

Notes on Winter Feeding Habits of North Texas Bobwhites

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From the viewpoint of the field biologist, Dallas is advantageously situated; for within a radius of less than a hundred miles one may reach six different principal soil types, each the result primarily of its underlying geological formation. Each of these rather large, northeast-southwest trending regions (four are sands, two are calcareous clays) possesses very noticeably different floras, which are due primarily to these soil differences, and to a lesser extent to climatic factors, the most obvious of which is the progressive decrease of rainfall westward. The two clay regions support tall- or mid-grass prairies. The sandy regions support woodlands, primarily oak in north-central Texas, but pine forest farther east.²

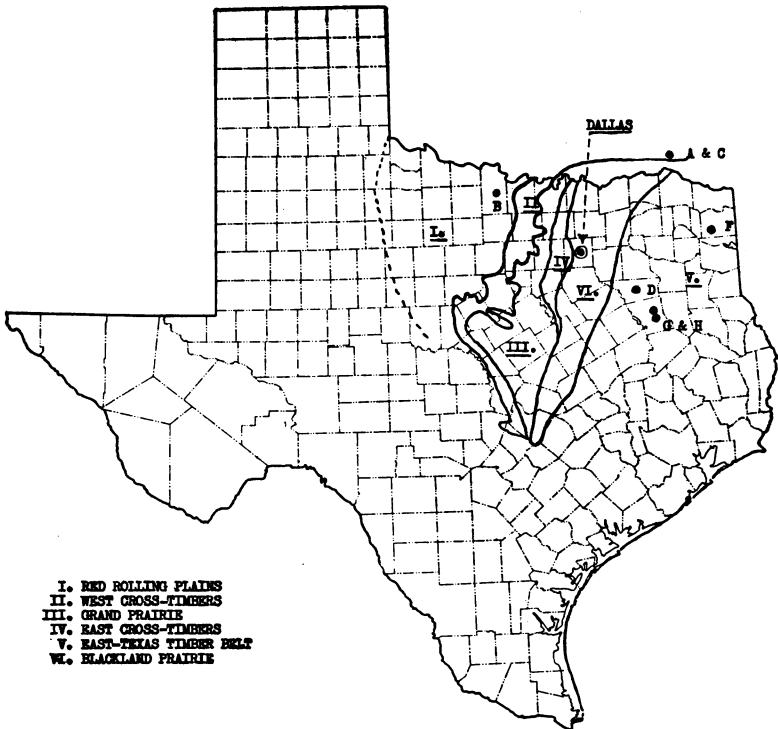
It is quite likely that corresponding differences may be noted in faunas; for some of the same, or different environmental factors which influence the flora (as well also the flora itself) might influence animal abundance and distribution.

The problem of which this paper is the partial result, was an attempt to note differences or similarities in the feeding habits of bobwhites in these different regions (as affected by the soils through plant relationships.) It was hoped that several hundred bird crops would be obtained from diverse locations in the different regions; and that, with sufficient data, trends, similarities, and differences in feeding habits could be noted. Numerous hunters were contacted, and each was supplied with a number of 3 x 5½" manila envelopes in which to place each individual crop. Dates and locations of the kills were recorded.

It seems however, that this study was undertaken in a poor year; for the unanimous opinion of all hunters conversed with, as well as clerks in five sporting-goods stores, was that quail hunting this year was "poorer than it's been in quite a few years." Several explanations were volunteered. Some supposed quail scarcity was due to heavy predation by greatly increased fox populations. One man believed that an

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²These and additional comments below on the vegetation of north-central Texas are largely based on lecture notes from the course in Geobotany given at Southern Methodist University by Dr. Lloyd H. Shinnars, 1948-49.



accelerated farming and grazing program throughout northern Texas had removed many cover and feed areas formerly used by quail. Almost all agreed that the exceptionally dry summer, fall, and early winter affected adversely food supplies and breeding; and another hunter held that the drouth conditions prevented hunting dogs from scenting the few birds that had survived.

Nevertheless some small success was realized in East-Texas, northwest Texas, and southern Oklahoma, and it is from these areas that the 68 crops here discussed were obtained. The Oklahoma crops are included because they were taken just north of the Texas boundary on a continuation of one of the regions mentioned above, and the flora is virtually the same.

Since the material obtained is in no way adequate to draw any general conclusions, the fragments are submitted as tidbits of possible interest to game managers, hunters, and naturalists.

My greatest appreciation is due Dr. Lloyd H. Shinnors, Director of the Southern Methodist University Herbarium. He was never too busy to give helpful suggestions, and without his assistance the seed identification would have been almost impossible. Further thanks are given to Mr. V. L. Cory and Dr. Eula Whitehouse of the Herbarium staff, who aided further in these identifications; and to Dr. E. P. Cheatum and Mr. Avery Freeman for the actual identification of the animal species. Grateful acknowledgment is made to the following men for taking the trouble to collect the crops: Messrs. Paul Williamson (who also helped with the geological data), Gene White, E. C. Bowman, and Paul Mathews.

Method

All seeds and plant materials were identified by comparison with Herbarium specimens. Grass seeds, however, were identified (when identification was possible) from descriptions and illustrations in Hitchcock's *Manual of Grasses* and Silveus's *Texas Grasses*. Identification of animal materials has been mentioned above.

Each crop was measured separately. Volumetric measurements were made by water displacement as follows. Each component species was measured separately, by funneling into a 5cc pipette, partially full of water. Displacement was recorded. The pipette was closed at the bottom simply by a short piece of rubber tube and a burette clamp. Almost all of the seeds and smaller articles were measurable by this method. For such items as acorns, larger seeds, insects, and leaves, a 10cc graduate was used for the displacement measurements. While this method was time-consuming, it is believed that a considerable degree of accuracy was attained.

The total volumes of each group of crops were then added, and the total percentage of each component species of the group was derived. The results are recorded on Table II.

Results

Seven groups of crops were obtained: one from the Rolling Red Plains (see map); two from a single location in the West Cross Timbers in southern Oklahoma; and four were from the East-Texas Timber Belt. It is noted that all were taken from sandy soils. While some difference in floras occur on the four sandy regions noted on the map, many species

are common to all of them, and this is reflected in the food species.

TABLE I.

Series	No. of Crops	Date Obtained	Region	County	Location
B	8	12/10/48	Rolling Red Plains	Clay	3 miles south of Henrietta
A	16	12/3/48	West Cross Timbers	McCurtain, Okla.	20 miles northeast of Hugo, Okla.
C	9	12/28/48	"	"	"
D	5	1/3/49	East Texas Timber Belt	Henderson	Near Athens
F	3	1/8/49	"	Cass	Near Hughes Springs
C	20	1/1/49	"	Anderson	Near Palestine
H	7	1/3/49	"	Anderson	" "

I. ROLLING RED PLAINS.

This region, one of rolling, dissected, brush-covered topography, is underlain by Permian sands. The soils derived from these formations are essentially sandy. It is the most arid of the six regions under consideration.

Series B. Only one group of crops was taken from this area. The five most important food species are, in their percentages:

<i>Cnidoscopus texanus</i> , (bull-nettle)	65.60
<i>Ambrosia psilostachya</i> , (perennial ragweed)	21.40
<i>Strophostyles leiosperma</i> , (wildbean)	9.40
<i>Rhus radicans</i> , (poison ivy)80
<i>Paspalum sp.</i>60

II. WEST CROSS-TIMBERS.

This region of southern Oklahoma is an extension of the same type found in north Texas. It is underlain by the Cretaceous Trinity sand. The climax vegetation of post-oak is obviously reflected in the quail foods. Henicka (1948) in an examination of hunting season quail crops taken in the 1947-1948 season also found acorn mast to be the dominant food in Denton, Wise, and Jack counties in the West Cross-Timbers. These Texas counties are north and west of Dallas.

Series A. Dominant food species are:

<i>Quercus stellata</i> , (post-oak)	86.37
<i>Ageneotettix d. decorum</i> , (little red-legged grasshopper)	5.18
<i>Strophostyles helvola</i> , (wild-bean)	4.53
<i>Desmodium sp.</i> (tick trefoil)53
COLEOPTERA-Scarabeidae- (grubs)50

Series C. Though this group of crops is from the very same area as those of Series A, it was separated because the two were taken over three weeks apart; in the intervening period, heavy rains occurred, which should have brought out vegetation growth of certain winter annuals. This expecta-

TABLE III

FOOD ITEMS	REGIONS					
	ROLLING RED FLAINS		WEST-CROSS TIMBERS			
	B-Series		A-Series		C-Series	
	% by Vol.	No.*	% by Vol.	No.*	% by Vol.	No.*
ANACARDIACEAE						
<i>Rhus radicans</i> (Poison Ivy)	.80	1	-		-	
AQUIFOLIACEAE						
<i>Ilex decidua</i> (Swamp holly)	-		.12	1	-	
BORAGINACEAE						
<i>Lithospermum incisum</i> (Puccoon)	.15	2	-		-	
COMPOSITAE						
<i>Ambrosia psilostachya</i> (Perennial ragweed)	21.40	8	-		-	
EUPHORBELACEAE						
<i>Gnidoscolus texanus</i> (Bull-nettle)	65.60	8	-		-	
<i>Croton capitatus</i> (Dove-weed)	.08	1	-		-	
<i>Crotonopsis linearis</i> (Spurge)	-		.27	6	.36	1
<i>Tragia nepetaefolia</i> (Stinging-nettle)	.55	5	-		-	
FAGACEAE						
<i>Quercus stellata</i> (Post-oak)	-		86.37	14	76.36	6
GRAMINEAE						
<i>Panicum-Capillaria</i> series (Witch-grass)	.45	1	.03	3	-	
<i>Panicum-Agrostoides</i> series (Panic-grass)	-		-		2.18	2
<i>Paspalum</i> sp.	.60	4	-		-	
LEGUMINOSAE						
<i>Desmodium</i> sp. (Tick-trefoil)	-		.53	8	-	
<i>Lespedeza</i> sp.	-		.03	3	-	
<i>Lespedeza Stuevei</i> or <i>violacea</i>	-		-		.36	1
<i>Strophostyles halvols</i> (Wild-bean)	-		4.53	6	2.54	1
<i>Strophostyles leiosperma</i> (Wild-bean)	9.40	7	-		-	
POLYGONACEAE						
<i>Polygonum opalouana</i> (Knot-weed)	-		-		T	1
ROSACEAE						
<i>Crataegus viridis</i> (Red-haw)	-		1.12	2	.36	1
VITACEAE						
<i>Parthenocissus quinquefolia</i> (Virginia creeper)	-		.18	2	-	
<i>Vitis</i> sp. (Wild grape)	.05	1	-		-	
Unidentified leaf matter	.15	3	.03	12	1.80	9
Misc. plant debris	.05	3	-		-	
ANIMAL MATTER						
ARANEIDA-AGELENIDAE			.75	1	-	
INSECTA						
COLEOPTERA						
BYRRHIDAE-Byrrinus	-		.05	1	-	
GARABIDAE-Barpalus (Ground beetle)	-		.06	1	-	
CHRYSOMELIDAE-Physonota (Leaf beetle)	-		-		1.08	3
CURCULIONIDAE (Snout-beetles)	-		T	1	-	
SCABAEIDAE-grub	-		.50	3	-	
Unidentified beetle body-parts	-		T	1	-	
Unidentified Coleopteran grubs	-		T	1	T	1

TABLE IIa, CONT'D

HOMOPTERA						
APHIDIDAE-(Plant lice)	-	T	1	T	1	
CICADELLIDAE-(Leaf-hoppers)	-	.15	1	-	-	
MEMBRACIDAE-(Buffalo tree-hoppers)	-	.12	1	-	-	
ORTHOPTERA						
LOCUSTIDAE (Grasshoppers)						
<i>Ageneotettix d. decorum</i>	-	5.18	4	-	-	
<i>Encoptolopus</i> sp.	-	.90	1	-	-	
<i>Melanoplus</i> sp.	-	.50	1	-	-	
INORGANIC MATTER-GRIT	-	.06	1	-	-	

Unless otherwise noted, animal material
in adult form.

T denotes trace:less than .01%

*No. of crops in which found.

Unless otherwise noted, plant material
in form of seeds.

tion is borne out by the data. Otherwise, little difference is noted. However, the crops in general contained less material. The acorn mast found was of dried fragments, and unlike the larger fragments and whole acorns found three weeks previously. Another point of interest is that this area was the only one, in the entire study, in which grasshoppers were found.

Dominant food species are:

<i>Quercus stellata</i> , (post-oak)	76.36
LOCUSTIDAE- <i>Melanoplus</i> , (blue grasshopper)	14.50
<i>Strophostyles helvola</i> , (wild-bean)	2.54
<i>Panicum</i> sp.- <i>Agrostoides</i> series, (panic grass)	2.18
Unidentified leaf material	1.80

III. EAST TEXAS TIMBER BELT.

This is the most productive timber region in the state. Though little virgin pine remains in the area, considerable lumber and pulp are still taken from it. The area is underlain by Eocene sands. Three of the four groups received from this area were taken west of the pine region, and the oak climax found here is again reflected in the crops.

Series D. All of the species of this group were somewhat to be expected. However, a rather large unidentified berry which comprised over half the volume of the group proved to be quite puzzling. This dark, drupe-like berry possessing a rather strong pepperlike odor eluded all attempts at identification by everyone concerned.

TABLE IIb

FOOD ITEMS	REGIONS							
	EAST TEXAS TIMBER BELT							
	D-Series		F-Series		H-Series		G-Series	
	% by Vol.	No.	% by Vol.	No.	% by Vol.	No.	% by Vol.	
ANACARDIACEAE								
<i>Rhus radicans</i> (Poison ivy)	-		-		.55	2	-	
COMPOSITAE								
<i>Solidago microphylla</i> (Goldenrod)-leaves	-		-		.25		-	
Unidentified seeds & pappus	-		-		T	1	-	
EUPHORBIACEAE								
<i>Acalypha gracilens</i> (Three- seeded mercury)	-		-		-		T	
<i>Cnidioscolus texanus</i> (Bull- nettle)	11.67	1	-		-		-	
<i>Croton capitatus</i> (Doveweed)	-		3.82	2	33.68	5	49.00	
<i>Croton monanthogynus</i>	-		-		.15	1	-	
FAGACEAE								
<i>Quercus shumardii</i> (Red-oak)	-		-		13.52	3	-	
<i>Quercus stellata</i> (Post-oak)	-		-		45.25	3	-	
<i>Quercus</i> sp.	-		-		2.00	1	1.53	
GRAMINEAE								
<i>Panicum texanum</i> (Panic grass)	-		-		.20	2	-	
<i>Panicum-Virgata</i> series (Switch grass)	-		-		-		.03	
<i>Paspalum</i> sp.	-		-		T	1	.17	
Unidentified grass seeds	-		-		-		T	
LEGUMINOSAE								
<i>Ghamaecrista fasciculata</i> (Partridge-pea)	-		25.13	3	.25	3	15.45	
<i>Desmodium</i> sp (Tick-trefoil)	-		-		-		.99	
<i>Galactia volubilis</i> (Downy- milkpea)	-		-		-		1.65	
<i>Lepedeza</i> sp.	-		.54	1	-		-	
<i>Lepedeza striata</i> (Japan clover)	-		-		-		T	
<i>Lepedeza stipulacea</i> (Korean lepedeza)	-		37.16	3	-		-	
<i>Lepedeza Sturdi</i> or <i>violacea</i>	-		-		T		1.22	
<i>Rhynchosia latifolia</i>	-		-		-		5.96	
<i>Strophostyles halvola</i> (Wild bean)	-		-		.05	1	-	
<i>Strophostyles leiosperma</i> (Wild-bean)	35.00	5	28.96	2	6.13	3	10.92	
ROSACEAE								
<i>Crataegus viridis</i> (Red-haw)	-		-		-		.17	
SAPOTACEAE								
<i>Bumelia</i> sp. (Chittim-wood)	-		-		4.00	2	-	
VITACEAE								
<i>Parthenocissus quinquefolia</i> (Virginia-creeper)	-		-		-		.05	
Unidentified berry	-		51.15	4	-		-	
Unidentified leaf matter	-		.54	2	1.00	6	1.99	
Misc. plant debris	-		-		1.00	3	5.62	
Unidentified seeds	-		-		-		.25	

TABLE IIb, CONT'D

ANIMAL MATTER						
ARTHROPODA						
INSECTA						
COLEOPTERA						
CHRYSOMELIDAE						
<i>Diabotrica vittata</i> (Striped cucumber beetle)	-		1.63	1	-	-
CURCULIONIDAE-(Snout beetles)	-		-		.10	1
ELATERIDAE-(Click beetles) grub	-		-	1	-	.07
Unidentified beetle parts	-		.54	1	-	.07
Unidentified beetle grubs	-		.54	1	-	.17
HEMIPTERA						
BELOSTOMATIDAE-(Plant water bugs) nymph	-		.54	1	-	-
LYGAIDAE-(Chinch-bugs)	-		-		-	.20
HYMENOPTERA-FORMICIDAE (Ants)	-		.54	1	-	-
HOMOPTERA						
APHIDIDAE-(Plant-lice)	-		-		-	T
MEMBRACIDAE-(Buffalo tree-hopper)	-		-		-	.07
REPTILIA						
SQUAMATA-IGUANIDAE						
Scalopus-(Fence lizard) tail	-		2.50	1	-	-
Unidentified animal matter	T	1	T	1	-	.67

Percentages of principal food items are as follows:

Unidentified berry	51.15
<i>Strophostyles leiosperma</i> (wild-bean)	35.00
<i>Cnidocolus texanus</i> , (bull nettle)	11.67
<i>Strophostyles helvola</i> , (wild-bean)	1.86

Series F. Though this group of three is small, it displays a wide variety of species for so few crops. Dominants are:

<i>Lespedeza stipulacea</i> , (Korean lespedeza)	37.16
<i>Strophostyles leiosperma</i> , (wild-bean)	28.96
<i>Chamaecrista fasciculata</i> , (partridge pea)	25.13
<i>Croton capitatus</i> , (doveweed)	3.82
CHRYSOMELIDAE- <i>Diabotrica vittata</i> , (striped cucumber beetle)	1.63

Series H. This group of only seven crops presents an extremely wide variety of species. It may have been noted by now that *Strophostyles leiosperma* has been found among the five most important items in almost every area. In fact, the only area in which it has not been found is the West Cross-Timbers; and its cousin, *S. helvola*, has been found here. Why it was not found in the A and C crops is not known. It has been seen growing abundantly beside *S. helvola* in the East Cross-Timbers just west of Dallas. While not the most abundant food item, it appears to be an important staple. Henicka (1947) found a "wild-bean" to be an

important quail food in the West Cross-Timbers in Denton and Jack counties, Texas.

The most important food items found in Series H are as follows:

<i>Quercus stellata</i> , (post-oak)	45.25
<i>Croton capitatus</i> , (doveweed)	23.68
<i>Quercus shumardii</i> , (red-oak)	13.52
<i>Strophostyles leiosperma</i> , (wild-bean)	6.13
<i>Bumelia sp.</i> , (chittimwood)	4.00

Series G. This group of twenty crops was received with the contents of the crops all mixed together. While it was taken from the same general region as Series H, the contents are noticeably different. In this group a great number of legumes are found. However, the most abundant species is *Croton capitatus*, a species found in most of the other groups. The publication cited of the Texas Game, Fish, and Oyster Commission (1945) considers this species the most valuable quail food in the state. The food dominants of this group are:

<i>Croton capitatus</i> , (doveweed)	48.96
<i>Chamaecrista fasciculata</i> , (partridge pea)	15.45
<i>Strophostyles leiosperma</i> , (wild-bean)	10.92
<i>Rhynchosia latafolia</i>	5.96
<i>Quercus sp.</i> , (fragments)	1.33

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