GTI symposium

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Global Taxonomy Initiative

ESTABLISHING THE TAXONOMIC IDENTITY OF SWEET POTATO WEEVIL *CYLAS* SPECIES-COMPLEX IN SIX REGIONS IN GHANA

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INTRODUCTION

- Sweet potato, (*Ipomoea batatas*), is one of the most important root crops in the world,

- particularly in sub-Saharan Africa where its cultivation area covers around 3 million hectares (Low and van Jaarwels, 2008).

- The commodity is highly productive with a low demand of inputs and labor.

INTRODUCTION Cont'd

- Insect pests have been recognized by farmers to be the most important constraints to sweet potato production (Ebregt et al., 2005).

- The most serious and commonly reported insect pest species in Uganda (Abidin, 2004), Kenya (Nderitu et al., 2009),

- Nigeria (Tewe et al., 2003) and Ghana (Appia-Danquah and Osei, 2013),

- are the African sweet potato weevils, *Cylas brunneus* F. and *C. puncticollis* Boheman (Coleoptera: Brentidae).

JUSTIFICATION

- Confident taxonomic separation into species has always come with its attendant problems.

- While certain species names may be predominant in some geographical regions, *C. puncticollis* and *C. brunneus* are confined to Africa (Wolfe, 1991).

- They often occur simultaneously and might both emerge from one infested storage root.

- It is speculated that, more than these two species occur in Ghana (Wolfe, 1991).

JUSTIFICATION Cont'd

- The questions that arise and most frequently asked are:
  - How many species exist in Ghana?
  - Are all the species found in all regions?
  - If not, which species are found in regions?

- However the liberal trade links between regions and continents do allow the free flow of materials across such frontiers with the possibility of different species finding their way in regions far removed from their origins.

JUSTIFICATION Cont'd

- As at now, most identification services have placed intercepted species as those found in the regions.

- Thus, it is clear that resolving the status of the two currently recognized *Cylas* species is important directly from the trade point of view,

- and also will confirm the species that are present or otherwise,

- It will add up to the numbers of conserved species.

JUSTIFICATION Cont'd

- It is in the regard that the establishment of the proper identification of these sweet potato weevils needs to be ascertained,

- so as to aid in targeting the right management strategies at the identified species.

SPECIFIC OBJECTIVES

- ✓ Identify the species that were found in the six regions,

- ✓ Examine the genetic diversity of sweet potato weevil populations from different locations.

MATERIALS AND METHODS

- **Study area**

Sweet potatoes are mainly grown in the interior and coastal savanna zones, and in other parts of the country, all on a small scale.

The survey was conducted in six (6) regions in Ghana such as Volta, Central, Upper East, Eastern, Upper East and Northern regions since they are the leading sweet potato production zones (Bidzakin et al., 2014).

MATERIALS AND METHODS Cont'd

- **Sampling procedure and collection of *Cylas* spp.**

✓In each of the six regions, three localities were randomly selected for trapping and collection of infested tubers by *Cylas* spp.

Figure 1: Field collection

The infested were introduced into envelopes and labeled as follows:

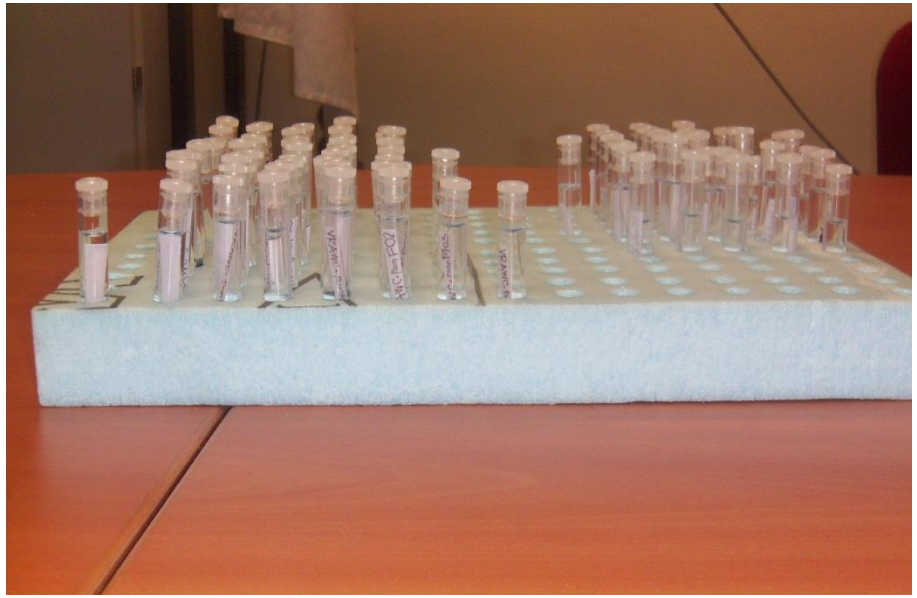
- ✓ date of collection,
- ✓ name of the locality and the region,
- ✓ and geographic coordinates of the locations.

a)

b)

Figure 2: (a) and (b) Incubation of infested tubers

a)



b)

Figure 3: (a) and (b)Collection of adults from infested potatoes

✓ Sorting of *Cylas* spp. specimens

Table 1: Distribution and sample size of each species of *Cylas* spp.

Species	N	Distribution	Males/Females
C. formicarius	270	Central Region, Volta Region, Eastern Region and Greater Accra	140/130
C. puncticollis	194	Central Region, Volta Region, Eastern Region, Upper East and Greater Accra	99/95

MATERIALS AND METHODS Cont'd

✓ **Specimens preparation for morphometric analysis**

464 specimens from Volta, Central, Eastern, Greater Accra and Upper East Regions were sorted out.

5 females and 5 males per locality were measured. In all, 184 specimens were measured.

14 characters from all parts of the body of male and female specimens were measured using an occular micrometer attached to a binocular microscope.

Figure 5: Binocular microscope

Table 2: List of characters used in this study

Character	Description
TLB	Total length of body
LE	Length of elytra
WE	Width of elytra
WEA	Width of elytra at apex
WEB	Width of elytra at base
LH	Length of head
WH	Width of head
WF	Width of frons
LR	Length of rostrum
WRAI	Width of rostrum at antennal insertion
LP	Length of pronotum
WP	Width of pronotum
WPB	Width of pronotum at base
WPA	Width of pronotum of apex

DATA ANALYSIS

- Principal component analysis (PCA) was performed, using RStudio software and SAS package.

RESULTS

✓ Two species were identified: *Cylas puncticollis* and *Cylas formicarius*

a) b)

Figure 6: (a) *Cylas formicarius* female (b) *Cylas formicarius* male

RESULTS

c)

d)

Figure 7: c) *Cylas puncticollis female*; d) *Cylas puncticollis* male

RESULTS

RESULTS

- Characters that contribute to differentiate between the two species are:

Total length of body, Length of elytra, Width of elytra, Width of head, Length of rostrum.

- Also statistical analysis revealed significant difference of characters between sex of *C. formicarius* ($p < 0.0001$) and *C. puncticollis* ($p < 0.0001$).

- but no significant difference was revealed between specimens per region (P = 0.51 and P = 0.08 for *C. formicarius* and *C. punticollis*, respectively).

PERSPECTIVES

- Subsequent measurments of specimens need to be done to increase the realability of our results,

- Examine the genetic diversity of species from different locations to check their relatedness,

- Description of sepcies found using holotype.

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