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For More Details Circle (107) on Reply Card

Stripe Smut Plant Parasite Of Turfgrass

By DR. JOSEPH M. VARGAS, JR.

Assistant Professor

Department of Botany and Plant Pathology
Michigan State University

STRIPE SMUT caused by the fungus *Ustilago striiformis* is probably the most destructive disease of Kentucky bluegrass, especially such cultivars as Merion and Windsor.

Light yellow blades of grass are the first symptoms to appear. As the disease advances the leaf blades begin to curl and have black stripes running parallel up and down the length of the blades. Older infected blades will be twisted, curled and shredded from the tips down. If these black stripes are touched a black soot-like dust will rub off on to your hands. This soot-like dust is the spores of the stripe smut fungus.

The stripe smut symptoms most commonly occur in the spring and fall during periods of wet cool weather when the day temperatures are below 70°F and gradually disappear as the temperatures become warmer. However, while the symptoms are most evident during periods of

cool weather very little turf is lost. Most of the infected turf is lost during the hot dry weather of the summer when the grass is under heat and drought stress or in open winters when the plants are subject to desiccation and cold temperature.

Stripe smut is a systemic disease which is perennial in the grass plant. Systemic means that the fungus is internal and can spread throughout the vascular system (veins) of the plant. The striping effect of the grass blades is caused by the fungus growing up the veins. Perennial means that once a grass plant is infected it will remain so for life although visual symptoms may not always be evident. The stripe smut fungus is able to survive adverse environmental conditions protected in the crowns of the grass plant where it can wait months or years for the ideal conditions to arrive before it becomes active again.

The stripe smut fungus can not attack through the foliage. It can

only attack through the lateral buds on the crowns and buds on the rhizomes. Rhizomes arising from such crowns are also infected. This limited type of infection probably explains why the disease is usually only a serious problem on turf areas three years or older. For similar reasons the disease only becomes a problem in sod fields that have been in cultivation for many years where the spores of the fungus have had time to build up. These spores are resistant and can remain alive in the soil for many years.

There are several Kentucky bluegrass cultivars available today which are believed to be resistant to stripe smut. However, this resistance is probably only temporary because of the numerous races the stripe smut fungus can produce. (Races are different strains or varieties of the stripe smut fungus, capable of attacking different varieties of Kentucky bluegrass).

And once a Kentucky bluegrass becomes widely grown, a race of the stripe smut fungus which can attack it will probably develop. That is not to say these resistant varieties are not preferable to those already susceptible, but merely a word of caution of what to be on the look-out for in the future.

One should check with the turfgrass expert in his region to find out about suitable stripe smut resistant Kentucky bluegrass cultivars in his area and then blend three or four of these together. Blending should slow down the development of races of stripe smut which can attack these resistant varieties of Kentucky bluegrass and both the sod producer and buyer will be happier in the long run.

Stripe smut is an internal disease
(continued on page 46)

Stripe Smut: The Systemic Disease



Stripe Smut in bluegrass.



Close-up of Stripe Smut on individual leaves.
*Color photos courtesy of E. I. Du Pont de Nemours & Co. Inc.

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Highly resistant to stripe smut, rust and leaf spot. Stripe Smut sporulates in May or June, shredding individual leaves. Field trials show that, while Merion is quite susceptible, Pennstar is highly resistant. It's also highly resistant to rust: rated on a scale of 0 (best) to 10 (worst), test data give a 1.7 rating to Pennstar vs. 8.7 for Merion. University tests also

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Medium color, good density, easy to manage. Pennstar persists at moderate-to-low fertility levels. It doesn't over-react to higher fertility. Because of its decumbent growth, Pennstar can tolerate close mowing. It can withstand drought conditions better than some other Kentucky Bluegrass varieties. And, with its pleasing medium bluegrass color, Pennstar is ideal for blending with other varieties. In mixtures, it's neither too dark nor noticeably light.

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Dennis Lee Wagner, Superintendent, Homestead Executive Golf Course, Spring Lake Heights, New Jersey

"You can really see the difference Pennstar makes. We've used Pennstar on fairways, greens and around the clubhouse and condominiums. Our results have been *very good* with Pennstar—it's held up real well with almost no fertilizing and very little watering. It's given us a real thick stand of grass, the color is a beautiful, lush green and I haven't noticed any disease at all. And people are saying that Homestead really looks like a golf course again."

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\$400 Million For Pure Water

Editor's Note: We continually hear about the award of large construction contracts which directly or indirectly involve members of the Green Industry. With this in mind, we have presented here some of the work which is being accomplished in upstate New York on a large pure waters

program. We hope that many of the specifications which have been implemented into this program can be used in other contracts where Green Industry firms are involved.

The County of Monroe, N.Y. — which celebrated its 150th birthday

in 1971, is involved in what is probably the most advanced and largest pure waters program in the nation. It requires the laying of hundreds of miles of sewer lines, four huge treatment plants, tearing up streets, roads, curbs, lawns, and trees, all of which must be restored to their original state upon completion of each contractor's contract.

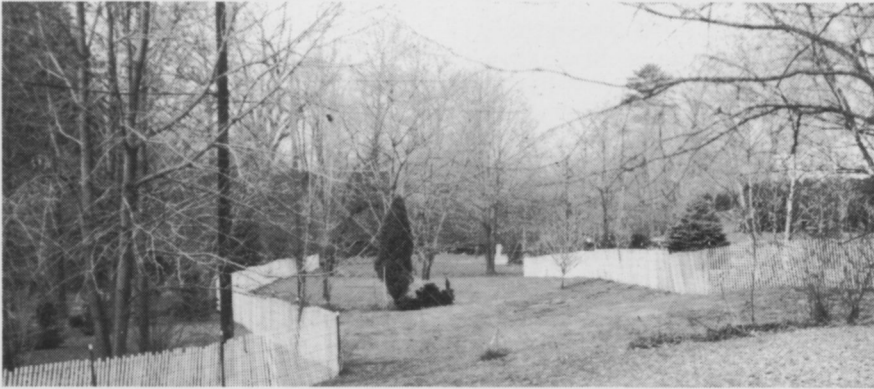
Following a recommendation of the then county manager Gordon A. Howe, officials in this western New York county had authorized a comprehensive study of the county's water in 1964 to determine what should be done to combat water pollution. Started in 1970, the cost of this program when completed in 1975, will be nearly \$400-million.

Following the study, the Monroe County Pure Waters Agency was created and a plan prepared. The division of pure waters was created under the County Department of Public Works whose responsibility was to carry out the recommendations of the Pure Waters Agency and the County Legislature. The Division represents a partnership of Federal, state, and local governments and well-known contractors, to eliminate water pollution.

In the last twenty years alone, Monroe County population has grown by more than 225,000 to an estimated 720,000 people and the index of Rochester industrial production has increased nearly five-fold, all adding to the pollution crisis.

The County has been divided into four regional systems following drainage basins. Each is having a network of sewers built by contractors, which will eventually gather loads from smaller feeder sewers and carry the sewage to large regional treatment plants. The new or remodeled treatment plants will provide a minimum of secondary treatment of the wastewater. Under the Pure Waters Plan, four regional plants are now being built by contractors to handle the work now being done by 34 over-loaded sewage treatment plants. The four, when completed, will be able to do the job more effectively. The 34 plants will eventually be phased out.

Interceptor sewer and force mains are being built throughout various towns, villages and cities of Monroe County.



This is one of the areas prior to construction.



The same area during construction.



After construction and restoration, the area looked like this.

Monroe county's Pure Waters program is a 12-month-a-year construction feat, with many contractors continuing to work on their sites during the winter months.

RESTORATION IMPORTANT

During any kind of construction, especially of this size, there is disruption and inconvenience to people.

Every attempt has been made to minimize the impact of the ecology and maximum efforts are being made to restore the surface to its original state as contractors complete their contracts.

Harold Bilow is Supervisor of Construction and Inspection for the Division of Pure Waters, and he and contractors have been working together to see that roads, streets, curbs, lawns, trees, and other surfaces disturbed by construction are returned to a normal state following each contract completion.

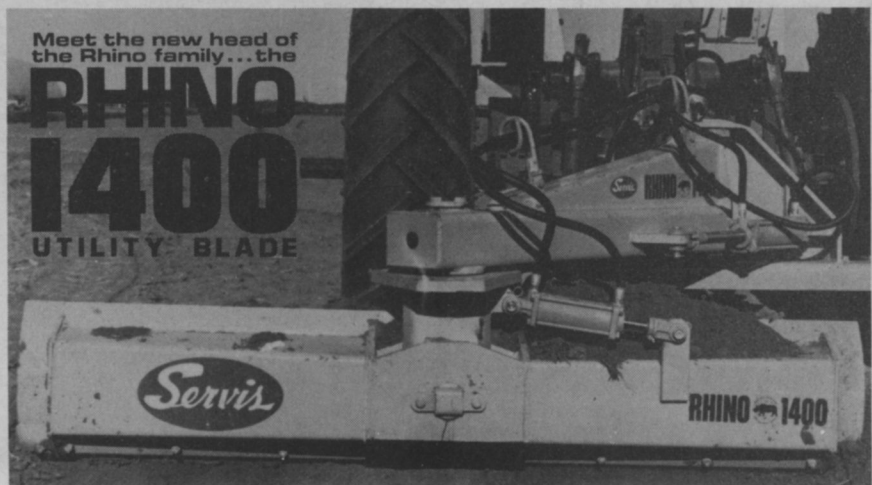
Grades, and surfaces, under the contractor's responsibility for restoration of surfaces, have to be restored so as to be equal to or better than the original condition which existed at the time they were damaged or disturbed as a result of work covered by the contract. None of the contractor's obligations are considered fulfilled until all restoration work has been approved by the Engineer and by public authorities having jurisdiction.

Where restoration of lawns, trees, shrubs, curbs, walks, roads, streets, etc. comes under the jurisdiction of town, county, state or other public authorities or public utilities, all work must be in accordance with the requirements of such authority.

Restoration of surfaces remain a "big" part of contractors responsibility
(continued on page 22)



Hundreds of miles of interceptor sewer lines were buried. Lawns, trees, curbs had to be restored to their original state.

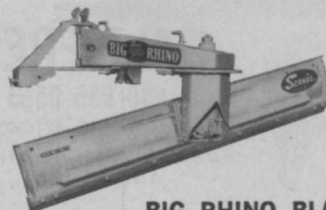


Designed for Category II and III tractors of 90 hp and up, this new leader of the Servis RHINO family puts more than 1400 pounds of mass into every ditching, grading, and backfilling job. Optional hydraulics control (at a touch) the patented main frame rotation and blade tilt. The RHINO 1400 has an eight foot moldboard, and support stand for hitching. Adaptable for quick-coupler.



SUPER RHINO BLADE

EXTRA HEAVY DUTY BLADE comes with thirty-six easy adjustments for angle, offset, tilt and pitch . . . without using a wrench! Four basic positions: standard, angled, reverse and extended. Takes on the toughest jobs with ease. Designed for wheel type tractors with 75 hp to 100 hp drawbar ratings, with either 3-point lift or 2-point fast hitch. Available in 7' and 8' moldboard lengths. Blade offsets 30" right or left. Fits tractor Categories I and II.



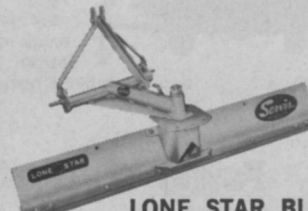
BIG RHINO BLADE

HEAVY DUTY BLADE finds dozens of jobs to do. Whether it's cutting ditches or filling them in . . . smoothing, leveling or grading . . . this blade will be one of your handiest tools. For wheel type 3-point lift tractors with up to 75 hp drawbar ratings. Thirty-four complete adjustments for blade pitch, angle and tilt. Available with standard 7' or optional 8' moldboard. Blade offsets 30" right or left. Fits tractor Categories I and II.



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GENERAL DUTY BLADE is smaller — but plenty tough — and ideal for leveling and dirt moving, digging and covering ditches, as well as for road-way work and windrowing. Moldboard extensions are available for converting this versatile six-footer into a rugged 7' blade. An optional 8' blade is also available. For wheel type 3-point lift tractors with up to 55 hp drawbar ratings. Thirty complete adjustments for blade pitch, angle and tilt. Blade offsets 23" right or left. For Category I only.



LONE STAR BLADE

LIGHT UTILITY BLADE is priced for popular demand. Designed for strength and durability, the Lone Star has 10 adjustments for angle of blade, 3 reverse blade positions and tilt adjustment. For wheel type 3-point lift tractors with up to 40 hp drawbar ratings. Blade offsets 12" right or left. Standard width is 6'. Also available in a special 8' wide model. All-steel welded construction. For Category I tractors.

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Johnsongrass can become a real problem on roadsides. Note how it is encroaching onto the highway above. We've tried a number of compounds for control. One new material that holds promise is Roundup, still an experimental herbicide.

VEGETATION MAINTENANCE

(from page 10)

and agencies determine the extent of stump spraying.

During the year, Lane County has a policy that requires all agencies cutting on county rights-of-way to obtain a brushing permit which reads in part: "All trees and brush will be cut down to stump level and the agencies will send a cutting report to the Public Works Department".

Hereafter, the spray crews stump spray all cut areas and continue to maintain the county right-of-way. This mutual co-operation between the different agencies and Lane County reflects a substantial savings to all parties as well as promoting good public relations.

The basal spraying program begins on a spot basis. During the

foliage spraying program all dwellings, orchards and adjoining crops are skipped because of drift or volatility. Then those areas will be basal sprayed in the fall and winter months.

The basal or stump formulations are: one gallon of 2,4,5-T low volatile ester brush killer, four pounds acid equivalent to twenty-four gallons diesel or Banvel brush killer oil soluble. Use one quart (one pound active) with two pounds acid equivalent of 2,4,5-T ester or four pounds acid equivalent of 2,4-D ester in 100 gallons of oil.

Again, it is very important to cover the plants or stumps with a chemical run-off. The cost of stump or basal spraying is \$1.10 per stump or patch of brush.

Foliage spray As a prerequisite to any spraying program, an orientation session is necessary to familiarize the spray crew personnel with



Alder tree to the right above has been sprayed with 2,4-D and 2,4,5-T low volatile ester formulation. Motorists will be able to see around curve with tree out.

the objectives of the program. Formulations, pressure regulations and road spraying reports, together with the public relations and county spraying policies, are necessary to the program. Printed literature designed to explain the safety of the chemicals used is carried in the trucks with the spray crews.

A field survey determines the extent of the schedule and particularly a co-ordination of spraying with dwelling, orchards and adjoining domestic crops. This spraying starts about the first of May. In 1972, 1,014.4 miles or 3,550 acres were foliage sprayed at a cost of \$25.01 per mile or 7.15 per acre. The foliage spraying is spot spraying of all weeds and brush within an acre. Were the job to be done by hand maintenance brushing crews, the costs would be \$1,007.00 per acre.

The foliage spraying program, since its start, has reduced the number of brush crew personnel from 30 men to the 8 men who make up the spraying crew. They cut most of the brush on rainy days in each of the six zones. Each zone does some brushing, but this is minor.

Noxious weeds spraying programs begin in mid-May. Here, again, the program begins with a field survey and determination of the need. The county spraying crew sprays the noxious weeds on county-owned lands and rights-of-ways. Weeds such as Canadian thistle, poison oak, conifers, cattails, morningglory, Johnsongrass and Bermudagrass are controlled with Amitrol-T, 24D, Tordon, Banvel and others.

The basic foliage spraying formulation is one gallon 2,4-D/2,4,5-T low-volatile ester brush killer, two pounds actual acid each, plus 8 ounces of X-77 Surfactant per 100 gallons of water. Spray is applied until plants are wet. We have also mixed one-half gallon odorless 170 with one-half gallon 2,4-D/2,4,5-T low-volatile ester. This formulation has been very effective for our public relations program.

Around the first of August, 1½ gallons brush killer 170 or 2,4-D/-2,4,5-T low-volatile ester in 10 gallons diesel and 88½ gallons water are sprayed.

In the winter months, the county uses Casaron G-10 at 50 pounds per acre. This chemical looks good on Canadian thistle, horsetail rush and morning glory. This should be used in the hard-to-control areas with heavy stands of weeds.

When spraying for weed and brush control, it is the policy of the county's Public Works Department

to avoid the various native wild flowers, Oregon grape, and other natural attractive plants unless they obstruct the view of the traveling public or impair drainage in ditches.

Correct drainage by mechanical means When Lane County's maintenance crew reshapes and cleans ditches and slopes with the use of two graders, three dump trucks, one scoop, one water wagon, plus two flagmen, the cost is \$381.00 per mile per year. The savings Lane County has had in grading gravel shoulders that have had soil residual chemicals sprayed on them is \$9,000.00 per

year. This means the grading operation is much faster without any vegetation in the shoulders; also, this reduces mowing costs which are 8-10 dollars per acre. These roads were to be mowed twice a year.

Soil residual spraying The first field survey of roads to be sprayed is made in January. The reports on soil conditions, weed and grass problems and topography of the road area are analyzed and the spraying program scheduled.

The soil residual program begins about February 1st. After the or-
(continued on page 20)

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We can't do anything about Teddy Temper.

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Chipco Turf Herbicide MCPP. It effectively controls Chickweed, Ground ivy, Knotweed and Clover. And it's kinder to fine turf grasses.

It helps keep your greens (and fairways) in the pink.

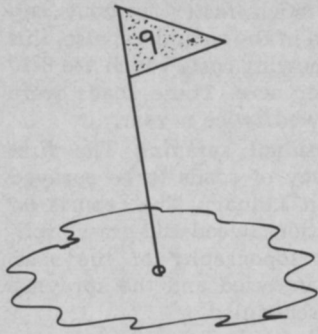
Chipco® Turf Herbicide MCPP

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"He's not just another duffer. He's chairman of the greens committee."





Nine Hole Courses Do They Need A Fulltime Golf Superintendent?

GOLF COURSE superintendents are often a rarity on small, 9-hole courses. Many managers figure they can't afford this "luxury" with their relatively small budgets.

But in a growing number of cases this superintendent and manager line of reasoning is often dead wrong — many of these 9-holers can't afford to be *without* a superintendent.

"There's no question in my mind about it," says Bob Burns, who has managed a 9-hole golf course in Cedar Falls, Iowa, since it opened in 1965. "A 9-hole course needs professional management just as much as the bigger operations."

Burns, who was Iowa's "Superintendent of the Year" in 1972, manages the course at the Beaver Hills Country Club, a privately-owned golf and social club that was a 9-hole course until an additional 9 was added last year.

During its entire seven years as a 9-holer, Burns was employed as superintendent. And this is possibly one reason Beaver Hills was financially able to expand into an 18-hole course so soon.

Looks More Professional

"When you have a superintendent on these small courses, everything looks better — more professional," say Beaver Hills Manager Bob Friis. "And you get more members as a result. We've been at near capacity membership for the last few years because of the quality of our course, and this has enabled us to

finance expansion programs much faster than we ordinarily would have. The program has been very successful."

Burns said he has always managed the course as though it was a big, major operation "within limits of our budget, of course."

The greens are mowed six days a week, cups are changed daily, fairways and tees are mowed three times a week, and roughs once a week.

In addition, Burns maintains complete disease and insect control and a professional fertilization program.

And his equipment is as complete and up to date as any you'll find on the larger country club courses.

"You don't get this kind of course maintenance when you just employ a parttime hired hand to maintain your course, which is often the case with 9-hole golf courses," Burns says.

"On these courses the greens often end up looking just like the fairways, the rough is out of shape, and the entire course is in a state of deterioration. And you'll often end up spending more in the end to shape things up again, and you'll certainly lose members to competing courses that are well kept."

Good Insurance

Manager Friis agrees: "When you take a look at that big initial investment in establishing a golf course and country club, you'll quickly realize that hiring a golf course superintendent is just sensi-

ble insurance to protect that investment."

Burns points out the extreme amount of technical knowledge necessary to properly manage a course today as a major point in favor of employing a professional superintendent.

"He must know turf grasses and maintenance techniques, soils, fertilizers, drainage, insects, turf diseases, fungicides, weeds, herbicides, and the tools and equipment necessary for modern turf maintenance.

"Sometimes it's even difficult for us to keep up with the different insecticides, herbicides, and fungicides and their proper usage," he says, "so I don't see how a parttimer can even begin to do it."

Environmentally Conscious

"In addition, many of these products must be handled professionally at all times. This aspect of golf course management is getting more critical every year."

Burn's biggest problem at Beaver Hills has been loss of elms from Dutch Elm Disease. Beaver Hills lies in a naturally wooded area — primarily elms — so tree replacement is an important part of his job.

He has worked up, on paper, a long-range landscaping program for the course which he says should solve most of the problems and enhance the beauty of the course when completed.

A member participation program for tree replacement was also initiated, with individual members buying a replacement tree, and, in turn, having it named after them.

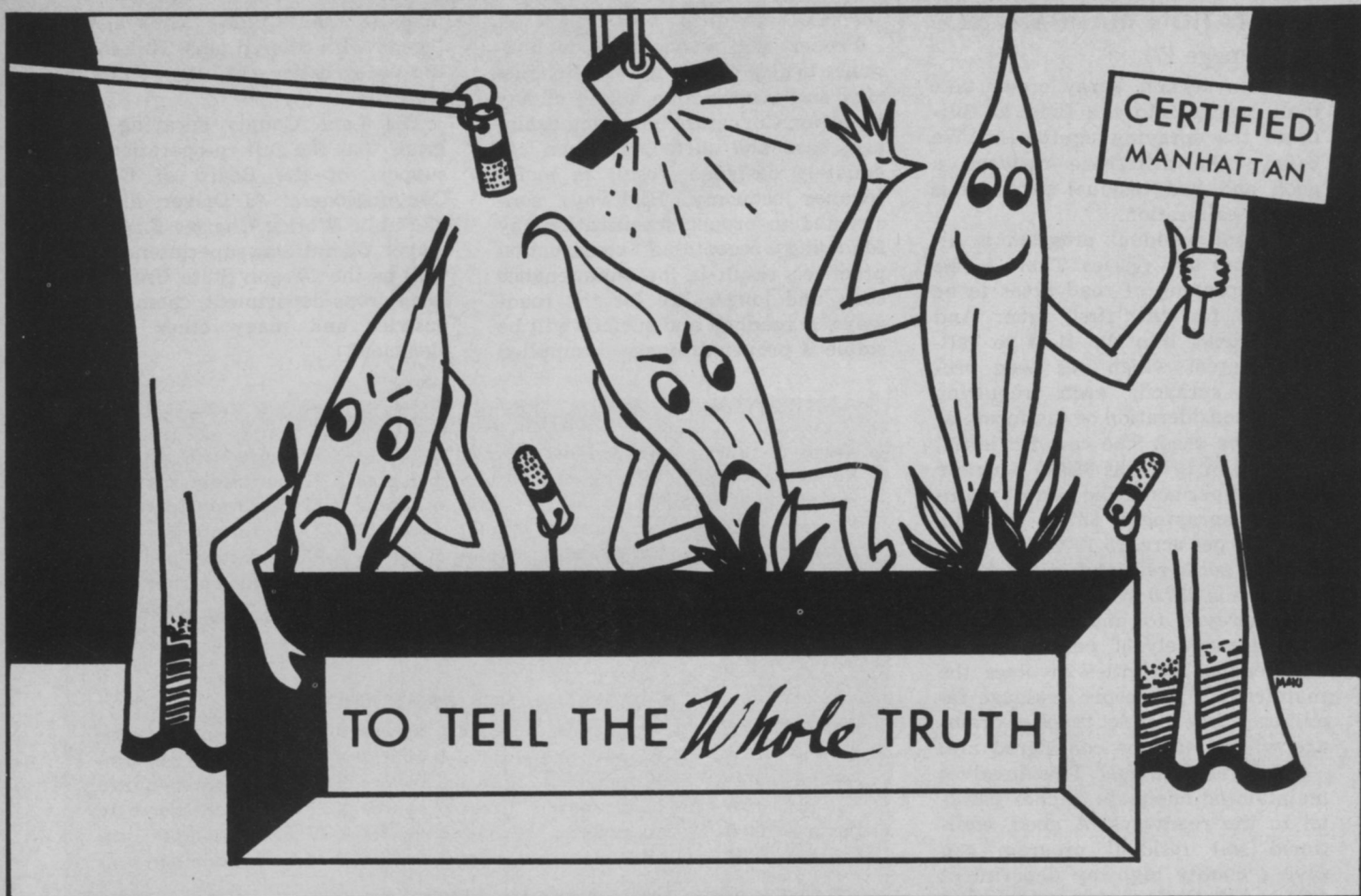
"This has worked great," Burns says, "and we've added 150-200 trees under this program so far. The members enjoy having a tree named after them."

Burns maintains an intensive control program against weeds, insects, and diseases such as: snow mold, dollarspot, brown patch, and others.

Because of this program, Beaver Hills has had no serious turf disease or insect problems since it began operation in 1965 . . . "a benefit of having a professional superintendent," Manager Friis strongly believes.

Burns says Beaver Hills is the envy of many other small course owners, who marvel at the condition of the course when they play there.

"Any course could look like this if they would come to realize that golf course maintenance is a specialized, technical job requiring trained men to get it done correctly," Manager Friis adds. □



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The seed produced by these growers is closely watched and both field certification and seed certification are required before the seed is released to you, the customer.

Any seed bearing the name "Manhattan" but which does not carry certification tags may not be truly Manhattan. The variance could be drastically untrue of variety.

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VEGETATION MAINTENANCE

(from page 17)

ientation session, spray crews take their trucks into the field to calibrate the spraying equipment. We believe the difference between a good and bad residual program is proper calibration.

The soil residual program is divided into two phases. There is the initial spraying of road areas to be sprayed for the first time. And their trucks into the field to calibrate of the areas which has been previously sprayed, each requiring special consideration of the formulation to be used. The cost for initial spraying in 1972 was \$80.15 per mile or \$26.72 per acre. The cost of maintenance spraying is \$57.48 per mile or \$19.19 per acre. In 1972, 39.6 miles or 118.8 acres received initial treatment while 637.0 miles or 1,911 acres were sprayed for maintenance.

Approximately 80 per cent of all maintenance activities involves the maintenance of proper drainage facilities. Three distinct types of drainage which must be considered are:

Roadside drainage: This involves maintaining adequate ditches parallel to the roadways. A good, well-timed soil residual program can save a county highway department money. Here is a comparison of costs for a spraying program versus county maintenance crews. It costs \$381.00 per year to reshape and clean slopes and ditches. The cost of a spraying program is \$68.76 per mile per year. The latter program eliminates the periodical cleaning of ponded or standing water. This water eventually saturates the subgrade of the roadway causing pavement settlement, slides and other undesirable conditions that cause considerable hazards to the motorist.

Road surface drainage: This consists of maintaining an adequate crown or transverse slope on the travelled way and shoulder areas. Surface areas which do not drain properly result in potholding, traffic safety hazards, and pavement breaking at the shoulder joint.

Cross drainage: This is provided by means of culverts and bridges and must be kept clear to provide protection to adjacent properties as well as the roadbed itself. The cost of a bridge and culvert soil residual program is .54¢ per structure versus hand cleaning of structures at \$3.87 per structure. Plugged culverts can very easily result in loss of large roadbed sections.

Inadequate maintenance of drainage results in abnormal maintenance costs, traffic hazards and short life

for road facilities.

Proper and economical maintenance begins during the location, design and construction stages of any highway. Curvature, gradient, drainage, base and surfacing, when adequately designed, result in maintenance economy. Highways constructed to proper specifications by following acceptable construction practices, result in low maintenance costs and longer life for the roadways. A roadbed and surface will be stable if proper drainage is supplied

maps of Lane County using a map legend with colored pins. This shows the progression of the spraying program.

The Lane County spraying program has the full co-operation and support of the Board of County Commissioners: Al Driver, director of Public Works; Charles E. Angermayer, operations superintendent as well as the Oregon State University farm crops department, chemical industries and many other related agencies. □

INITIAL APPLICATION

Krovar I	80W,	6 pounds,	plus 6 ounces X-77 Surfactant/per acre
Karmex	80W,	9 pounds,	plus 6 ounces X-77 Surfactant/per acre
Hyvar-X	80W,	4 pounds,	plus 6 ounces X-77 Surfactant/per acre
Princep	80W,	9 pounds,	plus 6 ounces X-77 Surfactant/per acre
AAtrex	80W,	9 pounds,	plus 6 ounces X-77 Surfactant/per acre
Atratul	80W,	9 pounds,	plus 6 ounces X-77 Surfactant/per acre

If there is foliage within the area to be treated, two-thirds gallons Amitrol-T is added per acre.

MAINTENANCE APPLICATION

AAtrex	80W,	12 pounds,	plus 6 ounces X-77 Surfactant/per acre
Princep	80W,	12 pounds,	plus 6 ounces X-77 Surfactant/per acre
Atratul	80W,	12 pounds,	plus 6 ounces X-77 Surfactant/per acre
Karmex	80W,	12 pounds,	plus 6 ounces X-77 Surfactant/per acre
Hyvar-X	80W,	6 pounds,	plus 6 ounces X-77 Surfactant/per acre
Krovar I	80W,	9 pounds,	plus 6 ounces X-77 Surfactant/per acre

If there is foliage within the area to be treated, one gallon of Amitrol-T is added per acre.

and compaction of materials is sufficient during construction.

A sound highway maintenance and soil residual program will result in better and safer roadways at a minimum cost, improved public relations and public acceptance of your road program.

The following soil residual formulations are used in the proportions shown below:

All of the above soil residual formulations are used in combinations and are used separately. Weather, soil and type of foliage within the area to be sprayed are factors which determine whether combinations or single products are used.

Keeping good records on all roads and County-owned lands is very important for a successful spraying program. It furnishes the statistics needed to analyze the cost benefits ratio, estimating cost and establishing budgets as well as permanent records for the data processing program for future reference. Records of all pesticides sprayed on county-owned lands are kept. The pesticide records have also proved beneficial in establishing responsibility in courts of claim.

In addition to this, there are two

WSSA Assoc. Membership Is Now Available

Specialized information on weed problems and their control is now available to associate members of the Weed Science Society of America.

This new membership classification is designed for anyone in applied weed control—chemical dealers or distributors, custom applicators, grounds maintenance managers, agri-fieldmen, regulatory officials, extension agents, farm managers and others.

Associate membership in WSSA will help those interested in practical and scientific aspects of weed control through the exchange of current information on new products and scientific developments.

Until now, only Regular Membership was available in WSSA. This category is open to anyone interested in weed control, but is primarily designed for research-oriented personnel.

Membership application forms and more details are available from the WSSA Special Office, 3123 Ligon Road, Raleigh, N.C. 27607.