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DIET OF THE VILLAGE WEAVER *PLOCEUS CUCULLATUS*

by A.S. Adegoke

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Diet and feeding behaviour usually determine the importance of a bird species as an agricultural pest, and feeding has therefore been studied in many pest species in an effort to determine their pest status and find appropriate control methods (Ward 1965, Zahavi 1971, Feare *et al.* 1974).

The diet of the Village Weaver *Ploceus cucullatus* has not been studied previously in much detail, although it is known to consume insects, rice, maize, oil-palm fruits and wild grass seeds (Bannerman 1949, Mahogunje 1959, Morel & Morel 1973, Funmilayo & Akande 1976).

I have made a more detailed and systematic investigation of seasonal variation of preferred diet, and factors that predispose each crop plant to attack by Village Weavers.

STUDY METHODS

The study area was Ibadan, south-west Nigeria, with some observations around Oyo. Types of cereal crops cultivated at Ibadan and Oyo differ; rice is rarely grown at Oyo but is cultivated in Ibadan at the International Institute of Tropical Agriculture (IITA), Institute of Agricultural Research and Training and National Cereals Research Institute. Guinea-corn is widely cultivated at Oyo but rarely in Ibadan; maize is grown equally in both areas.

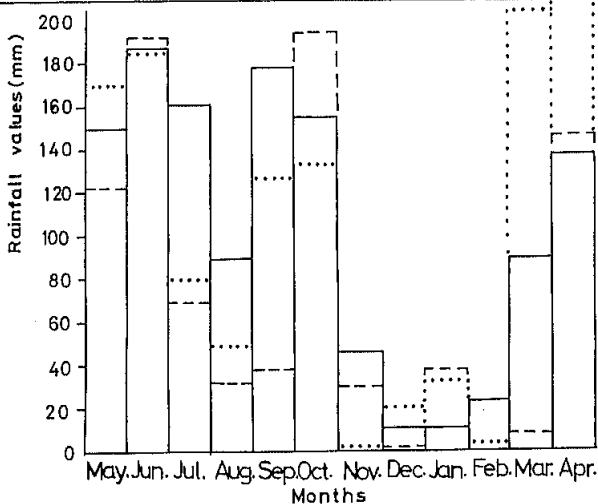
Feeding Village Weavers were observed with binoculars. Their foods were identified either on the spot, or samples were collected. Birds were captured with nets at least bi-monthly from May 1976 to April 1978 in all the ecological zones of the study area. Mist-nets were used between 0900 and 1900 hours in roosts and feeding grounds while purse nets (Funmilayo 1975) were used to capture birds roosting in nests.

Crop and gizzard contents were separated, dried at 100°C for 24 hours and weighed. Percentage weights contributed to birds' diet by major food species for each month was calculated to determine the importance of agricultural crops in birds' diet.

Three birds were collected on August 9, 10 and 24 1976 at Moor Plantation, where rice and maize were maturing simultaneously. At Moor Plantation, people were employed with instructions to chase birds away only from maturing rice. The crop and gizzard contents of each were analysed to determine which crop or plant species was most frequently included in the diet.

TABLE 1 Commonest foods in Village Weaver crops and gizzards.

<i>Elaeis guineensis</i>	Palmae	Fruit mesocarp
Wild berries		
<i>Solanum torvum</i>	Solanaceae	Fruit
<i>Zea mays</i>	Graminae	Seed
<i>Oryza sativa</i>	"	"
<i>Sorghum bicolor</i>	"	"
<i>Rottboellia exaltata</i>	"	"
<i>Sorghum arundinaceum</i>	"	"
<i>Panicum maximum</i>	"	"
<i>Eragrostis</i> sp	"	"
<i>Digitaria horizontalis</i>	"	"
<i>Brachiaria deflexa</i>	"	"
<i>Andropogon tectorum</i>	"	"
<i>Pennisetum subangustum</i>	"	"
<i>Catantops</i> sp	Acrididae	Whole
<i>Homorocoryphus vicinus</i>	Tettigoniidae	"
<i>Spathosternum pygmaeum</i>	Acrididae	"
<i>Chrysis</i> sp	Chrysidiae	"
<i>Macrotermis natalensis</i>	Termitinae	"



— Mean of monthly rainfall for 48 years
 - - - Total monthly rainfall May 1976 to April 1977
 " " " " 1977 " " 1978

FIGURE 1 Annual rainfall pattern in Ibadan area.

EFFECT OF ANNUAL RAINFALL ON DIET

The normal monthly rainfall for Ibadan (Anon 1961) is compared with total monthly rainfall obtained for each year of the study period to determine, firstly, their rainfall status (Fig 2) and, secondly, the effect on the birds' diet.

In Ibadan heavy rainfall (greater than 90 mm) usually starts from March, but the effect is not significantly felt, especially on vegetation, until May when some grasses like *Eragrostis* sp. start fruiting. It therefore appears that May marks the advent of abundant grass fruits for Village Weavers. Over 138 mm of rain falls in May, June, July, September and October. In August only 89 mm fell early and maize was harvested when dry. November to February are generally dry months (10-46 mm monthly). March (89 mm) and April (137 mm) are wetter (Fig 2).

Rainfall during the first year (May 1976-April 1977) was generally lower than average. Except for June and October, the monthly rainfall for the rainy season of 1976 (658 mm) was much less than that for a normal year at Ibadan (920 mm). May, July, August and September 1976 had little rainfall (122, 67, 32 and 39 mm) instead of the normal means of 149, 160, 89 and 178 mm. Those are the months when rain is of much importance for the maturation of rice, wild guinea corn *Sorghum arundinacearum*, the small-seeded *Rottboellia exaltata* and other grasses. High rainfall of 194 mm for October 1976 (mean 155 mm) was probably too late to have any beneficial effect on grasses like wild guinea corn which must have matured, and rice which normally should have been harvested by October.

But the monthly rainfall during the second year (May 1977 to April 1978) was greater than usual. Except in May and June 1977, wet season rainfall (May to October) was lower than usual; the dry season (November-April) was wetter than usual, except for November (1.0 mm) and February (2.0 mm). In March and April 1978, monthly rainfalls were 22 and 306 mm (annual means 89 and 137 mm). Thus in 1978 heavy rain started earlier, in March, instead of May.

DIET COMPOSITION

Crop and gizzard contents consisted of 37 different items made up of plants, animals and other items like grit and snail shells. The most frequently encountered are shown in Table 1. Small bits of the mesocarp of ripe fruits of oil-palm *Elaeis guineensis*, berries, Devil's Fig *Solanum torvum* and maize *Zea mays* were found in the crop and stomach of the Village Weaverbird. Only the mesocarp of ripe oil-palm fruits was eaten. Whole clean seeds of other grasses (Table 1, 5-14) were encountered in most cases, but sometimes broken seeds and rarely fruits (seed enclosed in the calyx) were found.

Adult insects (Orthoptera, Coleoptera, Isoptera and Hemiptera), spiders, insect larvae and a few unidentified pupae (Table 1, 15-19) were extracted from the crop with little deformation, but in most cases only mutilated parts (e.g. broken appendages and wings) were encountered. Insects included two species of ants; *Catantops* sp. (Acrididae); *Homorocoryphus vicinus* and *Spathosternum pymaeum* (Tettigoniidae); the termite *Macrotermis natalensis*; and *Chrysis* sp. (Chrysididae). From November to March Village Weavers fed on nymphs of the Variegated Grasshopper *Zonocerus variegatus*,

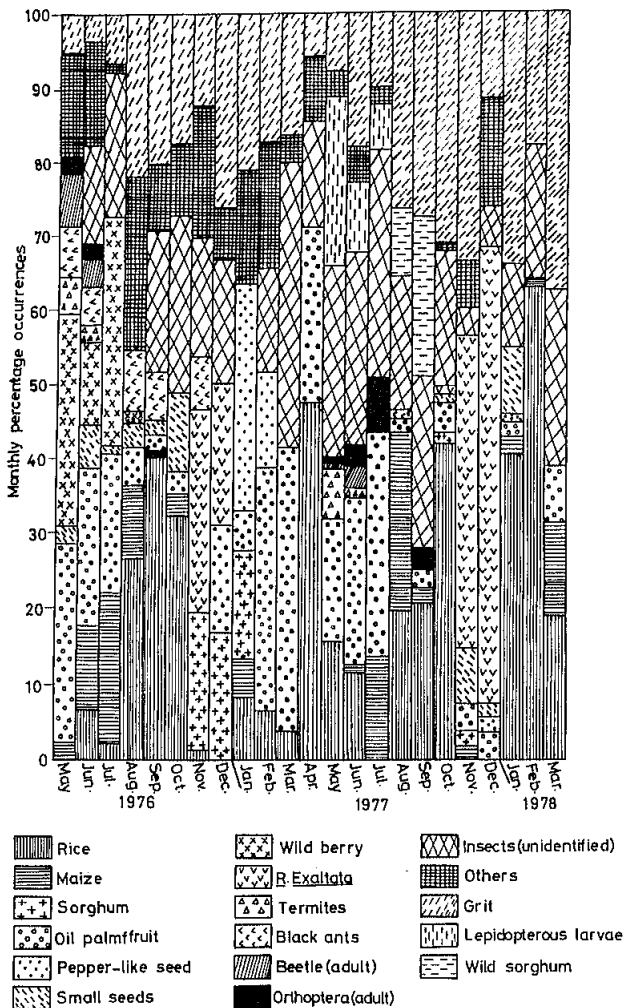


FIGURE 2 Monthly percentage occurrences of food items in the crop and stomach of the Village Weaverbird from May 1976 to March, 1978.

which were defoliating and removing the barks of a variety of plants including cassava, orange and maize. Some Variegated Grasshopper nymphs littered the underneath of breeding colony trees during this period. Insects contributed about 1% to the total dry weight of the crop and gizzard contents during each month while other unidentified items (Table 1) contributed less than 5%.

DIET VARIATIONS

Village Weavers consumed more items of food (9 per gizzard) in wet than in dry months (6 per gizzard). During the wet months, maize, rice, seeds of *Eragrostis* sp. and berries formed major parts of the diet, while sorghum, irrigated rice, *R. exaltata*, and *S. torvum* were the major items consumed during the dry months. All crops except irrigated rice and maize (only at IITA) were already harvested by the end of January and grasses were burnt as from December consequently more food items were available to birds in the rainy than the dry seasons. Insects and oil-palm fruits were consumed throughout May 1976 to April 1977.

During the wet months of 1976, 8.4-26.5% (average 21%) of birds were eating insects while 0-38% (average 18%) fed on insects during the dry months of 1976 (Fig 3). This trend, feeding more on insects during the rainy than the dry months, was confirmed in the second year when during the rainy season between 18-57% (average 38.5%) of birds fed on insects and 4-19% (average 13%) during the dry months (November 1977-March 1978). However it is interesting to note that orthopterous insects were extracted from the gut content of less than 3% of total birds captured during the two-year study period.

The composition of the food items in the diet in May 1977-April 1978 was different from that in the previous year (Fig 3). Birds depended less on Guinea-corn seeds in the second year when less than 2% fed on them, compared with up to 18% in the first year. Oil-palm fruits form a major component of birds' diet especially between May and July (both years) when 16-38% of birds fed on them.

Table 2 indicates that the quantity of food taken by males and females was fluctuating during each month, season and year. For the first year, maximum weight of 1.5 ± 0.1 g of food was recorded for the females in November 1976 when birds were not scared from matured Wild Sorghum and *R. exaltata*. Birds consumed an average of 0.5 g in August and September 1976 because bird scarers were preventing them from consuming matured rice grains in rice fields. By March and April 1977 bird ate least food; males ate an average of 0.3 g and females 0.2 g of food.

Food hardship was suggested by some birds attacking irrigated rice plots at IITA after bird scarers left in the evening, in March and April. Birds were still consuming rice grains at dusk, when four were netted and contained whole rice grains and few insect appendages.

In other months the birds ate more than 0.4 g since food was available (maize from late May-July and Guinea-corn from October to January). It appears that they were obtaining adequate food during this period.

During the second year there was no month (except December) when gizzards held small quantities of food (Table 2), suggesting that there was

TABLE 2 Monthly mean body weight and crop-and-gizzard content weight.

Month		Mean (S.E.) live weight (g)		Mean (S.E.) gut content (g)		n	
		Male	Female	Male	Female	Male	Female
May	1976	44.0±0.8	34.7±0.4	0.7 ±0.1	0.7 ±0.1	9	13
June		44.0±0.7	34.6±0.5	0.7 ±0.1	0.6 ±0.1	21	58
July		41.7±1.2	34.0±0.7	0.7 ±0.1	0.6 ±0.1	21	16
Aug		39.3±0.8	32.4±0.5	0.5 ±0.1	0.5 ±0.1	106	91
Sept		42.1±0.4	34.6±0.5	0.6 ±0.1	0.6 ±0.1	34	42
Oct		40.3±1.8	33.3±0.6	0.5 ±0.1	0.6 ±0.1	32	40
Nov		44.1±0.6	34.5±0.3	1.3 ±0.1	1.4 ±0.1	25	15
Dec		46.3±0.5	34.1±0.4	1.5 ±0.1	1.0 ±0.1	16	21
Jan	1977	44.0±0.6	34.6±0.6	1.0 ±0.2	0.8 ±0.1	13	28
Feb		41.7±1.9	35.4±0.5	0.6 ±0.2	0.5 ±0.1	3	30
March		42.9±1.2	34.1±0.8	0.3 ±0.1	0.2 ±0.1	13	16
April		41.4±0.6	33.1±0.5	0.4 ±0.1	0.2 ±0.0	31	28
May		43.0±1.1	34.5±1.1	1.1 ±0.1	1.0 ±0.3	47	25
June		39.3±1.0	33.4±0.9	0.8 ±0.1	0.7 ±0.1	30	40
July		39.0±0.8	32.0±1.2	0.5 ±0.1	0.4 ±0.1	26	13
Aug		43.7±0.5	36.7±2.7	0.7 ±0.1	1.4 ±0.5	52	9
Sept		41.7±0.4	33.4±0.2	0.7 ±0.2	0.4 ±0.0	27	48
Oct		42.0±0.8	33.0±0.6	1.2 ±0.2	0.8 ±0.2	22	37
Nov		45.0±1.7	36.9±0.7	1.1 ±0.2	0.9 ±0.1	20	42
Dec		38.2±0.8	31.3±0.6	0.4 ±0.1	0.3 ±0.1	18	25
Jan	1978	36.4±0.7	30.3±0.5	1.1 ±0.1	1.1 ±0.1	31	33
Feb		38.2±2.0	33.3±1.0	1.3 ±0.2	1.1 ±0.2	8	31
March		34.0±6.1	33.0±0.6	1.0 ±0.2	0.9 ±0.2	16	17
Mean		41.3±3.0	33.8±1.6	0.80±0.03	0.66±0.02	Total 621	708

t = 10.12*

t = 3.51**

* significant (p = 0.05)

** significant (p = 0.01)

no food hardship. Birds fed on large quantities of Wild Sorghum and *R. exaltata* which matured early (August/September instead of October), so large quantities were found in the birds much earlier (from August-November 1977) in the second than the first year (Table 2).

Male crop and gizzard contents weighed 0.80 ± 0.03 g and female 0.66 ± 0.02 g (Table 2), which are significantly different ($P = 0.05$). Male birds, with a mean weight of 41.3 ± 3.0 g are significantly heavier ($P = 0.05$) than females (33.0 ± 1.6 g - Table 2). But food weights per gram body weight of males and females did not differ significantly ($t = 0.04$, $P = 0.05$). This implies that males ate more food by virtue of their greater weight. The male alone builds the outer shell or the main part of the nests and it consumes more food than the female.

Table 3 shows the numbers of male and female gizzards containing each food item. A comparable number of each sex fed on grains, oil-palm fruits, and fruits of *S. torvum* according to availability. Rather more females (average = 61.5%) than males (average = 43.6%) ate insects. This difference is not significant ($t = 1.4$, $p = 0.05$). These results indicate that the qualitative composition of the diet was similar in both male and female birds.

ECOLOGICAL DIFFERENCES IN DIET

Birds at Oyo had different diets from those at Ibadan (Table 4). Only an average of 24% birds consumed maize grains but 57% ate rice (Table 5). The percentage number of birds that fed on other items like *Eragrostis* seeds (Table 5) are comparable with the values obtained for the same period in August 1977 (Fig 3) suggesting that in August 1976 when this aspect was investigated, birds preferred rice to maize.

THE IMPORTANCE OF AGRICULTURAL CEREALS

The percentage number of birds consuming different crop plant items throughout the year is shown in Fig 4a, and the percentage dry weight contributed by each crop plant fruit to the total food consumed by birds during each month is shown in Fig 4b.

From June to early August in 1976, maize was the major food consumed and it contributed 28-52% to the dry weight of food. By the end of August 1976, when maize was harvested, upland rice was maturing and 60-90% birds fed on rice grains until October 1976 when it was harvested. Rice contributed 32-70% of dry weight of food. From November 1976 to January 1977, 34-40% birds were consuming maturing/matured guinea corn which contributed more than 33% to food. In January-May 1977 birds obtained rice from paddies at IITA which also formed the major food by weight. Birds fed on mesocarp of ripe oil-palm fruit which contributed little to the dry weight of food consumed.

Guinea-corn and oil-palm fruits were neglected during May to April because Wild Sorghum and *R. exaltata* were abundant in the study area. It shows that birds eat rice, maize and guinea corn whenever available, in quantity depending on the availability of other foods.

TABLE 3 Percentages of gizzards containing various food items.

	Nov 1976		Dec 1976		Jan 1977		Feb 1977		May 1977		June 1977		July 1977	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Rice	5.3	0	0	0	8.3	25	0	47.8	50	33.3	0	0	0	0
Other grains	94.7	100	85.7	72.7	66.7	50	0	4.3	0	0	75.0	85.7	36	50
Oil-Palm fruit	0	0	14.3	54.5	8.3	14.3	100	56.5	50	58.3	87.5	64.3	68	50
<i>S. torvum</i>	0	0	0	0	41.7	71.4	33.3	17.4	0	0	0	0	0	0
Insects	42.1	53.8	14.3	63.6	8.3	21.4	33.3	39.1	85	100	62.5	85.7	60	66.7
No. of birds	19	13	7	11	12	28	3	23	20	12	8	14	25	12

TABLE 4 Monthly percentage occurrence of food items in crop-and-gizzards, Oyo and Ibadan.

	Oyo						Ibadan					
	June 1976	July 1976	Aug 1977	Sept 1977	Oct 1977	Nov 1977	June 1976	July 1976	Aug 1977	Sept 1977	Oct 1977	Nov 1977
Rice	0	0	0	0	0	0	60.0	28.6	45.1	46.3	89.7	0
Maize	40.2	29.4	22.2	0	0	0	25.0	57.1	54.8	4.2	0	3.5
Oil-palm fruit	64.1	55.5	33.3	33.3	54.5	30.0	52.0	28.6	0	0	0	0
Berries	31.9	67.6	88.9	66.7	72.7	10.0	0	0	0	0	0	0
Small grass seeds	18.0	20.7	0	0	0	0	25.0	0	0	0	0	0
<i>S. torvum</i> (fruits)	11.1	0	0	0	0	80.0	4.0	0	0	0	0	0
Insects	42.9	48.2	11.1	22.2	9.1	50.0	24.0	57.1	41.9	52.1	38.5	69.0

TABLE 5 Percentages of gizzards containing various foods, Moor Plantation (Ibadan), 1976.

	Aug 9	Aug 10	Aug 24	average, Aug 9-24
Maize	20	24	10	24
Rice	78	49	45	57.3
<i>Eragrostis</i> sp	29	10	0	13
Ants	0	50	24	25
Others	98	49	54	67
Grit	73	37	58	56

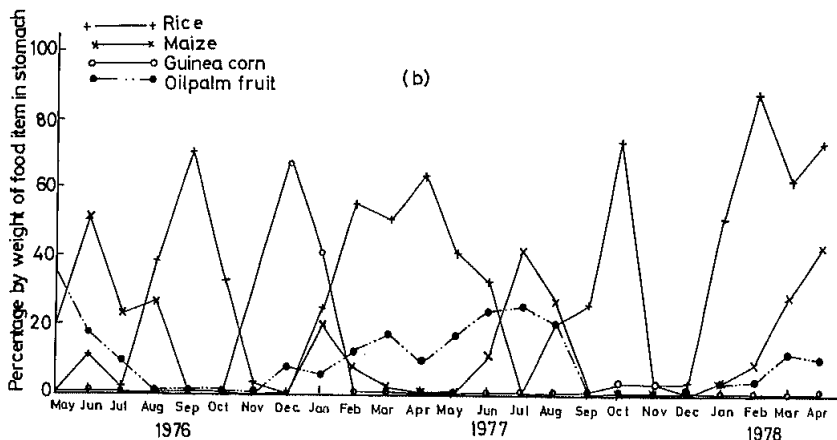
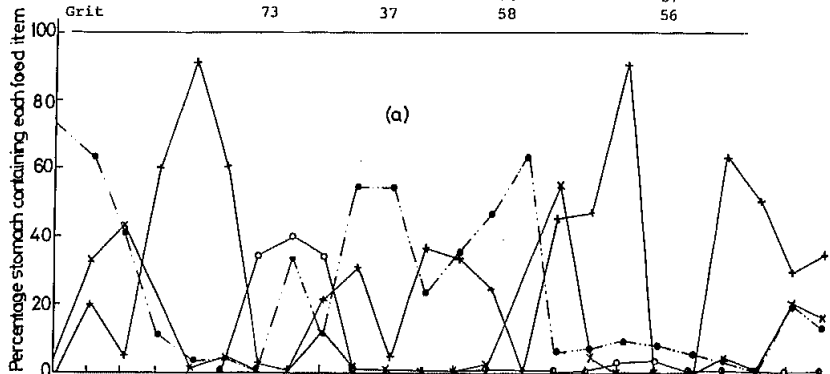


FIGURE 3a. The percentage number of stomach of birds containing crop plant parts during each month.

b. The percentage dry weight each food item contributed to the stomach content of birds during each month.

DISCUSSION

The possibly beneficial role of Village Weavers in consuming insect pests of agriculture like grasshoppers and termites appears to be limited. The Devil's Fig is a problem weed in tropical pasture which has attracted research for its control (Chadhoker 1976). Although weavers ate ripe and unripe fruits their effect on this weed appears insignificant (it is a perennial with vegetative propagation). Rice, maize, Guinea-corn and oil palm, important crop plants, are major foods. These crops mature sequentially and provide an almost unbroken supply of food for weavers, which may exert a detrimental effect on them. It appears that the degree of use of crop plants in a particular locality and season depends on alternative food sources available.

Village Weavers may subsist on agricultural crops in other ecological zones (Collias & Collias 1971, Camara-Smeets & Manikowski 1981).

Ward (1965) reported that severe crop damage was caused when seeds formed only about 4% of the diet of the Weaver *Quelea quelea*, so crop damage by Village Weavers may not be underestimated. *Queleas* may occur in several millions but Village Weavers only in hundreds near croplands (Adegoke 1979); but then almost every village has its colony of the Village Weavers.

Feeding on different crops at different seasons, coupled with seasonal changing breeding/roosting habit (Adegoke, in press) indicate that many forms of control methods would be needed to curtail damage to all crops.

SUMMARY

A two-year study of the diet of *Ploceus cucullatus* in two south-west Nigerian localities showed that it eats insect pests (grasshoppers *Zonocerus variegatus*, *Catantops* sp.; termites *Macrotermis natalensis*), but also eats important crop plants: rice, maize, and oil-palm fruits, respectively contributing 71, 52 and 38% of dry-weight food in May-October. In November-April guinea-corn, irrigated rice and maize formed 68, 88 and 42% of dry-weight food. But when seeds of *Rottboellia exaltata* and *Sorghum arundinaceum* were abundant, crop damage was reduced. The implication of diet in the control of the Village Weaver is discussed.

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