



## Boom spray cleaning, maintenance and calibration

The aim in applying any pesticide is to effectively distribute the appropriate amount on the target to obtain the desired result while minimising non target area contamination.

Too much pesticide can cause unacceptable crop damage or leave excessive residues in the crop or soil. It also increases the spraying cost by using more pesticide.

To apply a pesticide effectively the application equipment must be well maintained (to avoid delays caused by breakdowns) and accurately calibrated.

### Cleaning equipment during the spraying season

Flush equipment out with clean water immediately after use (preferably at each refill but at least once a day) to prevent chemical residues drying out on filters and in the nozzles. Taps at the ends of each boom section are desirable to allow spraylines to be flushed out completely. Do not leave the unit overnight with spray mixture in it.

If changing products, decontaminate the unit following the instructions on the product label. Even very small amounts of some products (for example sulfonylurea and growth-regulator type herbicides) can cause damage to susceptible crops if the unit is not thoroughly cleaned.

### Decontaminating

#### **After using sulfonylurea herbicides (e.g. Ally, Glean, Logran)**

- Drain unit and flush thoroughly with clean water for at least 10 minutes.
- Fill the tank with clean water and add 300 mL of chlorine bleach (containing four per cent chlorine) or 100 mL of a 12 per cent chlorine solution for each 100 L of water. Flush through the booms and hoses, allow to stand for 15 minutes with agitation and then drain. **Repeat.**
- Remove nozzles and filters and clean separately.
- To remove traces of chlorine rinse the tank thoroughly with clean water and flush through spraylines.

If there are no cleaning instructions on the label use the following procedure.

#### **After using water-soluble mixtures, wettable powders and flowables**

- Drain unit and flush thoroughly with clean water.
- Using clean water containing 1 L of household ammonia or 1 kg of washing soda to each 100 L of water, rinse the tank thoroughly and then leave the cleaning mixture in tank and lines overnight. (Read product label for special instructions.)
- The next day drain unit and flush thoroughly with clean water.
- Remove nozzles and filters and clean separately.

### **After using oil-based mixtures**

Ester formulations may impregnate spraylines, washers, valves and packing rings. If subsequent spray mixtures are left in the tank and lines for any period of time before use, the ester residues may contaminate the mixture. To avoid contamination from this source all spraylines, washers, valves and packing rings should be replaced after ester formulations have been used.

After using emulsifiable concentrates or esters, follow this cleaning procedure.

- Drain unit and flush thoroughly with clean water.
- If ester formulations have been used, rinse the tank with kerosene and flush through spraylines.
- Rinse the tank with clean water and detergent.
- Fill the tank with clean water and add 1 L of household ammonia or 1 kg of washing soda to each 100 L of water. Rinse the tank thoroughly and then leave the cleaning mixture in tank and lines overnight.
- The next day drain unit and flush thoroughly with clean, preferably hot, water.
- Remove nozzles and filters and clean separately.

### **Maintenance during spraying season**

Regularly check the tank, lid, boom, hoses and joints for corrosion, leaks or physical damage. Grease the pump as necessary, following the manufacturer's instructions. Regularly check the spray patterns of nozzles.

### **Cleaning and maintenance before storage**

Clean and decontaminate as described above. Check the calibration and order new nozzles if any are needed. Remove the nozzles and nozzle filters and flush the unit. Wash the filters and nozzles and store dry. Use a toothbrush to clean nozzles. Do not use wire or other hard objects. Remove and clean all in-line filters and store dry. Thoroughly check the whole unit, including the pump, and order any required parts.

### **Calibration of boom sprayers with PTO or engine-driven pumps**

The main factors that govern boom sprayer output rate are:

- nozzle output,
- ground speed,  $\Delta$  operating pressure,
- swath width being sprayed.

### **Procedure for calibrating nozzles**

Determine the most suitable pressure for the conditions (generally 200 to 300 kPa). Operate the boom and adjust the pressure to that required. Look for uneven nozzle spray patterns and overall pattern.

Measure in millilitres the output of each nozzle for one minute and record the measurements. Discard any nozzle that exceeds by 10 per cent or more the manufacturer's recommended output for that nozzle at the pressure being used. Charts are available from nozzle manufacturers and resellers.

Measure the output of the replacement nozzle and record the measurement.

Calculate the average output per nozzle:

$$\text{Average output} = \frac{\text{total output of all nozzles}}{\text{per nozzle number of nozzles}}$$

Discard all nozzles delivering 5 per cent more or less than the average and replace them. Check the output of the replacement nozzles.

The boom is now ready for calibration. There are several methods of doing this. Two methods, one where the boom remains stationary and one where the equipment travels over a measured distance, are described below

### Area calibration

#### **Method 1: The equipment remains stationary**

Determine the total boom output in *litres* per minute by using the figures obtained when calibrating the nozzles.

Determine in *metres* the effective spraying width of the boom sprayer (number of nozzles x distance between nozzles).

Determine the operating speed to be used in *kilometres* an hour. This is done by selecting a gear that at the rpm used to operate the pump when calibrating the nozzles will give a suitable speed. Then record the time taken to travel over a measured distance, towing the boom sprayer (and harrows if these are to be used during the spraying operation) preferably on a surface the same as or similar to that on which the actual spraying will be done. Apply the following formula:

$$\text{Speed(km/h)} = \frac{\text{distance travelled (m)} \times 3.6}{\text{time taken to travel that distance (sec)}}$$

Then apply the following formula:

$$\text{L/h} = \frac{600 \times \text{boom output (L/min)}}{\text{spraying width (m)} \times \text{speed (km/h)}}$$

#### **Method 2: The equipment travels over a measured distance**

Select the gear that at the rpm used to operate the pump when calibrating the nozzles will give the desired ground speed.

Measure off a 100 m run preferably on a surface the same as or similar to that on which the actual spraying will be done.

Record the time taken to travel over the 100 m towing the boom sprayer (and harrows if these are to be used during the spraying operation) using the gear and rpm already determined.

Operate the boom and check that it is operating at the correct pressure. Select a level spot and completely fill the tank with water (to the point of overflow). Ensure that the supply line to the shut-off valve is full.

Turn on the boom and operate at the determined rpm for the exact time taken to travel 100 m. Carefully measure the amount of water required to refill the tank to the original level. Determine in *metres* the effective spraying width of the boom sprayer (number of nozzles x the distance between each nozzle). Apply the following formula:

$$\text{L/ha} = \frac{100 \times \text{L used in the time taken to travel 100m}}{\text{spray width (m)}}$$

The boom sprayer is now calibrated.

## Amount of product to add to spray tank

Calculate the amount of product to be added to the spray tank to give the required application rate of product per hectare by using the following formula:

$$\text{Amount of product to be added to spray tank (L or kg)} = \frac{\text{recommended application rate (L or kg/ha)} \times \text{tank capacity (L)}}{\text{Output of spray unit (L/ha)}}$$

*Remember, once the boom has been calibrated any change in either ground speed or pressure will change the output per hectare and the boom must be recalibrated.*

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