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white 1½- to 2-in. flowers, borne in terminal panicles, are particularly effective, giving a white carpeted feeling to the entire area. In addition to the profuse, fragrant flowers of late summer and early fall, the seeds can be somewhat effective. But this aggressive vine must be kept in check.

Big-Petal Clematis (*C. macropetala*), a hardy native of Northern China through Siberia, is a subdued vine, reaching 10 ft. in height. It flowers during the spring and, therefore, the flowers are borne on previous season's wood. These blue 2- to 4-in. diameter flowers can be particularly interesting—a unique addition in the gardens, growing on yew branches or old pine roots, being effective early in the season. Wyman suggests the flowers are somewhat distinct as the center of each blossom is filled with numerous petal segments, giving it a rather dense texture.

Pink Clematis (*C. montana rubens*) is a vine, reaching 24 ft. in

height. The 2- to 2½-in. rosy-red to dull pink flowers initially appear in May and bloom through much of the summer. This native of Central to Western China was introduced by E.H. Wilson. It flowers on previous season's wood but can be a hardy, exciting addition for much of the summer.

Another native, Virgin's Bower (*C. virginiana*), is a tight vine, growing 12 to 20 ft. in height. It has bright green foliage throughout the summer. The white flowers which are borne on large panicles become effective and remain effective from July through September. This vine is native from Georgia through Nova Scotia.

Italian Clematis (*C. viticella*), with its rosy-purple flowers, 1½ to 2-in. in diameter, is effective from June through August.

Some of our favorite varieties include 'Henry' - clear white, 'The President' - a medium blue, 'Piccadilly' - pale violet, *jackmanii* 'Superba' - a dark, rich red to violet, and 'Nelly Moser' - a pink clematis.

There are several nurseries who have been leaders in the development of clematis. In the U.S., Steffan's Nursery of Fairport, New York, offers many of the species and cultivars of clematis which are hardy throughout the Northeast. In the United Kingdom, the nursery "Treasures of Tenbury," managed by Raymond Evison, is a standout. They not only have the most current techniques as far as propagation and production are concerned, but he has recently completed a visit to China, looking for new species for introduction and hybridizing which may add to the many offerings of this rich, colorful vine.

Clematis, when used in companion with other plants, can be an excellent addition to our already varied landscape without increasing maintenance costs. It can add color in a period when we don't have color and be relatively low maintenance. Clematis is a major group of vines which is almost unknown in the United States. **WTT**

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**20th
ANNIVERSARY**



Robert Moore has been president of Aquatrols since 1958. His daughter **Demie** is responsible for sales and marketing.

AQUATROLS CORPORATION OF AMERICA BUILDING ON A RECORD OF SUCCESS

For the past 25 years, Robert Moore, the developer of Aqua-GRO non-ionic wetting agent, has manned his Aqua-GRO exhibit at countless turf and horticultural industry trade shows. And he's preached the benefits of wetting agents before more industry meetings than he cares to remember. It has taken a while, but his efforts, on behalf of Aquatrols Corporation of America, are finally paying off.

Moore has been president of Aquatrols, a Pennsauken, New Jersey-based company that manufactures and markets Aqua-GRO, since 1958. Over the years, Moore and a handful of other wetting agent supporters have succeeded in influencing a large number of turf and horticultural professionals

Continues on page 46

The new Ditch Witch 1420:

DON'T SETTLE FOR LESS IN A STEERABLE, WALK-ALONG TRENCHER.

If you're investing in a 14-HP-class steerable walk-along trencher don't compromise. You deserve the best; the Ditch Witch 1420. The only steerable trencher in its class with a diesel option that goes through a 36-inch gate.

The 1420 can dig trench 5 feet deep*. Its hydrostatic ground drive can be fine tuned for slow trenching speeds, or stepped up to 2 MPH for movement around the job site. The digging boom is raised and lowered hydraulically, while the digging chain drive is mechanical for efficient use of power.

The 1420 is easy to operate. All controls are accessible from one location, including a single lever that operates steering, ground drive direction and speed. And since the drive wheels are steered, limited direction control during trenching is possible. There's even an optional boring attachment, and an optional outboard bearing support for extra strength in tough digging conditions.



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These are just the highlights. Get the whole story on the 1420 from your Ditch Witch dealer. He'll explain why you can't afford to settle for less than Ditch Witch quality. Or call toll-free for literature: (800) 654-6481. The Charles Machine Works, Inc., P.O. Box 66, Perry, Oklahoma 73077, Phone (405) 336-4402.

*Trench width and depth depends on boom and chain set up.



Ditch Witch

to accept horticultural agents as a viable water management tool and taught them how to use wetting agents effectively. In the process, Moore himself has become a familiar and respected figure in those industries.

New venture launched

The idea for Aqua-GRO was actually conceived by Lawrence Fletcher in the summer of 1953. Fletcher, a Havertown, Pennsylvania, homeowner, was determined to find a way to rid his backyard of a persistent puddle without having to resort to tearing up his yard to install a costly drainage system. He knew a little about surfactants and their effect on water and convinced Anthony Gallaccio, a neighbor and a freelance laboratory technician, to test several surfactants on Havertown's loam soil.

Enter Bob Moore, an acquaintance of Fletcher and a former Mobil researcher. Interested in Fletcher's idea, early in 1954 he tested various cationic, anionic and non-ionic surfactants on soil samples he had obtained from California, Pennsylvania and New Jersey. Moore discovered that while they facilitated water drainage, the cationic and anionic surfactants adversely affected soil stability and were phytotoxic. Moore then turned his attention to several non-ionic surfactants which didn't exhibit the same negative characteristics that the cationic and anionic surfactants did.

He noted that the non-ionic surfactants he tested performed differently on various soil types.

Acting on scientific intuition sharpened by ten years at Mobil, Moore blended together the best performer on each soil type and repeated his tests. He found that the surfactant blend worked as well or better on all of the soil types than any of the individual surfactants he had yet tested. Backyard field tests conducted on zinnias showed that the plants treated with Moore's surfactant withstood drought conditions better than those that were not treated.

By the summer of 1954, the liquid non-ionic wetting agent was perfected, and the team named it

Aqua-GRO. Fletcher and Moore, certain that they had developed a product that would make home drainage problems a thing of the past, formed Aquatrols Corporation of America to manufacture and market Aqua-GRO.

It wasn't long before both men realized that the decision to market Aqua-GRO to the homeowner was an ill-fated one. The average homeowner simply wasn't knowledgeable enough to appreciate how Aqua-GRO could benefit him, and the product floundered on the market for nearly two years.

Having failed to make any progress in the consumer market, Aquatrols turned to the greenhouse, nursery and golf course markets. Fletcher and Moore reasoned that the professionals in the plant and turf industries would understand the value of Aqua-GRO and readily accept it.

Aquatrols' big break came in the fall of 1956. T. L. Gustin, then President of Philadelphia Toro, took some Aqua-GRO with him to the Breakers Hotel in Boca Raton, Florida. The hotel's golf course superintendent applied some Aqua-GRO to his course. The very next day, he noted a difference on his greens—there was hardly a trace of the normal early morning dew. The Aqua-GRO treated greens allowed normal play earlier in the day than untreated greens.

Gustin sold a substantial quantity of Aqua-GRO in Florida that winter, and when he returned to Philadelphia, he gave Moore a list of turf industry people who were interested in handling Aqua-GRO, the rudiments of a national distribution network were established.

Wetting Agents Come of Age ... Slowly

By 1958, just as Aqua-GRO began to gain a foothold in the market, and despite the 28 patents that Aquatrols held worldwide, several other companies started marketing wetting agents of their own. Some of these products were effective and some weren't. Disappointed by some products' inability to match their company's claims, many people condemned wetting agents as useless.

Sales of Aqua-GRO up to that time were modest at best, and Fletcher opted to leave the company. Moore, positive that Aqua-GRO had vast potential, continued with Aquatrols.

According to Moore, had he known at the time that nearly twenty years of hard work and personal sacrifice lay ahead before he could claim any degree of success, he too might have thrown in the towel.

Moore and other marketers of wetting agents faced the same huge obstacle: The use of wetting agents for water management in turf and horticultural situations was a new concept in the late 1950's and little basic research by objective and respected industry authorities had yet been published.

Catch 22

"Industry acceptance of wetting agents was slow because we didn't have any basic research to back our claim," Moore explains. "We had a hard time getting people to understand that Aqua-GRO improved soil drainage, not by changing the characteristics of the soil, but by changing the behavior of water."

"Basically, we were in a Catch-22 situation. Aquatrols didn't have the money to sponsor basic research, and without research and researcher recommendations to back our claims, not many people were interested in trying Aqua-GRO. We knew that Aqua-GRO worked and that it would sell if we could only get people to try it."

The situation improved some in the 1960's as researchers in Florida and California conducted some applied research involving the use of wetting agents and reported good results.

Undaunted by the lack of research support, Aquatrols introduced a granular Aqua-GRO formulation in 1968. Using vermiculite as a carrier, granular Aqua-GRO was well-suited for incorporation in notoriously hard-to-wet soilless potting mixtures, which were gaining popularity in the greenhouse industry at the time.

Support of Aqua-GRO for greenhouse use was provided by Cornell

Continues on page 49

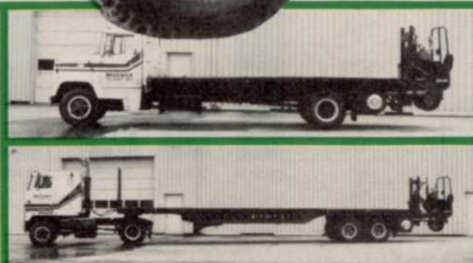
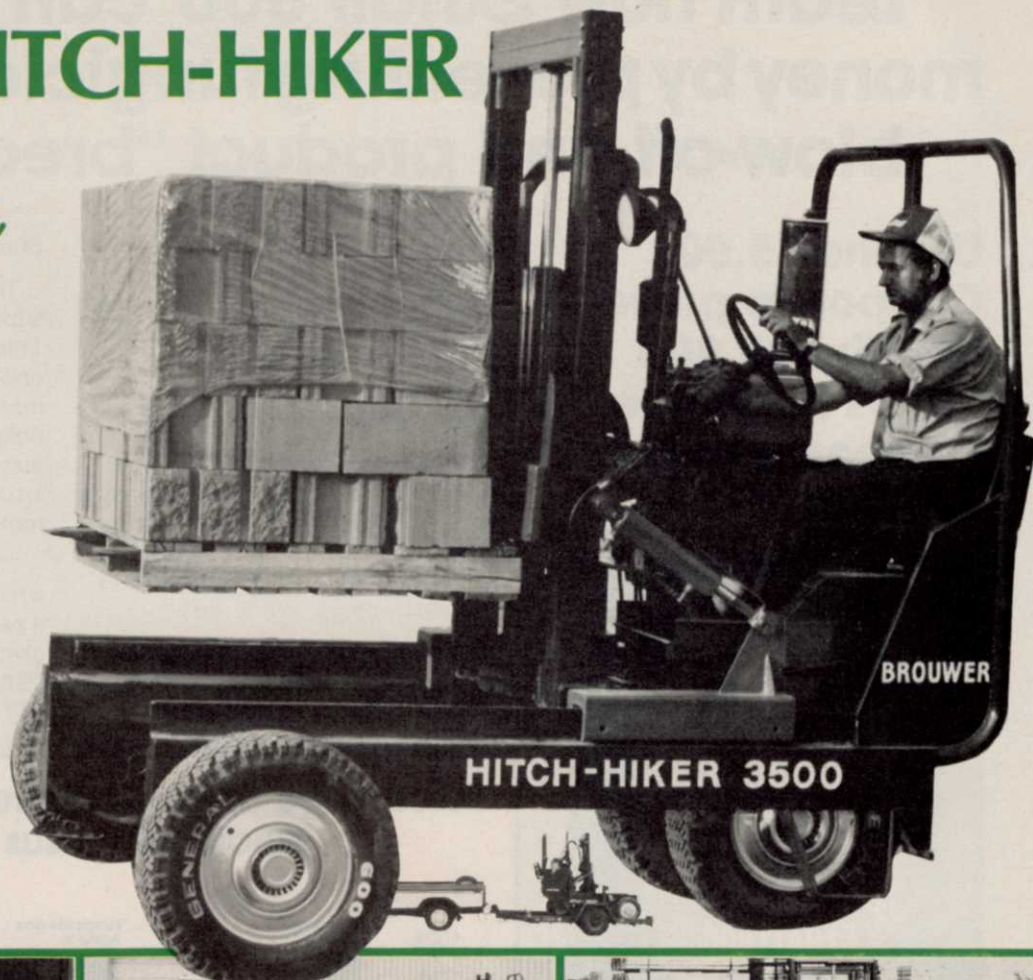
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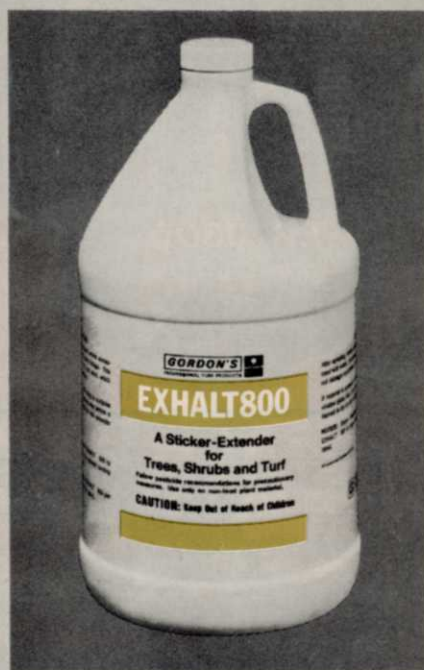
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Learn how Exhalt® 800 can save you money by preventing fungicide wash-off, blow-off and product "breakdown".

Use the \$5.00 Coupon to prove how Exhalt 800 keeps fungicide on trees, shrubs and turf.



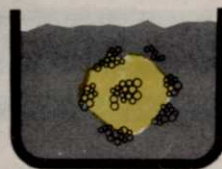
A closer look at Exhalt 800's unique encapsulating action.



One miniscule fungicide particle, greatly magnified. Countless millions of such particles in water become the spray solution.



Exhalt 800 enters spray tank. Hydrophobic (repelled by water), it breaks into myriads of tiny droplets and attaches to fungicide.



Tiny Exhalt 800 droplets form a porous "fabric" that encapsulates every fungicide particle, causing it to cling to turf or foliage.

We're painfully aware that you may be disenchanted with spreader-stickers, so we want to emphasize that Exhalt 800 is *not* a spreader-sticker. Rather it is a *Sticker-Extender* (we call it a tank-mix encapsulator), and there's a world of difference!

The *spreader* part of a spreader-sticker is a detergent that actually assists in wash-off. Exhalt 800, on the other hand, has a unique encapsulating action that causes fungicide to *resist* wash-off.

Simply stated: Spreader-Stickers *assist* wash-off; Exhalt 800, a unique

Sticker-Extender, *resists* wash-off.

To get a clear picture of Exhalt 800's superiority, study the chart below. This test, important though it is, is just one of many. Our files hold much other massive evidence of Exhalt 800's unique encapsulating power: the field-test data from many leading universities (test results available on request).

The evidence is clear and overwhelming — Exhalt 800 doesn't cost, it pays. Don't you owe it to yourself to give it a trial now, when you can get \$5.00 for doing it?

Percentage of fungicide retained after rains, Exhalt 800 versus Brand X:

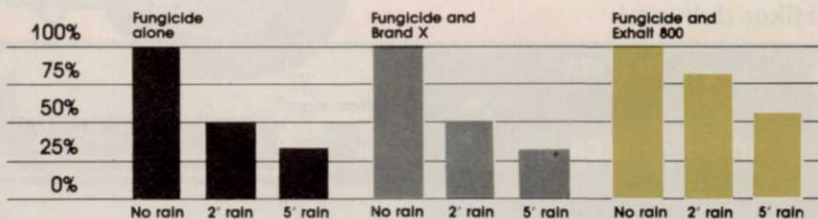


Chart shows how Exhalt 800 resisted wash-off in a laboratory test. Spray coatings were applied to glass panels and dried 10 minutes at approximately 70°F. Retention after erosion by rain was measured

by solvent stripping the panels and determining the residual fungicide by quantitative ultraviolet spectroscopy.

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Read what users say about Exhalt 800:



Everett Wood is the superintendent of Big Canoe Golf Club in Big Canoe, Georgia. Al Lanco of PBI/GORDON got him started on Exhalt 800 and now he swears by it. Here are his exact words. "Through the use of Exhalt 800 we are able to spray our greens with pesticide one hour and turn the water on in the next hour with no fear of our pesticide being washed off. This gives us the protection we seek during the heat and stress of the Southeast."



G. Wayne Zoppo is the superintendent at the Agawam Hunt Club in East Providence, R.I. In visiting with Jack Doyle of PBI/GORDON about his experience with Exhalt 800, he said that he has tested it very thoroughly and recommends it to his peers. He says: "Why take chances with expensive fungicides? Use Exhalt 800 with your fungicides for that extra protection. It works, and it is inexpensive."

Only Exhalt 800 Does it all:

- Exhalt 800 holds pesticides in place for longer life.
- Dries in an hour or less.
- Won't wash-off or blow-off.
- Flexes as turf and foliage grow.
- Extends effective control period.
- Saves material and labor expense.
- Economical: use one pint to 100 gallons of spray.
- If frozen, does not separate; can be thawed and used.
- Does not damage turf, trees and ornamentals when used as directed.

GORDON'S
PROFESSIONAL TURF PRODUCTS

AQUATROLS from page 46

plant scientists James Boodley and Raymond Sheldrake, developers of soilless potting formulas. Aqua-GRO was one of the wetting agents that they recommended, among the hundreds of wetting agents they had tested, as an ingredient in their soilless potting mixes.

Despite the scarcity of research recommendations, Aquatrols' sales of Aqua-GRO improved slowly but steadily into the early 1970's. Then in 1973, the first turfgrass textbook mentioning wetting agents was published by Dr. James Beard, professor of turf sciences at Michigan State University. Although his book made no positive recommendation of wetting agents, it did recognize them as a turf management tool with useful applications.

Indeed, most of the published research data directly concerned with the use of wetting agents in turf situations has been gathered since 1973—nearly 20 years after the initial formulation of Aqua-GRO.

"Without a doubt, the research conducted by such respected turf authorities as James Beard, Paul Rieke, James Wilkinson and John Madison has provided the basis for the relatively recent general acceptance of wetting agents by the turf industry," Moore contends.

Aquatrols into the 1980's

Responding to the needs of Aqua-GRO users and market opportunities, the company continued to refine its product. Aquatrols added a defoamant to Aqua-GRO in 1976, and introduced a spreadable formulation in 1977.

As Aquatrols' fortunes improved in the mid-1970's, Bob Moore was able to beef up his staff. In 1975, Ed Oberright joined Aquatrols as director of research, and Niki Holroyd came to Aquatrols as office manager. Oberright, who had been manager-in-charge of developing aviation oils and special products, brought 38 years of chemical research experience to Aquatrols. He had been responsible for improving and maintaining the quality of Aqua-GRO.

In the fall of 1977, Bob Moore's daughter, Demie, began working for Aquatrols on a part-time basis.

She assumed full-time responsibilities for product sales and marketing early in 1978.

With a goal of further increasing domestic availability and distribution of Aqua-GRO, Aquatrols, in 1980, signed an agreement with Mallinckrodt, Inc. to private label and co-market Aqua-GRO with Mallinckrodt. In 1981, Mallinckrodt introduced Aqua-GRO on the familiar Mallinckrodt green flag. Not content with merely marketing Aqua-GRO in North America, Aquatrols has recently established distribution agreements with companies in Hong Kong, Australia, South Africa and Japan and is presently negotiating agreements with distributors in Mexico, South America and the United Kingdom.

Tip of the iceberg

Demie Moore is optimistic about the future of wetting agents and sees a time when wetting agents will become a standard water management tool in the Green Industry. She draws a parallel between the difficulties encountered by the chemical fertilizer industry in gaining widespread market acceptance and those facing the wetting agent industry.

"It took about 20 years for chemical fertilizers to make substantial progress in the agricultural markets and 35 years before they became generally accepted—wetting agents appear to be following a similar pattern."

Bob Moore agrees with Demie and takes her prediction one step further. "Wetting agents complement all the more efficient management practices being adopted by all sectors of agriculture. Not only do wetting agents make more efficient use of water—a resource that will become scarcer in the future—they are useful in helping to reduce the incidence of water-related plant disease and the volume of pesticides and fertilizers needed to grow plants."

In fact, Bob is convinced that the existing wetting agent market is only the tip of the iceberg, and that in time Aquatrols will discover other useful applications for wetting agents. After 25 years in the industry, Aquatrols has only just begun.

WTT

VEGETATION MANAGEMENT

By Roger Funk, Ph.D., Davey Tree Expert Co., Kent, Ohio

Q: Could you tell me if the nematode that kills pines is in our area and if it affects blue spruce? What are the symptoms? (Massachusetts)

A: The pine wood nematode (*Bursaphelenchus xylophilus*) has now been reported in 34 states including Massachusetts. It has been found in 20 pine species, larch, balsam fir, two species of *Cedrus*, and white and blue spruce. The initial foliage symptoms are lighter green color and droopy needles. Affected trees may die all at once or the lower branches may stay green a little longer.

Q: I know that pH is a measure of the acidity in the soil, but what do the letters actually stand for? I have not been able to find this in any of my books that discuss pH.

A: According to Webster's dictionary, the "p" in pH stands for "potential of" and the "H" for "hydrogen."

Q: Should nitrogen fertilizer be added when organic mulches are used around ornamentals and, if so, how much should be applied? (Colorado)

A: As organic mulches decompose, some of the soil nitrogen in contact with the mulch is used by the decomposition organisms. Nitrogen deficiency (evidenced by leaf-yellowing (primarily of the lower leaves) may occur, depending upon the nature of the organic matter and the degree of decomposition. If this occurs, nitrogen fertilizer should be added as soon as possible. Two to two and one-half pounds of ammonium nitrate per 1000 sq. ft. or equivalent should be sufficient.

Q: Do mulching mowers reduce thatch buildup or improve turfgrass quality? (North Carolina)

A: Mulching mowers are relatively new and, although preliminary research results are favorable, continued research over several years is needed to assess the effect on turf quality.

Kentucky bluegrass plots at the University of Massachusetts mowed with a mulching rotary mower were reported as having significantly higher shoot density, dry weight and quality ratings but no significant differences in thatch depth compared to plots mowed with a conventional rotary mower.

Research at Texas A & M University on irrigated tall fescue indicate that there are few differences in turfgrass color, quality or thatch buildup after one season of observations when compared to turfgrass mowed with a standard rotary mower. However, turfgrass mowed with a mulching mower seemed to remain green longer into the fall and winter.

Q: In addition to competing for water and nutrients, do grasses produce toxic substances that inhibit the growth of field-grown nursery stock? (Pennsylvania)

A: Allelopathy is any direct or indirect harmful effect of one plant on another through production and liberation of chemical compounds into the environment.

Since it is difficult to distinguish between competition and allelopathy, many researchers use the word "interference" when the causes of growth are not clearly competition or allelopathy.

Research conducted at the University of Rhode Island has shown that leachates from perennial ryegrass, red fescue and Kentucky bluegrass suppressed the growth of flowering dogwood and forsythia. Although this is a clear indication of allelopathy, whether or not other woody plants are affected and to what extent will require further research.

Q: What are the best means of improving and texturing soil for development of improved grass root systems? (New Jersey)

A: For good root development and establishment of a lawn, a layer of 4 -6-in. deep top soil having good texture and structure is necessary. Soil texture refers to the size of soil (mineral) particles. Based on texture, soils can be classified as sand, silt and clay. Different home lawns, golf courses, athletic fields and other turf culture may have different soil textures. A soil testing is necessary to determine the condition.

The ideal soil texture for growing turfgrass is a loam, and extremes in soil texture (sands and clays) can be modified with the incorporation of either organic materials or mineral soils.

Organic materials such as peat or manure should be spread in a 2 -4-in. layer and then incorporated into the soil 6 -8-in. deep. Peat humus is the most desirable for soil modification because of its nitrogen content, pH and water absorbing capacity. Composted organic materials also can be used.

Mineral soils such as sand or clay can be used to improve soil texture. For partial modification of a sandy soil, a loam soil high in organic matter and containing 5% -8% clay can be used. For partial modification of a clay, a sand and organic matter is mixed into the upper 10 - 14-in. of root zone.

NOTE: Concerning control for the honeysuckle aphid which was discussed in the January 1982 "Vegetation Management" column, recent information from the University of Illinois indicates that nonsystemic insecticides such as malathion and sevin may not be effective. In addition, dormant oil applications appear to be of little value.

Applications of orthene or cygon when symptoms of infestation first appear have given the best results. Pruning and sanitation are also beneficial.

Send your questions or comments to: **Vegetation Management c/o WEEDS TREES & TURF, 757 Third Avenue, New York, NY 10017. Leave at least two months for Roger Funk's response in this column.**