and graphs explaining how the dollars are allocated. The portion of the budget alloted to urban forestry is comparatively small but we must convince the public that even these funds are wisely and efficiently spent.

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NEW APPROACH TO INSECT CONTROL[1]

by David G. Nielsen

Pesticides have come under increasing attack as environmental pollutants during the 1970's. Concern for potentially harmful long-range side effects from certain insecticide usage led to a surge in State and Federal support for research programs designed to discover and develop alternative methods of insect control. Loss and threat of loss of residual insecticides through legislation, and poor performance of these materials against some economically important insects, necessitated evaluation of other classes of insecticides and new approaches to insect control.

One major area of research is with sex pheromones, naturally-occurring chemicals which insects release to attract mates. A number of borers of woody ornamentals rely on such pheromones to facilitate mate location. These insects, which construct galleries in living tissues of woody plants, are the most destructive pests of woody ornamentals for which we do not have adequate control recommendations.

A research program was initiated at the OARDC in 1971 to improve borer control practices. A peculiar group of borers that mimic wasps, the clearwing moths, was chosen for this study because: (1) several of its members are serious pests of nursery and landscape plants (they are also pests of cucurbits and grapes); (2) adequate populations were available for study; and (3) they are day fliers, facilitating observation of behavioral patterns.

The first species studied was the lilac borer, *Podosesia syringae* (Harris), which was reported to fly during June in Ohio. During 1971-72, it was confirmed that this insect does emerge from lilac and ash in spring but that it or a very similar moth also emerges from ash in late summer (late August through September).

In 1971, we discovered that virgin female lilac borers emit a sex attractant when they are ready to mate. The chemical or chemicals emitted attracts males of its own kind (species) and males in at least three other genera of the clearwing moth family. Subsequently we have discovered that many clearwing moths respond to the same or similar sex attractants. Discovery of this phonomenon, sometimes called cross-attraction, means that a control method utilizing a sex attractant for one clearwing moth might be adaptable for controlling several other economically important borers.

Cooperative studies with the United States Department of Agriculture Insect Attractants, Behavior, and Basic Biology Research Laboratory located at Gainesville, Florida, have revealed that a sex pheromone isolated from peachtree borer, *Sanninoidea exitiosa* (Grote and Robinson), is attractive to lilac borer; dogwood borer, *Synanthedon scitula* (Harris;) an oak borer, *Paranthrene simulans* Lugger; and other clearwing moths. This attractant and related synthetic sex pheromones are currently being produced commercially in Ohio for use in research programs throughout the United States and abroad.

While one isomer (chemical form) of the synthetic sex pheromone is the best attractant for a particular species, another isomer, or a combination of two or more isomers, may be best for attracting another moth. We are currently investigating formulation of different isomers and combinations of isomers to determine the best combinations for borers that attack woody plants. We are also evaluating trap design, since we know

[1] Reprinted from *New Horizons*, 1975 (Horticultural Research Institute, Washington, D.C.)

that different moths have different flight habits and premating behavioral patterns.

The goal of this pheromone research is to develop an inexpensive trap containing synthetic sex attractant that can be purchased by producers, consumers, and pest control operators to trap male moths. If enough males can be captured before they mate, reproduction will be curtailed, and the infestation will be reduced. At the very least, it is hoped that pheromone traps can be employed to catch males, thereby signaling the time when insecticidal sprays should be applied to most effectively reduce the borer population. This technique is now being implemented in tree-fruit orchards to improve insect control while reducing the number of sprays and amount of insecticide needed to produce quality fruit.

During the course of these pheromone studies we have also accumulated insecticide evaluation data to support a label for Dursban 2E for control of lilac and ash borer. This usage has been approved by the Environmental Protection Agency (EPA) and awaits implementation by the insecticide industry. This insecticide has proven safe and effective against turf pests and should be a valuable new tool for controlling clearwing moth borers. When it is labeled and pheromone traps are available to time its application lilac and ash borers should no longer be serious problems in nurseries or the landscape.

Another potential application for pheromone is to permeate the mating atmosphere (tree canopy and surrounding air space) with pheromone so males are unable to locate a point source of attractant (i.e. the calling female). Other researchers working with agricultural and forest insect pests are trying to perfect this technique.

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TRANSPLANTING LARGE TREES[1]

by E. Ed Irish

My remarks today will be on the transplanting of trees in a 15 inch diameter range. Trees of this size are not available from most nurseries. It then becomes necessary to scout for native trees in the rural areas, vacant lots, old estates, etc. This limits the varieties you have to select from to offer your clients for potential plantings. As we travel throughout the year, we keep an eye peeled for suitable transplantable trees. We also have let it be known to other people in the landscape field that we are always interested in a good, sound, full, well-shaped tree.

The week before Christmas (December, 1972) we moved a 17 inch dbh sugar maple from Fairfield, Indiana to Grosse Pointe Farms, Michigan for a client. This tree was called to my attention by John Duling of Muncie, Indiana in the late spring. We examined this maple, took pictures of it, and showed these pictures to the client. She liked the tree, so it was moved.

In Michigan it has become difficult to move large trees due to road restrictions and permit requirements. The present restrictions allow 13½ feet high, 12½ feet spread, and 65 feet long. We do not haul these trees on our own mover on the road due to weight restrictions per axle and tires, so we load the mover and tree onto a lowboy.

This lowboy has a detachable gooseneck and with a few planks used to build a slight ramp, we can pull the tree mover up onto the trailer. The tree is pulled on top first so the branches overhand the rear of the trailer. Once the tree mover is on the trailer far enough to permit reattaching the gooseneck, the mover is secured with chains to the trailer. The plant ramp is piled on the trailer and the gooseneck is reattached. When the red flags are tied on the sides and ends of the tree, and the tractor hooked to the trailer, the tree is ready for the road.

[1] Presented at the 51st Annual International Shade Tree Conference in Detroit, Michigan in August 1975.