-0.031	Avoided
Acacia drepanolobium	0.430	0.325	1.323	0.420	- 0.440	Preferred
Acacia abyssinica	0.017	0.033	0.515	0.014	-0.020	Avoided
Acacia elatior	-	-	.	-		-
Acacia kirkii	0.028	0.015	1.867	0.025	-0.031	Preferred
Acacia gerrardii	0.022	0.009	2.444	0.019	- 0.025	Preferred
Pterolobium stellatum	-	-	-	-		-
Kigelia africana	-	0.007		-		-
Ormocarpum trachycarpum	0.004	0.009	0.444	0.003	- 0.005	Avoided
Diospyros abyssinica	-	0.009	-	-		-
Balanites aegyptiaca	0.054 -	0.066	0.818	0.049	-0.059	Avoided
Balanites glabra	-	-	-	-		-
Delonix elata		0.004	-	-		-
Dombeya torrida	0.005	0.009	0.556	0.004	-0.006	Avoided
Ximenia americana	0.006	0.009	0.667	0.004	-0.008	Avoided
Ficus sycomorus	-	-	-	-		-
Lannea schweinfurthii	-	-	-	-		-
Tennatia sennii	-	-	-	-		-
Sesbania sesban	0.012	0.026	0.500	0.010	-0.014	Avoided
Ficus lutea	.	-	.	-		-
Indigofera species	0.007	0.018	0.388	0.005	-0.009	Avoided
Cassia afrofistula	-	-	-	-		-
Albizia coriaria	-	-	-	-		-
Crotalaria axillaris	0.008	0.022	0.364	0.006	0.010	Avoided

TABLE 6: Continued

Plant species	**Habitat used Proportion (Pu) i.e. proportion of food records.**	**Habitat available proportion (P_A) i.e. proportion of occurrence in field.**	**Preference Ratio Pu/P_A**	**Confidence interval of use Proportion**	**Conclusion**
Leonotis nepetifolia	0.008	0.020	0.400	0.006-0.010	Avoided
Abutilon mauritianum	0.014	0.022	0.636	0.012-0.016	Avoided
Asparagus racemosus	0.017	0.037	0.459	0.014-0.020	Avoided
Ocimum suave	0.013	0.031	0.452	0.011-0.015	Avoided
Crotalaria lachnophora	0.008	0.011	0.727	0.006-0.010	Avoided
Hibiscus flavifolius	0.006	0.015	0.400	0.004 - 0.008	Avoided
Geniosporum rotundifolium	-	-		-	-
Vernonia lasiopus	-	-	-	-	-

Table 7: Food preference of giraffes in the riverine vegetation community in Ruma National Park.

Plant species	Habitat used proportion ratio. (Pu) i.e. proportion of food records	Habitat available Proportion (P_A) ie. Proportion of occurrence in field	Preference Ratio{ Pu /P_A)	Confidence interval of use proportion	Conclusion
Erythrina abyssinica	0.017	0.007	2.429	0.013-0.021	Preferred
Eurphobia candelabrum	-	0.005	-	-	-
Rhus natalensis	0.060	0.090	0.667	0.053- 0.067	Avoided
Scutia myrtina	0.021	0.046	0.457	0.017- 0.025	Avoided
Caesalpinia decapetala	-	0.008	-	-	-
Harrisonia abyssinica	0.025	0.046	0.543	0.020- 0.030	Avoided
Dovyalis macrocalyx	0.015	0.044	0.341	0.011-0.019	Avoided
Capparis cartilaginea	0.008	0.005	1.600	0.005-0-01]	Neither P nor A
Carrisa edulis	0.004	0.018	0.222	0.002- 0.006	Avoided
Cordia ovalis	0.008	0.010	O.SOO	0.005-0.011	Neither P nor A
Grewia bicolor	0.034	0.049	0.694	0.028- 0.040	Avoided
Phyllanthus ovalifolius	0.007	0.010	0.700	0.004-0.010	Neither Nor A
Lantana trifolia	0.008	0.009	0.889	0.005-0-011	Neither P nor A
Lantana camara		0.029	-	-	-
Solanum incanum	0-009	0.015	0.600	0.006-0.012	Avoided
Salanum sessilistellatum	0.006	0.007	0.857	0.004- 0-008	Neither P nor A
Ozoroa obovata	0.003	0.009	0.333	0.001- 0.005	Avoided
Ozoroa insignis	0.002	0.006	0.333	0.001- 0.003	Avoided
Acacia lahai	0.023	0.013	1.769	0.018- 0,028	Preferred
Acacia brevispica	0.029	0.028	1.036	0.024-0.034	Neither P nor A
Acacia polyacantha	0.148	0.019	7.789	0.137 -0.159	Preferred
Acacia seyal	0.167	0.076	2.197	0.156-0.178	Preferred
Acacia drepanolobium	-	0.001 .	-	-	-
Acacia abyssinica	0.1 11	0.031	3.581	0.101-0.121	Preferred
Acacia elatior	0.030	0.011	2.727	0.025- 0.035	Preferred
Acacia kirkii	-	0.004	-	-	-
Acacia gerrardii	0.021	0.007	3.000	0.017- 0.025	Preferred
Pterolobium stellatum	0.006	0.005	1.200	0.004-0.008	Neither P nor A
Kigelia africana	-	0.003	-	-	-
Ormocarpum trachycarpum	-	-	-	-	-
Diospyros abyssinica	0.051	0.079	0.646	0.044 -0.058	Avoided
Balanites aegyptiaca	0.007	0.018	0.389	0.004 -0.010	Avoided
Balanites glabra	0.034	0.032	1.063	0.028- 0.040	Neither P nor A
Delonix elata		0.002	-	-	-
Dombeya torrida	-	0.007	-	-	-
Ximenia americana	0.008	0.006	1.333	0.005 -0.011	Neither P nor A
Ficus sycomorus	-	0.005	-	-	-
Lannea schweinfurthii	0.020	0.041	0.488	0.016 -0.024	Avoided
Tennatia sennii	0.015	0.023	0.652	0.011-0.019	Avoided
Sesbania sesban	-	0.010			-
Ficus lutea	-	0.003	.	.	-

TABLE 7: Continued

Plant species	**Habitat used proportion ratio. (Pu) i.e. proportion of food records**	**Habitat available Proportion (P_A) ie. Proportion of occurrence in field**	**Preference Ratio{ Pu /P_A)**	**Confidence interval of use proportion**	**Conclusion**
Indigofera species	0.008	0.009	0.889	0.005-0.011	Neither P nor A
Cassia afrofistula		0.003	-	-	
Albizia coriaria		0.005		-	
Crotalaria axillaris	0.027	-		0.022- 0.032 -	-
Leonotis nepetifolia	0.025	0.010	2.500	0.020 -0.030	Preferred
Abutilon mauritianum	-	0.035		-	-
Asparagus racemosus	0.108	0.017	1.059	0.014-0.022	Neither P nor A
Ocimum suave	0.016	0.053	0.302	0.012-0.020	Avoided
Crotalaria lachnophora	-	0.005	-	-	
Hibiscus flavifolius	0.009	0.008	1.125	0.006-0.012	Neither P nor A
Geniosporum rotundifolium	-	0.005		-	
Vernonia lasiopus	-	0.011	-	-	

Table 8: Food preference of giraffes in Ruma National Park.

Plant species	Habitat used proportion ratio. (Pu) i.e. proportion of food records	Habitat available Proportion (P_A) ie. Proportion of occurrence in field	Preference ratio { Pu /P_A)	Confidence interval of use proportion		Conclusion	
Erythrina abyssinica	0.011	0.008	1.375	0.009	-0.013	Neither P	nor A
Eurphobia candelabrum		0.004	-	-		-	
Rhus natalensis	0.060	0.073	0.822	0.056	-0.064	Avoided	
Scutia myrtina	0.011	0.033	0.333	0.009	-0.013	Avoided	
Caesalpinia decapetala	-	0.004	-	-		-	
Harrisonia abyssinica	0.053	0.039	1.359	0.050	- 0.056	Preferred	
Dovyalis macrocalyx	0.005	0.029	0.172	0.004	-0.006	Avoided	
Capparis cartilaginea	0.003	0.006	0.500	0.002	-0.004	Avoided	
Carrisa edulis	0.003	0.014	0.214	0.002	-0.004	Avoided	
Cordia ovalis	0.006	0.016	0.375	0.005	- 0.007	Avoided	
Grewia bicolor	0.019	0.035	0.543	0.017	-0.021	Avoided	
Phyllanthus ovalifolius	0.008	0.017	0.471	0.007	-0.009	Avoided	
Lantana trifolia	0.005	0.018	0.278	0.004	-0.006	Avoided	
Lantana camara	-	0.028	-	-		-	
Solanum incanum	0.013	0.018	0.722	0.011	-0.015	Avoided	
Salanum sessilistellatum	0.003	0.009	0.333	0.002	-0.004	Avoided	
Ozoroa obovata	0.001	0.008	0.125	0.001	-0.001	Avoided	
Ozoroa insignis	0.007	0.011	0.636	0.006	-0.008	Avoided	
Acacia lahai	0.011	0.017	0.647	0.009	-0.013	Avoided	
Acacia brevispica	0.008	0.018	0.444	0.007	-0.009	Avoided	
Acacia polyacantha	0.151	0.017	0.888	0.146	-0.156	Preferred	
Acacia seyal	0.083	0.106	0.783	0.079	- 0.087	Avoided	
Acacia drepanolobium	0.229	0.058	3.948	0.223	-0.235	Preferred	
Acacia abyssinica	0.040	0.026	1.538	0.037	- 0.043	Preferred	
Acacia elatior	0.013	0.013	1.000	0.011	-0.015	Neither P	nor A
Acacia kirkii	0.016	0.007	2.286	0.014	- 0.018	Preferred	
Acacia gerrardii	0.017	0.005	3.400	0.015	- 0.019	Preferred	
Pterolobium stellatum	0.002	0.004	0.500	0.001	- 0.003	Avoided	
Kigelia africana	-	0.003	-	-		-	
Ormocarpum trachycarpum	0.002	0.001	2.000	0.001	- 0.003	Neither P	nor A
Diospyros abyssinica	0.016	0.049	0.327	0.014	-0.018	Avoided	
Balanites aegyptiaca	0.077	0.030	2.569	0.073	-0.081	Preferred	
Balanites glabra	0.009	0.017	0.529	0.008	- 0.010	Avoided	
Delonix elata	-	0.002		-		-	
Dombeya torrida	0.003	0.007	0.429	0.002	-0.004	Avoided	
Ximenia americana	0.008	0.009	0.889	0.007	-0.009	Neither P	nor A
Ficus sycomorus	-	0.003	-			-	
Lannea schweinfurthii	0.006	0.025	0.240	0.005	- 0.007	Avoided	
Tennatia sennii	0.004	0.013	0.308	0.003	-0.005	Avoided	
Sesbania sesban	0.010	0.020	0.500	0.008	-0.012	Avoided	
Ficus lutea		0.003	.	.		-	
Indigofera species	0.008	0.014	0.571	0.007	-0.009	Avoided	
Cassia afrofistula		0.004	-			-	
Albizia coriaria	-	0.005	-	-		-	
Crotalaria axillaris	0.014	0.009	1.556	0.012	-0.016	Preferred	

TABLE 8: Continued

Plant species	Habitat used proportion ratio. (Pu) i.e. proportion of food records	Habitat available Proportion (P_A) ie. Proportion of occurrence in field	Preference ratio { Pu /P_A)	Confidence interval of use proportion	Conclusion
Leonotis nepetifolia	0.011	0.013	0.846	0.009-0.013	Neither P nor A
Abutilon mauritianum	0.010	0.026	0.385	0.008-0.012	Avoided
Asparagus racemosus	0.017	0.025	0.680	0.015-0.019	Avoided
Ocimum suave	0.017	0.046	0.370	0.015-0.019	Avoided
Crotalaria lachnophora	0.005	0.007	0.714	0.004-0.006	Avoided
Hibiscus flavifolius	0.007	0.008	0.875	0.006-0.008	Neither P nor A
Geniosporum rotundifolium	-	0.007	-	-	-
Vernonia lasiopus	-	0.013	-	-	-

CONCLUSION

The Northern part of Ruma National Park had a much higher intensity of use by the giraffes than the South. Under such circumstances, the giraffes may themselves affect their food supply adversely by favouring and overutilizing preferred food plants in the small area where they established their home ranges and within which they confined their movements. Ruma National Park can still hold more giraffes because there are still areas unoccupied by them.

The nutritional quality and phytochemical status of giraffe browse species and chemical composition of soils in Ruma National Park should be carried out to determine whether there is a specific mineral that is essential to the giraffes and is only available in sufficient quantities in the Northern part of the park.

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