

were put into perspective. Problems and the technology to control them are a necessary part of good turf management, as the attendance at this annual conference would indicate.

Throughout the show speakers were available at a special consultant's corner booth to answer questions.

AGRONOMY

Watson is presented agronomic award

The American Society of Agronomy has named Dr. James R. Watson as recipient of its 1977 Agronomic Service Award. Dr. Watson, vice president for customer relations of The Toro Company and that company's principal agronomist, is an internationally recognized expert on turfgrasses. He is the author of a number of articles dealing with various phases of turfgrass care and management. Dr. Watson's research has been concentrated on fertilization practices, winter protection techniques, snowmold prevention and the adaptability of various species and strains of turfgrasses.

Dr. Watson earned a bachelor of science degree in agronomy at Texas A & M University and his Ph.D. at Pennsylvania State University. He is a member of the American Society of Agronomy and the Crop Science Society of America. Last year Dr. Watson received the United States Golf Association's Green Section Award for distinguished service to golf through his work with turfgrass.

The American Society of Agronomy, a 9,400-member scientific educational organization, established this award to recognize the development of agronomic programs and practices and effective public relations programs aimed at promoting the understanding and use of agronomic science and technology by the public.

LANDSCAPE

Kentucky clinic to feature experts

The Landscape/Garden Center Management Clinic, co-sponsored by the National Landscape Association and the Garden Centers of America, will be held February 5-8 at the Galt House in Louisville, Kentucky. The four day program will

feature such authorities as Prof. James B. Sinatra, John Trocke, Eric P. McCarty, Tom McDonald, Jr., Melvin Brady, and Robert Garton.

Sunday afternoon, Feb. 5, is devoted to NLA Committee Meetings. A "How I Do It" session will be held in the evening featuring subjects such as "Efficient Planting," "Guarantees," "Design Sketches," "Soil Additives" and "Mulches."

Monday the focus is on landscape. Subjects include: What's Happening in Residential and Small Commercial Landscape Design, the NLA Awards Luncheon and Accounting for the Non-Accountant.

Tuesday is a day for everyone. New insights on communication: top management with middle and middle with top will be presented. Panel and group discussions plus a presentation on Analyzing Operating Costs will be offered.

Wednesday, the focus is on garden center operations. The theme for the day will be "New Challenges Facing the Nursery Industry" with session subjects such as: How to Sell a Half Million a Year and Net 15% in a Retail Nursery and How the Public Sees My Staff.

NURSERY

Cal Poly alumni to create curriculum

The Ornamental Horticulture/Park Administration (OHPA) Alumni Association of California State Polytechnic University at Pomona, is now working to establish a continuing education program for the professional and interested amateur in conjunction with Kellogg West, Cal Poly's Center for Continuing Education, according to James Prusa, newly elected president of the group.

Prusa also said unveiled OHPA plans have been formulated to benefit the rapidly expanding organization membership.

Other officers include Mary Olson of Environmental Care, vice president; Chris Greenwood of Armstrong Nurseries, secretary; Rodger Duer of Cal Poly, treasurer; and the following directors: Richard Greer of Pomona Wholesale Nursery, Donna Browne of Target Chemical Company, Ken Jones of Armstrong Nurseries and past president John Provine of the Los Angeles County Arboretum.

Persons interested in the OHPA alumni organization may contact the alumni affairs office at Cal Poly, Pomona, 714/598-4748, for further information.

IRRIGATION

Andrus agrees with irrigation rule delay

Secretary of Interior Cecil Andrus has agreed that the Bureau of Reclamation will postpone any final regulation regarding the use of federally funded irrigation water until March 1, 1978. Proposed regulations, issued by the Bureau on August 25, contained stringent acreage provisions (160 acre limit) and residency requirements that generated support for legislation calling for a moratorium on the implementation of the regulations pending a 12 month review of the present federal reclamation law.

CHEMICALS

Mirex OK'd for fire ants in S.C.

EPA has approved aerial application of Mirex to control fire ants in certain coastal South Carolina counties, provided that the State complies with modifications made by EPA in the S.C. plan.

The approval required that the treatment area be modified to prohibit aerial application: (1) "To any aquatic areas, except for intermittent streams where there is no flow and except for man-made or natural impoundments of water which do not exceed two acres in size and are not commercially fished. However, even these exempted waters should be avoided where possible." (2) "Where runoff or flooding will contaminate aquatic areas." (3) "In contiguous wooded areas except for a 100-yard swath contiguous to treated areas . . ."

The approval specified two Colleton County areas which cannot be treated. It also requires the State to perform human, environmental and application monitoring of the Mirex treatment and to have certification by a State official of an inspection for fire ant infestation.

CHEMICALS

Trichem applies for fire ant product

Trichem Industries Corporation has applied for a changed use pattern to register Trichem TCE. They propose that the use pattern of the pesticide, includes use as a fire ant fumigant.

GOVERNMENT

UPDATE

Heptachlor/Chlordane Hearing To Close

The heptachlor/chlordane case is in its last stages after almost two years of hearings. A final decision by EPA Chief Administrative Law Judge Herbert L. Perlman will be due about the first week in February, 1978. EPA and Velsicol lawyers, meanwhile, are debating over some type of settlement agreement.

Officials were not optimistic about a settlement, but noted that the briefing schedule would be followed, regardless. Indications are that EPA and Velsicol will continue to try and work out some type of settlement even after their initial briefs are filed.

Some EPA officials seem to envision a settlement with some major uses, such as on corn, being continued for a while and then phased out. Because of the greater complexity of the heptachlor/chlordane controversy and the number of uses involved, many observers do not foresee a settlement.

Cadmium Extended, Benomyl RPAR Issued

A rebuttable presumption against registration against cadmium was extended to February 10. This RPAR effects 35 turf chemicals.

An RPAR against benomyl, a systematic fungicide used on turf and ornamentals, was noted in the December 6th Federal Register.

Additional chemicals that have been designated for pre-RPAR reviews include: Dimilin, a gypsy moth insecticide; Telone, a soil fumigant and phosphorus paste, used in insecticides and rodenticides.

Du Pont Will Rebut EPA RPAR on Benomyl

The Du Pont Company has announced intentions to rebut the EPA notice concerning presumption against their product "Benlate" benomyl fungicide. Results from extensive scientific tests and from years of world-wide field use show that use of "Benlate" to protect food crops does not represent a risk to man or the environment, according to the company.

Grower, fieldman, and investigator comments and views on benefits of "Benlate" have been requested and will be of special interest to the EPA. Letters to the EPA should include specific information on crops and acreages treated, disease control experienced, benefits observed in terms of improved yield or improved quality, plus facts on previous (or alternate) ways to handle disease problems in various crops and economic value of crops protected.

Letters should be sent in triplicate to: EPA, Office of Pesticide Programs, Federal Register Section (WH-569), 401 M Street, S.W., Washington, D.C. 20460. Letters should also carry the notation OPP-30000/23 for correct identification with the RPAR notice on "Benlate."

Pennwalt Issued Experimental Use Permit

An experimental use permit has been issued to Pennwalt which allows use of approximately 5,114 pounds of an insecticide mixture of O,O-diethyl-O-(2-isopropyl-6-methyl-4-pyrimidinyl) phosphorotioate and aromatic petroleum solvent to evaluate control of insect varieties in residential, industrial, food processing and business sites, and on ornamental trees, shrubs and turf. The permit expires Oct. 14, 1978.

NEWS

NURSERY

AAN forms council for national promotion

The Nursery Marketing Council is the most recent addition to the activities of the American Association of Nurserymen. The council has been established to supply the nursery industry with professional market research and analysis and the resulting advertising and public relations to increase the sale of plant material and related products.

Forty-seven firms have agreed to participate so far. Each of the wholesale nursery growers will add ¼ of 1% of value of plant material to all invoices under Nursery Marketing Council Contribution. If the customer honors this voluntary contribution, the grower will match it and forward the total to the NMC.

The NMC is managed by the staff of the AAN and supervised by its marketing Committee with ultimate authority resting in the Board of Directors.

J. Frank Schmidt, Jr., whose wholesale nursery operation is headquartered in Boring, Ore., is the first industry executive to take on a leadership role in the NMC. His assignment is to establish a committee responsible for enlisting early endorsement and support from a number of major wholesale growers nationwide. Schmidt hopes to build a \$100,000 to \$200,000 fund the first year to support NMC market research and the resulting consumer advertising.

Ketchum, MacLeod & Grove, a 54-year-old marketing organization, which ranks 23rd among all U.S. agencies in billing volume, has been selected as the national advertising agency which will provide the consumer research and marketing services planned for the all-industry program of NMC.

TURF

Ohio research center to build rhizotron

The first turfgrass rhizotron is being constructed at turfgrass research plots maintained cooperatively by OARDC and Ohio State

Continues on page 43

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SELECTING THE PROPER SPRAY APPLICATION SYSTEM

By Ron Morris, Assistant Editor

Environmental concern and EPA regulations make it impossible for an applicator to even contemplate a mistake involving chemicals. It is of the utmost importance that a competent applicator select and use the best equipment in a manner consistent with the environment and the pest to be controlled. While equipment varies, there are general guidelines for choosing a rig that will do the job for you.

A sprayer should be designed for the particular use intended. It should be a quality piece of machinery that is easy to fill, operate and clean. There are basically three types of large sprayers.

Low Pressure Boom Sprayers

This type of sprayer is designed to deliver a low to medium volume of spray at approximately 15 to 50 PSI. The advantages include relatively low cost, versatility and a medium to high capacity. They are limited by a low output if high volume is required. Low pressure tends to limit pesticide penetration into the foliage. There has also been some problems with agitation in this type of sprayer.

Hydraulic Sprayers

Hydraulic, or high pressure, sprayers are designed to spray large volumes of material at high pressures. Their advantages include being well built to withstand the higher pressures. They can also be converted to low pressure spraying with the proper pressure regulators.

Air Blast Sprayers

Also called mist sprayers or foggers, these units use a high speed, fan-driven stream of air to produce a fine mist that moves with the air stream. This stream can then be directed to either or both sides as the unit moves forward. Most of these types of sprayers can be adapted to apply either high or low volumes.

Because of the higher pressures used, often as much as 350 psi, good penetration and coverage are advantages gained. There is also low pump pressure. Pumps can move as little as 10 gallons per minute. However, because of the fine mist produced, there is a tendency towards more drift. It is also hard to limit the spray to the target area.

Tanks

A spray tank should have a large opening for filling and cleaning. This is essential for economic use. In addition, the tank should have qualities that will withstand the corrosion of any chemical you might use in it.

The tank should have a good, easily accessible drain. You should be able to quickly flush the tank,

pump, lines and nozzles after a day's use. Make sure the gauges can be read easily and quickly.

Pumps, strainers and hoses should be selected with the thought in mind that the tank is only as good as its parts allow it to be.

Pumps should be of adequate strength to supply pressures for all of your spraying needs. They should resist corrosion and abrasion. You should use the right pump with the right material. For example, wettable powder formations will quickly destroy a gear drive pump.

Strainers should protect the working parts of

Three methods for spraying large turf areas; the boom sprayer, the mistblower, and the helicopter. Cost of application is proportional to the application speed. The helicopter is the most expensive but the fastest.

the sprayer to avoid any misapplication due to clogged nozzles. They should be cleaned after each use. Strainers provide a defense against pump and nozzle wear and clogging.

Hoses should have a burst strength greater than any peak operating pressure. They should resist any corrosive effects of the material passing through them.

Be sure you check your pressure gauges often for accuracy.

Agitation

Agitation systems have traditionally been limited in their effect. Bypass agitation can be good enough for solutions and emulsions but it is best to use either jet or mechanical agitation for wettable powders. Mechanical agitation has been the best way to assure the best possible agitation. Work is being done on a sparge-line agitation system that is showing much promise. Basically this system picks up material from the bottom of the tank and, by means of a turbine pump, recirculates the material, via a sparge-lines, back into the top of the mixture.

Nozzles

The standard nozzle used on boom sprayers is the flat fan with tapered edges. Spaced at regular intervals across the length of the boom, these nozzles provide an overlapping, tapered edge that produces an even spray the length of the boom. These nozzles have degrees of spraying angles that allow variation in their separation width, and boom height. For example, a series of 80 degree nozzles



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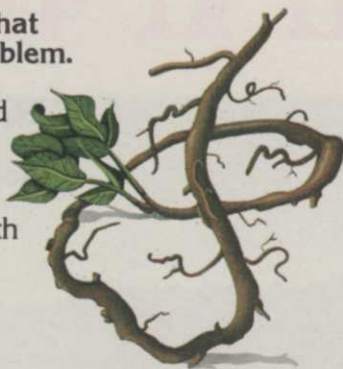


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Spray systems

may be spaced at 20 inches with a boom height of 17 to 19 inches while a 65 degree series of nozzle might be spaced at 20 inches with a 21 to 23 inch boom height.

It is usually best to standardize the nozzles on various pieces of equipment, which limits confusion and requires a smaller item inventory.

Manufacturers typically publish charts with their catalogs that describe the various nozzles, their best functions and capacities.

Hollow-cone type nozzles are often selected for use on boom sprayers when applying pesticides. This type of nozzle produces, as its name indicates, a hollow cone of spray. The pattern is circular with tapered edges and little or no spray in the center. Its main advantage is better foliage cov-

erage. Material is usually applied at higher pressures with this nozzle, assuring even better foliage coverage.

Boomless flooding nozzles are often used to apply liquid fertilizers. This nozzle works at lower pressures than the fan type nozzle and gives a fairly uniform coverage across its width. The wide off-center nozzles are also used in boomless spraying. They can also be used to extend the effective swath width of a boom when attached to the ends.

Many nozzles can be used for spraying more than one type of material. Some general guidelines are: for weed control, select either a regular flat fan, flooding fan or hollow cone; for fungicides, use either a hollow or solid cone; for insecticides, use a regular flat fan, or a hollow or

Mistblowers

by William Burdick, Canterbury Country Club, Beachwood, Ohio

We started mist blow spraying at Canterbury about five years ago and it has developed into our primary means of applying fungicides to fairways.

The equipment we're using is a small, three point hitch mist blower from Myers. We bought this machine in 1972, more or less as an insurance policy, in case during our PGA championship in 1973 we had to get out there and do a fast spray job. We did not buy it to be our primary piece of spray application equipment, although it has turned out that way.

The biggest factor in favor of mist spraying is time saved. With a boom system it was taking us anywhere from a day to a day and a half, with play on the golf course, to spray all our fairways. With the mist blower we've gotten that time down to two and a half hours or five hours, depending upon the method we're using.

Our program at Canterbury is to spray each week, and we do this religiously. We use all chemicals at half rate. We've found this to be very effective since we spray once per week.

The first week we'll spray down the center of the fairway blowing out both sides of the machine. Our fairways average 90-120 ft. wide and we can easily cover that.

The second week, and this is where we came up with five hours as opposed to the two and a half hours, we'll spray one side of the fairway, then back up the other. We're actually getting double coverage that way, still using the chemical at half rate. We also find that there is a benefit because the machine has a

boom directly underneath the tractor.

If we have to operate in a wind of more than six miles per hour we're losing a great deal of effectiveness. The operator can, however, become accustomed to using the wind to some advantage.

Morning applications are of benefit because of the dew. We're using 20 gallons per acre so we like to spray in the early morning when we have dew cover. I can't honestly say we've seen any noticeable difference in the amount of control between spraying on mornings when we do or don't have dew.

One of the disadvantages of this early morning application is the noise level. The fan on the sprayer plus the high tractor rpm that's needed are loud. We've had few complaints but if you have close neighbors or apartment buildings, I'm sure that this could be a problem.

An advantage of mist spraying is that the machine can be operated in almost any kind of weather condition. If you have a very wet situation you don't have to drive on the fairway — you can drive down the sides. This has saved us many times. In a pythium situation, we can get out there after any kind of rain storm, doing no damage to the fine turf, and still getting a beautiful application of chemical.

I think the mist blower is pretty much goof-proof. We've had no trouble at all with calibration. All you have to do is know your ground speed and pump pressure and the nozzle size takes care of the rest.

It's also a very low maintenance piece of equipment. I think the biggest problem, or the thing that you have to watch the closest, is nozzle size and wear, because you're operating at about 350 lbs. of pressure.

We were using brass tee-jet nozzles and found that we could only spray 18 holes of fairways about twice before changing nozzles. Since then we've changed to the same round steel nozzle that we use in the blower manifold and we only have to change those about twice a season.

There are many different types of stainless steel and hardened steel nozzles that can be used. It becomes a systematic thing to know exactly how much chemical we're going to use on an 18 hole fairway application. For example, if we don't have that extra 10 gallons left over to spray the practice tee area, we know it's time to change those nozzles.

Unlike boom spraying, where you're operating at low pressure nozzle clogging is not a problem.

The mist blower solved the problem of disease control in rough areas around our greens where it's just too tight to get any kind of boom spray equipment in. We can go up around the green very easily and we do this about three times a year. If we get into a situation where we can't get on the green or tee to spray with our regular equipment, we can give it enough of a shot with the mist blower to hold until the weather dries up.

We used to find that leaves were a problem on the fairway. A lot of times we were putting more chemical on the leaves than we were on the grass. We didn't have time to get out and clean them up before we sprayed. With the mist blower there was enough air blast to get the fungicide to the turf.

One of the primary things you must do is to be sure your operator has the proper protective clothing. We require they wear a rubber suit and respirator. We also require them to take a shower as soon as they are finished spraying. WTT

solid cone; to minimize drift use either a flooding fan or whirl-chamber hollow cone and keep operating pressures low (below 30 ps.).

Nozzles are made from many different materials. The best buy is the cheapest that will withstand your use of it. Brass is the most inexpensive, but also wears the quickest. If you are using an abrasive material, brass will not last long. Stainless steel is more expensive, but will resist corrosion and abrasion, especially if hardened. Plastic also resists corrosion and abrasion, but tends to swell when exposed to some solvents. Aluminum resists some corrosive materials but is easily corroded by some fertilizers. Tungsten carbide and ceramic nozzles are highly resistant to corrosion and abrasion, but are also expensive.

Nozzles should periodically be checked for uniformity of application. This can be accomplished by allowing each nozzle to fill a calibrated jar in a specified time. A nozzle should be replaced if its flow is 5% more or less than the average.

A good way to check nozzle pattern is to spray water over a stretch of asphalt. Watch for streaks as you increase speed or the spray dries. Replace any nozzle that has a faulty pattern. Nozzles should never be cleaned with any material that is as hard as, or harder, than the material of the nozzle. A toothpick works best.

Sprayer Calibration

There are many ways to calibrate a sprayer. Some are more difficult than others and some are downright abstract. One of the simplest methods is to fill the spray tanks and spray for a specified distance. Then measure, in gallons, the amount it takes to refill the tank.

Determine the total square feet in the test area by multiplying the spray width by the length of the area. A simple ratio can be set up and the total square feet one tank will spray can be calculated.

For example: If your spray width is 10 feet and you spray for 1000 feet, your test area is 10 feet X 1000 feet, or 10,000 square feet. If it took 10 gallons to spray that area, you set up a ratio as follows:

10 gallons to refill spray tank after one pass	Equals	100 gallons in a full spray tank
10,000 square foot test area		unknown area that a full tank will cover

Then: 100 gallons in a full tank X 10,000 square foot test area or 1,000,000 gallons square feet equals 10 gallons to refill the tank times the unknown area. Dividing 1,000,000 gallons square feet by 10 gallons gives and unknown area equal to 100,000 square feet. If you wish to have this number in acres divide by 43,560 square feet per acre. This gives a total of 2.3 acres. Then if you want to know how many gallons you are spraying per acre divide the number of gallons a tank will hold by the number of acres you have calculated it will spray. In this case it is 100 gallons divided by 2.3 acres or 43.5 gallons per acre.

Its all as simple as supplying your own figures for the underlined numbers above and carrying thru the problem.

Mixing chemicals

Following Environmental Protection Agency

regulations is the first law of mixing pesticides in any spray tank. According to the EPA regulations, a mixture is handled as if it were a new pesticide. If the label does not indicate a combination, then one should not be prepared.

There are, however, other aspects of tank mixing that should be considered also. Incompatibility of chemicals is a common problem. Incompatibility can be the result of a reaction between the components of a mixture, or it may be caused mechanically, as with flocculation, or one chemical can be absorbed and treated preferentially by the carrier of another. In any case, the properties of the chemicals are altered and you risk loosing effectiveness, or worse yet, plant damage.

Wettable powders are generally well adopted for use in mixes. Emulsions may cause flocculation. The application of pesticides as solutions can cause some problems. The fact that the compound is water soluble often increases the chances of a reaction when mixed with other compounds.

It is possible to overcome in compatibility problems by the use of a proper adjuvant. Improper use of an adjuvant however, can also cause damage. Adjuvants can also eliminate the selectivity of herbicides thus causing plant injury.

It is possible to pre-check the stability and compatibility of various chemicals. By using conversion figures, determine the amount of chemical needed to mix one pint of chemical spray mixture. Mix one pint in a quart jar, using the same procedures you would if it was the spray tank. Put a lid on the jar and shake until the mixture is well dispersed.

If the materials remain in suspension for a reasonable period of time or if they are easily redispersed by shaking, good agitation in the spray tank will ensure even spray coverage.

If, however, the chemicals rapidly settle to the bottom of the jar or form a messy precipitate, further testing with an adjuvant is necessary.

Prepare the same mixture in a second jar and add approximately 1/3 teaspoon of the proper adjuvant (check with your dealer first). Again, shake and observe the results. If they are not satisfactory, you may continue testing by altering the amount of adjuvant or changing to a different one. If the results remain unsatisfactory, do not attempt to use that mixture in your spray tank.

Alkaline Hydrolysis

Alkaline hydrolysis is the process whereby a chemical mixed with water of sufficient alkalinity undergoes a reaction that destroys that chemical's effectiveness. In many areas of the U.S. the water has sufficient alkalinity to cause such a reaction.

If you suspect your water, it is best to have the pH determined by a testing laboratory using a pH meter. Standard litmus paper and color strips may often be off as much as one or two pH units.

If the water pH is higher than 7.5, it is enough to affect some pesticides. In general, insecticides are affected more severely than are fungicides or herbicides. Carbamates and organophosphates are broken down more rapidly than are chlorinated hydrocarbons.

Adjuvants, again, are the answer. Sold specifically for this purpose, they can lower the pH of