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**Acoustic Characteristics of *Acanthoscelides obtectus* (Say)
(Coleoptera: Bruchidae) on Common Beans *Phaseolus vulgaris* L.
(Fabaceae)**

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Abstract

Acanthoscelides obtectus a multivoltine bruchid beetle, is a serious pest of common bean *Phaseolus vulgaris* L. (Fabaceae) in the tropics and subtropics. It is difficult to detect the presence of *A. obtectus* because it is cryptic and spends most of its developmental time inside the bean seeds. Their presence being almost imperceptible except for neat circular emergence holes created by the last instar larvae as they exit as adults. Because early detection of this pest using inexpensive acoustic means can be achieved, laboratory experiments were conducted to estimate the acoustic characteristics of the larvae and adults of *A. obtectus* on stored common beans. Spectral and temporal features of recorded sound signals recorded in an anechoic chamber were analysed. The larvae displayed continuous low amplitude impulses with periods of successive peaks and bursts. In contrast, the adults displayed lower amplitudes of impulses with less distinct peaks. In addition, spectrograms associated with the larvae had more high energy regions as compared to those of the adults indicating that movement by the adults is generally associated with low energy sound produced during mating and oviposition. Contrastingly, spectrograms of larvae were characterised by higher energy due to the feeding, locomotion, moulting and pupating especially during eclosion and as the new adult emerges from the infested seed. Analysis of impulse and burst rates revealed that rates of noise impulses in larvae and adult sounds varied significantly. The rates of bursts, rates of impulses and the impulses per bursts for the larvae and the adults were significantly ($p < 0.05$) different. Overall, the larvae and adults of *A. obtectus* produced varied acoustic signals that could be harnessed to acoustic sensor development. The use of acoustic sensors for real-time detection of *A. obtectus* infestation in stored common beans in sub-Saharan Africa will contribute to hunger and poverty alleviation.

Keywords: *Acanthoscelides obtectus*, acoustic characteristics, bursts, common beans, Impulses