Plant Disease and Insect Advisory

Entomology and Plant Pathology
Oklahoma State University
127 Noble Research Center
Stillwater, OK 74078

Vol. 6, No. 19 http://entoplp.okstate.edu/Pddl/ July 5, 2007

How might the 100 year flood or June rainfall event affect pecan weevil emergence?

Phillip Mulder, OSU Extension Entomologist

A few folks have called our offices asking this question about weevil emergence in a flood year. The question is a good one and unfortunately, we don't have any concrete answers only anecdotal stories. Most of the literature dealing with soil permeability and weevil emergence discusses emergence after drought conditions and the influences of moderate rainfall, not flood conditions. The expectation is that weevil emergence and numbers may be down based on widespread flooding of bottomland areas where pecan is typically grown. Hinrichs and Thomson (1955) were the first to gather data concerning amounts of rainfall and subsequent weevil emergence. Over a span of four years in Oklahoma they found that emergence occurred earlier in the season following rainfall in late July and early August. Later, data from Raney et al. (1970) confirmed the 1955 data and they stated that "weevil emergence increased 3-4 days after a 1-2 inch rainfall." Much subsequent work in Oklahoma, Louisiana and Texas has determined that while rainfall may partially determine the emergence patterns of adult pecan weevil, ultimately the words of Harp (1970) stated it best when he suggested that "the pecan weevil had evolved in perfect synchrony with the fruit maturity of its host and emerged each year accordingly." Therefore, it appears rainfall may be linked to emergence of weevils but only as it affects soil permeability in late season.

With Oklahoma experiencing the wettest June in 99 years, the resounding concern, or hope for many, is that excessive moisture has somehow created an unfavorable environment for weevil survival. Since many of the flooded areas have retained water for several weeks many folks might assume that weevil emergence could be set back. This is unlikely, but weevils may begin emerging early, thereby affecting post emergent longevity before pecans become suitable for oviposition. Most pecan growers understand that pecan weevils burrow into the soil profile about six inches below the surface; however, many do not realize what happens once they arrive in that temporary holding area. After larvae exit the tree, by chewing through the damaged nuts, they burrow into the soil to the desired depth and begin to construct an almost impenetrable earthen cell. Within this cell they will remain as larvae, pupae and later adults without feeding until environmental cues and years of co-evolutionary experience tell them it is time. Post-feeding 4th instar larvae and pre-reproductive adults have greater fat body content, undeveloped reproductive organs, and an 8-fold decrease in oxygen consumption compared to active stages. These

characteristics have led to many difficulties in rearing this insect in the laboratory, where a constant supply of weevils could provide year round specimens for study. This does, however, tell us that diapausing weevil larvae, pupae and adults are well protected, do not feed and can essentially sip oxygen to preserve themselves and their air supply.

Anecdotal evidence from growers in Texas have shown continued weevil emergence after bottomland trees were standing in water for a two month period. No suggestions were provided on quantifying any reductions in weevil numbers after these flood events. Similarly, in Oklahoma, heavy rainfall which substantially flooded clay bottom soils in the Haydonville area during studies conducted in 1999-2001 have experienced subsequent weevil populations that would rival any other typical year. These insects are indeed the denizens of the flood plains, where pecan is typically a native species.

Dr. Richard Grantham
Director, Plant Disease and Insect Diagnostic Laboratory

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Robert E. Whitson, VP, Dean, and Director for Agricultural Programs, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Dean of Agricultural Sciences and Natural Resources.