

Area-Wide Management Approach for Tarnished Plant Bug in the Mississippi Delta

Report

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Abstract. Large-scale field studies were conducted to evaluate effects of native winter-spring host plant management on tarnished plant bug (TPB), *Lygus lineolaris* (Palisot de Beauvois), infestations in cotton, *Gossypium hirsutum* (L.), in the Mississippi Delta regions of Louisiana and Mississippi. Herbicide applications reduced TPB bug densities in non-cultivated hosts along field margins in both states. This translated to reduced plant bug densities in cotton fields within the treated area in Mississippi, but not Louisiana. The lack of impact on plant bug densities in cotton fields in Louisiana might be attributed to the extent of the landscape that could not be treated. These results indicate that this management strategy does have utility for TPB management in cotton, but may not be appropriate for every situation.

Keywords: Tarnished Plant Bug, Cotton, Wild Host Plant Management

The tarnished plant bug (TPB), *Lygus lineolaris* (Palisot de Beauvois), is the major insect pest of cotton, *Gossypium hirsutum* (L.), within the Mid-South region. From 2001 to 2012, TPB has been the number one insect pest of cotton in Louisiana and Mississippi in eleven and nine of those years, respectively (Williams 2002a, 2002b, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013). During this period the average number of insecticide applications ranged from 1.4 to 5.3, and 2.2 to 6 in Louisiana and Mississippi, respectively. The Mississippi Delta is an area of intensive agricultural production. The number of insecticide applications for TPB management ranged from 3.1 during 2003 to 7.5 during 2007, with some growers making up to 15 foliar insecticide applications for TPB control during 2007. Control costs for this pest have ranged from \$13.89 to \$41.38 and \$17.90 to \$78.89 in Louisiana and Mississippi, respectively, from 2001 to 2012. Tarnished plant bug control costs in the Mississippi Delta have been higher than in other portions of Mississippi and Louisiana and ranged from \$24.50 to \$97.02. Furthermore, TPB is becoming resistant to many of the products currently used for their control, with few

if any replacements expected in the near future (Hollingsworth et al. 1997, Holloway et al. 1998, Snodgrass and Scott 1988, Snodgrass 1994, Snodgrass and Elzen 1995, Snodgrass and Scott 2003, Snodgrass et al. 2009).

Tarnished plant bug overwinters as an adult in reproductive diapause. This diapause mechanism is initiated by decreasing day length, however, TPB can emerge from reproductive diapause under diapause maintaining day lengths in response to temperature and food source availability (Snodgrass 2003, Snodgrass et al. 2012). When favorable temperatures occur and suitable winter host plants are available, TPB can produce a new generation earlier than if emergence from diapause were completely controlled by day length. Tarnished plant bug is a highly polyphagous insect, feeding on over 300 wild and cultivated host plants (Young 1986). This list of host plants includes many winter-spring annual broadleaf plants that occur within cotton fields and along field margins and non-crop areas (Snodgrass et al. 1984). Many of these plants are abundant in fields and along field margins. With the ability to break reproductive diapause early in the year in response to temperature and host plant availability, large populations can be produced to infest cotton later in the season.

Growers typically apply herbicides during late winter to early spring to destroy winter-spring weeds infesting fields. Studies were conducted in the delta regions of Mississippi (Snodgrass et al. 2005, Snodgrass et al. 2006) and Louisiana to examine impact of extending winter-spring weed management to field margins and adjacent non-crop areas on TPB populations. Reducing the occurrence and densities of winter-spring host plants should translate into lower populations of TPB that would subsequently infest cotton.

These studies were conducted in Mississippi (Bolivar, Sunflower, and Washington Counties) during 1999 to 2001 (Snodgrass et al. 2005, Snodgrass et al. 2006) in Louisiana (Tensas Parish) during 2004 to 2006 on commercial farms. Treated and non-treated areas were established each year (two per year in MS and one per year in LA). Test areas in Mississippi were 23 km²; test areas in Louisiana ranged from 6.1 to 21 km². Native vegetation was sampled with a 38.1 cm diameter sweep net at least bi-weekly beginning in February to estimate densities of TPB adults and nymphs. During late February to early March, a combination of 2,4-D, mecoprop-p, and dicamba was applied to the field margins in the treated areas to destroy all broadleaf plants. These herbicide applications were made approximately three to five weeks prior to cotton planting. Random cotton fields within each quadrant at each site were sampled with a sweep net at least bi-weekly throughout the growing season to estimate densities of TPB adults and nymphs.

Prior to herbicide applications, mean densities of TPB adults and nymphs along field margins were low. Following herbicide applications, mean densities of TPB adults and nymphs in the treated areas remained low and were not significantly different from mean pre-treatment densities in Mississippi (Snodgrass et al. 2005) and in Louisiana (Cook et al. unpublished). In Mississippi, mean numbers of TPB were significantly lower in cotton fields in treated areas (50% reduction) compared to cotton fields in non-treated area (Snodgrass et al. 2006). In Louisiana, there were no significant differences in mean TPB densities from cotton fields between the treated and non-treated areas. Plant bug densities in cotton fields during 2006 within the two areas were markedly different compared to 2004 and 2005, with fields in treated areas having substantially higher TPB densities than fields in non-treated area. In the Mid-South, non-crop areas including wooded areas and property enrolled in federal conservation programs, often occur in close proximity to cotton fields. Tarnished plant bug host plants that occur in these non-crop areas cannot be managed using the herbicide strategy evaluated in these studies. During 2004, the non-treatable areas represented 8% of the total treated area. During 2005, non-treatable areas represented approximately 7.5% of total area within the treated site. During 2006, the non-treatable areas represented 35% of total treated area. These studies indicate that managing winter-spring host plants of TPB can positively impact TPB management in cotton. However, the extent of area that cannot be treated within the crop landscape should be considered before employing this management strategy because presence and size of these areas may greatly influence results and value of this management strategy.

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