Taylorilygus pallidulus (Blanchard): A Potential Pest of Pine Seedlings

David B. South, Janusz B. Zwolinski, and Harry W. Bryan

Professor of *forestry and research associate, Auburn University School of Forestry and Alabama Agricultural Experiment Station, Auburn, Alabama and nursery supervisor, Bowater, Inc., Southern Division Woodlands, Chatsworth, Georgia*

Taylorilygus pallidulus *(Blanchard) is a cosmopolitan insect that has been found in pine nurseries in the United States, South Africa, and Guatemala. A caging study in South Africa demonstrated that this insect may be responsible for malformation of the terminal shoots (bushy tops)* of *young seedlings* of *maritime pine* (Pinus pinaster *Ait.). The morphological distortions of young pine seedlings are indistinguishable from those caused by* Lygus *spp. Due to its wide range,* T. pallidulus *is potentially a world-wide pest* of *conifer seedlings.* Tree Planters' Notes 44(2):63-67; 1993.

Pine seedlings with "bushy tops" were noticed at two nurseries in the southern Cape Province in South Africa in September 1991 by members of a U.S. tour group. These "bushy-top" seedlings exhibited multiple leaders, malformed shoots, and needle distortion. About 1% of Monterey pine *(Pinus radiata* D. Don) seedlings at the Witfontein Nursery showed such symptoms; 2% of slash pines *(P. elliottii* Engelm.), 4% of Monterey pine, and 5% of maritime pine (*P. pinaster* Ait.) at the Lottering Nursery showed such injury.

These "bushy-top" symptoms were identical to those caused by *Lygus spp.* on pine seedlings (Holopainen 1986, Schowalter et al. 1986, South 1986). Plant bugs similar to *Lygus spp.* were found at the Witfontein Nursery but these were later identified as *Taylorilygus pallidulus* (Blanchard) (voucher specimens were deposited in the U.S. National Museum of Natural History). As a result, a caging study was established at George, South Africa, to determine if *T. pallidulus* could cause young pine seedlings to form multiple leaders. Data from a trapping study conducted in Georgia, USA, were reviewed after examining the results from the caging study.

Materials and Methods

Caging study. This study was conducted at the Saasveld Forestry Research Center at George, South Africa. Soil from the Witfontein Nursery was sterilized and placed into 20 plastic trays of approximate dimensions 30 x 30 x 20 cm (height). Seeds of maritime pine and Monterey pine were each broadcast sown into 10 trays on September 30, 1991. Water was applied with sprinklers and humidity was kept high during germination. Each tray was placed in a separate cage. For each species, five random cages were used to release in sects. On November 5, 1991, 6 adult *T. pallidulus* were placed into each of the 5 cages containing Monterey pine. Another 6 adults per cage were added on November 12. On November 13, 5 adults were placed into each cage of maritime pine and another 2 adults were added on November 28. A total of 354 Monterey pine and 270 maritime pine seedlings were exposed to the insects. Control cages, where no insects were placed, protected 509 Monterey pine seedlings and 267 maritime pine seedlings. Differential germination percentages resulted in unequal seedling counts between the two species. Damage to seedlings was assessed on January 5, 1992. Each seedling was classified as either normal or showing signs of damage. Data were analyzed using a chi-square test.

Trapping study. In 1987, an insect trapping study was installed at the Carters Nursery in Chatsworth, Georgia, USA. Twelve white sticky traps (Rebelll®) were placed throughout the nursery (each location was usually further than 15 m from the end of the nurserybed and at least 15 m from an adjacent cover-crop or fallow field). Each trap was positioned in a bed of loblolly pine *(Pinus taeda* L.) seedlings and was hung from a bent piece of rebar so the bottom of the trap would be about 30 cm from the ground. Traps were monitored from May 20, 1987, until August 30, 1987. The traps were usually inspected on Monday, Wednesday, and Friday, and the number of tar nished plant bugs *(Lygus lineolaris* (Palisot de Beauvois)) and T. *pallidulus* were recorded at each inspection. Apart from anatomical differences, the species differ in color: adult *T. pallidulus* (figure 1)

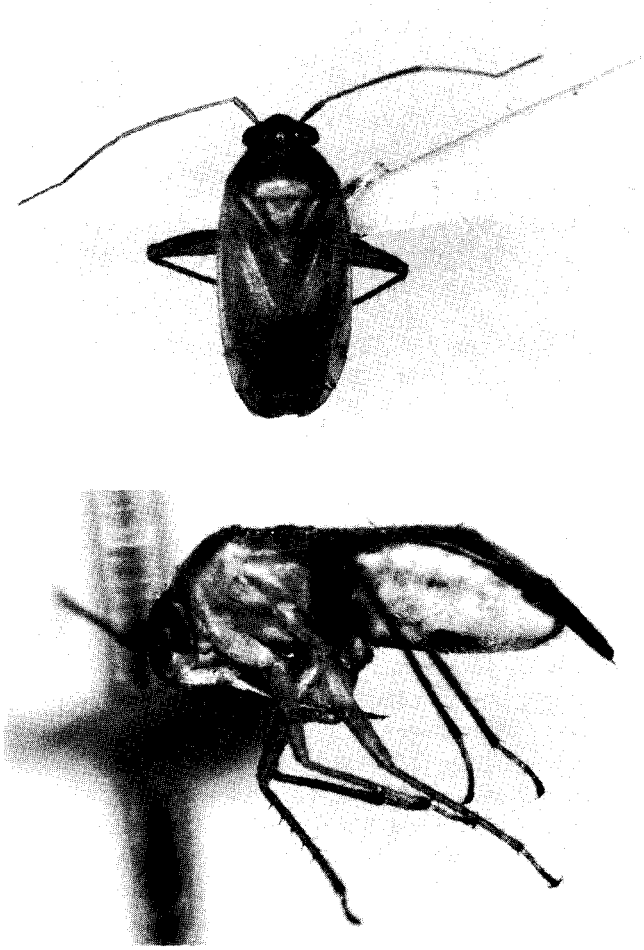


Figure 1-Taylorilygus pallidulus; *life* size = 4.5 to 5.0 mm (photograph courtesy of T.A. Henry, USDA ARS, Washington, DC).

are green whereas *L. lineolaris* are yellowish-green to brown. Once a week, the traps were cleaned with mineral spirits and retreated with Tangle-trap®. Seedlings were sampled by placing a counting frame (30 cm bed width) over the nursery bed and counting every seedling within the frame. The sampling was repeated six times at each insect trap. A total of 7,244 loblolly pine seedlings were evaluated for morphological distortion on July 10.

Results

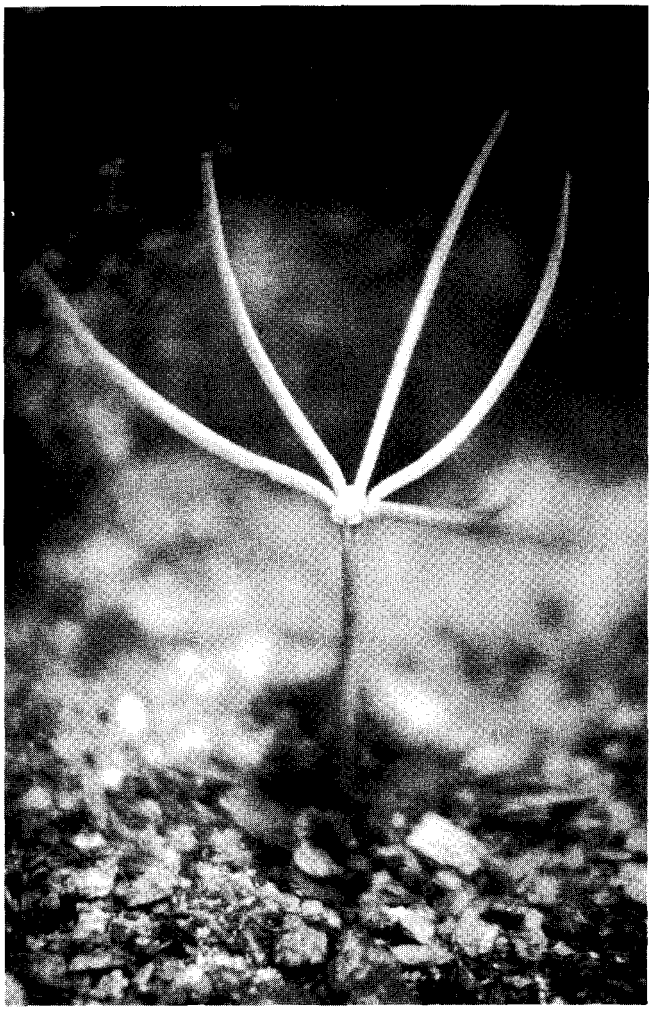
Soon after the insects had been introduced into the cages, the growing tip of the epicotyl of some seedlings died. These seedlings started sprouting multiple leaders with deformed needles. Damaged seedlings were very similar in appearance to those observed in September 1991 at the Witfontein and Lottering nurseries. Examples of malformed maritime pine seedlings associated with *T. pallidulus* infestation are shown in figure 2.

Monterey pine and maritime pine differed in their sensitivity to *T. pallidulus.* Only 2.8% of the exposed Monterey pine seedlings developed "bushy tops"; this was not significantly greater than 2.0% observed in the control cages. However, 27% of the maritime pine seedlings were malformed compared to 0.7% of the controls (chi-square = 77; $P < 0.001$). The reason for the difference between species is unexplained.

The results from the trapping study at the Carters Nursery in Georgia are shown in figure 3. The number of *T. pallidulus* caught exceeded the number of *L. lineolaris* caught during several periods during May, June, and July. On June 22, the average number of *T. pallidulus* recorded per trap was 11.9. Morphological distortion of loblolly pine began to appear during the first week of June, and by July 10, 9.7% of the seedlings were malformed.

Discussion

Before 1959, *Taylorilygus pallidulus* was better known under the name *Lygus apicalis* Fieber (now considered a junior synonym). Although several species of *Lygus* are known to cause multiple leaders in pine nurseries in the northern hemisphere (South 1991), no reports have been found on *T. pallidulus* being associated with damage to pine seedlings. This association is not too surprising because *T. cupressus* (Taylor) and *T. complexus* (Taylor) are known to feed on cypress (Taylor 1947). It has been previously assumed that "bushy top" seedlings of southern pines were solely due to injury from *L.* lineolaris (Bryan 1989; South 1991). However, *T. pallidulus* is also present in the southern United States (Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, and Texas) and can be associated with similar damage of pines. In some areas, the spring population levels of *L. lineolaris* will be greater than for *T. pallidulus* (Snodgrass et aL 1984), but population levels can be similar in the fall (Young and Lockley 1990). At the Garters Nursery in Georgia, both *T. pallidulus* and *L. lineolaris* were trapped in seedbeds. However, although 10% of the loblolly pine seedlings showed morphological distortion associated with these insects, it is difficult to say which species could be responsible for most damage.



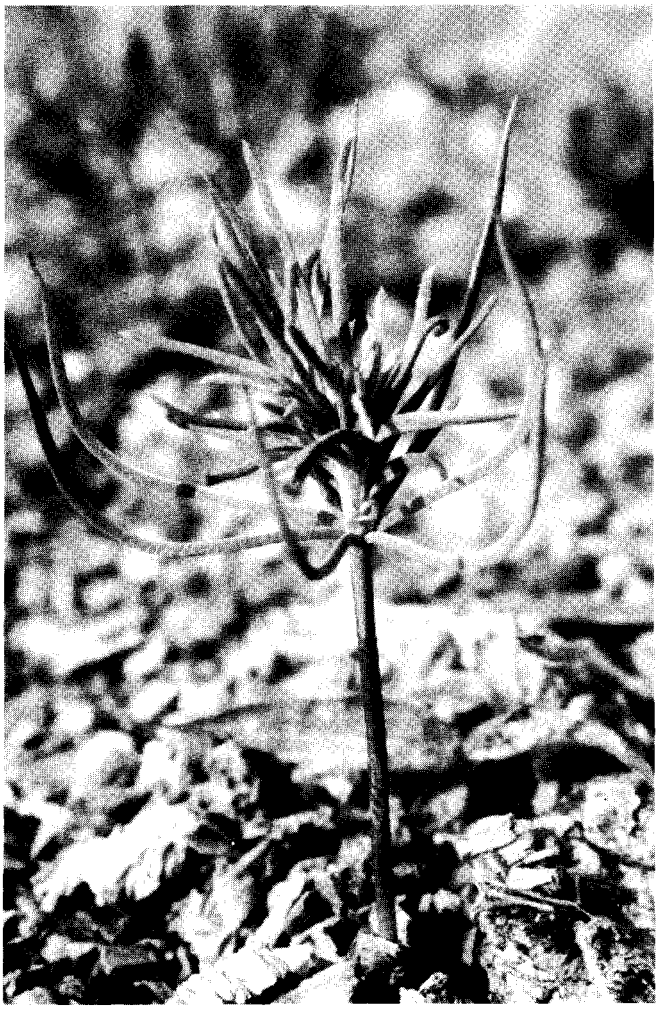


Figure 2-*Symptoms of damage associated with* Taylorilygus pallidulus *infestation on* Pinus pinaster.

T.Pallidulus is a cosmopolitan insect and can be found in Africa, Asia, Europe, South America, North America (Carvalho 1959), and Australia (Room and Wardhaugh 1977). Therefore, this insect is a potential pest of pines throughout the warmer parts of the world. For example, the senior author observed "bushy-top" seedling at a pine nursery in Guatemala in March 1992. *Pious oocarpa* Schiede seedlings with damage similar to that associated with *T. pallidulus* were observed at a nursery at Huehuetenago. The level of damage was approximately 1%. Several specimens of *T. pallidulus* were found feeding on weeds adjacent to the nursery. Therefore, managers of pine nurseries in the northern hemisphere should be aware that certain plant bugs besides *Lygus* may be causing shoot deformation. In addition, nursery managers in the southern hemisphere who have "bushy-top" pines should check to see if adults of *T. pallidulus* are feeding on newly germinated seedlings.

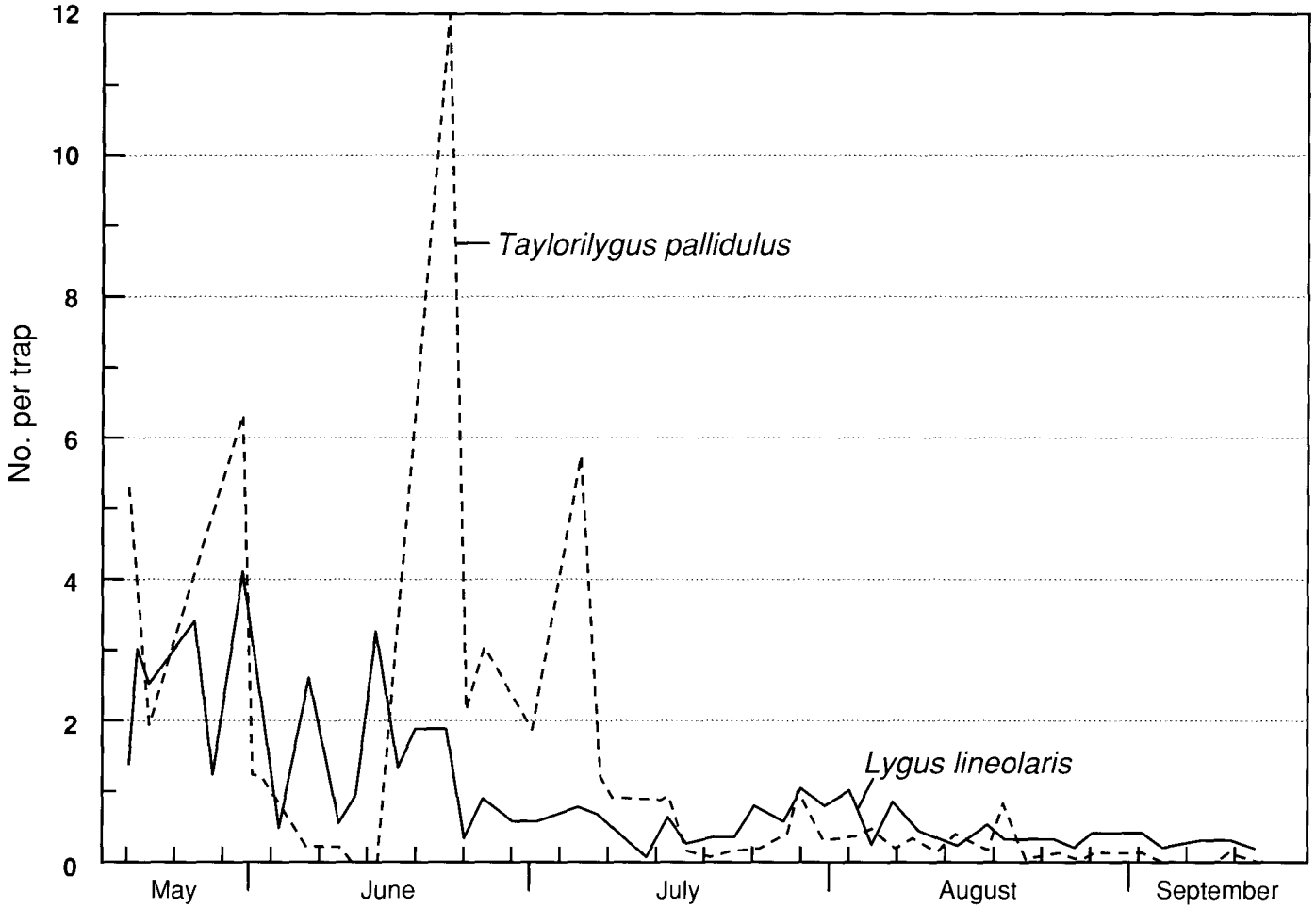


Figure 3-Recorded trapping of Taylorilygus pallidulus *and* Lygus lineolaris *at the Carters Nursery in 1987.*

Acknowledgments

The authors thank Thomas A. Henry, USDA Agricultural Research Service, Plant Sciences Institute, Systematic Entomology Laboratory, *c/O* the National Museum of Natural History, Washington, DC, for identifying Taylorilygus pallidulus collected from South Africa and Guatemala and supplying the photographs; and Lacy Hyche, Department of Entomology, Auburn University, for identifying insects collected from the Carters Nursery.

Literature Cited

Bryan, H. 1989. Control of the tarnished plant bug at the Carters Nursery. Tree Planters' Notes 40(4):30-33.

Carvalho, J.C.M. 1959. Catalogue of the Miridae of the world: Part IV. Subfamily Mirinae. Arquivos do Museu Nacional, Rio de Janeiro. 48(4):1-384.

Holopainen, J.K. 1986. Damage caused by *Lygus rugulipennis* Popp. (Heteroptera, Miridae) to *Pinus sylvestris* L. seedlings. Scandanavian Journal of Forest Research 1:343-349.

Room, P.M.; Wardhaugh, K.G. 1977. Seasonal occurrence of insects other than *Heliothis spp.* feeding on cotton on the Namoi Valley of New-South-Wales Australia. Journal of the Australian Entomological Society 16(2):165-174.

Schowalter, T.D.; Overhulser, D.L.; Kanaski, A.; Stein, J.D.; Sexton, J. 1986. *Lygus hesperus* as an agent of apical bud abortion in Douglas-fir nurseries in western Oregon. New Forests 1:5-15.

Snodgrass, G.L.; Scott, W.P.; Smith, J.W. 1984. Host plants of *Taylorilygus pallidulus* and *Polynnerus basalis* (Hemiptera: Miridae) in the delta of Arkansas, Louisiana, and Mis sissippi. Florida Entomologist 67(3):402-408.

South, D.B. 1986. The tarnished plant bug can cause loblolly pine seedlings to be bushy-topped. Note #27. Auburn, AL: Auburn University-Southern Forest Nursery Management Cooperative. 4 p.

South, D.B. 1991. Lygus bugs: a worldwide problem in conifer nurseries. In: Sutherland, J.R.; Glover, S.G.; eds. Proceedings, 1st IUFRO Workshop on Diseases and Insects in Forest Nurseries. Info. Rep. BC-X-331 Victoria, BC: Forestry Canada: 215-222.

Taylor, T.H.C. 1947. Some East African species of Lygus, with notes on their host plants. Bulletin of Entomological Research 38:233-258.

Young, O.P.; Lockley, T.C. 1990. Autumnal populations of ar thropods on aster and goldenrod in the delta of Mississippi. Journal of Entomological Science 25:185-195.