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# Tarnished Plant Bugs in Cotton (Research Information Sheet #101)

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# Tarnished Plant Bugs, *Lygus lineolaris* (Palisot de Beauvois), in Cotton

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# Introduction

In the Mid-South, the tarnished plant bug is an economically important insect pest of cotton. Nationwide, a total of 130 economically important plants have been recorded as hosts, including 21 of the 30 most important agricultural crops in the United States (1).

Adult tarnished plant bugs are about ¼ inch long, relatively flat and brownish-colored with a conspicuous light-colored triangle between the wings (2). The head is small, with a long proboscis that projects back under the body when at rest.

Immature tarnished plant bugs are called nymphs. They are light green and late instars have four conspicuous black spots on the thorax and one large black spot near the base of the abdomen. Their wings are not developed, but they can move rapidly and are difficult to detect in cotton foliage (3). Small nymphs may be confused with aphids, cotton fleahoppers, and potato leaf hopper nymphs. Tarnished plant bug eggs are cylindrical and partially embedded in plant tissue.

# Damage

Tarnished plant bugs are considered plant sap feeders. Symptoms of injury include small flower bud (square) desiccation, mutilation of leaves, damaged branches, damaged leaf petioles, and lesions on main stems (2). Seedling cotton can be injured by tarnished plant bugs feeding in the plant terminal. Cotton plants are highly susceptible to economic injury by tarnished plant bugs during the first 3 to 4 weeks of square formation. Feeding causes pinhead squares to abcise from the plant. Early season square removal causes the plant to expend most of its energy on vegetative growth, which delays fruit set and crop maturity and may cause excessively tall (rank) plants.

Damaged squares are characterized by a localized necrosis on anthers and staminal columns (3,4). Blooms and young bolls also are susceptible to tarnished plant bug feeding injury. Heavy feeding causes abnormal petal development and can result in crinkled and cupped blooms. Deep probing and feeding by these piercing and sucking insects causes internal damage on the anthers and stamens. Small bolls often exhibit black sunken lesions and may become desiccated and abort from the plant.

## Biology

Tarnished plant bugs overwinter as adults in ground trash and/or other shelter near late summer or early fall hosts. There are several generations per year. The insects complete one or more generations on spring hosts before moving into cotton fields. Clovers, vetches, mustard, primrose, fleabane, horse weed, black-eyed susan, and dock are some of the important weed hosts for tarnished plant bugs. Adults migrate in large numbers to cotton as the spring weed hosts mature and become unattractive. Extensive migration often occurs during periods of severe environmental stress on plant hosts. The average time required to complete one generation on cotton is 33 days at 80°F with the approximate number of days required for each stage as follows: egg - 8 days, nymph - 17 days, pre-ovipositional period - 8 days (5). Nymphs molt 5 times before becoming adults. Females may oviposit between 30 to 70 eggs.

## Varietal Susceptibility

Cotton cultivars that exhibit a tolerance against tarnished plant bugs would be a useful cultural management tool. The nectariless trait imparts tolerance to tarnished plant bugs but has limited availability. Field experiments conducted during 1994-1995 determined that plant bug injury among varieties tested showed extreme susceptibility of varieties with the frego bract (FB) trait (Table 1). All of the commercial cultivars tested expressed similar levels of susceptibility. Tarnished plant bug injury in the commercial varieties was significantly lower compared with that in the frego cotton LA850075 (6).

**Table 1. Cotton varietal susceptibility to tarnished plant bugs in Northeast Louisiana during 1994-95**

| | Trait[1] | | | | | |
|---|---|---|---|---|---|---|
| | | | | % Damaged squares[2] | | Average |
| Cultivar | G | N | FB | 1994 | 1995 | 1994-1995 |
| LA 850075 | + | + | + | 60.1a | 56.0a | 58.0a |
| Hartz 1215 | + | + | — | 22.1bc | 31.4b | 26.7b |
| Hartz 1244 | + | + | — | 25.2b | 28.3b | 26.8b |
| Chembred 1233 | + | + | — | —— | 23.9b | 23.9b |
| Deltapine 20 | + | + | — | 18.7c | 22.6b | 20.7b |
| Deltapine 50 | + | + | — | —— | 28.2b | 28.2b |
| Deltapine 51 | + | + | — | 17.7c | 24.1b | 20.9b |
| Deltapine 5409 | + | + | — | —— | 30.8b | 30.8b |
| Deltapine 5415 | + | + | — | 15.0c | 28.3b | 21.8b |
| Deltapine 5690 | + | + | — | 15.6c | 27.4b | 21.5b |
| Hyperformer HS-46 | + | + | — | 15.0c | 27.1b | 21.0b |
| Stoneville 474 | — | + | — | 17.3c | 22.8b | 20.1b |
| Stoneville 907 | — | — | — | 16.8c | 26.9b | 21.9b |
| Stoneville LA 887 | — | + | — | 14.4c | 27.4b | 20.9b |
| Sure-Grow 501 | + | + | — | 16.6c | 23.5b | 20.0b |

[1] Morphological traits include glabrous (G), nectaried (N), and frego bract (FB). Means in columns followed by a common letter are not significantly different according to LSD (*P*=0.05).
[2] Means across the Macon Ridge and St. Joseph branches of the Northeast Research Station (8 samples).

## Monitoring

Tarnished plant bug population densities are highly variable among and within fields during the growing season. These pests infest the margins of fields initially and eventually migrate across the entire field. Their distribution within fields is often "clumped" near field borders from which the source population immigrated. Therefore, consistent results on treatment efficacy, cotton yields, and maturity are often difficult to obtain. Sampling populations by sweep net and shake sheet are effective techniques, if fields are monitored once or twice weekly. Early season sampling should begin approximately at the pinhead square stage and be continued through the season as long as populations are present. These areas of initial infestations should be managed with border sprays to delay fieldwide infestations.

Timing of insecticide application may vary depending on fruit retention, yield potential, and environmental conditions. In Louisiana, the suggested index for applying insecticide treatments is 10 to 25 tarnished plant bugs and/or cotton fleahoppers per 100 plant terminals or 100 sweeps. Mid-late season applications should be based on whole plant evaluations and damaged boll ratings. Follow the suggested guidelines for other pests (i.e. Helothine complexes and/or boll weevils) and determine if the fruit damage from tarnished plant bugs is additive. Treat only as needed with broad spectrum insecticides or appropriate tank mixes to target the entire pest complex present.

## Insecticide Resistance

The tarnished plant bug has developed varying levels of resistance to all registered classes of insecticides in Arkansas and Mississippi (7,8). Resistance to multiple insecticides may preclude use of selected insecticides during the season since selection pressure depends on insecticide use patterns.

Tarnished plant bugs were collected from various hosts and locations in Louisiana during 1994 and 1995, and their seasonal susceptibilities to oxamyl, acephate, and cypermethrin were measured (6). Seasonal $LC_{50}$s of tarnished plant bug adults collected during 1994 and 1995 ranged from 0.93-6.49 mg/vial (7X variation) for acephate, 0.57-21.22 mg/vial (37X) for cypermethrin, and 0.92-4.84 mg/vial (5X) for oxamyl. Seasonal variation in $LC_{50}$s for each insecticide appeared to be related to the use pattern and application frequency of that class of insecticide. The highest $LC_{50}$s were generally recorded during late season (6). Insecticide resistantance management strategies widely adopted for management of tobacco budworm in cotton are applicable for tarnished plant bugs (9).

## Efficacy

Insecticides currently recommended for control of tarnished plant bugs in cotton include acephate, chlorpyrifos, dimethoate, dicrotophos, imidacloprid, methamidophos, and oxamyl.

The efficacy of selected registered and experimental insecticides against tarnished plant bugs was evaluated in field tests during 1994 and 1995. The trends for insecticide efficacy against tarnished plant bugs in the field tests were similar during both years. At 2 days after treatment (DAT), Karate 1E and the systemic insecticides Orthene 90S, Provado 1.6F, and Fipronil 80WG generally had the lowest numbers of tarnished plant bugs. Systemic insecticides such as Orthene 90S and Provado 1.6F generally seemed to have better residual efficacy compared with the contact insecticides, Thiodan 3E and Karate 1E. Efficacy of the experimental insecticide Fipronil 80WG was equal or better than that of Orthene 90S. Naturalis-L and Tracer 4SC were ineffective in controlling tarnished plant bugs.

**Table 2. Efficacy of selected insecticides against tarnished plant bug, summary of field trials, 1994-95**

| 1994 Treatment/form. | Rate/acre lb AI | Total (adults & nymphs) 25 sweeps 2 DAT | 4 DAT | 8 DAT |
|---|---|---|---|---|
| Fipronil 80WG | 0.038 | 3.9c | 2.8cd | 4.6b |
| Provado 1.6F | 0.022 | 4.9c | 3.8c | 3.4c |
| Karate 1EC | 0.033 | 3.8c | 3.3cd | 4.6b |
| Vydate 3.77L | 0.25 | 4.6c | 2.4d | 4.9b |
| Thiodan 3EC | 0.375 | 8.1b | 5.2b | 3.4c |
| Orthene 90S | 0.33 | 4.5c | 2.6cd | 2.7c |
| Naturalis-L 27F | 0.25 | 12.8a | 7.5a | 6.3a |
| Untreated | —— | 11.0a | 5.5a | 5.0b |

| 1995 Treatment/form. | Rate/acre lb AI | Total (adults & nymphs) 25 sweeps 2 DAT | 4 DAT | 8 DAT |
|---|---|---|---|---|
| Fipronil 80WG | 0.038 | 1.9bc | 2.4b | 3.3a |
| Provado 1.6F | 0.022 | 1.9bc | 2.5b | 3.4a |
| Karate 1EC | 0.033 | 0.9c | 1.7b | 4.2a |
| Vydate 3.77L | 0.25 | 2.4b | 2.7b | 3.6a |
| Thiodan 3EC | 0.375 | 5.1a | 4.5a | 4.7a |
| Orthene 90S | 0.33 | 1.8bc | 2.0b | 3.5a |
| Tracer 4F | 0.068 | 4.6a | 5.2a | 5.5a |
| Untreated | —— | 4.5a | 4.7a | 4.1a |

Means in columns followed by a common letter are not significantly different (LSD: P=0.10).

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