

Survey of Angiosperm Parasites on Vegetation of Modibbo Adama University of Technology, Girei Local Government Area of Adamawa State, Nigeria

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Abstract- A survey of angiosperm parasites on vegetation of Modibbo Adama University of Technology Yola using quadrant method measuring 100m x 100m for 20 quadrant. A total number of (14) different types of host plants species were identified these include, Eucalyptus, Mangifera indica, Acacia seyel, Vittelaria paradoxa, Anacardium, Azadiracta indica, Pakia bigblobosa, Lycopersicum esculantum, ficus thoningi, Citrus sinensis, Helianthus annuus, vitex doniana, Afzelia Africana. The result shows that plants without parasites (angiosperm) are the dominant over those with parasites. Six (6) different parasitic plants were also identified these are Loranthus, Mistletoes, Cuscuta, Oranbonche, striga, Cassytha. Mistletoes was found with the highest distribution attacking about five (5) different host species (Eucalyptus, Acacia seyel, pakia bigblobosa, Adansonia digitata, Afzelia Africana) making it the most dominant parasitic plant in the study area.

Index Terms- Angiosperm. Quadrant method, Host Plants, Parasites

I. INTRODUCTION

According to most recent tallies, there are 4100 species of Angiosperm that are parasites on other plant species (Nickrent and musselman 2004). In the angiosperm group, parasitism has evolved independently on a number of occasions, possibly upto 11 times (Barkman et al. 2007), although it could be argued that this species is mycoheterotrophic as a true haustorium is not formed (Kopke et al. 1981). parasitic angiosperm can be found throughout the world in most major ecosystems, from subarctic tundra, heartland and savanna woodlands to deserts and temperate and tropical forests. Some species are widespread agricultural pest; some are listed as rare and endangered while other species can enhance biological diversity (Norton and carpenter 1998, press and phoenix 2005).

Two broad types of parasitic angiosperm are distributed globally those that parasitize stems (aerial parasites, 40% of species) and those that parasitize roots (root parasites, 60% of species), (Musselman and Press 1995). One exception is the genus Tripodanthus of which at least one species attached to both stems and roots of host (Amico et al. 2007, Mathiasen et al., 2008). parasitic plants can be further distinguished according to

whether they are xylem or phloem feeders (Raven 1983, Irving and Cameron 2009). Host plants of parasitic angiosperms are extraordinarily diverse and encompass much of the plant kingdom ranging from herbaceous annuals and perennials to trees and shrubs some parasitic plants can parasitize many different species (e.g 450 species in the case of vacuum album), while others are extremely host specific. (Barney et al. 1998). A few parasitic partnerships have evolved so comprehensively that parasitic angiosperms can even parasitize other parasitic angiosperms epiparasitism and hyperparasitism, (Mathiasen et al. 2008). The role of parasitic angiosperms beyond that of immediate effects on host plants has been investigated most thoroughly in the past decade but mostly for herbaceous rather than woody hosts. (Press et al. 1999). Fungi, nematodes, bacteria and viruses are probably the first thing that comes to mind when thinking of plant parasites. These organisms certainly do cause damage to plants of economic importance. However, Parasites flowering plants are also important pathogens that cause damage to plants species (Daniel L. Nickrent and Lytton J. Musselman). Despite their huge importance and damage no detailed documentation of work has been carried on them. Although research have been conducted on the angiosperm parasites in other places but little or no work has been carried out on the angiosperm parasite species in Modibbo Adamawa University of Technology Yola campus.

This work will provide an overview of the type of parasites, identify the type of host that are been infected by a parasites and to determine the incidence of the angiosperm parasites. In order to achieve the stated objectives the study also has the following questions to provide answers. What is the type of angiosperm parasites found in the area? What is the percentage of plant species (host) with or without parasite?

II. MATERIAL AND METHODS

2.1 The Study Area:

The study was conducted at the Modibbo Adama University of Technology Yola campus. The area is situated in Girei in Local Government area of Adamawa state on latitude 09.14N and longitude 12.8N. The area has a landmass of about 50ha. (500.000m). it lies in the savanna region characterized by two distinct seasons (wet and dry) of varying durations. The

vegetation of the study area is characterized by few scattered trees dominating the herbaceous layer and the study was conducted on the undeveloped land mass only.

2.2 Sampling Method

Sampling via quadrant method was used as described by Slingsbly and Cook (1986). Quadrant was demarcated with pegs measuring 100m x 100m using a measuring tape. A total of 20 quadrants samples were randomized for data collection. Name of plant species and number of occurrences of species in each quadrant was recorded. Plant species were identified through leaves, stem, flowers and fruits which were then compared with the characteristic description of the plant species in text using vegetation of Nigeria, keay (1989) and shashina (1989). This also aided in the identification of the plants samples collected.

2.3 Data Computation:

For the computation of the data, the following formulae were used.

$$\text{Mean Area per tree (MA)} = \frac{\text{Plot Area} \times 100}{\text{Number of Vegetation}}$$

In the quadrant method, distances were not measured; the mean area was obtained by dividing the plot area by “sum numbers of trees in all plots.

$$\text{Absolute Frequency (AF)} = \frac{\text{Number with points species}}{\text{Total number of species}} \times 100$$

$$\text{Relative Frequency (RF)} = \frac{\text{Number with points species}}{\text{Total number of species}} \times 100$$

Relative frequency is the same or referred to as frequency percentage and it provides more useful information than the one derived on absolute basis.

III. RESULTS

3.1 Incidence of angiosperm parasites on vegetation.

The result on incidence of angiosperm parasites on vegetation of Modibbo Adama University of Technology Yola campus, fourteen(14) different plant species were identified and six (6) different parasitic plants(angiosperms) were identified from the twenty (20) sample quadrants (Table 1).The mean area per tree (MA) is 33.67m² and the mean distance (D) is 5.80m. This shows a sparse pattern of vegetation of distribution of the plant species see (Table2).The most frequently dominated parasitic plant and the highest distribution are mistletoes and cuscuta(Table3)

The most common angiosperm parasites are mistletoes 28.5% and cuscuta 23.42% (Table 4).Host plants with parasites, vittelaria paradoxa have the highest distribution with absolute frequency and relative frequency of 70 and 23.56% respectively. This followed by Azadiracta indica with 60 and 20.20% (Table 5).Host plants without parasites, Azadiracta indica have the highest distribution with absolute frequency and relative frequency of 175 and 58.92% respectively. This followed by Eucalyptus with 125 and 42.08% (Table 6).

TABLE 1: Host plants with parasitic angiosperms found in Mautech April 2015

Name of Plant species	Local Name	Name of parasitic plants
Vittelaria paradoxa	Shear butter	Loranthus
Eucalyptus	Zaiti	Mistletoes
Mangifera indica	Mongo	Loranthus
Acacia seyal	Shitim wood	Mistletoes
Anacardium	Cashew	Cuscuta
Azadiracta indica	Neem tree	Cuscuta
Pakia biglobosa	African locust	Mistletoes
Adansonia digitata	Baobad	Cuscuta
Lycopersicum esculantum	Tomato	Orabanche
Ficus thoningi	Blume	Loranthus
Citrus sinensis	Orange	Cuscuta
Helianthus annuus	sunflower	Striga
Vitex doniana	Black plum	Cassytha
Azalia africana	African Oak	Mistletoes

The mean area per tree (MA) is 33.67m² and the mean distance (D) is 5.80m. This shows a sparse pattern of distribution of the plant species.

Table: 2 mean Area per Tree/Mean Distance (plot area 10,000m²)

Parameter	Value
Mean area per tree (MA)	33.67m ²
Mean distance (D)	5.80M

Table: 3 Distributions of Angiosperm parasites in Mautech

Parasites/ Host species	Loranthus	Mistletoes	Cuscuta	Oranbonche	Striga	Cassytha
Vittelaria paradoxa	#	*	*	*	*	#
Eucalyptus	*	#	*	*	*	*
Mangifera indica	#	*	*	*	*	*
Acacia seyal	*	#	*	*	*	*
Anacardium	*	*	#	*	*	*
Azadiracta indica	*	*	#	*	*	*
Pakia biglobosa	*	#	#	*	*	*
Adansonia digitata	*	#	#	*	*	*
Lycopersicum esc	*	*	*	*	#	*
Ficus thoningi	#	*	*	*	*	*
Citrus sinensis	*	*	#	*	*	*
Helianthus annuus	*	*	*	*	#	*
Vite doniana	*	*	*	*	*	#
Afzelia Africana	*	#	*	*	*	*

Key:#: = present. *: = Absent.

Table 4 Percentage of Angiosperm parasites in Mautech

Name of parasites	Percentage
Loranthus	21.42
Mistletoes	35.71
Cuscuta	28.57
Oranbonche	7.14
Striga	7.14
Cassytha	14.28
Total	100

Table 5 Absolute and Relative frequency of plant species with parasites

Name of species	Absolute frequency	Relative frequency
Vittelaria paradoxa	70	23.56
Eucalyptus	25	8.41
Mangifera indica	50	16.83
Acacia seyal	15	5.05

Anacardium	40	13.46	
Azadiracta indica	60	20.20	
Pakia biglobosa	15	5.05	
Adansonia digitata	20	6.73	
Lycopersicum esculantum	35	11.78	
Ficus thoningi	25	8.41	
Citrus sinensis	30	10.10	
Helianthus annuus	40	13.46	
Vitex doniana	10	3.36	
Afzelia Africana	45	15.15	
Total		435	146.40

Table: 6 Absolute and Relative frequency of plant species without parasites

Name of species	Absolute frequency	Relative frequency
Vittelaria paradoxa	65	21.88
Eucalyptus	125	42.08
Mangifera indica	35	11.78
Acacia seyal	45	15.15
Anacardium	75	25.25
Azadiracta indica	175	58.92
Pakia biglobosa	40	13.46
Adansonia digitata	55	18.51
Lycopersicum esculantum	50	16.83
Ficus thoningi	10	3.36
Citrus sinensis	110	37.03
Helianthus annuus	30	10.10
Vitex doniana	20	6.73
Afzelia Africana	75	25.25
Total	835	281.08

IV. DISCUSSION

From the survey on the incidence of angiosperm parasites on vegetation in the study area, 14 different host species were identified, and *Vittelaria paradoxa* was found to be the dominant 23.56 percent with two different parasitic plants (*Loranthus* and *cassytha*) despite the fact that it is being used as fodder, followed by *Azadiracta indica* 20.20 percent with parasitic plant (*cuscuta*) found on it.

Azadiracta indica 58.92 percent was found to be the dominant plant species without parasites, followed by *Eucalyptus* 42.08 percent. This shows that plant without parasites (angiosperm) are the dominant over those with parasites. The mean area per tree (MA) is 33.67m² and the mean distance (D) is 5.80m. This shows a sparse pattern of distribution of the plant species in the study area.

Mistletoes 35.71 percent was found with the highest distribution attacking about five (5) different host species (*Eucalyptus*, *Accacia seyal*, *pakia biglobosa*, *Adansonia digitata*, *Afzelia Africana*) making it the most dominant parasitic plant in the study area. This shows that Mistletoes have a broad host range. Mistletoes function as keystone resources in many ecosystems, and they are important ecological component that positively affect diversity of habitats (Watson 2001). Followed by *cuscuta* 28.57 percent attacking four (4) different host plants (*Anacardium*, *Azadiracta indica*, *Citrus sinensis*, *Adansonia digitata*). *Loranthus* is another parasitic plant found attacking three(3) various host species, *striga* was found attacking two(2) different host species despite the fact that this is

predominantly found during raining season, *orabonche* and *cassytha* both attacking different single host species.

The vegetation of the research field can be describe as “tree and shrubs this observation conjured with the finding of (kowal and kassan 1988) as a typical disturbed Sudan savanna region. The flora has profoundly modified by cultivation as evidenced by the presence of *parkia biglobosa* and *Adansonia digitata* which are associated with cultivation (Arnborg 1991).

V. CONCLUSION

It is evident that host plants of parasitic angiosperm are extraordinarily diverse and encompass much of the plant kingdom ranging from herbaceous annual and perennial to shrubs and trees. There are large number of parasitic angiosperms in the research field many parasitize woody plants, trees and shrubs can have plant parasites on both their stems and roots. These parasites rarely kill their host, but under most circumstances the host both woody and herbaceous species suffer reduced growth and reproductive performances. The relationship between host plant and parasitic plants vary widely. The general distribution of parasitic angiosperm is tightly linked with that of their host and dispersal agents.

In view of the above, effective protection and conservation strategy is to be put in place this will not only enhance host plant species but also guide against desertification and prevention of complete loss of the woody plants or plants generally present in the study area.

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