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That's because golf superintendents rely on Agrico Fertilizers to keep critical off-green areas in top-flight playing condition.

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varied with the specific soil type. At a given concentration of surfactant, phytotoxicity was greater when grown on a treated silt loam than on a one to one mixture of sand and peat.

Root growth of turfgrass is more sensitive to inhibition or phytotoxicity by surfactants than shoot growth, whereas seed germination is the least sensitive. Soil Penetrant significantly reduced seed germination of barley at concentrations of 1,000 ppm or above whereas soil treated with Aqua Gro at 4,000 ppm did not reduce germination.

Comments: Nonionic surfactants are nonelectrolites which are chemically inactive. They are most effective in hard water and at warm temperatures. Several of the nonionic surfactants are used in turfgrass culture as wetting agents for the purpose of increasing the ability of water to moisten a solid substance such as the soil or thatch. Basically, a wetting agent lowers the surface tension, resulting in increased effective wetting of solid surfaces. Wetting agents vary in the degree of effective wetting they produce.

Wetting agents can be utilized in improving the wetting of hydrophobic soils, thatch and localized dry spots. Beneficial effects associated with the improved wetting include a reduction of the (a) evaporation rate, (b) incidence of dew and (c) amount of water lost by surface runoff. Potentially detrimental effects include (a) a reduction in the water holding capacity of the soil and (b) an increase in thatch accumulation resulting from the increased droughtiness of the thatch layer which restricts microbiological decomposition. There may be no beneficial effects from the use of wetting agents on soils which are not hydrophobic.

The results of this study indicate that the nonionic wetting agents can be phytotoxic to turfgrass plants when used at excessive rates. The root system, especially the root hairs, are much more sensitive to injury than the shoots. These results emphasize that wetting agents should not be used indiscriminately. The recommended rate of application should be followed closely. These studies also indicate that the potential degree of phytotoxicity will vary with the specific (a) wetting agent used and (b) soil type. Soils containing a higher amount of clay will have a greater tendency to absorb the surfactant and thus reduce its potential phytotoxicity. Potential phytotoxicity is far greater in solution culture studies than when turfgrass plants are grown in a soil media. Foliar injury of turfs by wetting agents are generally associated with (a) periods of high temperature, stress and (b) excessive rates of application.

In summary, nonionic surfactants or wetting agents are not cure-alls for turfgrass cultural problems. They are effective in improving water penetration into hydrophobic soils or thatch. A wetting agent is one of the tools available to the turfman in maintaining a quality turf. Wetting agents should be applied at the recommended rate in order to avoid potential phytotoxicity. In addition, consideration must be given to the particular temperature conditions, soil type and turfgrass species when selecting the rate and time of application of a wetting agent. Further research is needed regarding the beneficial or detrimental affects of wetting agents, particularly from long term, continual use.

Reaction of Kentucky bluegrass strains to feeding by the sod webworm.

R. C. Buckner, B. C. Pass, P. B. Burrus and J. R. Todd. 1969. Crop Science. 9(6): 744-746. (from the Kentucky Agricultural Experiment Station, Lexington, Ky.).

The objective of this investigation was to determine the relative degree of resistance to sod webworm injury present among various cultivars and selections of Kentucky bluegrass. The plot area was established in August, 1962. Detailed evaluations of sod webworm (*Crambus* spp.) injury were conducted during the 1964 to 1966 growing seasons. The experimen-

(Continued on page 24)

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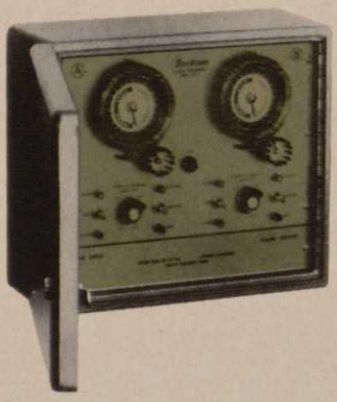
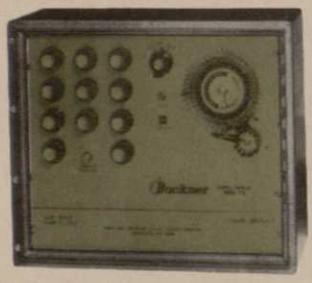


Our new CP-2 Dual Central Programmer, the ultimate in central programming, controls up to 600 stations from one location, includes a unique syringe cycle. Along with the FC-10, a simplified field controller designed to go with it, the CP-2 gives total remote control, yet can cost less than a conventional automatic system.



For large turf areas, the versatile 711E Automatic Controller does the job. This 11-station model gives "down-to-the-minute" watering on half hour starts, can be set to recycle.

The BR-10 is the controller for landscaped grounds, with 5 stations for lawn, 5 for shrubbery. Simple, rugged, reliable, the BR-10 offers individuals station timing, 0 to 60 minutes.

The AMA 100, an automatic moisture adaptor, can be connected to any controller already installed. Two electric impulse stainless steel probes in the turf activate the controller when the ground needs water.

Whichever model you choose, your rugged Buckner controller will give you years of trouble-free service. ☐ Call one of our distributors. Or send in the coupon—we'll help you decide which one was made for you.

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Beard

(Continued from page 22)

tal area was mowed weekly at a height of two inches. Data collected included visual evaluations of injury to individual Kentucky bluegrass cultivars as well as actual counts of number of larvae.

Results of the studies showed considerable variation in resistance to sod webworm injury among certain cultivars and selections of Kentucky bluegrass. The authors concluded that there are good sources of resistance to sod webworm injury available for use in breeding programs to develop resistant bluegrass cultivars.

Kentucky bluegrass obtained from naturalized stands of Kentucky grown seed contained relatively high levels of resistance to sod webworm injury. Selections of Kentucky bluegrass which were obtained from the more southerly locations in the United States also tended to be more resistant. In contrast, Newport, Park and Merion were quite susceptible to sod webworm injury. Evidently, there has been a natural selection for more resistant types of Kentucky bluegrass in the more southerly location due to the greater sod webworm activity in these areas.

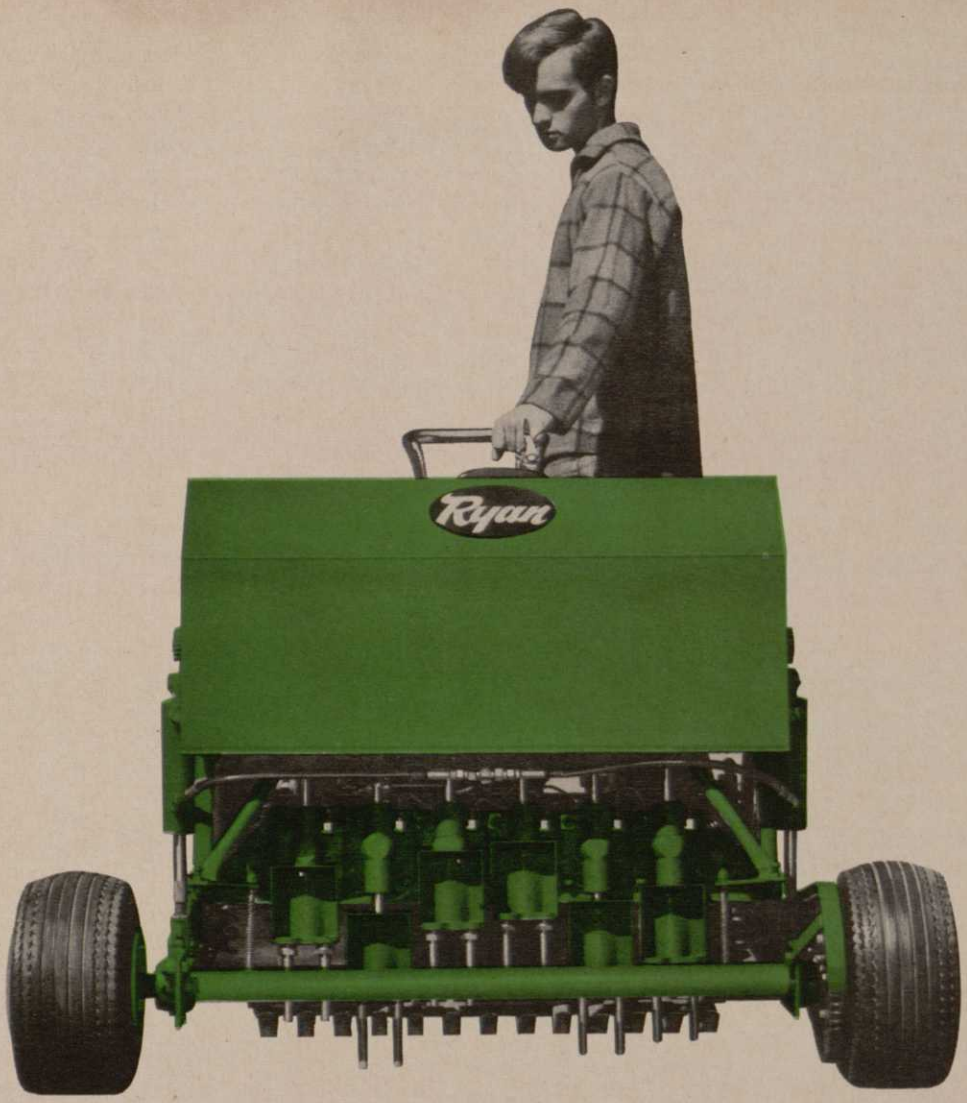
Investigations regarding the nature of resistance to sod webworm injury failed to provide a complete explanation. Preferential feeding trials, total sugar content and silica content of the shoots were not associated with resistance to sod webworm. However, the more resistant selections tended to have heavier rhizome weights than susceptible selections. Further studies are needed before the specific nature of resistance is elucidated.

Comments: Current breeding programs for improved turfgrass cultivars have emphasized primarily improved resistance to turfgrass diseases. However, insect problems can be just as important as disease problems in certain regions. This paper is one of the few studies available relating potential resistance to insect injury among turfgrass cultivars. This study shows that an acceptable degree of resistance exists among certain selections of Kentucky bluegrass. On southern turfgrass species, there is evidence of resistance with (a) certain selections of St. Augustinegrass to chinch bug and (b) certain selections of bermudagrass to the bermudagrass mite.

The use of insect resistant turfgrass cultivars is preferable to the application of insecticides since it is less costly and time consuming as well as being a preventative approach which avoids potential pollution problems. Unfortunately there are very few turfgrass cultivars which have been developed with specific resistance to a given turfgrass insect pest. More emphasis will be placed on this problem in the future as breeding programs become more extensive. □

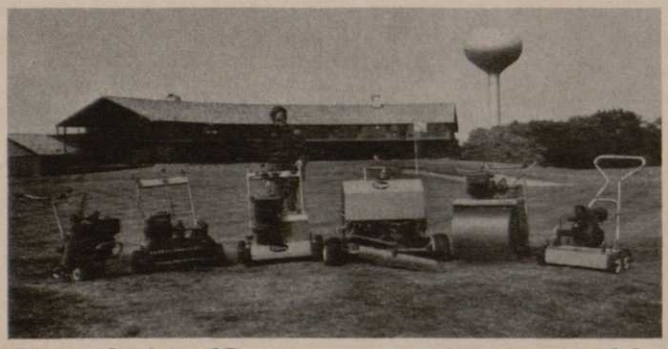
OTHER PAPERS OF INTEREST

1970 golf course survey for Northern Ohio Chapter of the Golf Course Superintendents Assn. *1970. Northern Ohio Turfgrass News. 13(3):1-3. (from Editor John P. Dunlap, 1518 Warrensville Center Road, Cleveland, Ohio 44121).*



"Keeping a 7,400-yard course up calls for rugged Ryan equipment."

(Says Milt Wiley, General Manager of Hazeltine National Golf Club, Chaska, Minn.)



Ryan helps 18-man grounds crew whip course into peak shape in seven years.

Hazeltine is a big, beautiful golf course nestled in a lush Minnesota valley. Only seven years old, it already is rated among pros as one of the world's most challenging courses. Its 7,400 yards is also a challenge to its 18-man grounds crew.

"We knew a course this size would require rugged turf-care equipment," said General Manager Milt Wiley. "So, we started out with a fleet of Ryan machines: a Rollaire, Ren-O-Thin, Mataway, Renovaire, Greensaire, Spikeaire and a JR Sod Cutter. We've since added another Mataway and a Greensaire."

The turf-care program consists of aerating in the fall. Instead of top dressing, they grind up the rich aerating cores with a Ren-O-Thin. About three times a year they use the Greensaires. Mid-summer they "spike" the course. To complete the program, they have a 60,000-sq.-ft. fairway sod nursery where the JR Sod Cutter is used.

Thanks to a great crew, and Ryan Equipment, Hazeltine's turf reached peak condition in just seven years.

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by Fred V. Grau

ANSWERS TO TURF QUESTIONS

Uncertified seed: just as good?

The June 24th dedication of the Joseph Valentine Memorial at the Joseph Valentine Turfgrass Research Center, University Park, Pa., was a fitting climax to his long and distinguished career. This man brought recognition and distinction to the profession of golf course superintendent.

The memorial's location at Penn State recognizes Valentine's half century of service at Merion GC, his part in stimulating the turfgrass program in Pennsylvania and his untiring efforts to upgrade his fellow workers. His efforts in making Merion Kentucky bluegrass available to the public now is a part of turfgrass history.

This writer is grateful to Joseph Valentine for directing me toward turfgrass as a career. He was one, along with others, who urged the university to hire an extension agronomist in turf. It was my good fortune to have been chosen for that position in February, 1935. It was a genuine pleasure to work with Joe Valentine until his death.

Come to the Joseph Valentine Turfgrass Research Center and visit the Valentine Memorial.

Q—*Just what is "certified seed"? We are urged to buy certified seed when available. Why should we insist on it? Isn't uncertified seed just as good?* *(Indiana)*

A—Certification of seeds assures the buyer of genetic integrity. It is the only way to be sure of getting the variety that you want. Uncertified seeds are not regulated by certification agencies so that the buyer has no protection as to quality and impurities.

In each state there is a certification agency that officially keeps tabs on every lot of seed that is approved for certification. The grower must have complied with all requirements such as 1) planting foundation seed that has been approved by the certification agency, 2) maintaining varietal purity by not permitting other varieties to contaminate the lot, 3) processing to a high degree of purity in accordance with regulations.

Because of these precautions certified seed costs more to grow and process and, therefore, costs the consumer more.

When certified seed is available it is false economy to save a few pennies by using uncertified seed that could cost far more in weeds and varietal contamination.

Q—*Along many highways in the East there is one grass that seems to be used more than any other. The blades are fairly coarse and, unmowed, it grows to a height of two to three feet. It seems to grow under a wide range of conditions of soils and climates. What can you tell us about this grass?* *(Ohio)*

A—The grass that is widely used on highways is Kentucky 31 fescue. In the West Alta fescue, a grass very similar to Kentucky 31, is used. Both grasses are tall fescue, a rugged hardy grass extremely tolerant to chemicals and road salt. To be kept in the best condition these grasses must be fertilized annually with a high nitrogen fertilizer. They seldom receive ideal management, however. Then the turf thins and erosion sets in. It is becoming standard practice to include a rugged perennial legume in tall fescue seedings to furnish nitrogen to the grass at no extra cost and to reduce or eliminate mowing.

(Continued on page 28)

USS Vertagreen

Weed & Feed for professional turf

With Balan kills Poa Annua and Crabgrass while it feeds your turf

With Balan

One of the greatest challenges to you as a golf course superintendent is the control of trouble making weeds such as Poa Annua in the Fall and Crabgrass in the Spring. And when it comes to combating these culprits you'll find that USS VERTAGREEN Weed & Feed for Professional Turf gets the job done. Weed & Feed contains famous BALAN, the selective pre-emergence herbicide that kills Poa Annua and Crabgrass seeds as they germinate. BALAN breaks down gradually . . . leaves no harmful residue . . . no damage to established turf. And as Weed & Feed controls weeds, its superior grass-growing nutrients (12-4-8 VERTAGREEN) act quickly to privide steady, healthy growth.

So remember . . . now's the time to kill Poa Annua before it gets a good grip on your turf. For great turf in the 70's, call the professional today . . . your VERTAGREEN Representative. He'll meet you on your own ground with a full line of dependable turf products and services for you.

Score in the 70's with the USS Vertagreen Professional turf program

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For more information circle number 240 on card

Grau

(Continued from page 26)

Q—*We have been looking for a reliable publication on "Ground Covers." Can you help us?*
(Pennsylvania)

A—A good circular came to my desk recently. It is Special Circular 108, The Pennsylvania State University, University Park, Pa. 16802. Craig Oliver, Horticulture Extension, is the author.

Q—*Is there a possibility of controlling mosquitoes by the sterile-male technique, which was successfully used on the screw-worm?*
(Florida)

A—Yes, success by this method has recently been reported in Science, Vol. 168, 12 June 1970, pp. 1368-69, by R. S. Patterson, *et al*, USDA, ARS, Entomology Research Division, Gainesville, Fla. The mosquito involved is *Culex pipiens quinguefasciatus*, a vector of human diseases, particularly filariasis. The sterilizing agent is *thiotepa*. □

If you have questions to submit to Dr. Grau, write him c/o GOLFDOM, 235 East 45 Street, New York, N.Y. 10017.

Emerson

(Continued from page 8)

came a membership corporation

- Whether there are any documented articles or bylaws
- Whether the corporation has a civic, fraternal or social purpose
- Whether there are any formalized procedures for becoming a member or for being expelled from membership
- Whether there are membership cards, a membership roster or established procedures for admitting guests of members.

Judging by these standards the essential factors which determine whether an establishment is a private club or serves the public are the extent to which the membership is genuinely selective on some reasonable basis; a fair start on an important question. □

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COMING EVENTS

Club Managers Assn. of America Workshop in Outdoor Recreation Administration, Cornell University, Ithaca, N.Y., August 10-13.

Golf Course Superintendents Field Day, University of Rhode Island, Kingston, R.I., August 26.

Law and Utility Turf Field Day, University of Rhode Island, Kingston, R.I., August 27.

Michigan State University Turfgrass Field Day, Traverse City CC, Traverse City, Mich., September 9.

Virginia Polytechnic Institute Turfgrass Field Day, Blacksburg, Va., September 9-10.

Turf and Ornamentals Day, Ohio Agricultural Research and Development Center, Wooster, Ohio, September 15.

CMAA Workshops in Executive Development and **Financial Management,** University of Chicago, Chicago, Ill., September 19-22.

Professional Golfers' Assn. West Coast Merchandise Show, Oakland-Almeda County Coliseum, Oakland, Calif., September 27-29.

Annual Hardware Show, Coliseum, New York City, October 12-15.

Central Plains Turfgrass Foundation Conference, Ramada Inn and Kansas State University, Manhattan, Kan., October 21-23.

CMAA Conference, Grosvenor House Hotel, London, Eng., January 17-24, 1971. (Registration starts two days before the conference.)

Michigan Turfgrass Conference, Kellogg Center, Michigan State University campus, East Lansing, Mich., January 26-27, 1971.

Golf Course Superintendents Assn. of America Annual Conference, Denver, Colo., Feb. 7-12, 1971.