



CASSIA TORA SEED AS AN ALTERNATE HOST FOR *CALLOSOBRUCHUS SUBINNOTATUS* (COLEOPTERA: BRUCHIDAE) IN STORED BAMBARANUT

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ABSTRACT

The study was aimed to determine the possibility of *C. subinnotatus* as an alternate pest attacking *cassia tora* seed. An infested *C. tora* seed were collected from Soro market in Ganjuwa LGA in Bauchi state. A fresh *C. tora* seed were sorted and transferred into an earthen clay pot. Thereafter, weevils were transferred into the earthen clay pot. After two weeks, dead and live parent stocks were completely sieved out to await the adult emergence. A fresh uninfected Bambara ground nut seeds were fumigated for 48 hours spread on a clean polythene mat covered with baft cloth to remove any residual effect of the fumigant and to exclude reinfestation. 10 pairs of laboratory reared F₂ generation of *C. subinnatatus* were introduced into the treated and untreated Bambara nut seeds already contained in plastic jars. The top of plastic jars was covered with a fine muslin cloth and kept at room temperature (29 – 32°C) in the laboratory and observation on oviposition, adult emergence, number of exit hole was made for one month. Oviposition, adult emergence, number of exit hole was of observed on Bambara ground nut seed. The result showed Sharp, a small, round punctured holes were observed on the surface of Bambara ground nut. The eggs were singly laid inside the seeds. Upon hatching, the first instar larva exits through the seeds and hover around the seed cotyledons and turning it into a mass of reddish colour suggesting that farmers should avoid storing Bambara ground nut in a place where there is infested *Cassia tora* seeds.

Keywords: *Cassia tora*, *Callosobruchus sobinnatatus*, Bambaranut, F₂ generation.

INTRODUCTION

Cassia tora is considered an annual weed, is very stress-tolerant, and is easily grown. In Nigeria, it occurs as a wasteland rainy season weed and its usual flowering time is after the monsoon rains, during the period of October to February. *Senna tora* grows in dry soil from sea level up to 1800 meters (Augustine *et al.*, 2010). The seed can remain viable for up to twenty years (Subramanion *et al.*, 2012). Up to 1000 plants can emerge per square meter following rain. Once the seed has matured, it is gathered and dried in the sun. In South Asia, it usually dies off in the dry season of July–October *Cassia tora* seed is a common herbaceous animal plant and an estimated 30, 000 metric tonnes of the seeds are produced annually (Ingweye *et al.*, 2010). It belongs to the family of Fabaceae (Caesalpinaceae) and other names for the plant include sickle senna, coffee weed, coffee pod or “java bean” (English), gyeolinyeongja (Korean) and *Tafasa* (Hausa) (Muhammad *et al.*, 2024). In Nigeria, *Cassia tora* seed is mostly grown in the Northern part of the country in areas were it not been cultivated during the rainy season. It tolerates a wide range of climate and temperature though, it prefers warmth and it is a good source of energy and protein meters (Augustine *et al.*, 2010). *Cassia tora* has the following approximate composition: carbohydrate 66-69 %, protein 14-19 %, fat, 5-7 % and anti-nutritional anthraquinone, 1-2 % (Li *et al.*, 2004). Senna is an invasive weed capable of dominating farmlands due to its high seed production capability. All parts of this plant are useful, including the leaves, seeds, and roots as reported by Shreeji Agro (2014) and Aliyu (2006). the leaves are obovate and alternate, consisting of three pairs of leaflets. The leaflets are opposite and pinnately arranged. The leaves are widely eaten as an additional source of food mixed with groundnut cake



“kuli-kuli” amongst the Hausa community and it is use for making soup. The flowers are brightly yellowed. The rhombohedral brown seeds are enclosed in highly beaked, curved, brown pods of 12-18 cm long enclosed with 18-28 seeds. It is a dry dehiscent pod-bearing plant. Due to its vigorous growth habit, it is typically the first plant to sprout following the first rain after a long period of dry season, making it an important source of pasture for grazing animals. The cosmetic and livestock feed formulation industries both value *C. tora* seeds as raw materials in the cosmetic industry as well as in the formulation of livestock feeds including fishes (Altrafine, 2013; Dasuki *et al.*, 2014). The leaves are a precious food product commodity across international borders. The dried leaves of *C. tora* are traded internationally, between Nigeria and Niger Republic (Muhammad *et al.*, 2017). The weed was widely reported to be used in ethnomedicine. Aliyu (2006) reported the utilization of *C. tora* leaves in mild laxatives, eye diseases, liver stimulants, heart tonics, dysentery, and anthelmintics or relieving constipation. Altrafine (2013) reported dried and fresh leaves are used in northern Nigeria in the treatment of ulcers, ringworm, and other parasitic skin diseases. The seeds of the plant are used greatly by the Ancient Chinese as an herb (Sheeji Agro, 2014). Altrafine (2013) reported leaves of *C. tora* as containing natural chemicals such as chrysophanic acid-9-anthrone, a valued fungicide often used as a natural pesticide in organic farms in India. However, the seed of *C. tora* is vulnerable to attack by insect which significantly damage the seed in a small period of time, this study is therefore carried out to determine the alternate host other than *C. tora* seed to avoid reinfestation of this insect on other crops.

MATERIALS AND METHODS

Experimental Site

The experiment was conducted at General laboratory, Faculty of Agriculture Sa’adu Zungur University Bauchi. Bauchi state is located between latitude 10° 22’E and 9°48’E and situated at 690.3m above the sea level in Savannah zone of Nigeria.

Samples of *C. subinnatus* were collected from previously infested Cassia seeds obtained from Soro market in Ganjuwa Local Government Area of Bauchi State, Nigeria (Plate vi). The insects were brought to the laboratory and kept at room temperature 28 + 2 °C and relative humidity 70 + 5%. 10 kg of sound uninfested *C. tora* (Plate ii) seeds was weight and transferred into an earthen clay pot. Thereafter, *C. sobinnotatus* were transferred into the earthen clay pot. A 20 perforations were made for the ventilation of an insects tied firmly and were allowed to oviposit under crowded conditions in a light:dark regime of 12L:12D at room temperature and relative humidity for Two weeks. Dead and live parent stocks were completely sieved out to await the emergence of F₁. The same procedure was used with F₁ generation to obtain F₂ generation used for the experiment.

Disinfestation of Bambara Nut Seeds

The Seeds were manually sorted to remove broken seeds with holes and other contaminants were sieved out using a mesh to remove insects and remaining contaminants. The sorted seeds were fumigated with Aluminium Phosphide (Phostoxin tablets) at the rate of 0.2 g/kg for 72 hours under airtight conditions to exclude any possible infestation that may affect the seeds as described by (Awoke *et al.* 2014). After 72 hours, the fumigated seed was spread on a clean polythene mat (plate ii)) covered with baft cloth to remove any residual effect of the fumigant and to exclude reinfestation for 48 hours.

Observation

The observation on adult emergence was made at weekly interval to detect the infestation and assess the level and nature of damage which include oviposition, number of exit holes and adult emergence.

RESULTS AND DISCUSSION

Nature of Damage of *Callosobruchus subinnotatus* on Bambara nut

Sharp, a small, round punctured holes were observed on the surface of Bambara nut (Plate iv). The eggs were singly laid inside the seeds. Upon hatching, the first instar larva (plate iv) exits through

the seeds and hover around the seed cotyledons and turning it into a mass of reddish colour. The eggs were also laid on the surface of the seeds (plate vii). Exit holes was serves as evidence of larval activity on the seeds. Pupation occurred inside the seeds. Later, the adult emerges after metamorphosis completion and starts another life cycle. This study agreed with that of Abbas *et al.* (2010) who reported a method for bringing the host plant to the laboratory and confirming the relationship between the host and the pest if the invasion in the field could not be confirmed. This is in line with that of Muhammad *et al.*, (2022) who reported that *C. subinnotatus* is widely known to be a primary pest of Bambara nut, *Vigna subterranean* (L.) Verdcourt. Proximate analysis of *C. tora* showed that it contain high amount of protein and carbohydrate which could serves as nutrition to the insect under study. Shahid *et al.* (2022) have earlier reported that under ideal laboratory conditions, adult female insects should be bred on the target host plant. If the pest completes its life cycle and produces a crawler sac in the host plant, the host plant should be documented as the pest scale insect's host. The insect is reported in this research as an alternative host in periods when Bambara nut is not available.



CONCLUSION AND RECOMMENDATION

From the result obtained, it could be concluded that *Cassia tora* seed is an alternate host for *C. subinnotatus* attacking Bambara nut under storage. To prevent infestation of *Calosobruchus subinnotatus* (a type of weevil) that attacks Bambara nut, farmers should avoid introducing *Cassia tora* seeds into their storage facilities.



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