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Tarnished Plant Bug

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Distribution and hosts

Lygus lineolaris (Palisot de Beauvois) (Hemiptera: Miridae), the tarnished plant bug (TPB), is a member of the Miridae family within sub-order Heteroptera and order Hemiptera. Originating from the Eastern United States, the TPB is now the most widely distributed *Lygus* species in North America and can be found in all agricultural regions of the continent in low as well as relatively high altitudes (Kelton 1975 Layton, 2000).

The TPB a highly polyphagous sap-feeder. It has been observed on over 300 host species and causes injury to at least 130 of these hosts. Tarnished plant bug occurs in a wide range of habitats including row and forage crops (carrots, cotton, lima beans, potatoes, seed alfalfa, soybeans), orchards (apples, peaches, pears), vineyards and nurseries (strawberries, cherries, pine seedlings), residential areas, margins of forests, fields, roads, and waterways (Tingey and Pillemer 1977, Young 1986).

Tarnished plant bug's preferred hosts consist of flowering weeds, primarily in subclasses Rosidae and Asteridae (Fig. 1) (Young 1986). Many documented host species of TPB were discovered by sampling weedy hosts near the margins of cultivated fields (Young 1986, Snodgrass et al. 1984). Tarnished plant bugs prefer weedy hosts and transition to cultivated crops under certain conditions (e.g., climatic, host plant development) (Tugwell et al. 1976 , Fleischer and Gaylor 1988).

Therefore, when an abundance of weedy hosts are present near cultivated hosts and/or specific climatic factors (e.g., increased rainfall) favors extended bloom periods, TPB populations flourish, contributing to high influxes into cultivated hosts when weeds senesce during hot summer months. In addition to plant feeding, TPB are known predators of Colorado potato beetle (*Leptinotarsa decemlineata*) eggs, as well as various life stages of a wide range of other insect species in the following families (orders in parentheses): Miridae, Cicadellidae, Aphididae (Hemiptera); Chrysomelidae, Curculionidae (Coleoptera); Geometridae, Noctuidae (Lepidoptera); Agromyzidae (Diptera); Braconidae, Formicidae (Hymenoptera); and Phalangiidae (Opiliones) (Young, 1986).

Figure 1. Top: TPB weedy host daisy fleabane (*Erigeron annuus*); Bottom: TPB weedy host common ragweed (*Ambrosia artemisiifolia*). (*Seth Dorman*)

Identification

Tarnished plant bug adults are approximately 5 to 6 mm in length, 2 to 3 mm in width, and have flat, yellowish-brown bodies with reddish-brown and black mottling, small heads and a long proboscis tucked ventrally at rest (Fig. 2) (Mueller et al. 2003, Greene et al. 2006).

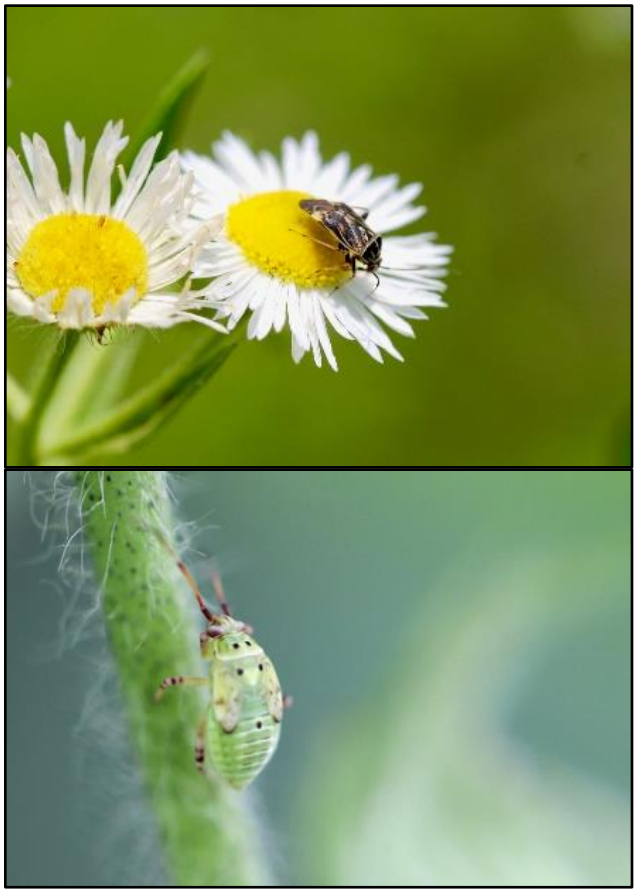

Figure 2. Top: Adult TPB on weedy host daisy fleabane, *Erigeron annuus*; Bottom: Fifth instar TPB nymph on cultivated cotton. (*Seth* Dorman)

Adults have a conspicuous yellow Y-shaped marking on the scutellum and longitudinal dark and light rays on the pronotum Summer adults vary in color from pale yellow with reddish-brown to black markings to completely black with only a few pale-yellow markings. For nymphs, early instars are light green; late instars are green with a yellowish tint and have five prominent markings (four dots on the thorax and one dot on the abdomen) (Fig. 2). Adult females are slightly larger than adult males.

Life history

The tarnished plant bug overwinters as an adult beneath plant debris, ground litter, and in other protected sites (Bariola1969, Layton 2000). Overwintering adults can enter diapause mated or unmated. Diapause is triggered by a reduced photoperiod in the fall. When the photoperiod reaches approximately 12.5 hours, over 50 percent of nymphs produced will diapause as adults on wild hosts (Snodgrass 2003, Snodgrass et al. 2013).

In addition to photoperiod, temperature and host plant availability may also play a role in diapause induction (Brent et al. 2013). Once wild hosts senesce, diapausing adults migrate to winter hosts. The primary winter host recorded in the Mid-South is henbit (*Lamium amplexicaule* L.). Shepard's purse (*Capsella bursa*-pastoris), buttercup (*Ranunculus* spp.), and daisy fleabane (*Erigeron annuus*) are also suitable hosts (Snodgrass 2003, Snodgrass et al. 2013). Early emergence from diapause can result from warmer temperatures (>50°F) and blooming wintering hosts (Snodgrass et al. 2012, 2013).

The tarnished plant bug completes one generation in approximately 30 and 43 days at 80°F when reared on weeds and cultivated crops, respectively (Fleischer and Gaylor 1988). Tarnished plant bugs will complete at least one generation in alternative hosts before moving to cultivated crops (i.e., corn, soybeans, cotton). Nymphs will molt five times before reaching the adult phase. The number of generations depends on the climate and the availability and blooming period of alternative hosts.

Cotton plant injury

Both TPB adults and nymphs feed on terminals, buds, flowers, and small bolls on cotton plants by piercing plant tissue with stylets and injecting salivary enzymes. As a result, TPB infestations can cause economic losses at relatively low population densities by causing direct injury. Yield losses are highest when injury occurs early in cotton's bloom period. Specifically, feeding injury can consist of localized tissue necrosis, abscission of squares and small bolls, morphological deformation of bolls and seed, altered vegetative growth patterns, and tissue malformations (Fig. 3) (Tingey and Pillemer 1977) Indeterminate crops, like cotton, produce different

age fruiting structures simultaneously throughout the growing season (i.e., squares, flowers, bolls) and are therefore more susceptible to economic losses from TPB feeding for longer periods.

Figure 3. Top: Square/bud abscission in cotton; Bottomt: TPB feeding injury to flowering cotton ("dirty bloom") (*Seth Dorman*)

Management

Cultural control

The most effective cultural control methods for TPB include weed management, variety selection, and planting date. Reducing primary weedy hosts near cultivated hosts will reduce TPB immigration into cultivated hosts when primary hosts senesce or are no longer available. Higher TPB populations have been documented in cultivated crops with weedy borders (Outward et al. 2008) Further, research has found that a single herbicide application applied to vegetative borders was effective at reducing TPB infestations in cultivated crops later in the growing season (Snodgrass et al. 2005).

Since TPB populations migrate from weedy hosts to cultivated hosts early to mid-summer and population size peaks in cotton late-summer, later planting dates may suffer higher and longer infestations compared to earlier planting dates. A later planting date also allows less time for plants to compensate for injury caused by TPB feeding. Variety selection can be an effective cultural control strategy. Tarnished plant bugs tend to avoid feeding and ovipositing on hirsute or hairy varieties with higher trichrome density (i.e., small hairs).

Detection

Tarnished plant bug populations can be irregular across a field. It is important to scout thoroughly before investing in chemical control. Sweep net and drop cloth sampling are most commonly used in cotton to detect TPB presence and abundance. Sweep net sampling is recommended until the second week of bloom. Following that, drop cloths are preferred.

Chemical control

For some crops and geographic locations with high TPB populations, cultural control may not prevent economic losses, and chemical control is needed. A variety of insecticides are labeled for control of TPB adult and nymphs. Insecticides labeled for TPB management include certain carbamates, organophosphates, pyrethroids, neonicotinoids, sulfoximines, and benzoylureas. Repeated applications of insecticides in the same class has been shown to cause resistance in the field, especially early-season applications of pyrethroids (Snodgrass et al. 2009).

Tarnished plant bug populations have demonstrated resistance to organophosphates, carbamates, and cyclodienes (Sndograss 1996, Snodgrass et al. 2008, 2009). With any pesticide, read and follow label instructions. Contact your local ANR Agent or Cooperative Extension office for more information on applying insecticides safely and for insecticide recommendations in your area.

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