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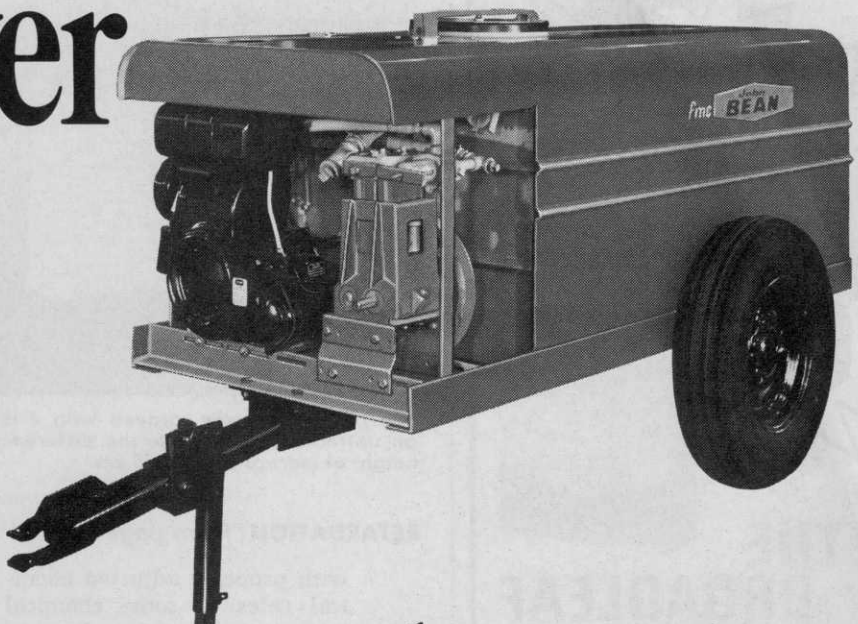

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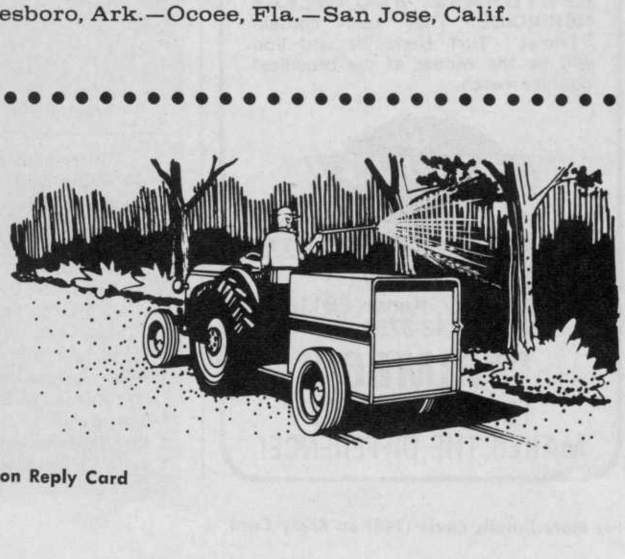

For More Details Circle (146) on Reply Card

The plot above was sprayed with 4 lbs./A of MON-820. The plot on the right is an untreated check. Note the difference in grass height after only 8 days. Initial height at start of test was 5 cm.

RETARDATION *(from page 30)*

with properly adjusted chemical rates — some chemical treatments have resulted in the development of a more attractive dark green color.

In greenhouse studies with grasses in pots and in field studies at Southern Illinois University, the effectiveness of several rates and combinations of 19 different growth retardants in reducing above-ground vegetative growth was evaluated. Included in the test were tall fescue, several varieties of Kentucky bluegrass, zoysia, bermuda, perennial ryegrass, and several grass mixtures. Pot studies were used for screening a large number of chemicals and rates and for selecting the more promising ones for field trials. Prior to spraying, grasses in pots were clipped to a uniform height. All pots were placed at random to receive one treatment within a measured area for spraying. Effectiveness of chemical retardation was measured by means of weekly height measurements and periodic color ratings. In field studies, we took similar measurements but also harvested a portion of each plot in order to calculate dry matter yield as a quantitative measure of chemical retardation.

Growth retardants that have looked most promising in greenhouse and field trials with tall fescue, Kentucky bluegrass, and other turf species have been MON-820

(continued on page 38)

Table 3. Height of Kentucky bluegrass[1], color ratings, and dry matter yield as influenced by growth retardant treatments.

Treatment	Rate (lb/A)	Grass Height (cm) 14	28	42	Color Rating[2] 19	49	Dry Matter Yield g/44 sq. ft. 33
Untreated control	———	10.3	14.8	16.4	10	10	668
MON-820[3]	1	6.5	8.1	13.2	7	9.5	282
MON-820	2	5.9	6.1	9.1	6	9	158
MON-820	3	6.0	6.1	9.0	6	9	165
MON-820	4	6.4	6.0	9.0	6.5	8.5	148
Slo-Gro[4]	1	9.4	12.7	15.5	9	10	560
Slo-Gro	2	8.5	11.5	13.9	8	9.5	467
Slo-Gro	3	8.3	10.3	13.0	8	9	376
Slo-Gro	4	8.7	9.5	13.4	7.5	9	343

(No. Days After Treatment)

[1] High nitrogen level plots. Adequate P and K were supplied as well as application of 2 lb. N/1000 sq. ft. at beginning of experiment.
[2] 0 = dead, 10 = best color
[3] Experimental compounds from Monsanto Company
[4] Maleic hydrazide formulation manufactured by Uniroyal Chemical

Asplundh calls it a forestry truck. You'll call it indispensable.

ASPLUNDH'S FORESTRY TRUCK MODELS L-40, 42, 45 and 50. This unit is the key to quick, efficient trimming in crowded, urban areas as well as along rural roadsides. It lifts the climber, chips the brush and dumps the chips. Asplundh's famous 12-inch chipper is mounted curb-side. The truck has a dump body that packs in 300 cu. ft. of chips. This configuration is the most compact, effective machine of its type ever produced. For further details, write or call: ASPLUNDH CHIPPER COMPANY, a division of Asplundh Tree Expert Co., 50 E. Hamilton Street, Chalfont, Penna. 18914 • (215) 887-2500.

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Keep the tough broadleafs out of your fairways with BANVEL® herbicide

The reputation of your course depends, among other things, upon the condition of your fairways. Broadleaf weeds make for bad lies and frustrated players. They also rob desirable turf of nutrients and moisture it must have to stand up under heavy use.

It may be you've despaired of ever getting rid of the "2,4-D tolerant" weeds. They're the very ones BANVEL 4-S was developed specifically to control . . . and does. Weeds like knotweed, red sorrel, carpetweed, chickweed, white clover, etc. . . . tough, resistant, spreading, thirsty, hungry.

Banvel attacks weeds two ways: one, it attacks through the leaves; two, Banvel is absorbed through the roots. Then Banvel is translocated throughout the plant—even to the deepest roots—to destroy the weed completely.

If you're still plagued by some of the "old favorites" such as dandelion, plantain, knawel, wild garlic and/or onion, burdock, etc., along with the real tough ones mentioned above,

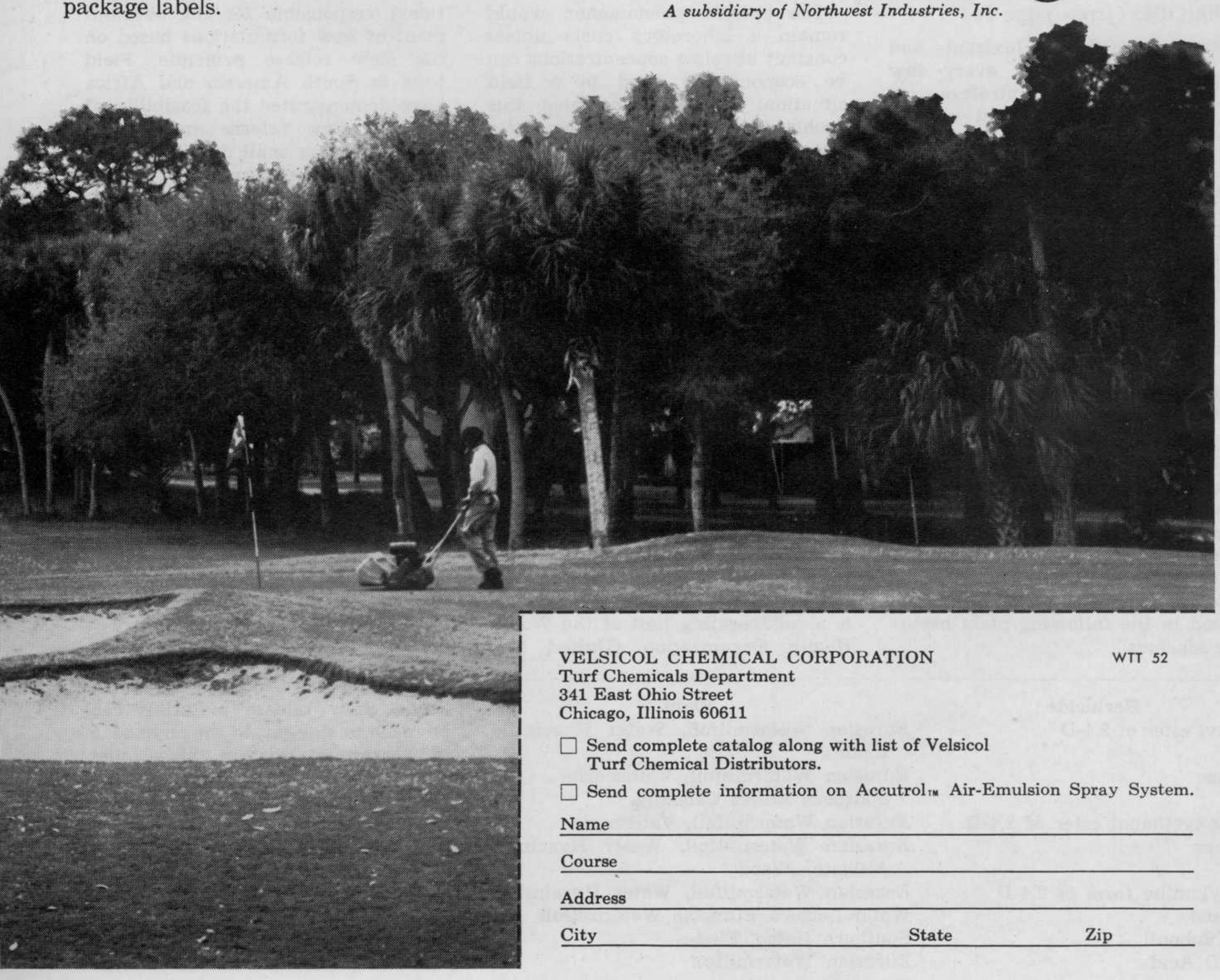


FIGURE 2: Chronic Effect of Herbicides on Southern Naiad

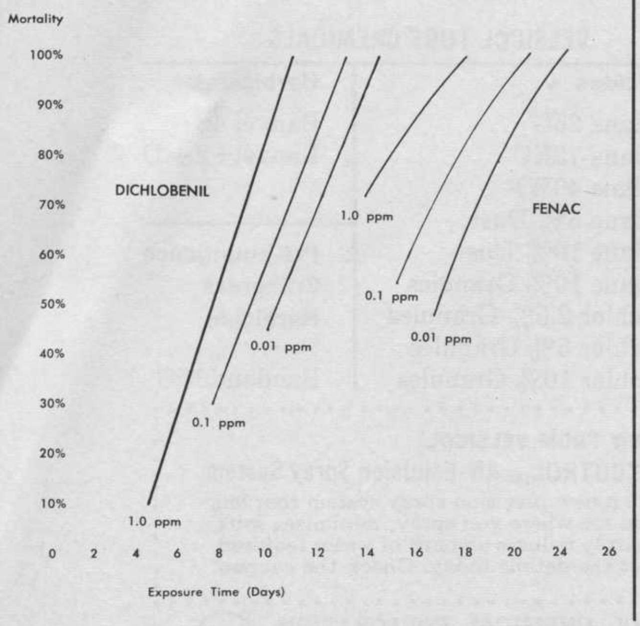
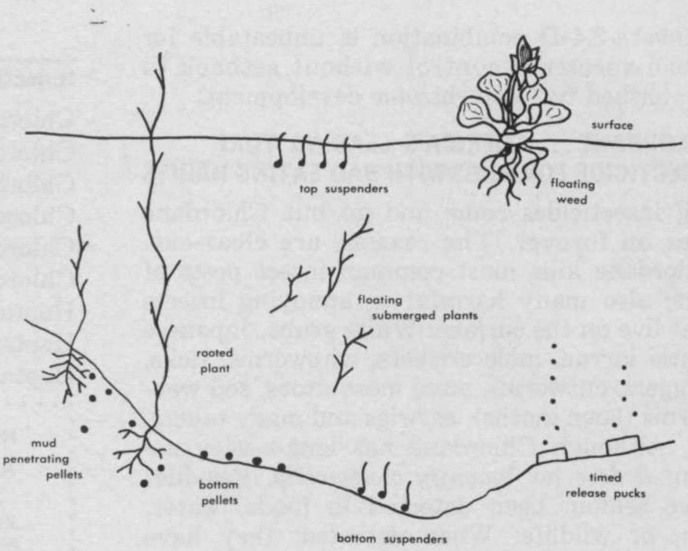


FIGURE 3: Phytozone Treatment Concepts



HERBICIDES *(from page 16)*

quires a great deal of toxicant—and the usual retreatment every few months for adequate control; our intention is to provide just enough chemical to give rise to a *chronic* intoxication effect which is just as deadly to the target through requiring a longer time to kill.

Chronic intoxication requires much less of the control agent than necessary to produce acute effects. As we decrease the amount of agent used, time necessary to kill does not increase accordingly! Figures 1 and 2 illustrate this effect. Present work with herbicides at concentrations as low as 1 part-per-billion in water show that we can destroy Eurasian Watermilfoil if the exposure period is long enough. In fact we intend to extend our studies with this aquatic weed to 100 parts-per-trillion concentrations, 10,000 times lower than in-use concentrations!

Chronic effects have been observed in the following plant-herbicide schemes:

The chronic phenomenon would remain a laboratory curio unless constant ultralow concentrations can be economically used in a field situation. In order to solve this problem we turn to the concept of a "slow release" matrix.

In 1964 it was discovered that anti-fouling agents could be incorporated in certain rubbery materials, and by the use of additives and proper vulcanization, the pesticide would slowly bleed out. Effective release of the agents involved has reached 89 months on test panels and over 5 years on ship hulls, buoys, and other marine objects. This material, under the name Nofoul is marketed by the B. F. Goodrich Company.

By 1966 insecticides, fungicides, and bacteriacides had also been formulated in slow release rubbery materials. However, our big thrust is in the direction of molluscicides, "snail killers" and our organization is a collaborating unit of the World Health Organization (United Nations) responsible for the development of new formulations based on the slow release principle. Field tests in South America and Africa have demonstrated the feasibility of using a slow release molluscicide and destroying snail disease vectors through *chronic* intoxication.

In 1969, the butoxyethanol ester of 2,4-Dichlorophenoxyacetic acid (2,4-D) was successfully compounded with natural rubber and a slow release mechanism established. Our investigations, confirmed by outside agencies, proved efficacy against the Water Hyacinth and Watermilfoil. Release lifetimes of 18 or more months have been analytically determined. Limited field tests are in progress.

In order to further reduce possible ecological disturbances, advantage was taken of the fact that rubber can be formulated in many shapes. 2,4-D and possibly other herbicides "layer-out" in still or sluggish waters. That is, there is little vertical mixing. Water weeds are confined by nature to certain areas of the water course or phytozones. Slow release materials can be made to stay put in the phytozone of interest, at least in fairly quiet waters, liberating the chemical agent where it will do the most good. Why poison the total water course if the target can only contact and absorb the herbicide in a particular part of that volume? Here are a few exciting solutions to this situation:

Floating pellets released at the

Herbicide	Plant
Butyl ester of 2,4-D	Eurasian Watermilfoil, Water Hyacinth Elodea
Fenac	Eurasian Watermilfoil, Vallisneria, Southern Naiad, Cabomba
Butoxyethanol ester of 2,4-D	Eurasian Watermilfoil, Vallisneria
Silvex	Eurasian Watermilfoil, Water Hyacinth, Alligator Weed
Oleylamine form of 2,4-D	Eurasian Watermilfoil, Water Hyacinth
Diquat	Water Lettuce, Eurasian Watermilfoil
Dichlobenil	Southern Naiad, Elodes
2,4-D Acid	Eurasian Watermilfoil

water surface that spread a thin layer of 2,4-D across the surface. Sinking pellets, by density adjustment can be made to penetrate or rest on bottom mud, that release herbicide where rooted plants are the most vulnerable. Suspending strands that hang vertically in the water. What we call "top suspenders" release 2,4-D in the first 6 inches of the water and are extremely effective in small pool tests against Water Hyacinth. In fact they tend to entangle in the roots of this floating plant. Bottom suspenders that release in the six or so inches of water just above the water bottom. All of these forms can be encapsulated in a heavy clay binder that, when dispersed in water, breaks foliage, sinks to the bottom, and degrades, slowly releasing pellets or suspenders. By proper choice of a binder release time is controllable. Figure 3 illustrates these concepts.

Now what does this all mean? If the laboratory results translate to the field we will not only be able to control aquatic weeds at 1/15 to 1/100 present dose levels, but extend between-treatment times to perhaps several years. In other words, we reduce contamination while saving money in labor costs.

A dose of 20 ppm held for 1 day, with retreatment twice a year gives an annual average dose of 164 parts-per-billion per day. We know that control under laboratory conditions is feasible at 10 parts-per-billion per day and probably at 1 ppb/day.

It is our belief that the future will see a great deal of research into slow release pesticides with many resulting commercial products of benefit.

Abbott Laboratories Releases Brochure

A new brochure, "Dipel and the Gypsy Moth," is now available from Abbott Laboratories. Dipel Biological Insecticide recently received Federal registration by the Environmental Protection Agency for the control of Gypsy Moth and certain other caterpillar defoliators of ornamental, shade and forest trees.

The brochure, in question and answer form, provides information on how to use the product under a variety of conditions. Dipel is registered for control of Gypsy Moth, elm spanworm, spring and fall cankerworm, bagworm, fall webworm and Red-Humped caterpillar (California only).

For more details, circle (719) on the reply card.

Insects In Weed Control To Be Studied

Insects to control weeds will be studied in a five-year program to be conducted by Virginia Tech.

Weeds have been estimated to cause more damage to crops than insects and diseases combined. Many insects, however, feed on weeds. Their use as a non-chemical means of weed control will be explored during the study.

According to Robert L. Pienkowski, professor of entomology and director of the project which is funded by the Cooperative State Research Service, USDA, researchers will identify and determine the distribution and abundance of insects attacking important weed species in Virginia.

Among the weed species to be studied are wild garlic, Johnsongrass, curled and musk thistles, crabgrass, morningglory, yellow nutsedge, horse nettle, fall panicum and ragweed.

The research complements work being done by Virginia Tech on control of musk and curled thistle through use of an imported weevil.

RETARDATION *(from page 32)*

and MON-845, experimental compounds from Monsanto Company; and Slo-Gro, a maleic hydrazide formulation manufactured by Uniroyal Company. In addition, MBR 6033 from the 3M Company and Maintain CF-124 from U. S. Borax Corporation have looked very promising in greenhouse trials. Field evaluations of these chemicals will be conducted in 1972.

Mon-820 has looked especially promising in retarding grass growth for six weeks or longer without much color loss. At rates of 1, 2, 3, or 4 lb/A it has given consistently better tall fescue and Kentucky bluegrass retardation over a 42-day period than Slo-Gro, which is currently available for use on roadbank vegetation in some areas. Some color loss became evident with higher rates of all chemical treatments. At no time during the study did lower rates of the MON chemicals affect color greatly. No rate of Slo-Gro affected color significantly in the early growth, but tall fescue color loss was very severe, particularly with higher rates, about five weeks into the trial. Kentucky bluegrass was not affected as severely by Slo-Gro treatments. Color maintenance was not affected as severely by Slo-

Table 4. Height of several grass varieties and species as influenced by treatment with the growth retardant MON-820.

Variety and Species	MON-820 Rate (lb/A)	Grass Height (cm) at 8 Days After Treatment
Common Kentucky Bluegrass	2	7.2
	4	7.3
	Control	14.2
Merion Kentucky Bluegrass	2	7.8
	4	6.9
	Control	12.4
Pennstar Kentucky Bluegrass	2	7.9
	4	7.2
	Control	11.1
Prato Kentucky Bluegrass	2	8.0
	4	7.4
	Control	13.0
Newport 25%, Merion 50%, Park 25% Kentucky Bluegrass	2	7.5
	4	7.0
	Control	11.7
N-7-16 Kentucky Bluegrass	2	7.5
	4	7.3
	Control	13.3
Fylking Kentucky Bluegrass	2	8.0
	4	7.7
	Control	11.7
Red Fescue 50% Common Kentucky Bluegrass 50%	2	8.7
	4	7.9
	Control	13.2
Perennial Ryegrass	2	8.6
	4	7.4
	Control	13.2
Perennial Ryegrass 50% Common Kentucky Bluegrass 50%	2	7.9
	4	7.2
	Control	12.4
Kentucky 31 Tall Fescue	2	7.5
	4	7.2
	Control	13.2
Common Bermuda	2	7.1
	4	6.7
	Control	10.7
U-3 Bermuda	2	5.6
	4	7.0
	Control	8.4
Tiffine Bermuda	2	5.5
	4	5.4
	Control	7.3
Kentucky 31 Tall Fescue 50% Common Kentucky Bluegrass 50%	2	7.6
	4	7.4
	Control	13.8
Meyer Zoysia	4	5.7
	Control	7.0
Midwest Zoysia	2	6.1
	4	6.2
	Control	9.1

Gro than with MON compounds on Kentucky bluegrass throughout the test and with tall fescue for a few weeks, but Slo-Gro was greatly inferior on tall fescue after five weeks.

All MON-820 treatments — 1, 2, 3, and 4 lb/A — gave greater retardation than the same rates of Slo-Gro on both N-fertilized and N-unfertilized Kentucky bluegrass plots over a 42-day period. Differences between treated and control plots were greatest when all plots had been fertilized with 2 lb N/1000 sq. ft. This N application brought about a greater color loss with the MON compounds than with Slo-Gro early in the experiment, but these effects did not last throughout the duration of the experimental period.

Dry matter yields of tall fescue and Kentucky bluegrass from MON-820 and MON-845 plots were generally lower than yields from Slo-Gro plots at comparable chemical rates, which indicates better growth retardation. In most instances, yields from MON plots averaged only one-fourth to one-seventh the yield of the untreated controls.

MON-820 treatments resulted in significant retardation of common, Merion, Pennstar, Prato, N-7-16, and Fylking Kentucky bluegrass; common, U-3, and Tiffine bermuda; Meyer and Midwest zoysia, and mixtures of Kentucky bluegrass with red fescue, perennial ryegrass, or tall fescue.

Based on our results with 19 growth retardants, we believe that chemical growth retardation of grasses has a great potential and a great future.

Literature on Chinch Bug Available From Stauffer

Literature about Chinch bug control with Aspon insecticide is now available from Stauffer Chemical Company.

A new brochure tells how to detect these pests in turf and specifies control procedures.

According to Stauffer, Aspon is recommended by leading turf experts and has been successfully used by home owners, golf course superintendents and commercial lawn care specialists with outstanding results. The product, Stauffer says, is one of least hazardous materials available for chinch bug control and in most instances only one application is needed per season.

A special section lists suggested application rates. For more details, circle (725) on the reader reply card.

U.K. Forestry Plantations Adopt Shell Prefix

Forestry plantations of the United Kingdom have adopted Shell Prefix herbicide. The official approval follows extensive field trials on Prefix granular formulation containing 7½% of the active ingredient.

The trials demonstrated Prefix as an efficient and economically attractive forestry herbicide, with cost savings arising from a smaller labor requirement and improved manpower utilization compared to other methods of weed control.

The first application of Prefix is recommended at a rate of 50 lbs. of granules per treated acre applied as a 3 ft. band over the trees.

Prefix is applied by means of the specifically developed machine, the Horstine Farmery Air Flow Granular Applicator, which ensures accurate and rapid placement either as a 3 ft. continuous band over the trees or, as a spot treatment over and around individual trees. The Applicator will treat an average of 5 acres per man day.

Tree Service Company Transplants Chinese Ginkgo

A 150-year-old Ginkgo tree in Niagara Falls, N.Y., was saved from the destruction of urban renewal, thanks to ecology buffs and the professional skills of Frost and Higgins Landscaping service.

The Niagara Ginkgo is estimated to be 150 years old and was planted by Thomas Tugby, who brought the tree back from China in a small tub. Since then, it has grown to five feet in diameter, 90 feet tall and with an 80-foot spread. Botanists say this oriental species is more than 200 million years old.

About 2,000 disturbed ecology buffs put pressure on the Niagara Falls Urban Renewal Agency to save the tree. With the cooperation of the mayor and the city government, they convinced the Housing and Urban Development (HUD) to appropriate money to save the tree.

Monroe Tree Company of Rochester, N. Y., was retained to study the possibilities and determine if the tree could be moved. Monroe contacted Frost and Higgins of Burlington, Mass. Authorization was granted to move the tree.

It was a triumph in large tree moving, says William A. Rae, president of Frost and Higgins. The tree was moved with a large root ball, 28 feet in diameter and 6 feet in depth. The root ball was placed on a platform and the tree moved slowly along a wide trench approximately 200 feet to its new home.

Rae says that the Ginkgo will receive much care for two to three years to insure proper growth after the shock of transplanting.

This is the 150 year old Ginkgo tree, five feet in diameter, that was transplanted by Frost and Higgins Landscaping service.

For More Details Circle (115) on Reply Card

For More Details Circle (149) on Reply Card