Parks Department has not said this is going to be the case at all. They're not anticipating spending more on labor.

WTT: What is your involvement with the 2,4-D controversy in Madison?

Dr. R. Gordon Harvey: I did my research Ph.D. thesis on 2,4-D. I had to become familiar to an extensive degree on the literature relating to it. Since then, I've had a research student do a paper on it. I teach a weed control course at the university. I probably have as much familiarity with 2,4-D as anyone in the community. Thus when the Vietnam veterans seek to have it banned, I use my experience and familiarity to establish a degree of logic and scientific perspective on the controversy.

Testimony was limited to three minutes. The uninformed has time to cry and be emotional. A knowledgeable scientist must give his qualifications and describe a complicated issue in the same three minutes. The city does not seek contacts as does EPA.

WTT: How do you feel about the ruling by the City Council?

R G H: I have serious misgivings about the conduct of the City of Madison's decision-making process. When the controversy arose, the Department of Health had a hearing. They published its notice on the back page of the newspaper. Only those proponents of the ban who were informed could attend. I saw the notice and was the only one to attend against the ban. Unlike EPA who seeks contacts, the Department of Health in the city depends solely on hearings of people in the city. At the hearing on Tuesday (Jan. 27, when the final vote was given), the City Council questioned their own ability to make decisions regarding hiring of employees by the city. Yet no one questioned their ability to make decisions of a scientific nature regarding the use of a pesticide when their only information came from a public hearing. Testimony was limited to 3 minutes per person. A scientist working for years on a pesticide and familiar with the extensive literature available has to introduce himself, give his qualifications, and review the issue. It's almost impossible. The uninformed has time to cry and be emotional. I find the whole procedure inappropriate for governmental action. They must familiarize themselves with the scientific literature, not just listen in a hearing room, not just base their response on emotion alone.

The action taken has minimum impact in terms of a deliterious effect. I teach in my class that no herbicide or pesticide should be used needlessly. The City Parks Department insisted that they be allowed to continue use of 2,4-D in cemeteries, golf courses, and other areas considered from their experience. But in a general park area where children play, people walk around, they felt there was no reason they couldn't reduce the use there, modify use by changing cultural practices, such as mowing, fertilizing. They felt they

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2,4-D *from page 51*

could stop using it for a few years while it is being studied. Even if weed problems become severe, if bee stings become severe, they're locked into little flexibility in countering these problems. The principle of using it judiciously was good but the interpretation was probably a little too strong and reduced flexibility.

Also, the City Council requested that the park put up signs for 48 hours to indicate use. I don't think that's unreasonable; I think it's unnecessary. If people want to be informed so they don't come near it, Okay.

WTT: Are you afraid the ruling will have ramifications against use in the county and state?

R G H: A full moratorium could have. Any time decisions like this are made for political expediency rather than scientific review, other communities tend to follow this, thinking that there was a scientific background. There is always the fear that this could have fallout in other areas.

City and county governments are based upon aldermen and elected officials, positions which are part-time and outside their normal profession. They don't have the time to seek out officials on their own. They have a hearing process to get the story.

"Obviously, some home-owners relish nice green turf without yellow flowers."

WTT: What is 2,4-D used for in the parks?

R G H: Dandelions are the most obvious. Also, various species of thistle. It has less effect on chickweed and white clover. Since there is no scientific basis that to use it is hazardous and we have 35 or 36 years of safe use history, it's not logical to switch to MCPP or 2,4DP, which are also used. There's no reason to think they're any different. White clover is slicker, causes more falls, and stains more than bluegrass turf. A phenoxy complex can successfully control both. I don't want to encourage the widespread use of dicamba because of the possible greater hazard with drift and nearby shallow rooted shrubs. It is absorbed easily by roots.

Typical drift damage to deciduous tree more likely to occur with some substitute chemicals (above). Roadside use is still permitted to prevent weeds spreading to farm fields (right).

The noxious weed law in Wisconsin requires that Canadian thistle, leafy spurge, and field bindweed must be controlled. Phenoxies are not equally controlled. Unless the state law is amended, the city would be in violation of the law. It appears that 2,4-D was the best control.

WTT: Are there any alternatives?

R G H: The only alternatives — the law says they must be prevented from going to seed — are mowing, which is very costly, and dicamba, but if the weeds are by shrubs they could be damaged. It causes problably 10 times more drift damage than 2,4-D. Those are the only major alternatives.

WTT: Are there any other reasons why 2,4-D should be used?

R G H: Aesthetic aspects as well. Obviously some homeowners relish nice green turf without yellow flowers. If growing uncontrolled in city parks, homeowners will have more problems controlling them. A small percentage were treated annually as it was. Even noxious weeds were not always controlled. Poison ivy and ragweed could increase without the use of herbicides. They can be controlled by mowing and hand pulling, but I'd like to use as many alternatives as possible.

WTT: Do you think there's reason to fear the use of 2,4-D?

R G H: There is no evidence at the present time that would suggest the least hazard presented to the public for using this material. We've used it for 36 years — farmers, foresters, and city employees around the country. Close to 2 billion pounds have been used. It's one of the most widely used pesticides ever and there has been no demonstration of adverse effects from it. To my knowledge, seven cases come to mind in which there's been nervous disorder to someone. They frequently were using other materials and other factors were involved — diseases, contaminants, and psychosomatic conditions. Because of these seven cases though, the EPA did tests on nervous systems. EPA last April had indicated no reason to take any action to stop 2,4-D's use, but because the herbicide was developed so long ago, some of the research did not meet some of the currently accepted laboratory practices. They asked manufacturers to do studies on carcinogenicity, reproductive problems, and other disorders. A number of studies had been done on carcinogenicity and these did not show any problems, but because of insufficiency in the technology they wanted them re-

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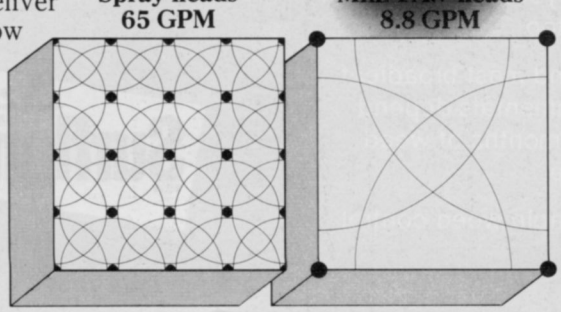

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KENTUCKY RESEARCH REVEALS GREENBUG TURFGRASS PREFERENCES

By D.W. Jackson, K.J. Vessels, and D.A. Potter, department of Entomology, University of Kentucky, Lexington, KY.

The greenbug, *Schizaphis graminum* (Rondani), has become an important problem of the turf industry within the last 10 years (1). Although this aphid is well studied as a pest of sorghum and small grains, little is known about its biology or habits on turfgrass. Many important questions concerning the aphid's overwintering site, its feeding preferences, and its reasons for attacking only certain lawns remain unanswered.

Damage

Greenbug feeding injury on turfgrass foliage shows up as yellow or rust-colored spots with necrotic centers, caused by toxic secretions injected into the plant tissue and from withdrawal of chlorophyll at the feeding sites. Translocation of the aphid's salivary toxins within the plant may also weaken the root system. Heavily infested turf may harbor 5,000 or more aphids per square foot, and will develop a characteristic rust color and finally turn brown (2). Greenbug damage nearly always begins around the base of trees, but often spreads into sunny areas as well. Our observations indicate that injury on home lawns is most severe in areas that are under moisture stress, while low-lying areas are less likely to be affected.

Research

In research at the University of Kentucky, we studied the feeding preferences, survival, and reproductive rate of greenbugs on nine common cool and warm season turfgrasses. We also tested the aphid's ability to survive on nine frequently encountered lawn and roadside weed species. Results showed that 'Kenblue,' 'Vantage,' and 'Adelphi,' the three Kentucky bluegrass cultivars tested, were all highly suitable hosts for the greenbug. Since these cultivars differ widely with respect to both their genetic and morphological characteristics, it is doubtful that existing Kentucky bluegrass cultivars with appreciable levels of resistance will be found. Although previous reports of greenbug activities on turf suggest that the aphid will feed and reproduce only on Kentucky bluegrass, we found that both 'Ky 31' tall fescue and 'Jamestown' chewings fescue will support rapid aphid buildups in the greenhouse. Aphids did not survive or reproduce on ryegrass, bentgrass, zoysiagrass, or bermudagrass.

The following weed species were screened as potential alternative hosts for the greenbug:

Common dandelion	*Taraxacum officinale* (Weber)
Broadleaf plantain	*Plantago major* L.
Buckthorn plantain	*P. lanceolata* L.
Ground ivy	*Galeochoma hederacea* L.
Pigweed	*Amaranthus* sp.
Wild strawberry	*Duchesnea indica* (Andr.) Focke
Large crabgrass	*Digitaria sanguinalis* L.
Violet	*Viola* sp.
Yellow wood sorrel	*Oxalis stricta* L.

In our studies, greenbugs failed to survive or reproduce on any of the nine grassy or broad-leaved weeds tested, suggesting that these plants do not serve as reservoirs from which greenbugs could reinfest a lawn.

Future Research

The recent alarming increase in greenbug outbreaks on home lawns suggests that this insect may have developed a new association with turfgrasses. Although it is possible that a new greenbug biotype or strain has evolved which prefers turfgrass over other hosts, there is evidence that certain high maintenance practices, such as overuse of insecticides and fertilizers, may be changing the physiology of the turfgrass habitat so as to make it more suitable for the greenbug. Observations during the 1979-1980 seasons indicate that greenbug outbreaks nearly always occur on well maintained, intensively managed lawns. It is apparent that additional research pertaining to the effects of lawn chemicals and high maintenance programs on greenbug popula-

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Although greenbug injury generally appears first in shaded areas under trees, heavy infestations may severely damage an entire lawn.

Patches of healthy grass in greenbug infested bluegrass lawns indicate the potential for resistant turfgrass species.

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Greenburg *from page 55*

tions will provide important information for the turf industry. Discovery of the greenbug's overwintering site may reveal a weak link in the aphid's life cycle that is vulnerable to control. The possibility that greenbug damage can be minimized by cultural practices such as timely irrigation, seeding with resistant lawngrasses, or use of a bagging mower should also be investigated.

Literature Cited

(1) Niemczyk, H. 1980. New evidence indicates greenbug overwinters in north. Weeds, Trees and Turf 19(6):64.
(2) Street, J. R., R. Randell, and G. Clayton. 1978. Greenbug damage found on Kentucky bluegrass. Weeds, Trees and Turf 17(10):26.

Weed Control *from page 21*

bined to provide a broader spectrum of control plus this combination has the advantage of using dicamba at a lower rate than when it is used alone. This combination should be applied at the rate of 1.0 pound ai/A, 2,4-D + 0.5 pound ai/A MCPP + 0.10 pound ai/A dicamba. Fall and spring are the best times for control with early fall being preferred especially when turf stands are contaminated with later germinating summer annuals (particularly spurges and *Oxalis).*

Some broadleaf weeds require more specific treatment. Creeping speedwell *(Veronica filliformis)* can be controlled with DCPA 75 W applied in May at 12 pounds ai/A. The granular formulation is not effective. Control using the 75 W often takes as long as three to four weeks to occur. Once the chemical begins to work, the level of control should be nearly 100 percent. DCPA 75 W is not currently recommended for control of any other speedwells.

Oxalis and wild violet are also difficult to control since silvex cannot be used. The combination of 2,4-D and 2,4-DP at 1.0 pound of ai/A from each has provided good control of *Oxalis.* Wild violet control from this combination is not as good as for *Oxalis.* Spring application is the best time of the year for wild violet control.

Regardless of the broadleaf weed control approach being used, treatments should be made only when soil moisture is adequate to support vigorous weed growth. Avoid spray drift onto sensitive plants, clean equipment properly after application, and dispose of empty pesticide containers in an approved manner. **WTT**

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PREVENTION OF TREE DISEASES INCLUDES ROOT GRAFT BARRIERS

Preventative measures remain the dominant control method for many diseases of trees and ornamentals. Selecting resistant varieties, removing diseased individuals, and planting many varieties in low proportions at safe distances apart are a few of the preventative measures used today.

Another preventative measure, not quite as common but equally important, is blocking transmission of disease by root grafts. This can be an effective measure where susceptible species are planted within root range of each other, generally within 35 to 50 feet. A mechanical or chemical barrier must be created between infected and healthy trees.

Dr. Jay Stipes, a plant pathologist at Virginia Tech maintains the best way to control Dutch elm disease is to prevent it. Stipes has served as a DED consultant to the U.S. Department of the Interior and state forest services across the country. "Severing root grafts is not always the answer, but on campuses, city blocks, golf courses, anywhere elms are planted in rows within close proximity, it cannot be overlooked," Stipes says.

Good sanitation, radical tree surgery, and timely applications of foliar insecticides also must be used to control DED, he says.

"When Dutch elm disease is transmitted above ground by bark beetles, radical tree surgery can often save the tree from further destruction," Stipes explains. "It's like cancer with a human being—you may have to remove a breast or a limb to save the person's life. It's the same way with trees.

"If a tree contracts Dutch elm disease by a natural root graft, however, there's no way to stop it. That's why it's so important to prevent the disease from spreading to other healthy trees."

Removing an infected tree will not eliminate the danger, he says. A mechanical or chemical barrier must be established to protect healthy trees as soon as a diseased tree shows signs of infection. "The strategy should be to sever the root grafts first, and then remove the diseased tree about two weeks later," he says.

Groundskeepers have two options available for severing root grafts mechanically. A trench 30 inches deep can be dug midway between diseased and healthy trees.

"The mechanical approach is probably the surest way to get the job done," Stipes says, "but not always the easiest. There are many instances when a fumigant may be preferred."

Groundskeepers electing to fumigate should have a pesticide applicator's license, Stipes says. Otherwise a professional arborist should be hired.

To stop DED with the fumigant Vapam, Stipes says groundskeepers must first drill 3/4-inch holes about 15 inches into the ground and six inches apart. This may be done with a soil auger, power drill or other suitable tool. The line should be at least 10 feet from the healthy tree, and extend well beyond the infected tree's drip line.

Because some apparently healthy trees may already be infected, it's usually a good idea to make a second fumigation line beyond the second tree, Stipes says.

A solution of one part Vapam and three parts water should then be poured slowly into each hole to within two inches of the soil surface. The hole should be sealed with dirt to trap the vapors and minimize grass kill.

Dr. Stipes stands where a diseased elm was recently removed and points at a healthy elm. A soil fumigant was used as a barrier to root graft transmission two weeks prior to removal of the diseased tree.

The fumigant soaks into the soil and kills tree roots in the immediate area. Thus, the underground root graft is broken and disease-causing sap cannot spread to healthy trees. Stipes cautions that Vapam will kill turf growing along the fumigation line, but this can be reseeded or sodded two weeks after the treatment.

Diseased trees should be removed two weeks after fumigating. A disease-resistant tree may then be planted in its place. Groundskeepers should consult their cooperative extension office for local tree planting recommendations, Stipes says. Always follow instructions on the pesticide label. **WTT**


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