INSECT PESTS ASSOCIATED WITH FLUTED PUMPKIN (*Telfaria occidentalis* Hook F.) IN ASABA AREA OF DELTA STATE, NIGERIA

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Abstract

Highly developed crop production depends upon acquisition of information on the magnitude of crop damages and losses, and ways of dealing with them effectively and expeditiously. Field trials were conducted in 2008/2009 at three locations in Asaba to identify insect pests associated with fluted pumpkin (Telfaria occidentalis). A total of 22 species of insects categorized into four orders and ten families were encountered throughout the study periods. Species from three families were rated as major insects and three as minor. Damages ranged from tattered and notched holes on leaves, copious sucking of sap from tender leaves and vines, and defoliation of leaves. Distribution of insects across the locations indicated occurrence of 34.3%, 31.8% and 34% at Mile 5, Anwai and Musa Camp respectively. The baseline pumpkin generated could be harnessed to develop control strategies for the local insect pests.

Key words: *Fluted pumpkin, insect pest, vegetable, hexapoda, damage*

Introduction

Vegetable production is a major farming activity in tropical Africa both in rural communities and urban areas. It provides income for small-holder farmers especially young school leavers (Youdeowei, 2004). It supplies essential micro-nutrient in most human nutrition which acts as preventive agents to many ailments in humans. Food security may no doubt be improved through concerted efforts to increase vegetable production. It offers employment opportunities also to the populace especially women folks who form a substantial proportion (Okon *et al*, 2009; Sabo and Dia, 2009). The attention in Sub-Saharan African population on vegetable production as vital dietary components is very essential as leafy and fruit vegetables have long been known to be indispensable ingredients in traditional sauces that follow carbohydrate staples (Francisca and Eyzaguire, 2006). According to Central Bank report, vegetable production in Nigeria constitutes about 4.64% of the total staple food production between 1970 and 2003 (CBN, 2003).

Pumpkin (*Telfaria occidentalis*) is a popular vegetable in Nigeria, Cameroon, Benin Republic, Sierra Leone, Angola, Uganda, Asia, America (Akoroda, 1990, Adetunji, 1997, Odiaka, 2001; Latham 2002; Schippers, 2002). The leaves are high in protein, calcium and vitamins A, B, and C while the seeds contain a high proportion of fat, protein, calcium and iron (FAO, 1998, Badifu, 1993). The main area of production is the Eastern part of Nigeria especially Anambra, Imo and Enugu States and parts of Calabar, Edo and Delta.

The crop is known to enhance breast milk production by lactating women. Extracts from the leaves is recommended for anemic and covalescing patients (Akoroda, 1990; Longe *et al.*, 1983).

Despite the importance and increasing relevance of vegetables to man in traditional agriculture in Nigeria, the production and quality have been greatly affected by some factors such as insect pests, disease infection and weed (Biazzo and Mabiunas, 2000) and other constraints such as high perishability of produce (Tindal, 1983). There is dearth of information on the insect pests associated with the production of *Telfaria occidentalis* in the study area. The study is therefore aimed at identifying the insect pests associated with this important vegetable and their distribution in the study area.

Materials and Methods

The study was carried out in Delta State between 2008 and 2009 cropping seasons at Musa camp, Anwai and Mile 5. The distance between Anwai and the study area at Musa camp is about one kilometer and about 1.3km between Anwai and Mile5 experimental field all located within the Delta State University campus, Asaba. The study areas were located at latitude 06° 14`N and Longitude 06° 49`N with hot humid climate. Raining season lasts between April and October with mean annual rainfall of 1,500 – 2,000mm with peak in June/September, mean temperature of 37.3°C, relative humidity 77%, monthly soil temperature at 100cm depth, 28.3°C while the monthly sunshine stands at 4.8 bars (Federal Ministry of Aviation, Asaba Inspectorate Office Bulletin, 2009).

Land Preparation and Planting

Five years fallowed fields dominated by *Chromolaena odorata*, *Ageratum* sp., *Tridax* spp and *Heterophylla* sp were chosen for the experiments. Fields at the three locations were cleared, pulverized and demarcated into plots and seed beds measuring 4 x 4m ($16m^2$), using simple farm tools; cutlass, spade, pegs, hand trowel, hoe and measuring tape while the experimental area measuring 20m x 12m was chosen per location consisting of 15 plots laid out in completely randomized design.

The fruits of *T. occidentalis* used were purchased from local market. The pods were split open with knife and the seeds were carefully extracted, dried under shade for three days to cure. These were later planted on the prepared plots at a seed/hole with spacing of 1m x 1m with total of 16 stands/bed and 240 stands per experimental location. Other agronomic practices were carried out as at when due. It should be noted however that no form of insecticide was applied and no record of pesticide application in the area before the experiment.

Data collection and analysis

Data collection commenced three weeks after sowing. Insect collections counting and observation were made twice a week on Mondays and Fridays by 8:30 – 10am, and 6 – 7:30 pm respectively. Data were not subjected to any statistical analysis rather the results were discussed using simple percentages.

Occurrence and Species Distribution of insects foraging on *Telfaria occidentalis*

The sampling procedure aimed at insect pests foraging on the vines and leaves were used during the plant growth. Field observations on occurrence of insect pests were made from all

the planted plots between 7:00 hours and 18:00 hours (local time). All cropped stands were selected from each plot and all insects encountered on each stand were collected. Beneath each plant stand was a spread of clothe (100 x 100 cm) meant for specimen collection. The inactive and relatively small insects were collect with aspirator on the vines while foliage (leaves) insects were sampled using short and long handle sweep nets (diameter 35 cm by 45cm deep). The long handle nets were used to sweep the middle and upper crow of each stand while the short handle net was used for the lower crown. Ten complete sweeps were taken on the foliage around each stand. Developmental stages sampled were brought back to the laboratory and reared to adult in appropriate food media such as soft stem vines and leaves of *T. occidentalis*.

Thereafter, the stands were jarred vigorously for sixty seconds (one minute) carefully to collect other vegetative insects which otherwise might have escaped collection by sweeping. All collections were kept temporarily in ethyl alcohol and examined under microscope in the laboratory. Some eggs, larvaes and adults were also brought to the laboratory in separate vial to check for parasitization; while collected species were sorted out and identified by comparison with paratypes at the department of Agronomy Delta State University Asaba Campus. Others were taking to the insect reference collection center, Department of Crop Protection and Environmental Biology, University of Ibadan and International Institute for Tropical Agriculture (IITA) Ibadan, Nigeria.

Results and Discussion

A complex of insect species with different feeding habits was found foraging on the vegetative parts of pumpkin leaf, *Telfaria occidentalis* (Table 1). A total of twenty-two (22) different species of insects were collected across the three locations where the study was conducted; and categorized into four orders and ten families (Table 2), while Table 3 indicated the nature of damage done to the plant by the insects and their pest status. Out of the twenty-two species collected, some species of Isoptera, Hymenoptera, Coleoptera and Hemiptera could not be identified, and these constituted 107, 2and 11 21_unidentified Same species of the different four orders across the three locations of Mile 5, Anwai and Musa Camp respectively. Coleoptera had the highest insect order (4) followed by Hymenoptera and Orthoptera with 2 orders each while the least was Hemiptera (1) across the three locations (Table 1).

Table 1: Population distribution of insect species associated with *T. occidentalis* in the three study areas.

	Locations			
Insect species	**Mile 5**	**Anwai**	**Musa camp**	**Total**
Copa occidentalis	3140	2959	3223	9322
Cheilomenes sulphurea	19	11	6	36
Diabrotica undecimpunctata	1389	129	115	383
Concephalus concephalus	3	2	5	10
Ichneumonid wasp	-	-	1	1
Mylabris pustulaata	-	1	1	2
Aulacophora Africana	646	591	599	1836
Atractomorpha acutipennis	4	-	3	7
Nezara viridula	3	4	5	12
Bagrada spp	1	-	4	5
Zonocerus variegates	52	47	42	141
Unidentified isopteran	58	30	19	107
Braconid wasp	-	-	2	2
Unidentified wasp	1	1	-	2
Unidentified weevil	-	-	1	1
Unidentified bug	4	2	5	11
Nabis americoferus	2	-	2	4
Diploxys fallax	4	-	4	8
Indozocladius asperulus	-	-	1	1
Coryna spp	1	-	1	2
Apion clavipes	138	126	114	378
Acalymma vittata	8	16	17	41
	4223	3919	4170	12312

Coleoptera as an order of insect has been reported as the largest order in the class Hexapoda or Insecta in the entire animal kingdom with about one-quarter (1/4) of all named insects (Emosairue, 2007). The major economic part of *Telfaria* is the leaf and these are the major target of the insect pests which feed voraciously and copiously on the fresh succulent and tender leaves thereby reducing the market value, photosynthetic capacity and predisposition to other secondary infections. According to Youdeowei and Service (1995), the nature and severity of damage to crop plants determines to large extent the categorization of such insect into major minor, occasion or ordinary insect. Omoleye *et al.,* (2001) classified some insect species as specialist feeders (those whose feeding is exclusively on a particular host plants) and the generalists describing the insect species which can feed on any host plants.

Generally, a total of twelve thousand three hundred and twelve (12,312) insect species were encountered (including identified and unidentified) in the three study areas with 4,223, 3,919 and 4,170 at Mile 5, Anwai and Musa Camp respectively. The predators encountered belonged to Coleoptera while the parasitoids were found in the Hymenoptera Table 2.

Table 2: Insect pests associated with *T. occidentalis* in Asaba

Order/Family	Species	Damaging stage	Nature of damage(s)
Coleoptera / Chrysomelidae	*Copa occidentalis*	Adults and larvae	Eat notched holes on leaves
	Aulacophora Africana	Adults and larvae	Leaf defoliator
	Diabrotica undecimpunctata	Adults and larvae	Adults eats tattered holes on leaves while larvae eats root and bore stems
	Acalymma vittata (Fab.)	Adults	Destroy stems and emerging leaves
Coleoptera / Apionidae	*Apion clavipes*	Adults	Clear small holes in leaves and eats flowers
Coleoptera / Coccinelidae	*Cheilomenes sulphurea* (Oliv.)	Predator	(Prey on a number of insects)
Coleoptera / Curculionidae	*Indozocladius asperulus*	Adults	Bore holes on pods. (It is a weevil)
Coleoptera / Meloidae	*Mylabris pustulata* (Thunberg.)	Adults	Adults feed on flowers (petals and anthers)
	Coryna spp.	Adults	Adults feed on pollen and developing flowers
Hymenoptera / Braconidae	*Braconid wasp*	Predator	Parasitoid
Hymenoptera / Ichneumonidae	*Ichneumonidae*	Predator	Parasitoid
Orthoptera / Acrididae	*Zonocerus variegatus*	Adults and nymph	Defoliate leaves
	Atractomorpha acutipennis	Adults and nymph	Leaf defoliator
Orthoptera / Tettigoniidae	*Concephalus concephalus*	Adults and nymph	Leaf defoliator
Hemiptera / Pentatomidae	*Nezara viridula*	Adults and nymph	They suck sap from stem and leaves
	Diploxys fallax	Adults and nymph	They suck sap from stem and leaves
	Bagrada spp.	Adults and nymph	Both adults and nymphs feed on foliage of the crop

The nature of damage and damaging stages are presented in Table 2. The occurrence and status of insect species encountered (Table 3) indicated ten families and 18 species with 34.3%, 31.8% and 34% grouped into major and minor pests at mile 5, Anwai and Musa Camp respectively. The major insect pests encountered in the three locations were found in the family Chrysomelidae, Apiomidae and Acrididae while the most abundant species were *Copa occidentalis, Aulacophora Africana, Diabrotica undecimpunctata, Acalymma vittala* all

chrysomelidae while *Apion claripes* and *Zonocerus variegatus* belongs to *Apiomdae* and *Acrididae* respectively.

Most damages were done by the adults and larvae/nymphs. This ranged from tattered and notched holes on leaves especially by the Coleoptera while Orthoptera defoliate the leaves considerably thereby reducing the photosynthetic capacity of the plant, quanlities and market values. Some Coleoptera such as *Indozocladus asperulus* adults bore holes into the pods while *Mylabris pustulata* and *Coryna* spp feed on flowers (petals and anthers), pollens and developing flowers. The Hemipteran adults and nymphs were found sucking sap from the stems, leaves and the tender vines causing distortion, shrinking, shriveling and curling of the leaves.

The occurrence and status of the insect pests encountered in the study area is presented in Table 3. The family chrysomelidae with *Copa occidentalis, Aulacophora Africana* and *Diabrotica undecimpuntata* were major insect pests across the three locations while *Acalyma vittata* was in Nile and Anwai only. Other major insect pests found were *Apion claripes*, *Zonocerus varieagutus* the rest were either minor and not well distributed in the locations. Generally, 34.3%, 31.8% and 34% was the occurrence percentage of this insects in Mile 5, Anwai and Musa camp respectively.

Table 3: Occurrence and status of the insect species recorded on the study area

Family	**Genus/species**	**Mile 5**	**Anwai**	**Musa camp**
Chrysomelidae	*Copa occidentalis* *Aulacophora Africana* *Diabrotica undecimpunctata* *Acalymma vittata* (Fab.)	+++ +++ +++ +++	+++ +++ +++ +++	+++ +++ +++
Apioidae	*Apion clavipes*	+++	+++	+++
Coccinelidae	*Cheilomenes sulphurea* (Oliv.)	+	+	+
Curculionidae	*Indozocladius asperulus*	-	-	+
Meloidae	*Mylabris pustulata* (Thunberg) *Coryna* spp/.	- +	+ -	+ +
Braconidae	*Braconid wasp*	-	-	+
Ichneumonidae	*Ichneumonidae*	-	-	+
Acrididae	*Zonocerus variegates* *Attractomorpha acutipennis*	+++ ++	+++ ++	+++ ++
Tettigoniidae	*Concephalus concephalus*	++	++	++
Pentatomidae	*Nezara viridula* *Bagrada spp.* *Diploxys fallax* *Nabis americoferus*	++ + + +	++ - - -	++ + + +

Keys: **+++ = Major pest present**

++ = Minor pest present = absent

Conclusion

The study gives a baseline information on the insect pests of fluted pumpkin in Asaba as it is about the first research work on insect pests of fluted pumpkin in this area. The study identified copa occidentalis Aulacophora afircana, Diabrotical undecipunctata, Acalymma Vittata, Apion Clavispie all Coleoplera and Zonocersus Variesgatus belonging to Orthoptera order as the key insect pests decimating fluted pumpkin in these areas. Further studies on afortable cost effective and environmentally friendly control strategies on this insect pest is recommended. Meanwhile, the use of botanicals or low amount of selective pesticides which allows population of natural enemies such as ants, mantids and ladybird beetles as well as parasites to enhance /natural pest control is advocated. The information generated could be harnessed to develop proper management strategies for controlling these local insect pests in the area.

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