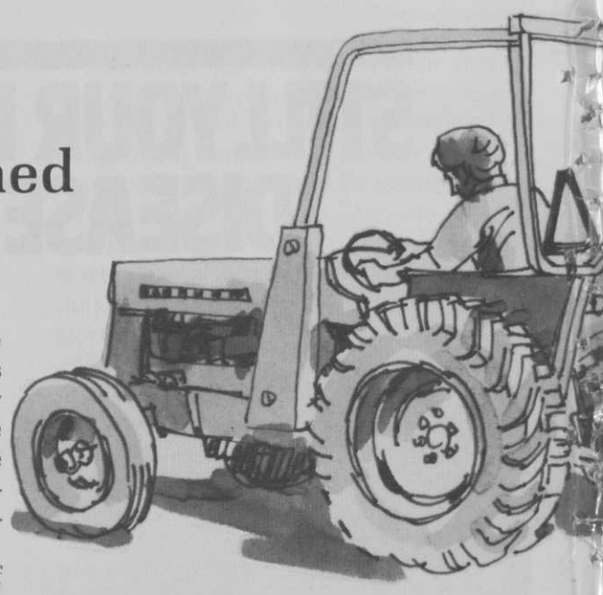
Sprayers and spraying: Good equipment must be maintained



Of all the equipment on a golf course, the sprayer requires the most attention. A spraying mistake on just one green can cause several thousand square feet of irreparable damage. The turf must then be completely renovated. The mistake can be one of not mixing the chemicals properly, not calibrating the sprayer properly, or not operating consistently at speeds and pressures that the sprayer has been calibrated to. Any of these can lead to serious charges by the Environmental Protection Agency, in addition to a loss of player revenue and renovation costs.

A trained and certified applicator is required for the application of pesticides, either directly on the job or readily available to the job site. It is a matter of regulation and just good business that he use the best available equipment in a manner consistent with the pesticide label, the environment and the pest that is being controlled.

There are three basic types of sprayers. The large **airblast sprayer,** also called mist sprayer or fogger, uses a high-speed, fan-driven stream of air to produce a fine mist that moves with the air stream. This stream can be directed to either or both sides as the unit moves forward.

There are several advantages to a fogger. Good penetration and coverage result from the high pressures used, often up to 350 psi. The pump runs at low pressure, moving, in some uses, as low as 10 gallons per minute. The fogger can cover a large area in a relatively short period of time.

Disadvantages include a tendency of the fine spray to drift. It is difficult to operate in winds greater than five or six miles per hour, although a good operator might use the wind to advantage. Nozzle wear is a problem because of the high pressure. A nozzle made of harder materials is necessary to insure the right rates over a period of time. It might be necessary to change a nylon or brass nozzle each trip around the course. See the discussion on nozzles further in the text for a comparison of materials and life spans.

A **high pressure,** or hydraulic, sprayer is designed to spray large volumes at very high pressures. This type of sprayer is most often used by professional arborists to cover the canopy of large trees. A high pressure sprayer can be converted to low pressure spraying by changing the pressure regulators.

Probably the most common type of sprayer on the course today is a **low pressure boom** sprayer. This sprayer delivers a low to medium volume of spray at pressures ranging approximately 15 to 50 psi. A low pressure sprayer can be limited by its low pressure output. This low pressure tends to limit penetration into foliage and the sprayers have a reputation for poor agitation systems. These sprayers are, however, relatively inexpensive, have a medium to high capacity, and are very versatile.

There are some aspects of a good spray unit to look for in any of the above three. A spray tank should have a large accessible opening on the top for adding chemicals, water and for cleaning the tank. The tank and fittings should be of a good quality material to resist corrosion from any chemicals you plan to use in it. There should be no "hidden pockets" inside the tank that would prevent complete and thorough cleaning.

Speaking of cleaning, the tank should have an easily accessible drain that allows complete emptying of the contents of the tank. Being able to clean that tank after a day's use quickly and thoroughly minimizes labor and makes the spray unit that much more efficient.

NOZZLES

A flat fan nozzle with tapered edges is commonly used on boom sprayers. These nozzles produce an overlapping, tapered spray pattern that, with proper spacing, provides an even pattern the length of the boom. Boom height and nozzle spacing depend upon the nozzle used. A 65 degree series of nozzles, for example, requires a 20-inch spacing with a 21- to 23-inch boom height, while an 80 degree series requires a 20-inch spacing and boom height of 17 to 19 inches. Information such as this can be found in manufacturers' charts which describe the nozzles and their functions.

A boomless flooding nozzle works at a much lower pressure than the fan-type and gives a uniform coverage across its width. They prove effective when applying liquid fertilizers. Wide off-center nozzles can be used to extend the effective swath width of a boom when attached to either end of the boom.

Hollow cone nozzles produce, as the name indicates, a hollow cone spray pattern. The pattern is circular with tapered edges and little, or no, coverage from the center. It is generally used at higher pressures and provides good foliage penetration.

Some general guidelines for selecting nozzles include:

For weed control: Flat fan, flooding fan, hollow cone.

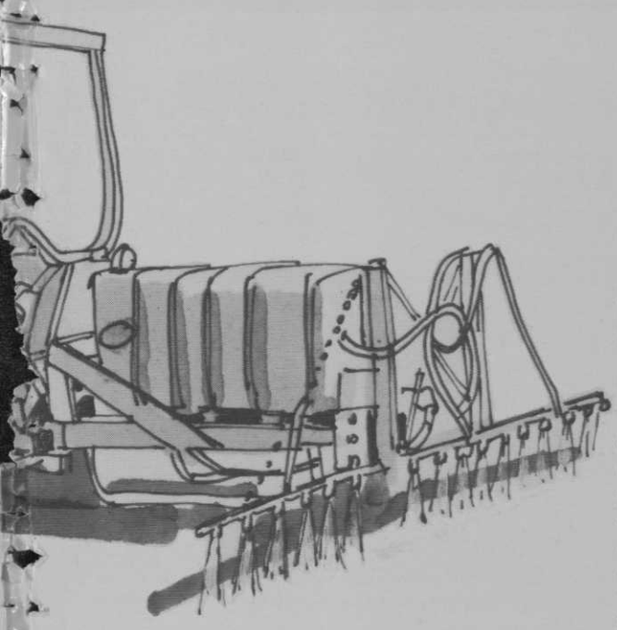
For fungicides: hollow or solid cone

For insecticides: flat fan or solid cone.

A flooding fan or whirl-chamber hollow cone will minimize drift when operating pressures are kept below 30 psi.

Materials

Plastic, nylon, aluminum and brass nozzles have essentially the same life expectancy, or wear time before the wear begins to affect uniformity of application. Nylon and brass are relatively inexpensive. Aluminum will resist corrosion by most materials but is easily corroded by some fertilizers. Plastic or nylon will swell when exposed to some solvents. Stainless steel has three to four times the wear expectancy of brass and increases to 10 to 15 times if the stainless is hardened. Tungsten carbide nozzles have a wear expectancy of 150 to 200 times that of brass. Price increases with life expectancy but circumstances might prove the expense.



"A mistake on one green can wipe out several thousand square feet of expensive turf."

Uniformity

The nozzles on a particular boom should be checked periodically for uniformity of dispersal. This can be accomplished by allowing each nozzle to discharge into a calibrated jar for a specified amount of time and then averaging the resulting amounts of liquid. A nozzle should be replaced if its flow is 5 percent more or less than the average.

A good way to check the pattern on a boom sprayer is with WATER over a stretch of asphalt. Any nozzle that streaks should be first cleaned or replaced if that doesn't solve the problem. Nozzles should never be cleaned with an object of material harder than the nozzle. A toothpick is generally best.

PUMPS

Replacing a pump brings with it the thought that there may be a type that will do the job better. There are three types of pumps.

Piston pumps have a long life, are dependable, and operate at tractor PTO speeds. They are more expensive and output is limited because over 10 gpm generally cannot be mounted on a PTO shaft. A piston pump is a good choice for abrasive suspensions.

Centrifugal pumps deliver higher volumes at low pressures but require an auxillary power source because of the speeds required. They generally have a capacity of 70-130 gpm and can develope pressures up to 170 psi. Volume falls off rapidly above pressures of 30-40 psi.

Roller pumps are probably the most popular. They generally have a lower initial cost, operate well at PTO speeds, are easily repaired and are compact.

A sprayer that is used for many different types of chemicals usually requires changing nozzles, spacing, ground speed or other factors that affect calibration. It is these changes which may require a larger or different type of pump. The need for agitation is another factor in pump selection. It is best to take your requirements to a reputable pump manufacturer who can supply you with charts that point out which pumps will perform best under your requirements.

CALIBRATION

Calibration of a sprayer before actual application is a most important step. There are several methods. Should you manage to master some of the more abstract methods you would be qualified to teach physics at any university. The simplest method involves filling the tank with water, spraying a certain distance, then measuring the amount of water it takes to refill the tank. The calibration run and future applications should be made at the same ground speed. Make careful note of it.

Total square feet covered in the calibration run can be determined by multiplying the length of the spray width, NOT boom width, times the length of the run. If the spray width is 10 feet and you spray for 100 feet, you have covered 1000 square feet.

Multiply the total gallons in a full spray tank times the square feet in the test area and divide by the amount that it takes to refill the tank after the calibration run to find the square feet that a full tank will cover. If you wish to convert square feet to acres, divide by 43,560. To convert acres to square feet, multiply by 43,560.

MIXING CHEMICALS

Chemicals should not be mixed unless the label indicates such a mixture. EPA regulations state that a mixture is handled as a new chemical and not just a combination of materials.

Chemicals that may be mixed are often incompatible because of formulation or chemical nature. An adjuvant might overcome these problems. Adjuvants should be selected as carefully as the chemical itself. The wrong adjuvant can eliminate the selectivity of herbicides, for example, risking damage to non-target species.

Stability and compatability of various mixtures can be checked. Using conversion figures, determine amounts needed to fill a pin jar with the spray solution. Mix this solution in a quart jar and shake until the mixture is well dispersed. If the materials remain in suspension for a reasonable amount of time, or if they are easily redispersed by shaking, good agitation in a spray tank will ensure even spray coverage.

If, however, the chemicals rapidly settle to the bottom of the jar or form a precipitate, further testing with an adjuvant will be necessary. Prepare the same mixture in another jar, add an appropriate amount of adjuvant and shake the mixture. If the results are still not good, you might want to try more of the same adjuvant or a different one.

Before applying the above steps, it might save time to consult the various chemical manufacturers. Such compatability information might be readily available. They should also be able to advise you of any restrictions on such a mixture, if it is allowed at all.

WATER pH

Some chemicals may be affected by a process known as alkaline hydrolysis. Water with a pH higher than 7.5 can cause problems with some chemicals. In general, insecticides are affected more severely than are fungicides or herbicides. If you suspect your water, have a test done by a good laboratory. Standard litmus paper tests can often be off one or two pH units.

Adjuvants can also solve this problem if you have it. Sold specifically for this purpose, they can lower the pH of your water into a more acceptable 4-6 range. Again, consult your chemical dealer for information and advice.

Some chemicals may be adversly affected by water with an acid pH, such as fungicides containing copper, which may solubilize and cause plant injury.

You may elect to have a custom applicator do the spraying. Be sure they are professionals. There are some very good ones. Helicopter spraying is one method that is quick and can be done when turf conditions do not favor ground application. Before using any service, however, consult with some of the service's customers.