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FEEDING DISRUPTION BIOASSAY FOR FIELD MONITORING OF INSECT SUSCEPTIBILITY TO BT-TRANSGENIC CROPS AND TRADITIONAL PESTICIDES

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Abstract

A consumer version of the feeding disruption bioassay for pesticide resistance detection and species diagnosis (*R.M. Roe et al., 2000, US Patent Number 6,060,039*) is currently in the commercialization phase of development. The kit measures the potential effectiveness of pesticide treatments against ***lepidopteran*** pests, particularly the tobacco budworm (TBW)-cotton bollworm (CBW) complex as it occurs in cotton crops (*W.D. Bailey et al. 1998, Crop Prot. **17**:591*). The kit consists of a specially designed white plastic 16-well plate with recessed hydrateable meal pads containing an insecticide diagnostic dose and a blue feeding indicator. The appearance of blue feces, easily seen on the background of the white plate, is a marker for feeding. Insects that produce blue feces are resistant to the diagnostic dose of the pesticide. The assay kit can be stored at room temperature until needed. The test is performed in 24h on individual neonates or older insects, and the results are read in as little as 4h on groups of insects. Data are presented on a working resistance kit for the TBW and/or the CBW for the following insecticides: Bt, spinosyn, permethrin, indoxacarb and emamectin benzoate. A species diagnosis kit has been designed and field-tested for distinguishing the TBW from the CBW (*W.D. Bailey et al, 2001, J. Econ. Entomol. **94**:76*). Finally, the utility of our new assay approach for other insect species has been demonstrated by the development of a kit for spinosyn in the cabbage looper (*R.M. Roe et al., 2002, Proc. Beltwide Cotton Conf., Atlanta, GA*). The commercial manufacturer has developed state-of-the-art robotics technology for custom production of resistance and species diagnostic kits, and the basic technologies can be used for routine insect rearing and microtiter plate high throughput screening.

Transgenic plant technology will most likely be the major method of control for moth pests in cotton in the future, especially apparent as the result of the next generation of transgenic cotton varieties expressing multiple Bt toxins. Because of this increased dependency, it is critical that we keep up with the latest developments with advances in diagnostic technology for resistance detection. In 2003 we began research to validate the feeding disruption assay for monitoring insect resistance for the next generation transgenic technology.