A QUANTITATIVE STUDY OF THE VEGETATION SURROUNDING THE *TAENIDIA INTEGERRIMA* (APIACEAE) POPULATION AT FORT POLK IN WEST CENTRAL LOUISIANA

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ABSTRACT

The vegetation surrounding a yellow pimpernel (*Taenidia integerrima*) population on Fort Polk in Vernon Parish in west central Louisiana is reported. This species is rare in Louisiana (S2) and very little habitat data are available for the species throughout its range. The number of species found in the samples totaled forty-seven with eight woody vine species, twenty-two herbaceous species, and seventeen tree or shrub species. The most common associated herbaceous species was *Chasmanthium sessiliflorum*, the most common associated woody vines species was *Toxicodendron radicans,* and the most common associated tree and shrub species was *Hamamelis virginiana*.

RESUMEN

Se estudió la vegetación que rodea una población de pimpinela amarilla (*Taenidia integerrima*) en Fort Polk en Vernon Parish en el centro oeste de Louisiana. Esta especie es rara en Louisiana (S2) y hay muy pocos datos disponibles del hábitat de la especie en todo su rango. El número de especies encontradas totalizó cuarenta y siete con ocho especies trepadoras leñosas, veintidós herbáceas, y diez y siete árboles o arbustos. La especie herbácea asociada más común fue *Chasmanthium sessiliflorum*, la más común de las lianas leñosas fue *Toxicodendron radicans,* y la especie arbórea y arbustiva más común fue *Hamamelis virginiana*.

INTRODUCTION

Yellow pimpernel, *Taenidia integerrima* (L.) Drude, is an herbaceous perennial member of the Apiaceae that ranges throughout the eastern United States (USDA NRCS 2011). Although globally secure and reported from 32 states, it is found sparingly throughout most of them (NatureServe 2011). However, in the West Gulf Coastal Plain on the western edge of its range, it is rare (S2) being reported in Louisiana from five parishes Bienville, Caldwell, Natchitoches, Vernon and Winn (Louisiana Natural Heritage Program 2011). It is reported from Harrison, Red River, Sabine, and San Augustine Counties in east Texas (Turner et al. 2003) but only from San Augustine County in the USDA database (USDA NRCS 2011).

Taenidia integerrima is usually found on the edges of wooded areas, especially where wooded slopes occur and its habitat includes rocky bluffs along river and creek valleys, relatively dry, open rocky woods where little shrub or herbaceous vegetation occur, and rocky bluffs where the forest canopy is broken (Guthrie 1968). According to NatureServe (2011) it is found in mesic calcareous forests and Britton and Brown (1943) report it from rocky or sandy soils. In Louisiana, Larke and Smith (2003) report the habitat as open hardwood-dominated calcareous forests, often on lower slopes or near small intermittent creeks.

Our study population is located in Vernon Parish in west central Louisiana on the sloped banks of a ravine which feeds into Bird's Creek. The soil at the site is Eastwood silt loam (Soil Survey Division 2003).

METHODS

A 25 × 5m macro plot was positioned over the *Taenidia integerrima* population. The sampled area was divided into 50 (5 × 0.5m) plots and ten plots for sampling were randomly selected using a random number generator. Each plot was systematically examined and all species were identified and the number of plants was determined and recorded. For the herbaceous plants, woody vines, and shrubs/saplings, cover was determined by measuring and adding up the total length-width area (stem and leaves) occupied by the individuals of each

species in the sample. For trees that were as tall as or taller than 1.9m, the DBH was measured at the standard 1.37m height using a diameter tape and recorded to the nearest 0.1 cm.

All data were entered into Microsoft Excel for storage and calculations of variables. The percent cover was calculated by dividing the area occupied by each species by the plot area (2.5m²), and multiplying by 100. The mean diversity (richness), density (number of plants per plot), and percent cover plus the standard deviation were calculated for the ten plots for each plant group (herbaceous plants, woody vines, shrubs/saplings, and all plants). The mean dbh and standard deviation for the shrubs/trees were calculated for the ten plots. The frequency, mean density, mean cover percent and mean DBH were calculated for each species in all ten plots. The relative values for each of these variables (frequency, mean density, mean DBH, and mean cover percent) were calculated by dividing the value for the species by the total for all species in the plant group. Each value was multiplied by 100 to convert it to percent and the sums of the relative values were used to determine the importance value with a total of 300 for woody vines and herbaceous and 400 for the tree/shrubs.

RESULTS

The number of species totaled forty-seven with eight woody vines, twenty-two herbaceous plants, and seventeen tree, shrub or saplings (Table 1). The mean number of species per plot ranged from 4.40 for woody vines to 9.70 for herbaceous plants. The mean number of plants per plot (density) was 74.20 for all plants and ranged from 8.70 for trees and shrubs to 44.40 for herbaceous plants. The mean cover percent for all plants was 95.67 and ranged from 18.93 percent for woody vines to 55.86 percent for herbaceous plants. The mean dbh per sample was 15.10 cm.

The tree and shrub species are listed in Table 2, the woody vines are listed in Table 3 and the herbaceous species are listed in Table 4. The species are arranged in descending importance value in all of the tables. The three most important tree and shrub species are *Hamamelis virginiana* (69.17), *Tilia americana* (59.02), and *Viburnum dentatum*) (25.94) (Table 2). The most important woody vine species was *Toxicodendron radicans* (76.83), while *Parthenocissus quinquefolia* (75.33) and *Smilax smallii* (39.57) ranked second and third respectively (Table 3). The dominant herbaceous species was *Chasmanthium sessiliflorum* with an importance value of 74.84 followed by *Taenidia integerrima* (42.46) and *Desmodium glutinosum* (39.70) (Table 4).

DISCUSSION

Our community data are similar to the larger nested yellow lady slipper plots on Fort Polk (Allen et al. 2004). They reported seventy-eight total species with nine woody vines, twenty-one herbaceous species, and forty-five tree, shrub or saplings. Their mean number of species per sample ranged from 9.00 for woody vines to 23.80 for shrubs and saplings. The mean number of stems per sample (density) averaged 651.40 per sample for all plants and ranged from 77.00 for trees and shrubs to 216.80 for shrubs and saplings. The mean cover percent for all plants was 240.74 percent and ranged from 8.68 percent for woody vines to 159.86 percent for herbaceous plants. The mean dbh per sample was 877.98 cm.

The Fort Polk/Vernon Parish population is associated with the herbaceous species, *Chasmanthium sessiliflorum* and *Desmodium glutinosum*. The woody vines, *Toxicodendron radicans* and *Parthenocissus quinquifolia* were also found associated with *Taenidia integerrima* at this location. We also found the two most common associated tree and shrub species were *Hamamelis virginiana* and *Tilia americana*. The vegetation surrounding the *Taenidia integerrima* population is similar to nearby lady slipper populations (Megyeri & Allen 2011 and Allen et al. 2004). These authors also found *Hamamelis virginiana* as one of the top three shrubs/saplings and *Tilia americana* as one of the top three trees. For the herbaceous plants, *Chasmanthium sessiliflorum* was associated as one of the top three species along with *Toxicodendron radicans* and *Smilax smalii* as two out of the top three species in woody vines.

Our data are the first quantitative report on the vegetation surrounding *Taenidia integerrima*. The vegetation around the other populations of *Taenidia integerrima* throughout its range should be sampled for comparison with our data so as to get a better idea of the variation, if any, of its habitat.

TABLE 1. Communnity variables for ten sample plots around the *Taenidia integerrima* population on Fort Polk in West Central Louisiana.

	Diversity (Richness)			
	All Plants	**Herbaceous Plants**	**Trees/ Shrubs**	**Woody Vines**
Mean	17.70	9.70	4.70	4.40
Std Dev.	4.30	2.31	1.83	1.26
Range	12–21	5–13	2–8	2–7
Total Number	47	22	17	8
	Density (Number of plants per plot)			
	All Plants	Herbaceous Plants	Trees/ Shrubs	Woody Vines
Mean	74.20	44.40	8.70	21.10
Std Dev.	21.33	10.96	3.65	13.00
Range	50–114	26–60	5–12	7–46
	Cover Percent			DBH(cm)
	All Plants	Herbaceous Plants	Shrubs/ Saplings	Woody Vines	Trees/ Shrubs
Mean	95.67	55.86	22.88	18.93	15.10
Std Dev.	29.33	11.54	20.65	4.56	20.65
Range	53.17–166.59	41.49–75.94	6.69–71.23	4.39–41.50	26–37

TABLE 2. Variables for Tree/Shrub species in ten sample plots around the *Taenidia integerrima* population on Fort Polk in West Central Louisiana.

Species	**Mean Frequency**	**Mean Density**	**Mean Cover**	**Importance DBH**	**Value**
Hamamelis virginiana	90.00	2.20	5.16	0.00	69.17
Tilia americana	30.00	0.50	2.32	5.40	59.02
Viburnum dentatum	50.00	1.90	5.05	0.00	56.69
Liquidambar styraciflua	20.00	0.20	0.00	7.10	53.57
Acer rubrum	50.00	0.70	2.43	1.75	41.90
Quercus alba	50.00	0.90	1.31	0.00	27.24
Fraxinus americana	40.00	0.50	0.99	0.00	18.99
Styrax grandifolius	10.00	0.30	2.29	0.00	16.54
Ostrya virginiana	30.00	0.30	0.27	0.00	11.11
Cornus florida	10.00	0.10	0.00	0.85	8.91
Vaccinium virgatum	10.00	0.20	0.57	0.00	7.14
Pinus taeda	20.00	0.20	0.04	0.00	6.72
Prunus serotina	20.00	0.20	0.02	0.00	6.63
Ulmus alata	10.00	0.20	0.20	0.00	5.40
Carya ovata	10.00	0.10	0.16	0.00	4.04
Crataegus marshallii	10.00	0.10	0.06	0.00	3.55
Sassafras albidum	10.00	0.10	0.02	0.00	3.37
Total	470.00	8.70	20.88	15.10	400.00

TABLE 3. Variables for Woody Vine species in ten sample plots around the *Taenidia integerrima* population on Fort Polk in West Central Louisiana.

Species	Frequency	Mean Density	Mean Cover	Importance Value
Toxicodendron radicans	90.00	6.10	5.20	76.83
Parthenocissus quinquefolia	60.00	7.00	5.40	75.33
Smilax smallii	70.00	1.90	2.77	39.57
Bignonia capreolata	40.00	3.30	1.84	34.47
Smilax tamnoides	50.00	0.90	1.73	24.78
Smilax glauca	60.00	1.00	0.67	21.90
Vitis spp.	40.00	0.50	0.49	14.03
Smilax rotundifolium	30.00	0.40	0.83	13.10
Total	440.00	21.10	18.93	300.00

TABLE 4. Variables for Herbaceous species in ten sample plots around the Taenidia integerrima population on Fort Polk in West Central Louisiana.

Species	Frequency	Mean Density	Mean Cover	Importance Value
Chasmanthium sessiliflorum	100.00	7.10	27.12	74.84
Taenidia integerrima	80.00	10.70	5.65	42.46
Desmodium glutinosum	90.00	7.60	7.43	39.70
Dichanthelium boscii	100.00	4.30	3.18	25.70
Scleria oligantha	60.00	1.50	2.52	14.08
Elephantopus carolinianus	50.00	1.90	2.40	13.73
Phaseolus polystachios	70.00	1.40	0.75	11.71
Desmodium laevigatum	30.00	2.10	2.04	11.47
Solidago caesia	40.00	2.10	0.94	10.54
Symphyotrichum drummondii	50.00	1.00	0.41	8.13
Dichanthelium comutatum	50.00	0.90	0.50	8.08
Viola walterii	40.00	0.70	0.19	6.04
Mitchella repens	30.00	0.70	0.42	5.42
Scutellaria elliptica	40.00	0.50	0.08	5.40
Polystichum acrostichoides	20.00	0.20	1.42	5.05
Ruellia caroliniensis	30.00	0.60	0.19	4.78
Verbesina virginica	20.00	0.20	0.32	3.09
Symphyotrichum lateriflorum	20.00	0.30	0.15	3.00
Lilium michauxii	20.00	0.20	0.12	2.72
Sanicula canadensis	10.00	0.20	0.02	1.52
Euphorbia corollata	10.00	0.10	0.01	1.27
Salvia lyrata	10.00	0.10	0.01	1.27
Total	970.00	44.40	55.86	300.00

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