SUCCESSFULLY CALIBRATING APPLICATIONS OF

VectoBac® & VectoLex®

Mosquito Control Products

VALENT BIOSCIENCES CORPORATION

Calibration. The First Step

Calibration is a simple, yet critical step in assuring the performance of mosquito larvicides. Accurate dosage and complete coverage of the breeding area are essential to success with biological larvicides such as VectoBac® and VectoLex®. Regardless of whether the application is with a hand-held pressurized sprayer or a sophisticated aerial delivery system, proper calibration is essential.

Four factors determine the dosage rate that will be delivered during any application. They are:

- width of swath that is treated
- flow rate of material being delivered
- dilution rate of the material

Depending upon the specific conditions of the application, some of these factors will be readily adjustable, while others may be quite limited. For example, VectoBac G and VectoLex CG are applied as granular, undiluted finished product. No adjustment of dilution rate is possible. However, with VectoBac 12AS, VectoBac WDG and VectoLex WDG formulations, a wide range of dilution rates is possible because they are applied as liquids. Similarly, flow rates from many pump operated backpack sprayers and compressed air sprayers are difficult to adjust beyond a specific range, while a broad range of adjustment may be available with power equipment.

When flow rate is adjustable, it is usually best to adjust it to accommodate the desired speed, swath and application volume. Where adjustment of flow is difficult, base the total application volume on flow, speed and swath width; then adjust the dilution rate of the material to deliver the desired amount of larvicide to the area.

The Formulas

For US Calculations

Delivery rate of material (gallons or pounds per minute) divided by coverage rate (acres per minute) equals the application rate. To calculate coverage rate, use the following formula.

$$\text{Coverage (Acres per Minute)} = \frac{\text{Speed (MPH)} \times 88 \times \text{Swath Width (Feet)}}{43{,}560}$$

A simplified version of this formula is:

$$\text{Coverage (Acres per Minute)} = \frac{\text{Speed (MPH)} \times \text{Swath Width (Feet)}}{495}$$

Adjust the flow rate of the equipment (when possible) according to the following formula to achieve the desired application rate.

Flow Rate = Desired Application Rate (L or gal/ac) x coverage (Acres/Minute)

When flow rate cannot be adjusted:

$$\text{Application rate} = \frac{\text{Flow Rate} \times 495}{\text{Speed} \times \text{Swath}}$$

Dilution rates must be adjusted to achieve desired dose.

For Metric Calculations

Delivery rate of material (liters or kilograms per minute) divided by coverage rate (hectares per minute) equals the application rate. To calculate coverage rate, use the following formula.

$$\text{Coverage (Hectares per Minute)} = \frac{\text{Speed (KPH)} \times 16.67 \times \text{Swath Width (Meters)}}{10{,}000\ (M_2/\text{Hectare})}$$

A simplified version of this formula is:

$$\text{Coverage (Hectares per Minute)} = \frac{\text{Speed (KPH)} \times \text{Swath Width (Meters)}}{600}$$

Adjust the flow rate of the equipment (when possible) according to the following formula to achieve the desired application rate.

Flow Rate = Desired Application Rate (L or Kg/Ha) x Coverage (Ha/Min)

When flow rate cannot be adjusted:

$$\text{Application rate} = \frac{\text{Flow Rate} \times 600}{\text{Speed} \times \text{Swath}}$$

Dilution rates must then be adjusted to achieve desired dose.

Calibrating Manual Applications

While the math involved in calibration is rather straightforward, the real world application of these parameters is more challenging, especially with ground applications made by individual applicators.

No two applicators or pieces of equipment have exactly the same characteristics. Consequently, applicators must learn their travel speed (pace) in various habitats. The swath width and flow rates of the application unit also need to be measured. Finally, make adjustments based on these parameters to achieve the desired rate.

Measuring Travel Speed

Unfortunately, few larval habitats are found on level ground that is free of debris and vegetation. It is important to measure your own comfortable working pace in the larval habitat to be treated. It is best to do this by marking a known distance in the habitat, then timing how long it takes to travel that distance at a comfortable working pace. This measurement should be repeated three times, and averaged to produce the working number for each habitat.

Swath width is best determined by doing a static test on a flat, relatively clean surface such as a parking lot.

Measuring Swath Width

Swath width is best determined in a static test on a flat, relatively clean surface such as a parking lot because the projection of liquid or granules can be visually determined and measured on such surfaces. Decide whether applications will be done from shorelines, in which case, treatments can only be projected to one side; or if travel through the breeding site is possible, applications can be made to both sides of the applicator. In the first case, the effective swath can be equal to the distance that the equipment will project the material. In the second case, it will be equal to two times the projection distance. Even distribution over shoreline swaths is achieved using a 90-degree oscillating motion of the spray wand. In habitats where travel through the site is possible, distribution is achieved using a 180-degree oscillating motion of the spray wand.

The flow rate of some liquids from backpack or compressed air sprayers can be easily determined with a graduated cylinder or other liquid measuring device.

Measuring Flow Rates

The flow rate of liquids from backpack or compressed air sprayers can be easily determined with a graduated cylinder or other liquid measuring device. The spray pressure is maintained at a standard level, and spray is discharged into the cylinder for one minute.

The volume in the cylinder determines the flow rate per minute. Once the flow rate is known, total delivery volume per area can be calculated, and the appropriate dilution rate for delivery of desired label rates can be determined. It may also be possible to change flow rates by changing pressure and/or nozzle orifice size.

Measuring granular flow rates from power backpacks can be challenging. The drum method shown here is one of two procedures recommended to get an accurate reading.

Granular flow rates from power backpack units are somewhat more difficult to measure because of the difficulty of capturing granules as they discharge from these units. Discharging an entire tank load to determine flow can be time consuming, wasteful and impractical. Placing a small known amount of granules in the tank can often give false readings because the discharge tends to increase as the tank becomes almost empty.

To overcome these problems, two methods can be employed. If a scale is available that is capable of weighing the entire backpack unit, use the following procedure. First fill the tank to a specific level, top off the fuel and weigh the entire backpack. Then run the unit for one minute open to a specific flow setting, re-fill the fuel tank and weigh the backpack again. The first weight minus the second is the flow rate per minute. Take an average of readings with the granule tank when it is three-fourths, one-half and one-fourth full to get the most accurate flow rate reading.

Alternatively, a method of catching the granules can be used, and the amount discharged in one minute can be weighed. This allows smaller scales to be used. Nylon stockings and CO_2 trap collection bags can be used, but often will tear and fail. Plastic drums can be modified to catch granules as well. Make large-screened openings in the drum to allow air to readily flow, and a small input hole where the granule delivery tube is inserted. The screened drums seem to be most reliable and durable. These methods allow capture and re-use of material.

Since granules are not diluted for application, adjustments must be made to the backpack unit until the desired flow rate (or nearest possible flow rate) is achieved. Fine adjustment of some backpack units is possible by

Fine adjustments of some backpack units is possible by changing the throw of the connecting rod between the control level and the tank. Shown here is an actuating rod.

changing the throw of the connecting rod between the control lever and the tank. A fair amount of trial and error is usually involved. It is best to mark the side of the granule tank of the unit with the flow rate and date of calibration once this process is completed.

Measuring granular flow rates from power backpacks can be challenging. The drum method shown here is one of two procedures recommended to get an accurate reading.

Standardizing Applications

Regularly repeat calibration steps throughout the season to assure there is little variance in the equipment over time. Likewise, individual applicators should practice their pace and check their swath measurements. When oscillating the spray wand to produce a swath, it is important to make a full swing. Otherwise, a smaller swath will result. It is also important to provide a rapid enough oscillation to provide even coverage. Routinely practicing these motions will assure standardized and effective delivery of larvicides.

Following the simple calibration practices mentioned in this piece will help ensure maximum performance from biological larvicides such as VectoBac and VectoLex. Valent BioSciences Corporation has a highly trained staff of sales representatives and technical specialists who can answer calibration or product questions. Contact your local representative or Valent BioSciences at 800-323-9597.

VectoBac® **VectoLex®**

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