

Irrigation Equipment

Pumping station and number of heads will be determined by the superintendent at each individual course.

This suggested list has only touched a few of the many odds and ends and pieces of equipment needed. If we may have omitted the one piece of equipment which you feel is necessary, by all means add it to the list.

A maintenance building should meet the following requirements:

1. Superintendent's office (desk, file cabinets, adding machine, etc.)
2. Toilet facilities (showers, lockers, etc.)
3. Adequate heating and ventilation
4. Paint spraying room
5. Herbicide-fungicide, etc. storage room
6. Fertilizer storage area
7. Adequate storage area for all equipment
8. Adequate maintenance area.

Also in conjunction with the main maintenance building, an additional storage building is essential for the storing and mixing of topdressing material. Topdressing should be kept in a dry area so that it will be available

at any time of the season. A two-year supply should be stored at all times.

If we have the necessary equipment and maintenance building, how many men will be required to keep the equipment rolling for the necessary turf maintenance? We suggest the following personnel be considered for the average 18-hole golf course in the Northeast.

- 1 Superintendent (year round employment)
 - 1 Assistant Superintendent or Foreman (year round employment)
 - 1 Mechanic (year round employment)
 - 2 Laborers (year round employment)
 - 3 Laborers to be hired at the beginning of the outside maintenance program to be carried through until fall maintenance is completed.
 - 3 Laborers to be hired as summer help
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- 11 men total

Regardless of the maintenance building and modern equipment, the work load cannot be carried out unless an adequate work force is available; a work force that can be depended on, day in and day out; men with responsibility to themselves, to the golf course they are working for and to the equipment they are handling.

Power Sprayers

by Albert Newberger, Agronomist

If one were to ask which piece of equipment is most vital to good golf course maintenance, a variety of answers might be expected. Certainly in this day of increased use of herbicides, insecticides, fungicides, and liquid fertilizers, power spray equipment must rank high on the list.

Treatment of turf, trees and shrubs on golf courses is becoming more and more necessary if we are to maintain high standards of quality in our plant

materials. Where chemicals are available in both dry and liquid formulations, it is often more economical to use the liquid.

However, many golf courses still have either no power spray equipment, or at best, highly inadequate equipment. Modern spray equipment is generally quite good, and it is not recommended that one build his own sprayer. However, it can be done if the material and know-how are available.

First, consider the major components of all power spray equipment. The primary component of any spray system is the pump. Pumps can be placed in two categories: positive displacement and non-positive displacement.

Positive displacement means that liquid is discharged as soon as the pump operates and continues as long as the pump operates. These pumps need no priming, but must have some means of relief when the discharge control valve is closed. These mechanisms will be discussed later. Examples of positive displacement pumps are the piston, gear, and some rotary pumps.

Non-positive displacement pumps can be operated without liquid discharge and are not necessarily self-priming. Examples of this type are the centrifugal and turbine pumps. The pumps mentioned above vary considerably in characteristics such as wear, cost, pressure, and speed of operation. Before purchasing or building a power sprayer, these characteristics should be investigated and given careful consideration.

Piston pumps are popular for all-purpose use because they can handle a wide variety of materials. When fitted with rubber or neoprene piston

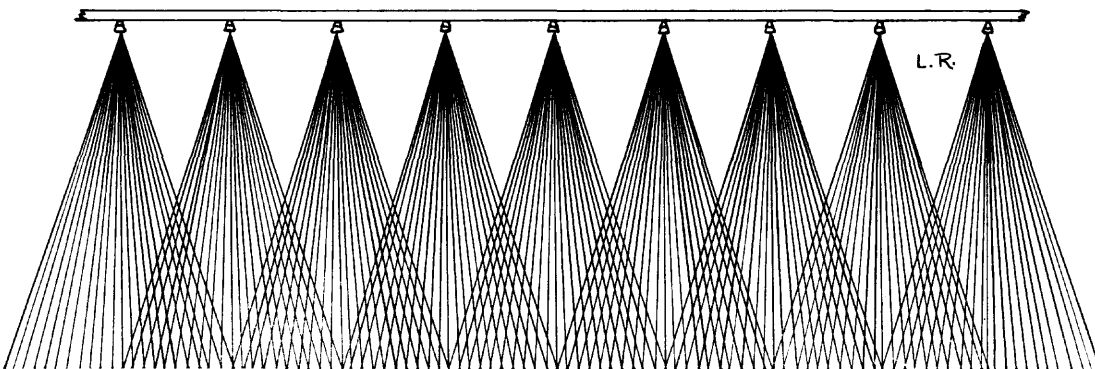
cups, these pumps are quite resistant to abrasion. For most golf course work, a pump capacity of 5-10 g.p.m. at 40-400 pounds per square inch is acceptable.

As mentioned, positive displacement pumps require a pressure regulator or bypass valve to relieve pressure and recycle liquid when the discharge control valve is closed. The pressure regulator also maintains constant pressure delivery to the boom or gun.

Located between the boom and the pump, the pressure regulator consists of a spring-loaded valve with adjustable tension. Whenever the pump pressure exceeds the spring tension, the valve opens allowing liquid to recycle into the tank, thus keeping pressure constant. This recycling aids in agitation, and in some cases is the sole source of agitation.

Adjustment of the spring tension regulates pressure at the boom or gun. In order to do this, the pump must maintain a pressure in excess of the desired pressure at the boom. In the case of non-positive displacement pumps, regulation of pressure is accomplished with a pressure reducing valve. This valve is also located between the pump and the boom, but no liquid is recycled in this case. Pressure on the input side of the valve may

A good spray pattern—a turf management must.



fluctuate, but output pressure is fairly constant.

An integral part of any sprayer is the pressure gauge. This should be located between the boom cut-off valve and the boom. It should be placed in such a position and be large enough so that the operator can read it clearly. The pressure gauge should be capable of reading pressure higher than the pressure used in normal operation. For general golf course spraying, a wide range of pressures, maximum 600 p.s.i., should be anticipated, especially if equipment also is to be used on crops other than turf.

Consideration of the type of tank to use in a power sprayer is very important. Size and material are of primary importance. For golf course use, tanks ranging from 200- to 400-gallon capacity are desirable, since most turf spraying is of rather high gallonage, 50-100 gallons per acre. When selecting a tank, its resistance to corrosion must be considered, since many chemicals are highly corrosive.

Because a power sprayer on a golf course is used to apply various types of chemicals, the tank should be of such material that it can be thoroughly washed out after use. Wooden tanks are resistant to corrosion, but they may tend to absorb highly volatile chemicals, thus limiting their use. In the case of both metal and wooden tanks, lining the interior with an inert material such as fiberglass or plastic may be desirable. Stainless steel and aluminum alloy tanks are commonly used today, but they are expensive.

The tank should have one large opening on top for filling, and at least one adequate drain on the bottom, to facilitate cleaning.

Because a large percentage of chemicals used in sprayers are either emulsions or wettable powders, some means

of sufficient agitation is necessary. The two most common methods of agitation are mechanical and hydraulic, the former generally considered to be better. Mechanical agitation is accomplished by paddles attached to a horizontal shaft in the lower part of the tank. The shaft is driven by the prime mover of the pump, either a gasoline engine or the tractor power take-off.

Hydraulic agitation is generally accomplished by forcing recycled liquid from the pump through holes in a pipe near the bottom of the tank or through an agitator nozzle. A large quantity of liquid must be recirculated in order to effect proper agitation.

Small bilge pumps can be used for agitation if mechanical or hydraulic agitation is impractical. Flat-bottom tanks generally require 30-40% more agitation than round-bottom tanks to keep material in suspension.

The pump suction line in the tank should be located near the bottom, but not so close that it will pick up sediment. A small well, 1 or 2 inches deep, beneath the tip of the suction line is preferable.

Strainers located at key points in the system alleviate clogging problems and facilitate more efficient operation. An easily removable 50- to 80-mesh strainer should be placed in the large filler opening at the top. This aids in mixing the spray material and the exclusion of large lumps. A strainer of similar size should be placed within the pump suction line.

A strainer of 100 mesh or smaller should be placed in the pump discharge line, and should be of sufficient area to do a thorough job of straining. Finally, the nozzles will contain screen of such size that it will block particles larger than the nozzle openings.

A quick-closing valve must be placed

in the boom supply line to allow for immediate cessation of spray flow. It is generally considered necessary to locate this valve as close to the boom as possible so a minimum of spray, still in the line, will drip out. By the use of spring-loaded nozzles, the necessity for placing the valve close to the boom is eliminated.

For golf course spraying a boom of 20-25 feet is preferable, and it can always be adapted to spraying a smaller swath by capping nozzles. Always recalibrate the sprayer after doing so!

The boom generally should be constructed of a strong pipe such as galvanized steel, black iron, or some alloys, and should be one inch in diameter or larger.

When the boom far exceeds the width of the tractor, it should be sectioned and hinged for easy folding. Sectioned booms require separate feeder lines, and this is generally desirable since it gives better control and more versatility in tight areas.

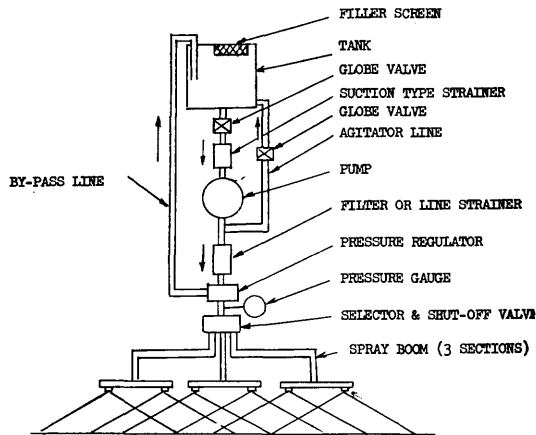
Sectioned booms should be held in the extended position by springs which allow them to give when they strike an object such as a tree or fence.

Front or rear mounting of the boom is primarily a matter of preference.

Nozzle attachment is preferable at the sides or the top of the boom to reduce settling of dirt particles and to reduce spray flow after closing of the cutoff valve. If spring-loaded nozzles are used and the boom is flushed out regularly, bottom attachment of nozzles is quite acceptable.

Nozzle spacing depends on the type of nozzles used, which in turn depends on the crop. Spacing of 18-22 inches using flat fan-shaped spray nozzles is desirable for most turf work. However the width of the spray delivered and the boom height govern the spacing.

It is generally desirable to keep the



Schematic diagram indicating the essential parts of a sprayer.

boom at a minimum height and pressure just great enough to produce the rate fan width, in order to minimize drift.

Consideration of the nozzles is extremely important! They are generally made of brass, plastic, stainless steel, or hardend stainless. The materials mentioned are given in order of increasing resistance to abrasion and also in order of increasing cost. Nozzles wear quite rapidly, especially when wettable powders are used frequently.

Selection of nozzles will depend on frequency of use and the material being used. However, when using *any* nozzle for application of wettable powders, frequent calibration is absolutely essential.

A hand spray gun or hand boom should be included in the spray system for golf course spraying.

Oil-resistant high pressure hose, 50-100 feet in length should be connected to the gun or hand boom. This hose is normally $\frac{3}{8}$ to $\frac{1}{2}$ inch in inner diameter. A reel with 100 foot capacity should be mounted on the tank so the hose can be rolled neatly and stored right on the rig.

Hand guns can be obtained which are adjustable from a fog to a far-reaching stream, and spray discs can be quickly changed for different types of spraying.

The mounting of a sprayer must be considered, especially if it is home-made. Most golf course sprayers are trailer-mounted riding on an axle with two wheels. Tandem wheel assemblies are also used in order to distribute weight more uniformly. Trailer-mounted sprayers allow for greater tank size which is desirable for general golf course spraying. However, rear and center tractor-mounted tanks may be used if necessary.

Homemade sprayer systems often use 55-gallon drums for the tank. These tractor-mounted tanks should be conveniently attachable and detachable. One of the greatest advantages of the tractor-mounted tank is that the boom can easily be placed in front of the tractor, thus allowing the operator to better observe the spray pattern.

Homemade systems may be mounted on an axle also, without too much difficulty. If the tank is such that its capacity is 400 gallons or more, over-size tires or tandem wheels should be used to prevent damage to soft turf.

The tank should be centered directly over, or slightly forward of the wheels to prevent too much pressure being exerted on the tractor drawbar as the amount of liquid in the tank changes.

Once you have either purchased or constructed your sprayer, the most important consideration is its proper use and care.

The following is a list of do's and don'ts:

Operating Precautions

1. Never use a pin, knife or other metal object to unplug a nozzle. Use compressed air, an old toothbrush or

brush with soft bristles. Never blow into a nozzle to clean it.

2. Never allow dirty water or debris to enter the tank.

3. Control spray drift by:

- (a) using the largest nozzle and the lowest pressure that will apply the spray material
- (b) keeping the boom as low as permissible
- (c) never spraying on a windy or even a breezy day.

4. Never operate a sprayer with any of the screens or filters removed. If the screen is constantly becoming plugged, replace it with a screen with the proper mesh and capacity.

5. Never fasten a P.T.O.-driven pump solidly to the tractor with a bar. Most sprayer pumps should be kept from rotating with the chain provided. Fastening the pump with a bar usually causes rapid pump bearing wear.

6. Never allow any sprayer pump to run without water, even for a short time. If no water is present, pump seals, bearings and other working parts may be severely damaged.

7. Never leave a tank with any spray material in it—even during noon hour. Wetable powders settle rapidly and are difficult to re-suspend.

8. Always pump at least 50 gallons of clean water through the sprayer at the end of the day or when changing from one spray material to another. Clean the nozzle tips and all screens at the same time. This will help to reduce the gummy deposits or the wetable powder accumulations in the sprayer. Leaving the tank full of clean water will help reduce flaking inside an unlined steel tank.

End-of-the Day Cleaning

Whenever wind or weather conditions force you *temporarily* to stop

spraying, clean the sprayer to prevent gum or powder deposits in the pressure regulator, selector valve, nozzle tips and on screens.

Follow these simple steps:

1. Rinse the inside and outside of the tank with plenty of clean water.

2. Half fill the tank with clean water and spray it out at low pressure. While the sprayer is operating, (a) run the bilge pump, (b) adjust the pressure regulator and the selector valve and (c) remove the plugs in the ends of the three boom sections. A small amount of liquid detergent added to the clean water will help clean the inside of the sprayer system.

3. Clean the nozzles, nozzle screens and suction screens with compressed air or a soft brush. Replace the screens and nozzles.

4. Leave the tank full of clean water if weather conditions permit.

Never clean a sprayer near susceptible plants or where the wash water could contaminate water supplies.

Storing the Sprayer

When you store your sprayer properly instead of just letting it sit in the fence corner, you add years to its useful life and put money into your pocket.

Here is a good procedure to follow.

1. Thoroughly clean the sprayer.

2. Completely lubricate all moving parts according to the manufacturer's recommendations.

3. Make a list of all faulty parts and order the new ones NOW—not next spring when you want to start spraying.

4. Fill the tank with water and add the recommended quantity and type of rust inhibitor or new light oil (see your instruction manual). Drain the tank. Leave all tank openings uncovered for better tank ventilation, but screen them to keep out dust and debris.

5. Clean all nozzle tips and screens with compressed air or a soft brush and kerosene. Store the tips and screens in a jar of new light oil or kerosene.

6. Take the weight off any tires.

7. Remove, clean and drain the pump. Fill it with the light oil or rust inhibitor recommended by the pump manufacturer. Seal all pump openings to keep out dust and dirt.

Make certain that no water is left in the pressure regulator, selector valve or the boom. These parts will be severely damaged if water freezes in them.

COMING EVENTS

November 30-December 2	Oklahoma Turfgrass Conference Oklahoma State University Stillwater, Oklahoma
December 1-2	Illinois Turfgrass Conference University of Illinois Urbana, Illinois
December 5-7	Texas Turfgrass Conference Texas A&M University College Station, Texas
December 8-9	Louisiana Turfgrass Conference University of Southwestern Louisiana Lafayette, Louisiana
January 11-13	Nebraska Turfgrass Conference Nebraska Center for Continuing Education Lincoln, Nebraska
January 24-25	Virginia Turfgrass Conference Hotel John Marshall Richmond, Virginia
January 27	United States Golf Association Green Section Conference New York, N. Y.