LITERATURE CITED

Crampton, E. W. and L. E. Harris. 1961. Applied animal nutrition. W. H. Freeman and Co., San Francisco. 753 p.

Fowler, J. F. 1967. Seasonal variation in food consumption and weight gain in male and female white-tailed deer. Unpubl. master's thesis, La. State Univ., Baton Rouge. 40 p.

Long, T. 1967. Quality of deer foods. Trans. Northeast. Deer Study Group. University Park, Pa. 3:107-113.

, R. L. Cowan, C. W. Wolfe, and R. W. Swift. 1961. Feeding the white-tailed deer fawn. J. Wildl. Manage. 25:94-95.

, R. L. Cowan, G. D. Strawn, R. S. Wetzel, and R. C. Miller. 1965. Seasonal fluctuations in feed consumption of the white-tailed deer. Pa. Agr. Exp. Sta. Progr. Rep. 262. 5 p.

Schrader, W. H. 1963. Deer and wild turkey at a bargain. Proc. Southeast. Assoc. Game and Fish Comm. 17:27-30.

Yoakum, J. 1971. Habitat improvement, p. 74-78. *In* R. D. Teague (ed.), A manual of wildlife conservation. The Wildl. Soc., Washington, D. C. 206 p.

SEASONAL FOOD-HABITS OF WHITE-TAILED DEER (*ODOCOILEUS VIRGINIANUS*) IN A TREATED EASTERN NORTH CAROLINA POCOSIN

by

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ABSTRACT

A study of food-habits of white-tailed deer on approximately 26,000 acres of industrial timberlands in eastern North Carolina was made in a managed pond pine pocosin. A rumen analysis was completed for each of 128 deer collected during the period October 1971 through July 1973. These samples were partitioned into groups: spring, summer, fall, and winter. Although most of the food utilized was leafy browse, definite seasonal trends were established. Fruit of shining sumac and pokeweed was utilized heavily in the fall. A shift to greenbrier and ericaceous plants in the winter was observed. Important spring food items included succulent stems and leafy material of red maple and blackberry. Red maple was also heavily utilized in the summer along with such species as pokeweed, grape, greenbriers, and swamp cyrilla. The importance of species associated with forest openings is documented.

INTRODUCTION

The management of any population of wild animals is indeed extremely difficult, and becomes even more complicated when it must be accomplished coincidentally with other resources of the land. Such is the case on many southern forests. Knowledge of the food-habits of a wild animal such as the white-tailed

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deer (*Ococoileus virginianus*) is perhaps one of the most important foundations of a management system. Korschgen (1969) observed that "Management food-habits studies provide practical and immediately useful information for management of a particular species..." The objective of this work then was to examine the food-habits of white-tailed deer on an area utilized in the past few years primarily for cellulose production. It is hoped that the results of this study will help in identifying those silvicultural practices which best complement wildlife management practices and thus facilitate fuller utilization of the land resources.

Rumen analysis was chosen to achieve these goals. It was felt that fistulation and range surveys did not meet the quantitative standards necessary to compare specific areas and silvicultural practices. While rumen analysis has certain disadvantages such as variable digestion rates of rumen materials and the sacrificing of study animals, it provides the most useable data for separating browse species according to degree of utilization. Dzieciolowski (1970:103) states, "The botanical method of rumen content analysis gives a reliable qualitative characteristic of food consumption, and provides data for a listing of species consumed. This is especially important in the case of tiny plants which are often overlooked in other techniques of sampling such as animal observation."

AREA DESCRIPTION

The study area is a typical coastal plains-pond pine pocosin as described by Wells (1932). It encompasses portions of Craven, Pamlico, and Beaufort Counties, North Carolina. The area extends over approximately 26,000 acres owned by Weyerhaeuser Company of which approximately 10,000 acres have been harvested, site prepared, and replanted with loblolly pine[1] during the past eight years. Site preparation was accomplished by mechanical removal of organic material (slash) with tractors equipped with combinations of KG blades, root rakes, discs, and bedding plows. There are several agricultural fields adjacent to the study area. The typical natural pocosin vegetation includes an overstory of pond and loblolly pines with an understory of cane, hollies, and ericaceous plants. The treated stands are composed primarily of loblolly and slash pines in the overstory and a varying array of understory plants. Until the pine canopy achieves dominance and closes, the understory includes pokeweed, hollies, red maple, sweetgum, sumac, greenbriers, and numerous annuals. Although the topography of the area is generally flat, hardwood drainages do exist. These drainages are often wet even in the dry months and such species as red maple, sweetgum, baldcypress, black tupelo, and various oaks make up the overstory species. Unless disturbed, these drainages have a closed canopy and produce very little browse for deer under natural conditions.

Annual temperatures range between 2° F and 106° F with an average January temperature of 46.6° F and an average July temperature of 80.2° F. There are on the average 230 frost free growing days with the mean annual first frost date occurring on November 20. The mean annual rainfall is 52" (N. C. Agri. Exp. Station 1971).

Soils on the study area are of three major series: Bladen, Coxville, and Portsmouth (Jurney *et al.* 1929). All three soils are characterized as being poorly to very poorly drained but under management will support certain agricultural crops and loblolly pine (Lee 1955).

METHODS

A total of 128 rumens were sampled during the period October 1971 through July 1973. These samples were partitioned into four groups: spring, summer,

[1]All plant species identified and mentioned in the text are presented in Appendix A.

fall, and winter. Each group is represented by 32 rumens over the two year period. The mean annual first frost date was used to distinguish between the fall and winter samples. Spring samples were collected during the third week of April while summer samples were collected during the third week of July in both years.

The analysis of the rumen samples was accomplished using a modification of the point sampling method as described by Chamrad and Box (1964). Chamrad and Box's method entails dropping pins at prescribed places over an imaginary grid from a sliding bar into a tray of prewashed sample material. When a piece of vegetative material is struck by a dropped pin, the material is identified and its volume is estimated. The major modification was the removal of all plant materials struck by a sampling point as opposed to "on the spot" identification and volume estimation. Other modifications included washing the samples over an eighth inch (⅛") mesh screen except for samples containing smaller seeds; they were washed over a 2.00 mm. mesh screen. After identification of the vegetative material was made, the relative frequency of occurrence and percent of total volume was determined for each plant species. The volumes of vegetative material were determined by water displacement.

RESULTS AND DISCUSSION

The relative frequency of occurrence and the percent of total volume for all identified food materials for the respective sampling periods are presented in Tables 1-8. Based on the frequency of occurrence and volumes observed, a number of plants emerged as heavily utilized food items. The fruit of shining sumac and pokeweed was heavily utilized in the fall. Although corn and soybeans are not associated with a forest, their role as an important source of energy in the fall and winter is acknowledged. Red maple and swamp cyrilla also appear to be staple constituents of the fall diet.

A shift occurs in the winter months to persistent deciduous species and evergreens. Even though several of the fall foods such as pokeweed and red maple are either unavailable to the deer in winter or not utilized, the fruit of shining sumac continues to be heavily utilized. The green leafy material of swamp cyrilla, yellow jessamine, greenbriers, and hollies comprises the bulk of the deer's late winter diet. Lanceleaf, laurel, saw, and cat greenbrier are among the greenbriers used. Of the hollies, large gallberry, little gallberry, and American holly are among those utilized.

As soon as buds open, another shift in food-habits occurs. Young succulent stems and green leafy material make up the bulk of the diet in spring. By far the most heavily utilized species is red maple followed closely by a number of the species of the genus *Rubus*. Mushrooms, grasses, and many tender leafy plants are also taken during this period.

Green leafy material is also heavily utilized through the summer months. Unlike the other three seasons, a substantial shift in browse species utilized was observed between the two summer samples. Red maple and mushrooms were most heavily utilized in 1972 followed by red chokeberry and the greenbriers. The 1973 summer sample showed a heavy utilization of pokeweed and grape that did not occur in the summer of 1972. Other species utilized in the summer of 1973 were comparable to those of 1972. The successional dynamics of the plant populations on lands under silvicultural treatments is a possible explanation for the summer differences. While the percent occurrences of pokeweed and grape are relatively low, their high percent volumes cannot be ignored.

Seasonal trends shown by selected browse species are presented in Figures 1-12. A constant decline in utilization from spring through winter is exhibited by red maple, blackberry, and grasses. This is understandable considering the rapid

decline in nutrient content and succulence of these plants. In contrast an increase in utilization from spring to summer in chokeberry, greenbriers, and pokeweed was observed. This is probably due to the fact that these latter plants remain relatively succulent even in the hot summer months. An increase in utilization from spring through winter is observed in pokeweed fruit, sumac fruit, greenbrier, and hollies; this is probably because of their time of development and persistent nature.

The importance of openings in maintaining sufficient browse resources for deer is very apparent. Nearly all of the heavily utilized browse species are intolerant of one or more effects of a closed canopy. The primary benefit of the forest opening is the large increase in diversity of species which it creates. Following the harvesting of a stand, grasses, mushrooms, and coppice growth become established within a short period of time. Red maple is a good example of a species that is well adapted to coppice regeneration (USDA Forest Service 1965). Within a year, pioneer successional plants such as pokeweed and sumac flourish. Lay (1964) in a Texas study documented the importance of diversity of species and Patton and McGinnes (1964) documented the increase in diversity of species associated with silvicultural practices. The seasonal differences in browse species utilized in this area have been noted above; indications such as high abomasum parasite counts (Kellogg 1973) suggest that an even greater source of energy is needed to fulfill these seasonal needs if current population densities are to be maintained. Smith *et al.* (1956) reinforced this premise through a nutritional study done on the Holly Shelter gamelands in eastern North Carolina. The habitat type on the Holly Shelter area is very similar to the natural habitat on the study area. The important difference being that at the time of Smith's work the Holly Shelter area was in a natural climax stage and supported a poor deer browse resource. The reason for the poor browse resource was twofold. First of all the vegetation contained insufficient amounts of crude protein, phosphorus, and boron for body maintenance of an adult deer. The second problem was an insufficient seasonal diversity of species. Both of the problems could have been improved by silvicultural manipulation of the area. Disturbance of the natural stands would have initiated new growth of native species that was more succulent and more nutritious. By opening the natural climax canopy, shade intolerant species would arise and thus increase the diversity of species. The benefits of silvicultural manipulation to deer in this habitat type is evident on the Craven County study area.

CONCLUSIONS

There are several observations which the authors feel must necessarily be noted as a result of this study and comparisons with the food-habits literature. The contribution of forest clearcutting to the deer browse resource and to the herd itself is phenomenal. Several factors strengthen this point. This study demonstrated that even in the pocosin where a great many plant species are green year around, there is still a substantial seasonal difference in white-tailed deer food-habits. Clearcutting supplies an area with a great diversity of species in the deer's browse zone. As was noted above in the Holly Shelter study, the undisturbed or natural pocosin with few available species resulted in low quality browse. Clearcutting serves to eliminate the problem. In agreement with the findings of Harlow and Hooper (1971), green leafy material was utilized to a greater extent than stems. One of the characteristics of clearcuts is the large biomass of leafy shoots and annual plants produced following site preparation.

The second observation deals with the applicability of food-habits work in general. The information supplied by this study is applicable only in pocosin

areas of which there are millions of acres in the Southern coastal plain. The findings of food-habits studies that cross major plant community boundaries are likely to be irreparably confounded, and hence inapplicable in specific land management situations.

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Table 1. Fall Analysis 1971.

Common Name	% Occurrence	% Volume*	% Volume**	Plant Parts Eaten***
shining sumac	52.63	37.04	45.81	fruit, seed
pokeweed	10.53	19.77	24.45	fruit
white oak	5.26	10.05	12.44	fruit
soybean	36.84	9.92	----	fruit
corn	36.84	9.24	----	fruit
red maple	36.84	2.76	3.42	leaf, stem
swamp cyrilla	47.37	2.57	3.18	leaf, stem
misc. hollies	26.31	1.30	1.60	leaf, stem, fruit
mushrooms	15.79	0.70	0.87	entire plant
grape	10.53	0.65	0.80	leaf, fruit
blackberry, raspberry, etc.	15.79	0.30	0.40	leaf
grasses	15.79	0.30	0.40	leaf, blade
hawthorn	15.79	0.30	0.40	leaf
yellow jessamine	42.11	0.27	0.33	leaf, vine
redbay	10.53	0.25	0.31	fruit, leaf
misc. greenbriers	21.05	0.29	0.35	leaf
japanese honeysuckle	10.53	0.11	0.14	leaf
bracket fungi	5.26	0.11	0.14	entire plant
red chokeberry	10.53	0.08	0.09	leaf, stem
leucothoe	5.26	0.08	0.09	leaf
laurel oak	10.53	0.08	0.09	leaf
laurel greenbrier	10.53	0.08	0.09	leaf, fruit
waxmyrtle	15.79	0.04	0.05	leaf
misc. oaks	10.53	0.04	0.05	leaf
cocklebur	5.26	0.04	0.05	fruit
clover	5.26	tr	tr	leaf
unknows	---	3.61	4.47	----

*% volume with agricultural crops included
**% volume with agricultural crops not included
***plant parts listed in order of preference
tr trace

Table 2. Winter Analysis 1971.

Common Name	% Occurrence	% Volume*	% Volume**	Plant Parts Eaten***
corn	38.46	47.38	----	fruit
shining sumac	23.08	15.18	34.42	fruit, seed
soybean	30.77	8.51	----	fruit
swamp cyrilla	38.46	5.63	12.76	leaf, stem
yellow jessamine	46.15	5.26	11.93	leaf, vine
misc. greenbriers	69.23	4.84	10.98	leaf
misc. hollies	76.92	2.67	6.08	leaf, stem, fruit
laurel greenbrier	15.38	2.09	4.75	leaf
misc. oaks	23.08	1.51	3.41	leaf
mushrooms	15.38	1.05	2.37	entire plant
japanese honeysuckle	30.77	0.92	2.08	leaf
red maple	15.38	0.65	1.48	leaf
blackberry, raspberry, etc.	23.08	0.39	0.89	leaf
laurel oak	7.69	0.26	0.59	leaf
waxmyrtle	38.46	0.20	0.45	leaf
leucothoe	7.69	0.13	0.30	leaf
redbay	7.69	0.13	0.30	fruit
white oak	7.69	0.13	0.30	leaf
grasses	7.69	0.07	0.15	leaf blade
sweetbay	7.69	tr	tr	leaf
bracket fungi	7.69	tr	tr	entire plant
unknowns	----	2.98	6.77	----

*% volume with agricultural crops included
**% volume with agricultural crops not included
***plant parts listed in order of preference
tr trace

Table 3. Spring Analysis 1972.

Common Names	% Occurrence	% Volume*	% Volume**	Plant Parts Eaten***
red maple	75.00	22.53	25.39	leaf, stem, bud
blackberry, raspberry, etc.	62.50	15.83	17.84	leaf, stem
red chokeberry	31.25	11.87	13.38	leaf, stem
corn	6.25	11.26	----	fruit
mushrooms	12.50	8.83	9.95	entire plant
black cherry	12.50	7.00	7.89	leaf
grasses	68.75	3.65	4.12	leaf blade
misc. hollies	37.50	2.12	2.40	leaf, stem
laurel greenbrier	25.00	1.52	1.72	leaf
yellow jessamine	12.50	1.22	1.37	leaf, vine
angle-stemmed fetterbush	6.25	1.22	1.37	leaf
misc. greenbriers	18.75	1.22	1.37	leaf
sedge	6.25	1.22	1.37	leaf
swamp cyrilla	37.50	0.61	0.67	leaf
misc. oaks	6.25	0.30	0.34	leaf
soybean	6.25	tr	----	leaf
lespedeza	6.25	tr	tr	leaf, stem
waxmyrtle	6.25	tr	tr	leaf
shining sumac	6.25	tr	tr	fruit, seed
unknowns	----	9.59	10.82	----

*% volume with agricultural crops included
**% volume with agricultural crops not included
***plant parts listed in order of preference
tr trace

Table 4. Summer Analysis 1972.

Common Names	% Occurrence	% Volume	Plant Parts Eaten*
red maple	68.75	27.34	leaf, stem
mushrooms	18.75	14.24	entire plant
misc. greenbriers	56.25	13.09	leaf
laurel greenbrier	43.75	8.92	leaf
red chokeberry	56.25	8.06	leaf
swamp cyrilla	68.75	5.32	leaf
grasses	75.00	5.32	leaf blade
hawthorn	25.00	2.88	leaf
blackberry, raspberry, etc.	25.00	1.29	leaf
cane	6.25	1.15	leaf
lespedeza	6.25	1.15	leaf, stem
grape	6.25	0.86	leaf
misc. hollies	25.00	0.57	leaf
yellow jessamine	25.00	0.58	leaf, vine
selaginella	18.75	0.14	leaf
leucothoe	6.25	0.14	leaf
unknowns	----	8.49	----

*plant parts listed in order of preference

Table 5. Fall Analysis 1972.

Common Name	% Occurrence	% Volume*	% Volume**	Plant Parts Eaten***
soybean	50.00	38.34	----	fruit
shining sumac	37.50	24.47	46.38	fruit, seed
pokeweed	12.50	9.38	17.79	fruit
corn	25.00	8.90	----	fruit, seed
swamp cyrilla	68.75	4.06	7.70	leaf, stem
yellow poplar	12.50	3.64	6.90	dead leaf
red maple	37.50	2.18	4.14	leaf, stem
eastern redbud	12.50	0.97	1.84	dead leaf
yellow jessamine	6.25	0.81	1.53	leaf, vine
misc. hollies	43.75	0.72	1.38	leaf, stem, fruit
laurel greenbrier	37.50	0.69	1.30	leaf
grape	12.50	0.65	1.23	leaf
misc. greenbrier	31.25	0.51	0.97	leaf
hawthorn	18.75	0.28	0.54	leaf
sweetbay	12.50	0.24	0.46	leaf
redbay	12.50	0.20	0.38	fruit
blackberry, raspberry, etc.	12.50	0.16	0.31	leaf
misc. oaks	12.50	0.12	0.23	leaf
red chokeberry	18.75	0.10	0.18	leaf
mushrooms	12.50	0.08	0.15	entire plant
leucothoe	6.25	0.04	0.08	leaf
black cherry	6.25	0.04	0.08	leaf
grasses	6.25	0.04	0.08	leaf blade
bracket fungi	6.25	0.04	0.08	entire plant
clover	6.25	tr	tr	leaf
unknowns	----	3.32	6.29	----

*% volume with agricultural crops included
**% volume with agricultural crops not included
***plant parts listed in order of preference
tr trace

Table 6. Winter Analysis 1972.

Common Name	% Occurrence	% Volume*	% Volume**	Plant Parts Eaten***
soybean	43.75	23.21	----	fruit
mushrooms	25.00	17.57	27.15	entire plant
corn	25.00	12.09	----	fruit, seed
misc. hollies	93.75	8.44	13.06	leaf, stem, fruit
shining sumac	18.75	8.33	12.88	fruit, seed
laurel greenbrier	56.25	6.75	10.43	leaf
yellow jessamine	56.25	6.45	9.98	leaf, vine
swamp cyrilla	56.25	5.31	8.21	leaf, stem
pokeweed	6.25	2.61	4.04	fruit
misc. greenbrier	50.00	2.86	4.42	leaf
sweetbay	37.50	2.25	3.49	leaf
red chokeberry	12.50	0.57	0.88	leaf
red maple	12.50	0.44	0.68	leaf
blackberry, raspberry, etc.	18.75	0.41	0.63	leaf
waxmyrtle	6.25	0.33	0.51	leaf
grape	18.75	0.33	0.51	leaf
yellow poplar	6.25	0.28	0.43	dead leaf
bayberry	12.50	0.28	0.43	leaf
pine	6.25	tr	tr	terminal shoot
misc. oak	6.25	tr	tr	leaf
grass	6.25	tr	tr	leaf blade
bracket fungi	6.25	tr	tr	entire plant
unknowns	----	1.47	2.27	----

*% volume with agricultural crops included
**% volume with agricultural crops not included
***plant parts listed in order of preference
tr trace

Table 7. Spring Analysis 1973.

Common Name	% Occurrence	% Volume	Plant Parts Eaten*
red maple	81.25	37.03	leaf, stem, seed
blackberry, raspberry, etc.	75.00	24.41	leaf, stem, flower
red chokeberry	37.50	7.65	leaf, stem
sweetgum	25.00	6.83	leaf, bud
lespedeza	18.75	4.55	leaf, stem
grasses	50.00	2.90	leaf blade
misc. hollies	25.00	2.69	leaf, stem
sweet pepperbush	18.75	1.65	leaf
black cherry	12.50	1.65	leaf
japanese honeysuckle	12.50	1.20	leaf
sweetbay	6.25	0.83	leaf
swamp cyrilla	12.50	0.41	leaf
laurel greenbrier	12.50	0.41	leaf
yellow jessamine	6.25	0.41	leaf, vine
cane	6.25	0.41	leaf
waxmyrtle	6.25	0.41	leaf
misc. oak	6.25	tr	leaf
misc. greenbrier	6.25	tr	leaf
misc. grape	6.25	tr	leaf
mushroom	6.25	tr	entire plant
unknowns	----	6.49	----

*plant parts listed in order of preference

Table 8. Summer Analysis 1973.

Common Name	% Occurrence	% Volume*	% Volume**	Plant Parts Eaten***
pokeweed	18.75	18.74	19.88	leaf, fruit
misc. greenbriers	87.50	10.13	10.75	leaf
grape	18.75	9.75	10.34	leaf
red chokeberry	43.75	7.27	7.71	leaf
red maple	81.25	7.07	7.51	leaf, stem
blueberry	25.00	5.93	6.29	leaf, fruit
soybean	18.75	5.74	----	leaf, fruit
blackberry, raspberry, etc.	25.00	5.54	5.88	fruit, leaf
laurel breenbrier	31.25	5.16	5.48	leaf
grasses	50.00	3.04	3.25	leaf blade
misc. asters	18.75	2.87	3.04	flower
selaginella	6.25	1.91	2.03	stem, leaf
hawthorn	31.25	1.34	1.42	leaf
swamp cyrilla	25.00	1.34	1.42	leaf
redbay	6.25	1.15	1.22	leaf
misc. oak	6.25	0.76	0.81	fruit
lespedeza	6.25	0.57	0.61	fruit
misc. holly	6.25	0.38	0.41	leaf
unknowns	----	11.28	11.97	----

*% volume with agricultural crops included
**% volume with agricultural crops not included
***plant parts listed in order or preference

SEASONAL VARIATION OF SELECTED BROWSE SPECIES BASED ON 2 YEARS OF DATA

FIG. 1 - RED MAPLE

FIG. 2 - RUBUS SPP

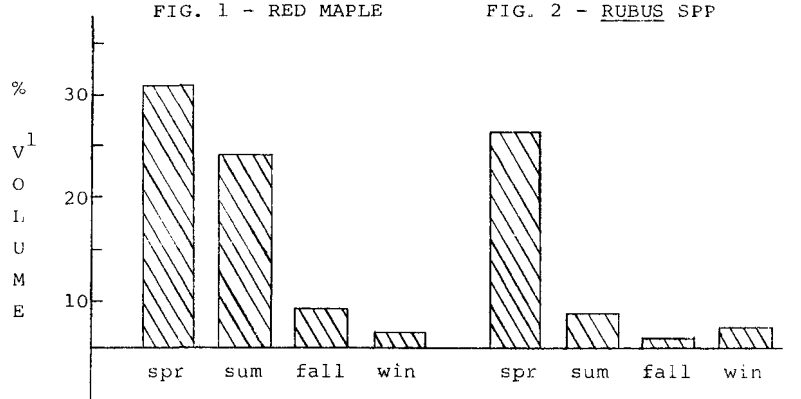
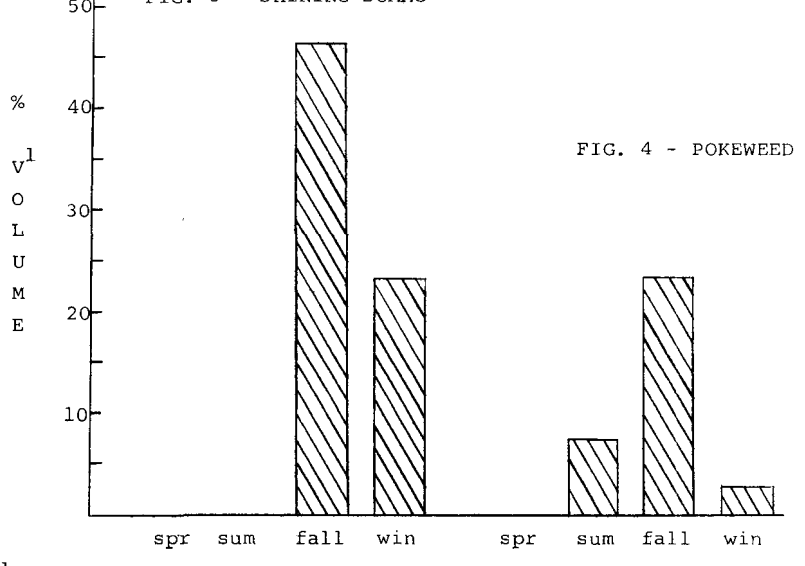
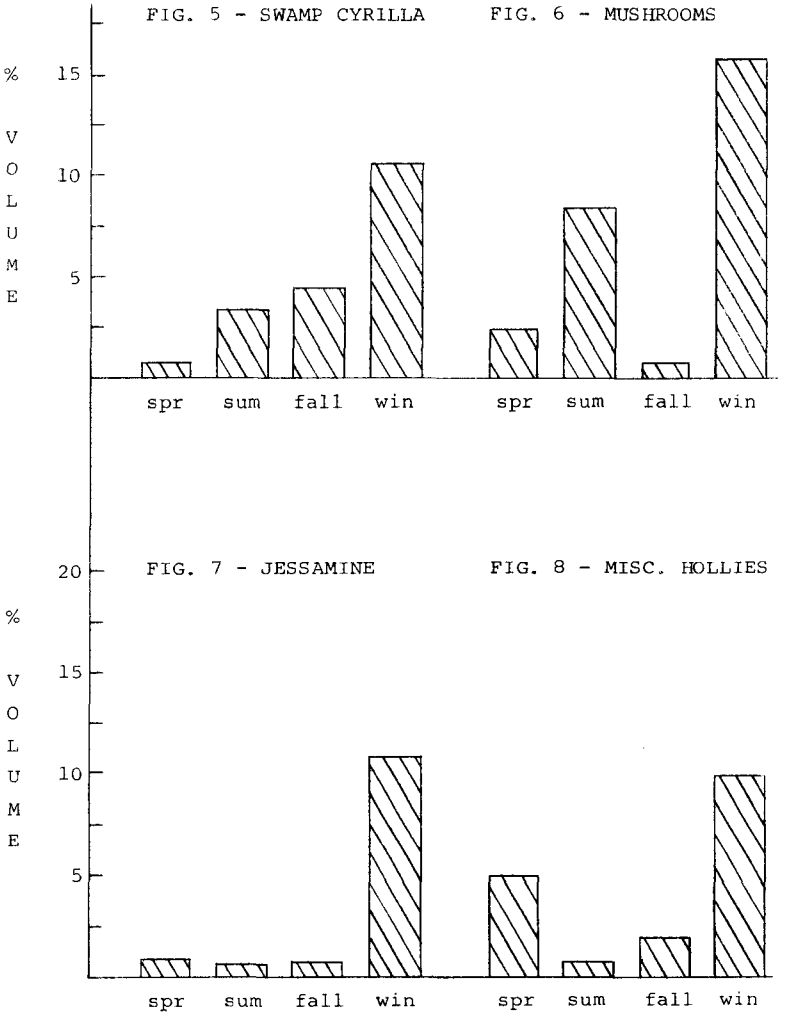


FIG. 3 - SHINING SUMAC

FIG. 4 - POKEWEED



[1] agricultural crops excluded



[1]agricultural crops excluded.

FIG. 9 - RED CHOKEBERRY FIG. 10 - LAUREL GREENBRIER

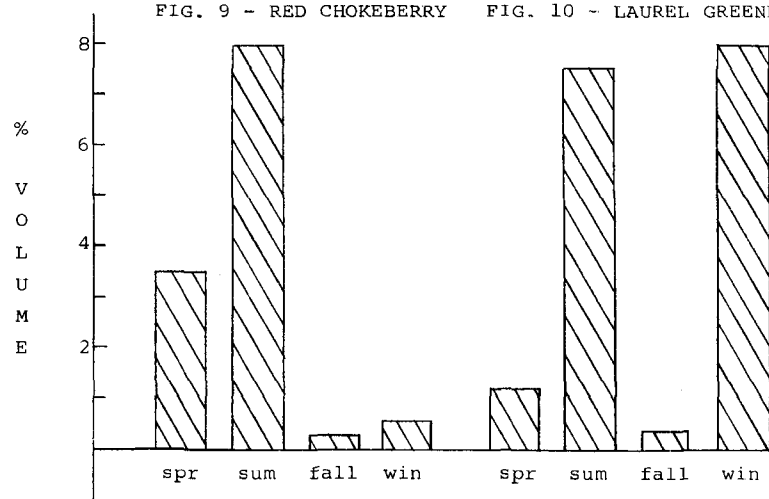
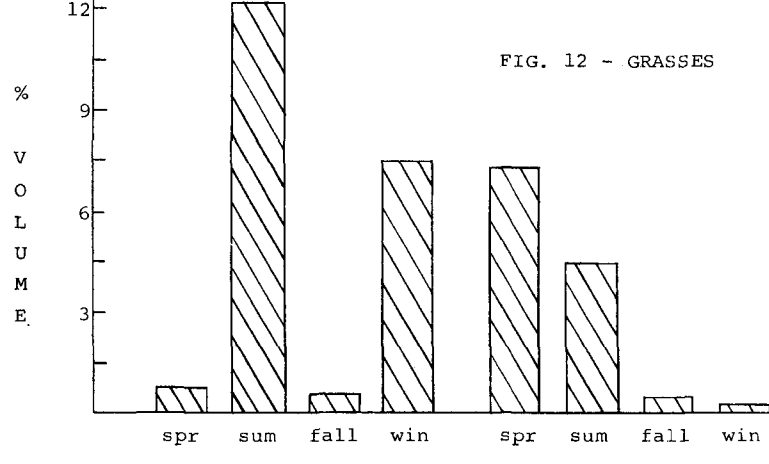


FIG. 11 - MISC. GREENBRIERS

FIG. 12 - GRASSES



[1]agricultural crops excluded

LITERATURE CITED

Chamrad, Albert D. and Thadis W. Box. 1964. A point frame for sampling rumen contents. J. Wildl. Mgmt. 28(3):473-477.

Dzieciolowski, R. 1970. Foods of the red deer as determined by rumen content analysis. Acta Theriolegica 15(6):89-110.

Harlow, Richard F. and Robert G. Hooper. 1971. Forages eaten by deer in the southeast. Proc. 25th Ann. Conf. Southeastern Assoc. of Game and Fish Commissioners. p. 18-46.

Jurney, R. C., W. A. Davis, and J. J. Morgan. 1929. Soil Survey of Craven County, North Carolina. U.S.D.A., Bureau of Chemistry and Soils bulletin no. 23.

Kellogg, Forest. 1973. Personal communication to A. J. Weber. Southeastern Cooperative Wildlife Disease Project, Athens, Georgia.

Kotschgen, Leroy J. 1969. Procedures for food-habits analysis. Wildlife management techniques, third ed., The Wildlife Society, Washington, D. C. p. 233-250.

Lay, Daniel W. 1964. The importance of variety to southern deer. Proc. 18th Ann. Conf. Southeastern Assoc. of Game and Fish Commissioners. p. 57-62.

Lee, William D. 1955. The soils of North Carolina; their formation, identification, and use. North Carolina Agr. Exp. Station Tech. Bulletin no. 115.

North Carolina Agricultural Experiment Station. 1971. Weather and climate in North Carolina. North Carolina State Univ., Raleigh, N. C. bulletin no. 396.

Patton, David R. and Burd S. McGinnes. 1964. Deer browse relative to age and intensity of timber harvest. J. Wildl. Mgmt. 28(3):458-463.

Smith, Frank H., Kenneth C. Beeson, and Walter E. Price. 1956. Chemical composition of herbage browsed by deer in two wildlife management areas. J. Wildl. Mgmt. 20(4):359-367.

U.S.D.A., Forest Service. 1965. Silvics of forest trees of the United States. Agr. Handbook no. 271.

Wells, B. W. 1932. The natural gardens of North Carolina. The Univ. of North Carolina Press, Chapel Hill, N. C. p. 47-78.

APPENDIX A

The common and scientific names of plants mentioned and listed in the text.

common name	*scientific name*
red maple	*Acer rubrum* L.
cane	*Arundinaria* sp.
aster family	Asteraceae
eastern redbud	*Cercis canadensis* L.
sweet pepperbush	*Clethra alnifolia* L.
hawthorn	*Crataequs* spp.
sedge family	Cyperaceae
swamp cyrilla	*Cyrilla recemiflora* L.
yellow jessamine	*Gelsemium sempervirens* (L.) Ait. f.
soybean	*Glycine max* (L.) Mer.
large gallberry	*Ilex coriacea* (Pursh) Chapm.
little gallberry	*Ilex glabra* (L.) Gray
American holly	*Ilex opaca* Ait.
lespedeza	*Lespedeza* sp.

common name	*scientific name*
leucothoe	*Leucothoe axillaris* (Lam.) D. Don
sweetgum	*Liquidambar styraciflua* L.
yellow poplar	*Liriodendron tulipifera* L.
Japanese honeysuckle	*Lonicera japonica* Thunb.
angle-stemmed fetterbush	*Lyonia lucida* (Lam.) K. Koch
sweetbay	*Magnolia virginiana* L.
wax myrtle	*Myrica cerifera* L.
bayberry	*Myrica pensylvanica* Loisel.
*water tupelo	*Nyssa aquatica* L.
*black tupelo	*Nyssa sylvatica* Marshall
redbay	*Persea borbonia* (L.) Spreng.
pokeweed	*Phytolacca americana* L.
*slash pine	*Pinus elliottii* Engelm.
*pond pine	*Pinus serotina* Michx.
loblolly pine	*Pinus taeda* L.
grass family	Poaceae
black cherry	*Prunus serotina* Ehrh.
white oak	*Quercus alba* L.
laurel oak	*Quercus laurifolia* Michx.
shining sumac	*Rhus copallina* L.
blackberry	*Rubus* spp.
meadow spikemoss	*Selaginella apoda* (L.) Spring
saw greenbrier	*Smilax bona-nox* L.
cat greenbrier	*Smilax glauca* Walt.
laurel greenbrier	*Smilax alurifolia* L.
lanceleaf greenbrier	*Smilax smallii* Morong.
red chokeberry	*Sorbus arbutifolia* (L.) Heyn.
*baldcypress	*Taxodium distichum* (L.) Richard
clover	*Trifolium* sp.
blueberry	*Vaccinium* spp.
grape	*Vitis* spp.
cocklebur	*Xanthium* sp.
corn	*Zea mays* L.

*mentioned in text but not identified as a browse species.

AUTHORITY

Radford, Albert E., Harry E. Ahles, and C. Ritchie Bell. 1968. *Manual of the Vascular Flora of the Carolinas.* University of North Carolina Press, Chapel Hill.