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G81-550 Ecofarming Operating High Capacity Sprayers (Floaters) for Herbicide Application

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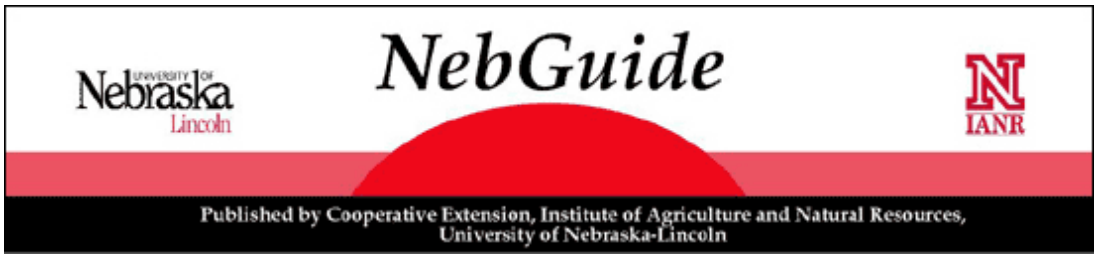

Ecofarming Operating High Capacity Sprayers (Floaters) for Herbicide Application

This NebGuide will help you determine whether you are covered by or exempt from the Worker Protection Standard and provide information on how to comply.

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Many flotation sprayers are only used to spray fertilizers and herbicides in the spring. Ecofarming, however, represents a March to November market for them. Successful ecofarming requires precision spraying of herbicides on the winter wheat stubble, and offers tremendous opportunities for professional applicators. Commercial application eliminates some of the field work for the farmer, which is an important element for more efficient farming. The commercial applicator is also able to do a better job since he spends more time spraying and thus is able to afford better equipment. However, timeliness is important and the commercial operator must be careful to avoid becoming overcommitted.

High capacity flotation sprayers can mean faster application, but good judgment is needed when the wind is blowing and when fields are wet. Compaction may interfere with crop development and weed control. Weed seeds can be pressed into the moist soil and may not be killed if they germinate before it rains.

Herbicide application requires more precision with flotation sprayers than is currently being done with fertilizers. Some equipment changes will need to be made. These changes can be made by the manufacturer when you buy a new sprayer.

You cannot adjust the height of the spray boom on most flotation sprayers. It is usually 4 or 5 ft off the ground, depending upon the manufacturer.

Factors affecting the uniformity of application are nozzle types, nozzle spacing, orifice size, nozzle pressure, nozzle height, nozzle orientation, speed and wind.

Nozzles

Most high capacity sprayers are equipped either with large flood nozzles or with Raindrop® nozzles spaced at 60 or 120 inches. Raindrops® do not produce sufficiently "fine" spray droplets for use with most postemergence herbicides. Extreme care must be made in the selection of flood nozzles since few herbicide labels suggest their use. Also, flood nozzles do not give as uniform a pattern as flat-fans.

It is impossible to do a good job of spraying herbicides with 120 inch nozzle spacings. There should be at least 100 or 200 percent overlap of spray patterns. Remember that this overlap must be achieved at the height of the target weeds, not at ground level. With double or quadruple coverage, any uneven coverage from individual nozzles can be partly compensated for by spray from adjacent nozzles.

Proper overlap can be obtained by raising or lowering the boom. Spacing should be at 40 inches or less. Several successful applicators have equipped their sprayers with 30-inch nozzle spacing for flood nozzles and 20-inch for flat-fans. Delvan Corp. has spray kits available in cinch spacing that will attach to the present boom.

The boom height needs to be lowered for the closer nozzle spacings. This will also aid in reducing drift and uneven spray patterns under windy conditions. If the boom is lowered, gauge wheels or skids are needed to prevent the boom from going too low on rough terrain.

Turn every other nozzle slightly so that the spray pattern does not strike the pattern from the next nozzle. Generally, spray from flood nozzles should be directed straight down when spraying paraquat in wheat stubble. If terrain is uneven and/or tall weeds are present, direct the nozzle about 20° to the rear. Consider a windshield to reduce drift. A properly designed windshield and boom will push tall weeds down, spraying them as the boom passes.

Select tips that apply the required flow. Stainless steel tips have better patterns than nylon tips. Quickly attached nozzles and turret nozzles are also available. Be sure that the spray solution enters at the center of each boom section, and check nozzle output across the spray swath.

Pressure

Pressure affects application in several ways. It influences droplet size, nozzle flow rate, spray angle, and pattern uniformity. An increase in pressure decreases droplet size more rapidly in flood nozzles than in flat-fan nozzles.

Operators of flotation equipment sometimes attempt to correct volume per acre (hectare) by varying the pressure. Minor flow corrections for such things as nozzle wear can be made by changing the pressure. The nozzle flow rate is proportional to the square root of the pressure; therefore, to double the application volume, the pressure must be increased four times. For example, if the flow from a K10 nozzle at 10 psi = 1.0 gpm, the pressure must be increased to 40 psi to double the flow to 2.0 gpm. Major changes in volume should be made by changing nozzle-size or ground speed since nozzles are designed to operate within a specified pressure range.

The general pressure range at the nozzle for flood nozzles is 10 to 30 psi at the nozzles. When spraying weeds in wheat stubble, however, pressure should be 30 to 35 psi at the nozzles because weeds are generally present and small droplets (> 150 microns) are generally needed for adequate coverage. Flat-fan nozzles should also be operated at 30 to 40 psi.

Nozzle height in relation to speed is critical in obtaining uniform application. Nozzles 4 to 5 ft off the ground are subject to wind and speed distortions. The nozzle pattern width is decreased 15 to 20 percent by traveling at speeds of 12 mph. Patterns are more distorted as speed increases. Bear in mind that traveling 10 mph into a 6 mph head wind results in a 16 mph wind speed at the nozzle. High speeds can also create a vortex behind the sprayer, thus further distorting the pattern. The travel speed must be selected according to field conditions to obtain uniform application and to keep the boom from whipping back and forth or bouncing up and down. Bouncing and whipping of the boom will cause skips in weed control patterns. For most applications, the maximum travel speed should be 12 mph rather than the speeds of 18 to 22 mph that are often used. Higher speeds require more water for uniform coverage; however, as droplet size increases, effectiveness with paraquat decreases. Also, higher speeds create more dust which may reduce the effectiveness of paraquat. Dust flaps mounted on the sprayer behind the wheels help to reduce dust but may increase vortex problems.

Do not add an extension to the boom unless the hose size for feeding the boom is also increased or the number of feeder lines is increased. Poor spray patterns have resulted when hose size was not changed. Be sure that spray lines have adequate capacity. If the hoses, connections and valves are too small, there is a drop in pressure. A flow velocity of 5 to 6 ft per second in the boom is recommended.

Sufficient agitation is necessary to keep the herbicide in suspension. As a general rule, 6 gallons of hydraulic agitation is needed for each 100 gallons of solution. It is highly desirable to cut the agitation as the amount of solution in the tank is decreased. Some herbicides will floccuate with over-agitation.

Flush spray lines with clean water after use or if spray operation is stopped for longer than 30 minutes. Some herbicides will settle out in the lines in a short period of time.

Operation

Crop damage can occur if the nozzles are allowed to drip during turns or when the sprayer is stopped for refilling or other reasons. To avoid dripping, the nozzles should be installed above the boom with an electrically operated solenoid or a mechanical valve on each nozzle. However, these do not function properly in rough fields. Mechanical check valves may affect pressure more, but are more trouble free. If check valves are used, remember to account for the pressure drop across the valves when calibrating the nozzle flow rate. A 5-psi check valve requires an additional 5 psi.

An electronic sensor should be installed on the nozzles so that any plugged nozzle can be located immediately. Use screens to reduce chances of foreign materials plugging the orifices. All sprayers should be equipped with a 10 to 20 mesh/inch basket strainer. An inline strainer should be installed in the line after the centrifugal or turbine pump. Mesh size of 16 to 50 mesh/inch can be used, depending upon nozzle size. It is often not necessary to have an inline strainer because of the large nozzle size and the basket strainer. However, with spray fertilizer solutions + herbicides or herbicide combinations, there could be incompatability problems. The inline strainer will partially solve minor incompatability problems until a compatability agent is obtained. Be sure to have a pressure gauge on the boom after the strainer for observing pressure droppage.

Many applicators are now using spray monitoring systems. These are small computers that are mounted in the cab. They provide information such as acres sprayed, volume left in tank, volume per minute, ground speed, distance traveled, and gallons per acre being applied, which are necessary to do a good job.

Marking Systems

Marking systems currently used include flagmen, automatic flaggers, mechanical markers, dyes, foams

and electric guidance systems. The most widely accepted system used by flotation operators is the foam marker. Limitations of the foam marker include visibility and their short duration. Double running allows better visibility of foam since the driver is centered on a foam marker rather than looking at the end of the boom. However, double coverage takes more time and water, and runs down more stubble. It does greatly lessen skips and overlaps, however. Marking systems that are at the end of the boom make it difficult for the driver to avoid skips and overlaps. A half-rate nozzle placed on each end of the boom with intended overlap helps to avoid skips. Recent research has concentrated on lightsensing, rotating lasers and radio controlled guidance systems.

The Ag Nav™ systems recently introduced use radio signals to track and guide the operator by means of a continuous display on the dashboard. This concept has tremendous potential for reducing overlap and skips on large fields, but operator experience is required to determine electronic reliability under field conditions. So far, they have limitations on small fields, irregular fields and where the terrain has over a 60 ft rise in a field.

An extra nozzle should be placed on the end of the boom when spraying the outside edges of the field, after which it is shut off. The ends of the field should be marked so the operator can shut the sprayer off without slowing down. He then makes his turn, and is going at full speed when he passes over the end mark. The ends are sprayed after the rest of the field is finished. This allows the field to have uniform application.

In summary, precision herbicide application is required for successful weed control. Generally, increasing pressure, narrowing nozzle spacing, slowing down, and avoiding skips and overlaps can be accomplished with any rig. Adequately equipped sprayers that are correctly calibrated and operated by professional applicators will greatly aid in the expansion of ecofarming.

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