

Physicochemical mechanisms of resistance in sorghum to *Chilo partellus* (Swinhoe)

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Variation in nutritional components and amounts of secondary metabolites not only affects the growth, development and survival of insect herbivores but also indirectly influences expression of host plant resistance to insects. In this study, we examined the role of different biochemical and morphological factors in sorghum as host plant defense against the spotted stem borer, *Chilo partellus* (Swinhoe). The genotypes IS 2205 and IS 2123 suffered lower deadheart incidence, and exhibited deleterious effects on development and survival of *C. partellus*, followed by ICSV 700, ICSV 708 and ICSV 25066 than the susceptible check, Swarna. The anthocyanin pigmentation in sorghum seedlings and *C. partellus* deadhearts were found significantly and negatively correlated with the larval period ($r = -0.60^{**}$ to -0.88^{**}), while positively correlated with the larval and pupal weights, and larval survival and adult emergence ($r = 0.58^*$ to 0.95^{**}). Conversely, the numbers of *C. partellus* exit holes in the stalk, larvae recovered, number of tunnels and stem tunneling length were significantly and positively correlated ($*$, $** = P \leq 0.05$ and 0.01 , respectively) with the larval period ($r = 0.72^{**}$ to 0.89^{**}), but significantly and negatively correlated with larval and pupal weights, larval survival and adult emergence ($r = -0.54^*$ to -0.84^{**}). Although there was significant variation in morphological traits and biochemical composition of the sorghum genotypes, there was no direct link to expression of resistance to this insect, but for a few cases. The significant and negative association of total carotenoid, p-coumaric acid, zinc and iron contents with growth, development and survival of *C. partellus*, and damage parameters ($r = -0.48^*$ to -0.72^{**}), indicated their role in expression of resistance to *C. partellus* in sorghum. However, the interaction among different biochemical compounds and the morphological traits, rather than a particular biochemical constituent played a greater role in host plant defense against *C. partellus*.

Keywords: Anthocyanin pigmentation, Antibiosis, Deadheart incidence, Host plant resistance, Mechanisms of resistance, *Sorghum bicolor*, Spotted stem borer