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FOOD HABITS OF THE BOBWHITE QUAIL IN THE GEORGIA PIEDMONT

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INTRODUCTION

The bobwhite quail (*Colinus v. virginianus*) is traditionally and inseparably linked with the State of Georgia. Historically, this bird has been associated with the "Peach" state, constituting a major esthetic and economic entity. The present investigation is concerned with obtaining important management ingredients from food habits information.

DESCRIPTION OF STUDY AREA

The Georgia Piedmont Plateau consists of foothills and gently undulating terrain with broad interstream areas. Its soils range in texture from sandy loams to clay loams. The most extensive series is Cecil. Mid-summer maximum temperatures average about 90°F., with the frost free season averaging around 230 days. Annual precipitation averages close to 50 inches. Cropland, pasture, and woodland are important components in land usage.

MATERIALS AND METHODS

The food habits investigation was accomplished by an examination of 279 crops collected during the November 21-February 28 hunting seasons of 1965-66, 1966-67.

The air dried crop contents were weighed on a Mettler electronic balance to the nearest milligram. Individual food item weights and the frequency of occurrence were tallied by individual months, but combined for the two winters and summarized for the entire period. Individual item weight percentages were obtained by dividing item weight by the total weight. Percentage of frequency of occurrence was calculated for the individual months and entire period by dividing the number of crops in which an item was found by the total number of crops containing food. Identification of seeds was made mostly by reference to Martin and Barkley (1961) and Musil (1963).

Classification was taken as far as possible considering the material dealt with and the availability and occurrence of similar organisms. Due to the importance of the lespedezas in the present study, an attempt was made to classify them to the specific level, if possible.

RESULTS

The quail crop collection covered a 10 county Piedmont area, with 81 per cent of the crops coming from Clarke, Jackson, Oconee, and Walton counties. Sixty-three (22.6 per cent) of the crops were empty of food matter. Weight of crop contents ranged from .003g to 13.321g, and averaged 1.9g for all crops and 2.4g for crops containing food.

A total of 42 individual plant food items and 10 separate animal items were identified. Items identified as plant matter comprised 99.91 per cent of the bobwhite's fall and winter diet, with the remaining 0.09 per cent labeled as animal matter. Of the 513.907 gram plant matter weight, only 4.829g (0.94 per cent) could not be classified.

Insects comprised 81.8 per cent of the animal matter with the remaining 18.2 per cent recognized as spiders (Aranea). Coleoptera (beetles), primarily Carabidae (ground beetles), made up over 60 per

cent of the insects by weight, with the orders of Orthoptera (represented by grasshoppers), Lepidoptera (one butterfly pupa), Hymenoptera (represented by ants), Diptera (fly larvae), and Hemiptera (true bugs), also represented.

Although 17 plant families were represented, relatively few were of major importance. Legumes (Fabaceae) represented 52.3 per cent of the total crop content by weight with representatives occurring 458 times (the total of all occurrences of each food item identified as a member of the legume family). Within this family, members of the genus *Lespedeza* occurred 318 times and composed 47 per cent of the total plant matter by weight. Four classifications of lespedezas are found duplicated in the listings of the 7 most important foods on both a frequency of occurrence and weight basis (Table 1). They are: common lespedeza (*Lespedeza striata*), sericea lespedeza (*Lespedeza cuneata*), unidentified lespedeza, and korean lespedeza (*Lespedeza stipulacea*). Other legumes of importance (comprising over one per cent of total weight or found in over nine per cent of the crops containing food) were: partridge pea (*Cassia fasciculata* and *C. nictitans*), beggartick (*Desmodium spp.*), milk pea (*Galactia sp.*), cow pea (*Vigna sinensis*), and soybean (*Glycine max*).

Grasses (*Graminae*) were represented 46 times and comprised 33.30 per cent of the total crop weight. Only two of eight items within this family were found to be of any importance. Corn (*Zea mays*) was observed to be the number two quail food in this area, (from the combined frequency and weight classification) and sorghum (*Sorghum vulgare*) ranked fifth by weight.

Fagaceae, represented entirely by oak acorns, was the sixth most important quail food in the Piedmont area. The witch-hazel family (Hamamelidaceae) made up by sweetgum (*Liquidambar styraciflua*) seeds, and Japanese honeysuckle (*Lonicera japonica*) berries of the honeysuckle family (Caprifoliaceae) were found to be of lesser importance. (Table 1).

DISCUSSION

Weight of food items was used in the present study in evaluation of the foodstuff consumption. This method was thought more indicative of nutritional value of items consumed, than the conventional volumetric method.

Similar studies (Larimer, 1960; Korschgen, 1948; Johnson and Pearson, 1949; Baldwin and Handley, 1946; and Lett, 1946) have shown the fall and winter diet to be largely vegetable.

Legumes totaled over half of the total contents weight and occupied nine positions in the 15 most important foods. In the Alabama Piedmont, Lett (1946) found the family to occupy the main position and studies in Illinois (Larimer, 1960), Alabama (Johnson and Pearson, 1949; and Allen and Pearson 1945b), and Virginia (Baldwin and Handley, 1946) showed the per cent of total volume represented by legumes to range from 39 to 54. The bulk of this (47 per cent of the total weight) was identified as *Lespedeza* and is considered in the individual food listings.

What are the important foods of this region? Following each individual item below is the ranking in frequency of occurrence and then the ranking from a weight standpoint. Items are arranged in decreasing order according to importance; first items are those found in both the important weight and frequency listings (Table 1). Following the duplicated items are those found in over nine per cent of the crops, and following those are the items individually comprising over one per cent of total foodstuff weight.

Common lespedeza (1,1) was undoubtedly the most important quail food of the region. Larimer (1960) found a grouping of this and Korean lespedeza to rank first by frequency (42 per cent of the crops) and third by volume (nine per cent of the volume). Barbour (1951) reported the annual to rank fifth by volume. Johnson and Pearson (1949) ranked it second by frequency and volume. Baldwin and Handley (1946) ranked it second by volume in the Virginia Piedmont, and third for the entire state. The December diet in Alabama (Allen and Pearson 1945b) con-

TABLE 1. Bobwhite Foods Individually Comprising Over One Per Cent of Total Weight or Found in Over Nine Per Cent of 216 Crops *

Food Item	Percentage of		Food Item	Percentage of		Duplicated Items **
	Occurrence	Total Weight		Total Weight	Total Weight	
1. Common Lespedeza	57.41		Common Lespedeza	34.66	Common Lespedeza	1
2. Leaf Material	39.35		Corn	30.06	Corn	2
3. Sericea Lespedeza	38.39		Acorns	7.49	Sericea Lespedeza	3
4. Unidentified Lespedeza	31.91		Sericea Lespedeza	6.37	Unidentified Lespedeza	4
5. Partridge Pea	28.90		Sorghum	3.08	Leaf Material	5
6. Corn	14.35		Unidentified Lespedeza	2.84	Acorns	6
7. Beggartick	11.11		Sweetgum	2.48	Korean Lespedeza	7
8. Korean Lespedeza	11.11		Leaf Material	2.19		
9. Milk Pea	9.72		Korean Lespedeza	2.10		
10. Honeysuckle	9.72		Cow Pea	1.94		
11. Acorns	9.26		Soybean	1.59		

* All items arranged in order of decreasing importance.

** Third (duplicate) category ranked by multiplying percentage of weight by percentage of food items found in both listings.

tained 12 per cent by volume (second place) of this valuable food, observed in 33 per cent of the crops (fifth place). Lett (1946) observed it to comprise 26 per cent of the volume, occurring in 54 per cent of the crops in his Piedmont study.

Corn (6,2), the second most important food of this region, is an important quail food wherever it is grown. In southern Illinois it ranked one and two by volume and frequency, respectively (Larimer, 1960). It was third by volume in Kentucky (Barbour, 1951). In Missouri it ranked second in volume, composing 17 per cent of the fall and winter diet (Korschgen, 1948). Alabama investigations for November and December (Allen and Pearson 1945a and 1945b) placed this seed in third and second place respectively, by volume.

Sericea lespedeza (3,4), contrary to the majority of food habits studies of other sections, was found to be an important Piedmont quail food. This widespread introduced perennial was the third most important consumed item. Of studies perused, only Handley (in Stoddard, 1931) considered it an important quail food. It is, however, so hard-seeded that it may well be of little nutritional value (Davison, 1958).

Unidentified lespedeza (4,6) thought to be mainly native perennial bush clovers, was the fourth most important quail food. *Lespedeza spp.* comprised almost two per cent of the diet in the Virginia Piedmont (Baldwin and Handley, 1946). Allen and Pearson (1945a and 1945b) found it to rank fourth and third by frequency for November and December, respectively. Davison (1942) ranked it eleventh by volume for the upper southeast. Handley (in Stoddard, 1931) observed the lespedezas in 39 per cent of the crops analyzed.

Leaf material (2,8), the sole content of a portion of the crops, was thought to have been mainly taken incidental with seed consumption. Most studies have omitted this as a food item, but Davison (1942) observed it to comprise 1.3 per cent of the volume of 5,189 crops (ranking 13th).

Acorns (11,3) was the sixth most important Piedmont food, found in nine per cent of the crops, and recorded as 7.5 per cent of the weight. Smaller acorns were consumed whole, but the majority were consumed in fragmentary form, indicating utilization in conjunction with mast feeding by larger animals. Larimer (1960) ranked it ninth and fourth by frequency and volume, respectively. Korschgen (1948) placed it fifth by volume and Baldwin and Handley (1946) placed it sixth for the Virginia Piedmont. Lett (1946) observed acorns in over nine per cent of the 1,176 crops analyzed, totaling over four per cent of the volume. Allen and Pearson (1945a and 1945b) found it ranked fourth and first by frequency and volume, respectively. Davison (1942) placed the oak mast second by volume.

Korean lespedeza (8,9), the last item of over one per cent by weight and over 9 per cent by frequency, is a widely reported quail food. Larimer (1960) grouped this with common lespedeza, with the combination ranking first and third by frequency and weight, respectively. Davison (1942) using the same grouping as Larimer placed the combination in the number one position by volume. Barbour (1951) and Korschgen (1948) found this introduced annual to occupy the number one volume position as also did Johnson and Pearson (1949) in Alabama.

Partridge pea (5,-), beggartick (7,-), and milk pea (9,-), although not as valuable as the above, were found to be substantial diet items. The importance of these was substantiated by many of the comparable studies, particularly those in the southeast.

Honeysuckle (10,-) and sweetgum (-,7) were found to be consumed fairly regularly and classed as "marginally important".

Sorghum (-,5), cow peas (-,10), and soybean (-,11) were found in so few crops as to be rendered unimportant except possibly where locally abundant adjacent to suitable coverts.

SUMMARY

Forty-two individual plant food and 10 animal items were identified from 279 crops collected from the Piedmont area from the 1965-66 and 1966-67 hunting seasons. Plant matter (less than one per cent of which was unidentified) comprised 99.9 per cent of the contents with the 0.1 per cent classified as animal representatives. Legumes comprised over 52 per cent of the weight with 9 out of the 15 top food members of this family. Within this family lespedezas composed 47 per cent of the total crop contents weight, with four of the seven main foods included in this genus. Grasses were found to represent 33 per cent of the total weight, the bulk of which was corn. Individual food items found in over nine per cent of the crops containing food *and* comprising over one per cent of the total weight arranged in decreasing order were: common lespedeza, corn, sericea lespedeza, unidentified lespedeza, leaf material, acorns, and Korean lespedeza.

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