Expanding Overseas Market Competing for Chemicals, Manpower, 20th Northeastern Weed Meet Hears in New York Last Month

"A new demand for trained personnel and product distribution is coming from the foreign weed control market," Dr. William R. Furtick, Oregon State University in Corvallis, told delegates to the 20th Annual Northeastern Weed Control Conference. Almost 700 weed control contractors, highway and utility workers, horticulturists, and researchers attended the three-day conclave at New York City's Hotel Astor, Jan. 5-7, honoring pioneers in the weed control field whose work during the last two decades has made this group's annual sessions one of the country's most educational conferences. The concurrent subway strike, which created massive chaos for New York City, did little to dampen delegates' interest and enthusiasm for this year's fact-filled program. Only minor arrival and departure inconveniences held total attendance slightly under last year's record enrollment.

"Weed control is one of the most rapidly growing fields today in this country," Dr. Furtick continued, "and now international sales have exceeded domestic use. Demand for additional trained personnel in the USA will increase more than ever before. We already have a serious shortage. And now the growth of the foreign market further complicates the problem," he observed during the first session of the combined technical- and use-oriented weed control meet.

Serving needs of conference delegates were reports of test results on weed control methods, chemicals, and equipment, given by contract applicators, researchers, and representatives from industrial, university, and governmental organizations.

New Products from Industry

Among the new products being offered weed controllers, nine new herbicides were described for potential use in nonagricultural fields. Dr. Robert Metz of Niagara Chemical Corp. chaired the panel of chemical company researchers.

Dr. Mark B. Weed, Agricultural Research Section of the E. I. duPont de Nemours & Co., Inc., introduced the first new herbicide, Sinbar, formerly known as test chemical 732. "Sinbar," he said, "is a uracil-type compound which has controlled deep-rooted annual weeds and perennials during test trials. Its oral LD_{50} to rats is 1,000 mg./kg. Toxicity tests in feeding studies with dogs and rats are in process. Sinbar inhibits photosynthesis and leaves the plant in a chlorotic state with stems and leaves somewhat faded." Weed explained, "It has given good control of quackgrass at 2 to 4 lbs. per acre. Plants pick the chemical up through their roots, and apparently there is no translocation of it downward into the soil."

Dr. Stan N. Fertig, Cornell University, Ithaca, N. Y., discussed preemergence treatments for weed control. He also co-authored a report with Dr. Armin H. Furrer, from Rutgers University, on fall treatments for quackgrass control in clay soils.

Hooker Chemical Co. researcher, Dr. L. G. Butler, described their new product, Glytac. "Its technical name is ethylene glycol bis-(trichloroacetate), and has an oral LD_{50} to rats of 7,000 mg./kg. Use of Glytac is now restricted to the Delta area, and is not used on crop plants," he said. Tests have shown that Glytac's herbicidal activities are reduced when it is applied as an emulsion. Hooker recommends its dilution in an oil solvent. Among the weeds controlled, Butler listed johnsongrass, quackgrass, and broadleaf annuals.

Richard Otten, Amchem Products, reported on his firm's new herbicide, Sindone, formerly known as D 263. It is a mixture of 1,1-dimethyl-4,6-di isopropyl 5 indanyl ethyl ketone and 1,1-dimethyl-4,6- di isopropyl 7 indanyl ethyl ketone. "During trials, this herbicide controlled hairy crabgrass, goosegrass, and most seedling grass weeds. It should be applied at 8 to 10 lbs. per acre for weed control in turf. It controlled weeds after preplant soil and preemergence applications."

"Application to register Paraquat for nonagriculture use has been made," J. P. Good of Chevron Chemical Co. disclosed. "It will be especially useful in grass seed bed applications, but Paraquat should not be used with anionic wetting agents." The herbicide, insoluble in most organic solvents, is soluble in water. Its oral LD_{50} to rats is 115 mg/kg., and has a very short residue period.

Velcisol's coded herbicide, OCS-21799, was explained by Dr. Warren H. Zick. The chemical name for this new entry is 2-(4-chloro-o-tolyloxy)-N-methoxyacetamide. "The potassium salt of this compound is formulated in water as the herbicide, and its oral LD_{50} to rats is 175 mg./kg. Results from two test seasons have shown high general herbicidal activity when applied both preemergence or postemergence. Currently, combinations of Banvel-D and OCS-21799 are being tested, and 1:2, 1:3, and 1:4 ratio formulations will be available," Zick concluded.

"Now formulated as a 75% wettable powder, Planavin (SD 11831) is used primarily for weed control in cotton but does look promising on turf. However, it is not yet registered for such use," Dr. R. H. Schieferstein, Shell Development Co., said. "As a preemergence herbicide, Planavin is very active, and

has a low oral LD_{50} to rats of 2000 mg./kg.

"Niagara Chemical Division of FMC Corp. is developing a new herbicide, NIA 11092, for low-rate nonagriculture use," Dr. Richard W. Bushing, from Niagara's Middleport, N. Y., headquarters, told delegates. "It is now formulated as granules, a wettable powder, or 1 lb./gal. emulsifiable concentrate. It has a low LD_{50} rating orally to rats at 3,000 mg./kg." Bushing said that 3 to 5 lbs./A. should be used for annual weeds and up to 6 lbs./A. for woody-rooted perennials. Applied at 2 lbs. per 100 gals., NIA 11092 will defoliate conifers and maples within 6 weeks.

Rohm & Haas Co. researcher, Dr. V. H. Unger, described two experimental herbicides BV-201 and BV-207. Both are formulated as either a 40% wettable powder or an emulsifiable concentrate at 1.5 lbs./gal. Each is soluble in organic solvents and only slightly soluble in water. "To date, most tests have been made on weed control in agronomic crops," Unger explained, "but these compounds applied at from 2 to 6 lbs./A. were effective on some 30 weeds species found in turf and along roadsides." Some of the susceptible species are crabgrass, mallow, chickweed, pennycress, pigweed, purslane, witchgrass, crowfoot, and annual bluegrass.

"Another selective herbicide which has been tested against many annual weeds is Patoran, a product of CIBA Corp., available in technical form or as a 50% wettable powder. It has been tested against 29 weed species and gave control at from 1 to 4 lbs./A. During standard sensitivity tests, beets, most cucurbits, most cole crops, and tomatoes were found to be susceptible to it," Dr. R. B. Seely of CIBA, summarized at the close of the new products session.

Drift Control Additives Tested

"Our research in a small wind tunnel revealed that particulated sprays reduced drift potential to less than 1% compared with unmodified water-solution sprays," B. C. Byrd, Technical Specialist for The Dow Chemical Co. explained during a session on utility and railroad weed control. Particulated sprays are formed by adding special chemicals to mixtures of water and herbicide. Uniform and larger particles are formed from herbicide droplets so the spray is less subject to air currents. "Field tests tend to substantiate wind tunnel results. In nine different states, Norbak (a particulating agent) prevented off-right-of-way damage by confining the herbicide, Tordon, to intended targets when sprayed from helicopters. There was little effect on plants off the rights-of-way.

"Test results showed that 2 gals. of Tordon 101 mixture in a total volume of 10 gals./A. of particulate spray provides adequate control of susceptible species actively growing on sandy or sandy-loam soils. Tordon 101 mixture is .54 lb./gal. of 4-amino-3,5,6-trichloropicolinic acid and 2 lb./gal. of 2,4-D as the triisopropanolamine salt. On rocky areas, clay soils, or where brush

Graduate assistant, A. B. Rogerson from Virginia Polytechnic Institute, reported on the effectiveness of soil sterilants under highway guardrails. His research was planned with Doctors T. O. Evrard and W. E. Chappell, both staffers at V.P.I.

is covered with dense vines, 3 gals. in 15, or 4 gals. in 20, may be needed to control less susceptible species. Double applications at ½ rate per swath, and during periods of active plant growth, have given consistent and most effective results," Byrd told the weedmen.

On the subject of drift control with invert emulsions, John F. Walker, Hercules Powder Co. research department, added, "Both effective coverage and drift control are influenced by droplet size range. Unfortunately, coverage and drift control demands on droplet size range are exactly opposite. Right-of-way spraying, usually done by aircraft at a substantial altitude, calls for strict drift control. Here, a large droplet size is necessary so that herbicide will hit only the weedy targets." Walker explained that, on the other hand, spraying very large areas at low altitudes, or from the ground, necessitates small droplet size to get good coverage. Drift in this case would be held to a minimum since the spray is applied near the ground. "We now know that properties of invert emulsions are variable and in any piece of equipment, aerial or ground rig, requirements of invert applications can be met by adjusting characteristics of the invert emulsion, either in the field or lab."

J. W. Suggitt, research chemist for the Hydro-Electric Power Commission of Ontario, Canada, pointed out, "Where herbicides must be applied to right-of-way

Registration was nearly 700 at the 20th Annual Northeastern Weed Control Conference at the Hotel Astor in New York City. Weed controllers, suppliers, and researchers were processed rapidly under the supervision of Dr. and Mrs. John A. Meade. Dr. Meade, 1965 Secretary-Treasurer, organized the check-in process and helped maintain its steady flow.

or roadside brush next to sensitive crops, simply prepared thickened sprays will permit applications in winds up to 8 miles per hour. This wind speed would halt application of normal spray mixtures. Herbicides thickened with hydroxyethyl cellulose (HEC) are used advantageously where slower drying and greater leaf retention are needed. Such mixtures minimize the number of very small droplets and reduce the risk of damage to adjacent sensitive plants by wind drift."

Plants Affect Public Waters

"Vegetation that grows next to public water supply reservoirs, and next to the streams that supply these reservoirs, directly influence both the quality and quantity of stored water," William I. Boyd, E. I. duPont de Nemours & Co., explained during the utilities weed control session. "In supply streams, leaves hamper the flow of water. They clog screens, plugs, and valves, as well as affect the taste, color, and quality of water.

"There are two approaches to vegetation control in areas bordering public water supplies," Boyd added. "One is to prevent or remove growth of troublesome broadleaved brush; the other is to establish conifers to prevent the accumulation of leaves in the water and, at the same time to prevent erosion. However, even in a conifer program with pines or spruce, leafy plants cause problems in freeboard areas next to water, along roadways, and other service areas.

William I. Boyd, from E. I. duPont, told weedmen about factors that should be considered when controlling weeds near public water supplies. "DuPont has conducted large-scale field tests during the summers of 1962, 1963, and 1964 to see whether residues could result from typical applications," he said.

"Cutting plants is not only a difficult task, but it can be time consuming and costly. Therefore, many chemical companies have experimented with chemicals for brush control," Boyd explained. He outlined that, by law, such chemicals shall not reside in drinking waters beyond the limits set forth by the U. S. Public Health Service. He told the delegates that for three years DuPont has tested Ammate herbicide applied with a mistblower for vegetation control around water reservoirs. Concentrations of up to 4 lbs. of Ammate per gallon of water gave good results, he said.

Fenac Tested in Ponds

Madalene E. Pierce, Vassar College at Poughkeepsie, N. Y., reported results from treating four ponds with a 10% concentrate of Fenac. "The ponds were on the Vassar Campus, each less than one acre and with no appreciable inlet or outlet. Two received enough chemical to give a 1-part-per-million dosage

concentration, one pond had 2 ppm, and the fourth 3 ppm.

"Applications of granular Fenac were made on June 8, 1965. Their effects on pond plant and animal life were tabulated six times between June 11 and September 23, 1965.

"*Potamogeton pusillus,* a submergent weed, was eradicated at 2 ppm, and the same concentration greatly reduced *Lemna minor,* a surface weed. *Wolffia columbiana,* another surface weed, was resistant to all concentrations; however it was slightly reduced in an open pond treated at 2 ppm. *Potamogeton crispus,* a submergent weed, was eradicated by a dosage of only 1 ppm, but winter buds were produced later.

"Water temperature remained for the most part between 64°F and 68°F and never exceeded 70°F.

The aquatic biologist added that plankton organisms, small invertebrates, frogs, turtles, and adult and young fishes seemed unaffected by the Fenac treatments. The chemical name of Fenac is 2,3,6-trichlorophenyl acetic acid.

Simazine Controlled Aquatic Weeds

"The effects of simazine on aquatic plants seem to depend on the amount of the chemical applied," David L. Sutton, Virginia Agricultural Experiment Station, Blacksburg, divulged during the aquatic weed control session. "Higher concentrations usually control a wider range of plants. During our tests, using eight applications ranging from 2 to 4 ppm in water, nearly 65% of the simazine remained after one week. Of three applications from 0.6 to 1.5 ppm, about 30% of the simazine was still present one week after treatment.

"In greenhouse tests, we found there are at least three ways that simazine may be removed from the water: (1) adsorption to the soil or glass, (2) volatilization, or (3) removal by a plant species, namely *Oedogonium* sp. used in our tests.

"In subsequent tests conducted in seven ponds, it was found that repeated applications with simazine seemed more effective for control of filamentous algae than for *Chara* spp. or higher plants. *Eleocharis* spp. did not seem to be effected by simazine treatments; however, there was some damage done to this species along a pond bank. In all pond treatments, there was no control of any aquatic plants with five applications of 0.1 ppm.," Sutton concluded.

Chemicals and Management Control Turf Weeds

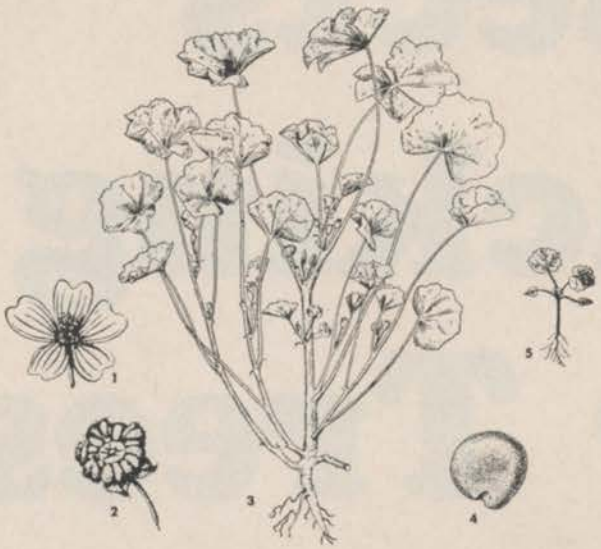
Weed control in turfgrass was featured in sessions all day Thursday. More than 15 speakers from university research departments and agricultural experiment stations reported on results from their current weed control tests.

"To adequately suppress broadleaf weeds in Kentucky bluegrass varieties," Dr. C. R. Funk, Associate Research Professor at Rutgers University, said, "our tests show that good fertility is needed. At closer cutting heights, ¾ inch and 1½ inch, competition was most severe from broadleaf weeds when compared with plots of grass cut to 2½ inches.

"Fertilizer levels in Kentucky bluegrasses influence their sus-

Common Mallow

(Malva neglecta)



Introduced from Eurasia, common mallow is widespread throughout North America. It inhabits moist, loamy soil types and grows in yards, gardens, and cultivated fields.

Other common names for this species are round-leaf mallow, running mallow, cheeses, buttonweed, and low mallow. It is annual or a short-lived perennial species, sometimes called biennial and reproduces only by seeds.

Growth habit is semiprostrate; stems extend upward or they grow laterally from the crown at ground level. Seedlings (5) may grow, for a short time, both upward and laterally. Stems are hairy and may be 3 feet long. A deep, fibrous taproot (3) supports the plant.

Leaves are bright green and nearly round. Their edges are irregularly scalloped or have shallow lobes, and are from 1 to 3 inches in diameter. Leaves are alternate on the stems.

Flowers are produced singly or clustered in a leaf axil. They are small, bell shaped, and bluish white. Each flower (1) has five petals, each from 1/3 to 2/3 inch long.

Seeds (4) are produced within a cup (calyx bracts) formed by the flower head. They are attached together in a circle in the cup or pod (2) which is round, flat, and buttonlike. The button-shaped pod resembles a round cheese divided into 10 or 20 seed sections, thus the common name "cheeses." Seeds are dark gray, flattened, and nearly circular with a deep notch in one side. Often they contaminate flower, clover, and grass seed. A single plant may produce over 40,000 of these tiny (1/16 in. dia.) seeds each year.

During the period of rapid leaf and stem growth, this weed is eliminated by 2,4-D, 2,4,5-T, or silvex treatments at the rate of 1 lb. per acre. During periods of slower growth, repeated treatments are necessary. In lawns and yards its spread can be halted by cutting before seed is produced.

Prepared in cooperation with Crops Research Division, Agricultural Research Service, United States Department of Agriculture, Beltsville, Maryland.

(DRAWING FROM NORTH CENTRAL REGIONAL PUBLICATION NO. 36, USDA EXTENSION SERVICE)

Dr. C. R. Funk, Rutgers University, New Brunswick, and Dr. Joseph M. Duich of Penn. State University, chatted during a presession break. Dr. Funk told weed control delegates about the influence of grass variety, fertility level, and cutting height on weed invasion in Kentucky bluegrass. Dr. Duich discussed control of broadleaf weeds in turf.

ceptibility to invasion by crabgrass," Funk asserted. "Crabgrass was most serious in our test plots at high fertility, but broadleaf weeds were more serious at low fertility. During establishment, grasses with rapid germination and vigorous seedlings were less effected by weed competition than were slower starting varieties. Use of rapid starting grasses as companion species with bluegrass varieties is one method of reducing weed competition," Dr. Funk advised.

Knotweed Control Tested

University of Rhode Island researcher, Dr. Richard Skogley, reported on "Early and Mid-Season Chemical Control of Knotweed in Turfgrass." Effectiveness of about 30 herbicides or their combinations were tested for selective knotweed control in 1965 during one early season and one midseason trial.

"When treatment was made to young plants, knotweed control was achieved with more chemicals applied at lower rates," Skogley announced. "Good control of seedling knotweed resulted from treatments of liquid DMPA at 15 lbs./A., and with dicamba as low as 0.25 lb./A. A combination of 0.1 lb. dicamba with 1 lb. of 2,4-D per acre gave knotweed control, and mecoprop-2,4-D combinations gave control at dosages as low as 0.5 mecoprop with 1 lb. 2,4-D per acre.

"At both early and midseason stages of growth, good knotweed control was obtained only with dicamba at 1 lb./A. Dicamba-

2,4-D combinations gave good control at the rates: 0.2 plus 1 lbs., 0.25 plus 1 lb., and 0.5 plus 1 lb. per acre."

Mecoprop, uncombined, failed to control knotweed at either stage of growth as did 2,4-D and silvex. Combinations of 2,4-D, one with silvex and one with 2,4,5,-T, applied only to mature knotweed, failed to control it. Dry formulations of dicamba and mecoprop were tested against mature knotweed, and neither gave satisfactory control, Skogley said.

Broadleaf Weed Control Explored

"From our tests on two separate country club fairways, the value of MCPP for safe clover control, and dicamba for knotweed, was reconfirmed," Dr. Joseph M. Duich of the Penn. State University department of

Dr. Robert W. Metz (left), chairman of the "New Products from Industry" session, discussed potential weed control materials and plans for the coming year with his associate Don Moore. Both are from Niagara Chemical Div., Middleport, N. Y.

agronomy disclosed. His talk was presented to those interested in weed control in turfgrasses and revealed results from rather large-scale field trials. Nine herbicides or their combinations were tested, and control of weeds such as knotweed, clover, dandelion, ox-eye daisy, thyme-leaved veronica, and other broadleaf weeds was reported.

Duich said that, "MCPP potassium salt was more effective than an ester formulation, and to provide broad-spectrum control for weeds such as dandelion and plaintain, 2,4-D must be combined with dicamba and MCPP. Alone or in combinations, 2,4-D," he said, "may be harmful to both bentgrass and

Poa annua if applied above 1 lb./A."

Herbicides were applied with a four-nozzle plot boom sprayer at 45 gal./A. with pressure at 35 lbs. per square inch. The single pass technique used was assumed the best to approximate a tractor-drawn spray rig. All treatments were applied on April 28 and 29 when clover and *Poa annua* were actively growing and knotweed was in the post-cotyledon stage. One golf course area was irrigated and supported 80% *Poa annua* and 20% bentgrass; the other, irrigated only during the test period, was composed of 50% bluegrass and 50% weeds rather uniformly distributed, Duich outlined.

Control in Established and Putting Turf Studied

Continuing with the Thursday afternoon session on weed control in turfgrass, Dr. Elwyn E. Deal, from the University of Maryland agronomy department, discussed control of crabgrass, goosegrass, and annual bluegrass with preemergence herbicides. Connecticut Agriculture Experiment Station researcher, Dr. John F. Ahrens described studies on chemical control of *Poa annua* in putting green turf.

"DMPA granules and bensulide granules provided 90% to 100% late-season crabgrass control at rates recommended by manufacturers. Granular siduron, test material D-263, Bandane, and wettable powder DCPA gave 80% to 90% control," Deal announced.

"Goosegrass," Deal added, "was particularly controlled by recommended rates of granular D-263, H-9573, FW-925, and wettable powder siduron. Higher rates of these and DCPA, Bandane, DMPA, and bensulide gave best goosegrass control. Annual bluegrass plants were injured by all DMPA and FW-925 treatments. High rates of benefin, DCPA, siduron, and bensulide also injured bluegrass plants. None of the herbicides tested affected fall germination of annual bluegrass when applied at rates recommended by manufacturers."

Reporting results of his tests on *Poa annua* control in putting green turf, John Ahrens said, "DMPA applied at 15 to 20 lbs./A. in September, or in April and September, greatly reduced *Poa annua* infestations in putting green turf. Slight injury to bentgrass turf resulted from the second application of DMPA at 15 lb./A. one year after initial treatment.

"Bensulide, applied at 16 and 32 lbs./A. in October, 1964, provided fair control of *Poa annua* in May, 1965. Reapplication at 15 and 20 lbs./A. in September, 1965, on the same plots caused no turf injury," Ahrens cited.

Ilnicki: 1966 President

Dr. Richard D. Ilnicki, Rutgers State University, New Brunswick. New Jersey, was elected 1966 President of the Northeastern Weed Control Conference. Dr. Gideon D. Hill, of duPont, 1965 President, announced that other new officers will be Cornell's Arthur Bing, Secretary-Treasurer, and John Gallagher, of Amchem, is Vice President.

A conference wide vote elected Homer LeBaron of Geigy Chemical Co., Ardsley, N. Y., representative to the Weed Society of America. Mr. LeBaron will act as liaison between the NEWCC and WSA and will attend their committee and business meetings during his four-year term.

Next year's Northeastern Weed Control Conference meeting place and date was not announced, but will appear in a coming issue of *Weeds Trees and Turf*.

Raymond P. Atherton, Kerr-McGee Corp. (left), Robert A. Peters, University of Connecticut, and Andrew Watson, Dow Chemical Co., correlated industrial progress with research as they took a midmorning break during the Agronomic Crops session.

Officers of the Northeastern Weed Control Conference are (from left) 1965 President, G. D. Hill, E. I. duPont de Nemours & Co.; 1966 President Richard D. Ilnicki, Rutgers University, New Brunswick, N. J.; Vice President John Gallagher, Amchem Products, Inc., Ambler, Pa.; and Arthur Bing, Secretary-Treasurer from the Cornell Ornamental Horticulture Research Laboratory, Farmingdale, N. Y.

Iowa Park Personnel Meet

Park and recreation personnel from Iowa and bordering states meet at the University of Iowa March 18-19 for a Conference on Community Development for Parks and Recreation. The expansion-directed conclave features a session on "Grass, Turf, and Groundcover for Park and Recreation Areas." Edward Cott, Iowa State University extension horticulturist and turfgrass specialist, will explore this problem.

Registration fee of $10 includes a banquet and a luncheon. Additional information and reservations for the two-day meeting are available from Prof. E. A. Scholer, The University of Iowa, Department of Physical Education for Men, Iowa City, Iowa 52241.

Connelley Advances at NMSU

Hoy C. Connelley, former soil conservationist with the Cooperative Extension Service, New Mexico State University, was recently appointed research technician in the university's Agronomy Department, Agricultural Experiment Station.