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Protecting Sorghum Grain from Pests in Africa

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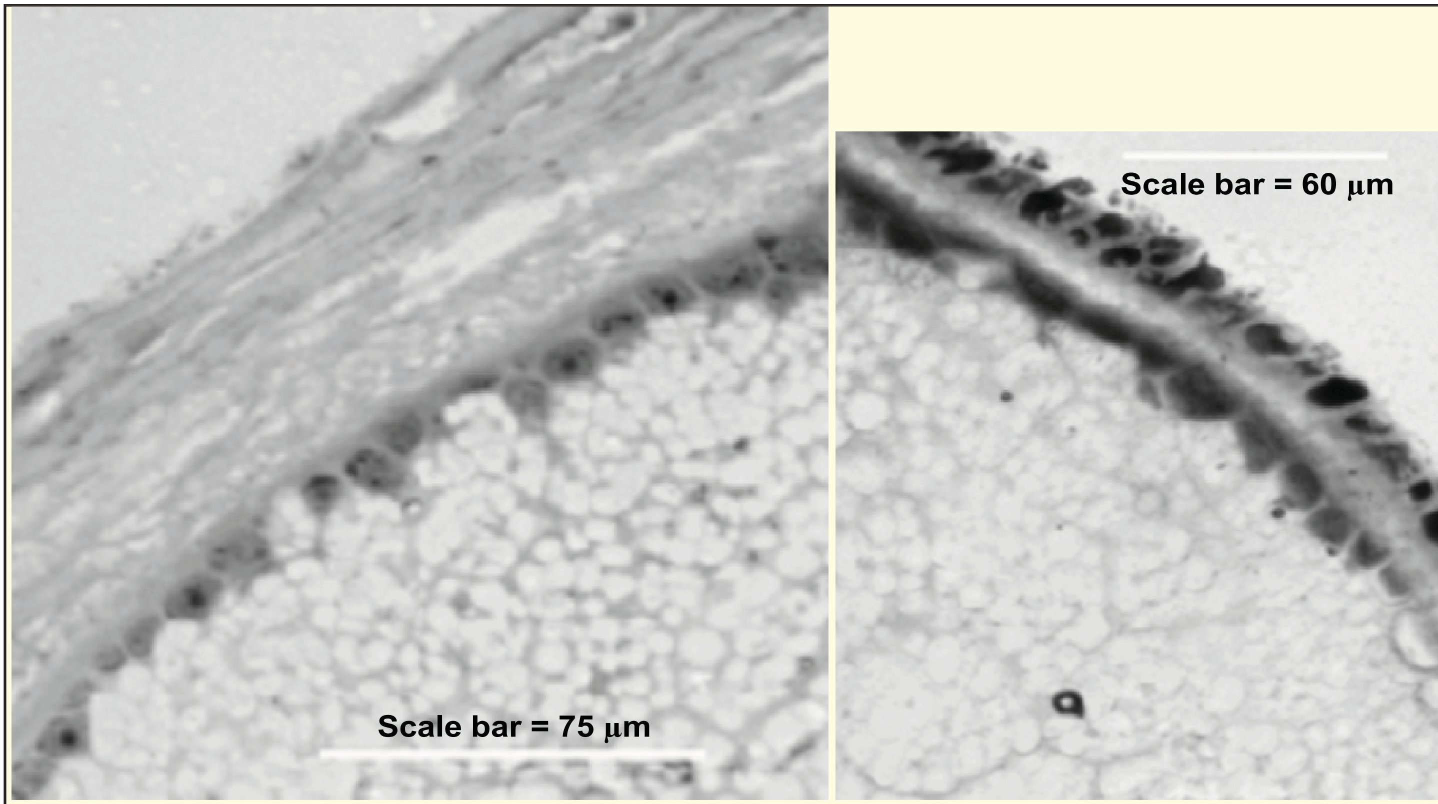
Insect pests destroy more than 35% of stored grain worldwide and probably even more in Africa. Considering the current global food shortage this is a tremendous loss. To mitigate losses caused by insects in stored sorghum grain, INTSORMIL scientist Bonnie Pendleton of West Texas A&M University is collaborating with African entomologists to develop management strategies. Storage conditions are critical in preventing losses due to pests. A survey in Mali by IER scientist Niamoye Yaro Diarisso found that farmers in the Koulikoro and Ségou regions thresh sorghum and millet and store it in the form of grain. However, in the Sikasso region the entire sorghum panicle or millet spike is stored.

Types of storage structures vary within Mali. In the Koulikoro and Ségou regions structures are made of plant material (photo right). Insects can readily penetrate these structures. In the Sikasso region walls of storage structures are made of clay and cement, clay on rock or clay alone (photo center above).

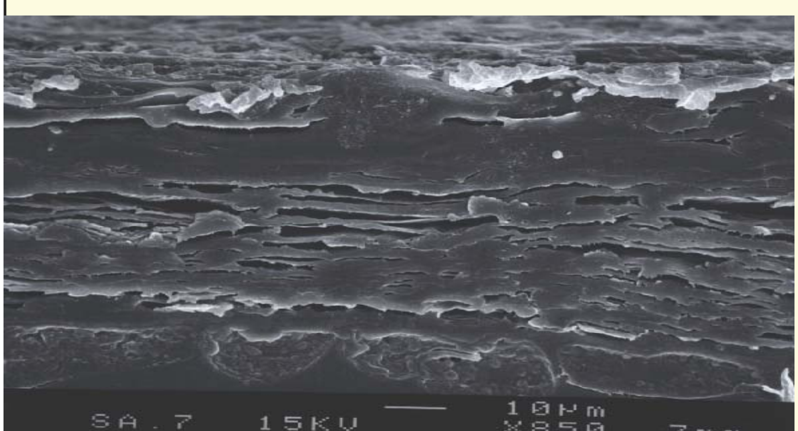
The Mali survey indicated that farmers cannot afford to use insecticides to control storage insects. However, 36% use local plants (botanicals), primarily bénéfin, *Hyptis* sp.; neem, *Azadirachta indica* and tamarin, *Tamarindus indica*, to control pests in granaries. INTSORMIL scientists are identifying additional botanicals that provide effective and low-cost control of storage pests. In IER studies 31% fewer grains were attacked when treated with powder of the leaves of *Acacia nigricans* (photo left) as compared to nontreated grains.

INTSORMIL entomologists are also searching for insect-resistant sorghum and millet cultivars to provide a low cost, effective and environmentally safe method to manage storage pests. In studies by IER scientists, sorghum varieties Acar and 97-SB-F5 were least damaged (1.0 and 0.5%), while 04-CZ-F5P was most damaged (5%) by the lesser grain borer, *Rhyzopertha dominica* (photo left). Fernando Chitio, Mozambique and Madani Telly, Mali found fewest maize weevils, *Sitophilus zeamais* (2 per gram) emerged from grain of Tx7078, Sima, Macia, Sureno, and BTx2959, compared to 25 per gram from other varieties such as SC630-11E11. Also, grain of Tx7078, Sureño, Sima, Macia, and BTx2959 retained most (95-99%) original weight, while SC630-11E11 and others lost 28-47% of their original weight due to the feeding damage of maize weevils. Light and scanning electron microscopies show the seed coat of resistant Sureño is twice as thick as that of susceptible SC630-11E11 sorghum (see figures below). Sureño is a popular dual purpose variety from Central America where it is extensively grown for grain and forage.

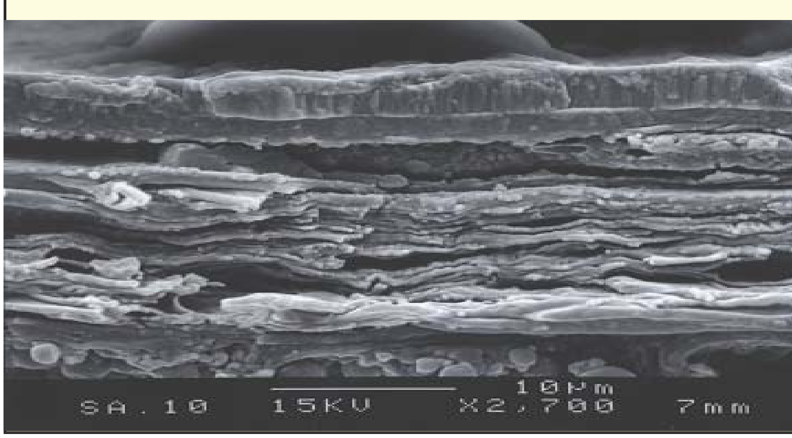
Sept 5, 2008



Light microscope photos of maize-weevil resistant Sureño (left) and susceptible SC630-11E11 (right) sorghum. Note thick (about 75 µm) seedcoat of Sureño compared to thin (about 25 µm) seedcoat of SC630-11E11.



Scanning electron microscope image of a cross section of the seedcoat of maize-weevil resistant Sureño sorghum



Scanning electron microscope image of a cross section of the seedcoat of maize-weevil susceptible SC630-11E11 sorghum