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Color Variation in the African Sorghum Head Bug

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Sorghum [*Sorghum bicolor* (L.) Moench] is an important cereal crop in West Africa. It is damaged by over 150 species of insects worldwide, of which *Eurystylus oldi* Poppius (Heteroptera: Miridae) is one of the most damaging pests in West and Central Africa (Ratnadass et al. 1994). Published reports of *Eurystylus* spp. on sorghum suggest a complex of species are involved in West Africa. *Eurystylus marginatus* Odh. was recorded as the dominant species in Mali (Doumbia and Bonzi 1985), *E. rufocunealis* Poppius in Nigeria (MacFarlane 1989), *E. risbeci* Sch. in Senegal (Risbec 1950), *E. marginatus* in Niger (Steck et al. 1989), and *E. immaculatus* Odh. in Nigeria and Mali (Sharma et al. 1992, 1994; Ratnadass et al. 1994). However, based on head bug collections from several locations in West Africa, Stonedahl (1995) reported that the major head bug species infesting sorghum in West Africa is *E. oldi* Poppius, with *E. bellevoyei* Reuter sometimes occurring as a minor pest. Previous identifications of *E. marginatus* were misidentifications, while *E. risbeci* and *E. immaculatus* are synonyms of *E. oldi.* This confusion about species identity has, to an extent, been due to various color morphs of *E. oldi,* and to different names being assigned by taxonomists at different times/locations.

Few farmers recognize head bugs on sorghum, and most are not familiar with the nature of the damage these insects cause. Agronomists and breeders in general are unaware of head bugs, and their damage potential. This ignorance is attributable to the relatively small size of the insects, and the fact that both nymphs and adults tend to assume the same color as that of the panicle/grain. There is therefore a need to educate farmers/extension workers, agronomists, and breeders on the identification and pest status of *E. oldi* in West and Central Africa. In this paper color variation in *E. oldi* in relation to panicle/grain color in sorghum is reported.

In 1989, first- and second-instar head bug nymphs collected from sorghum panicles in the field in Nigeria and Mali, were sorted into red, red-brown, and green color morphs. The nymphs were reared on green or red-colored sorghum grain, corresponding to 'white' and 'brown' grain classes. Red-colored nymphs reared on red grain developed into reddish adults with bluish-green undersides, while the green nymphs reared on green grain developed into greenish-brown adults with bluish-green undersides. Red-brown nymphs reared on green grain became brown-black adults, with light green undersides. Red nymphs reared on green grain became light green or red, while green nymphs reared on red grain developed into light green adults. Dark brown nymphs reared on green grain became brown-red adults.

Observations on the changes in color of the nymphs and adults were confirmed during the 1999 rainy season at Samanko, Mali. The green first-instar nymphs collected from white- or tan-grained sorghum cultivars S 34 or ICSV 197, that have green immature grain, developed into greenish-brown adults with bluish-green undersides when reared on the maturing green grains of the same white- or tan-grained cultivars, or of chalky-grained cv Nagawhite. The green first-instar nymphs collected from white- or tan-grained sorghum cultivars, S 34 or ICSV 197, developed into reddish-brown adults with bluish-green undersides with distinct red markings on their abdominal segments, when reared on the maturing red grains of Sorvato 28 or Framida (which is actually brown-grained: its grain has both a pigmented testa and a red pericarp).

The green third-instar nymphs collected from panicles of the tan-grained sorghum cultivar ICSH 89002 developed into greenish-brown adults with bluish-green undersides when reared on the maturing green grains of the same tan-grained cultivar. However, the nymphs developed into light green adults when reared on the maturing red-brown grains of Framida. The red third-instar nymphs collected from panicles of the red-brown grained sorghum Framida developed into reddish-brown adults with light green undersides in males, and bluish-green females with red markings on their abdominal segments, when reared either on the maturing red grains of

the same cultivar, or on maturing green grains of tan-grained ICSH 89002.

Thus, the color of the head bugs changed with the color of the food they consumed. However, there were a few exceptions, that might be due to changes in grain pigmentation during development, that might not be apparent in the immature grain fed to the nymphs. These observations suggested that the different species reported earlier on sorghum are in fact the color morphs of the same species, as confirmed by the taxonomic studies of Stonedahl(1995).

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Predation by *Cheilomenes propinqua* on Corn Leaf Aphid

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Introduction

The corn leaf aphid, *Rhopalosiphum maidis* Fitch (Homoptera: Aphididae), is among the insect pests of sorghum [*Sorghum bicolor* (L.) Moench] that cause economically important damage to the crop (Teetes et al. 1983). Direct damage, observed during attacks by large colonies of *R. maidis* on young sorghum plants, can kill seedlings. Indirect damage includes both secretion of a honeydew that favors the development of molds, and transmission of such viruses as the sorghum dwarf mosaic virus (SDMV) (Hagen and van den Bosh 1968).

Extensive use of broad-spectrum chemical pesticides, usually prescribed to minimize insect pest damage on sorghum, is rarely cost effective and often leads to the development of resistance within populations of *R. maidis* (Young and Teetes 1977). Hence, there is an urgent need that alternative control methods to chemicals be developed and made available to farmers.

Cheilomenes propinqua Mulsant (Coleoptera: Coccinellidae) is a polyphagous predator widely distributed in Africa (IIE 1996). It is a potential biological control agent for *R. maidis.* However, attempts to include *C. propinqua* in a biological control program require (as for any other predator) that adequately designed studies gather detail information on its vital functions, including its numerical and functional responses. Holling (1963) defined the functional response of a predator as its ability to linearly increase its consumption in response to increasing population densities of the prey. Thus, the predation effectiveness, or voracity of a predator, is a key component of its functional response.

This paper summarizes results on laboratory evaluation of the predation effectiveness of *C. propinqua* adults and larvae on *R. maidis.*

Materials and methods

In 1997 and 1998 *C. propinqua* and *R. maidis* were collected from field-grown sorghum plants at the University of Ouagadougou's Research Station, located 20 km from Ouagadougou, Burkina Faso.

Aphid prey were captured by excising sorghum leaves on which they had formed large colonies. Excised leaf pieces were then carefully placed in 1.5-L, covered.