

Biological Control of Kudzu

Kudzu, *Pueraria montana* var. *lobata*, was introduced to the United States as an ornamental, and was later widely planted for erosion control. However, it soon became unmanageable and escaped cultivation, invading wastelands, road and power line rights-of-way, and natural and industrial forest sites. Sometimes called the “weed that ate the south,” kudzu is now thought to be one of the most harmful non-indigenous plant species in the United States. Kudzu control through mechanical and/or chemical means is difficult, expensive, and often not effective. Therefore *P. montana* was considered a suitable target for biological control. Researchers who surveyed kudzu in China reported an abundance of natural enemies feeding on the plant there. Systematic survey sites to look for insects feeding on kudzu were established in China in 1999, and several insect species have been identified as potentially useful as biological control agents in the United States (Sun et al. 2006).

Testing needs to be conducted on crop plants and on native species related to kudzu, to determine whether it would be safe to release these insect species. Kudzu is in the Family Fabaceae, tribe Phaseoleae, subtribe Glycininae. Although there are no congeners of kudzu in the continental United States, there are several native species in the subtribe Glycininae (including American hog peanut, *Amphicarpaea bracteata*) as well as an important crop, soybeans. In addition, a number of species in the tribe Phaseolinae are of ecological and/or economic importance (Birdsall and Hough-Goldstein 2004).

Gonioctena tredecimmaculata (Coleoptera: Chrysomelidae), a voracious leaf beetle, was sent from China in 2004, and successfully reared on kudzu foliage in the quarantine facility at the **USDA/ARS Beneficial Insects Introduction Research Unit** [http://www.ars.usda.gov/main/site_main.htm?modecode=19260000]. Adult no-choice tests were conducted on the following economically important plants: soybean, bush bean, pole bean, cowpea, and jointvetch. Adults ate no cowpea or jointvetch, and small amounts of bush and pole bean foliage; all adults died on these diets except for 2/12 (17%) on pole bean. However, substantial soybean foliage was consumed, and adult survival was high (79%) on soybean. Larval no-choice tests were conducted on soybean, bush bean, and cowpea. All larvae died within 3 days on cowpea and bush bean, but 29% of larvae given soybean foliage survived to the adult stage.

Both soybean and kudzu plants that were grown in the greenhouse appeared to be quite different from plants grown in the field. Therefore additional experiments were conducted to determine whether *G. tredecimmaculata* might refuse to feed on soybean from the field even though it fed on greenhouse-grown foliage. However, the insects did not distinguish between greenhouse and field-grown plants even though differences were found between the two types of foliage in trichome number, water content, leaf toughness, nitrogen content, and flavonoid content.

A second insect, the curculionid *Ornatalcides* (*Mesalcidodes*) *trifidus* was sent from China in June 2005. Adult weevils were tested on the following economically important crop or ornamental plants: bean, cowpea, jackbean, pigeonpea, pea, *Erythrina abyssinica*,

Hyacinthbean, alfalfa, and soybean. Weevils did not feed at all on any of these hosts except for soybean; however, adult feeding on soybean caused death of potted plants. We were not able to rear this insect past the early larval stage on detached kudzu foliage or on potted kudzu or soybean (larvae feed internally in stem galls in the field).

Adults of both *G. tredecimmaculata* and *O. trifidus* also ate the native legume, *Amphicarpaea bracteata* (American hog peanut). Larvae of *G. tredecimmaculata* also ate hog peanut foliage, and 50% (4/8) survived to adulthood fed only on this plant.

Conclusions

To date neither *G. tredecimmaculata* nor *O. trifidus* can be considered safe for release, since both fed on soybean and American hog peanut in the quarantine facility in no-choice tests. We hope to obtain additional species from China to continue the search for an insect that is sufficiently host-specific.

References Cited

Birdsall, J. and J. Hough-Goldstein. 2004. [Proposed Host Specificity Plant List for Testing Potential Biological Control Agents of Kudzu](#). Submitted to USDA APHIS-PPQ Technical Advisory Group for Biological Control Agents of Weeds (TAG Petition No. 04-05).

Sun, J., Z. Liu, K.O. Britton, P. Cai, D. Orr, and J. Hough-Goldstein. 2006. [Survey of phytophagous insects and foliar pathogens in China for a biocontrol perspective on kudzu, *Pueraria montana* var. *lobata*](#) (Willd.) Maesen and S. Almeida (Fabaceae). *Biological Control* 36: 22-31.