

## **Backpack, Boom and Hydraulic Sprayer Calibration Education for Landscapers and Greenhouse Growers**

### **Introduction**

The New Hampshire Landscape Association Executive Committee requested a boom and backpack sprayer demonstration take place during a meeting in 2017. A survey of attendees identified a need for training on Backpack and Boom Sprayer Calibration. This educational program was developed and expanded to include greenhouse and nursery spray applications.

The 2017 USDA Census of Agriculture reported New Hampshire had 463 horticultural growing operations. The 2009 University of Vermont New England Environmental Horticulture Economic Impact Survey reported that NH had an estimated 793 landscaping and/ or tree service establishments. These establishments routinely apply pesticides through backpack, boom and hydraulic sprayers.

### **Challenges**

Due to the great variability of crop canopy density and height in ornamental landscapes or in a greenhouse throughout the production season, landscape and greenhouse pesticide labels commonly permit greater variability in amount of spray solution to be used by specifying rates of product per volume of spray solution. This reality makes calibration of sprayers used in greenhouse and landscape applications fundamentally different than for field and orchard applications which specify rate of product per area treated. Amount of spray solution must be determined prior to the spray through the calibration process and varies based on crop height, density, presence of hangers as well as sprayer/ nozzle type, pressure and applicator speed.

As a result of this variability, applicators face increased possibility of mixing excess spray solution at a given volumetric rate, resulting in wasted or overapplied pesticide.

### **Educational Objectives**

The Backpack, Boom and Hydraulic Sprayer Calibration Education for Landscapers and Greenhouse Growers trains and gives tools to growers and landscapers to:

- Determine spray volumes and pesticide amount
- Assess spray coverage and penetration prior to application
- Use after-market control flow valves
- Create an atmosphere of precision and accuracy surrounding pesticide application in this audience

These trainings and tools will result in:

- Reduced waste of pesticide or time from improperly mixed sprays
- Greater pesticide efficacy from properly applied sprays resulting in decreased economic damage from pests and disease or resulting in decreased repeat applications

This program, in addition to its value as stand-alone programming, was designed to be brought in as a component of other and existing programming. As a result, growers and landscapers are exposed to this important practice incidentally as they seek out other educational and networking events. This

adaptability was demonstrated with the Tristate IPM Program, the High Tunnel Conference and the Extension Summer Plant Health webinar series.

### **Program Activities**

Workshops: Fifteen different in-person workshops with instruction, demonstration and hands-on use took place over three years and five states. Host sites included trade shows, UNH Pesticide Safety Education applicator trainings, trade organization meetings and a multi-state Extension workshop.

Webinars: This information was presented at three webinars. Each of these presentations was part of a larger webinar-based program or series, highlighting the program's ability to be included in existing programs.

Videos: A nine video series on sprayer calibration was made possible with a grant from the EPA Region #1 through the New England Vegetable and Berry Growers Association, and technical support from the Chazzbo Media, University of Delaware Cooperative Extension and the National Pesticide Safety Education Center. These videos are linked in an attachment to this application.

Site visits: Four site visits were made to do on-site calibration and training. These sites included the groundskeeping for an aerospace engineering firm, a boarding high school and for an agricultural technical high school and the grower staff at a large young plants producer.

Fact sheets/ Worksheets: Four worksheets were adapted for backpack and boom sprayer use for area-based application. One worksheet was developed for greenhouse or landscape sprays for calibrating sprayers and calculating spray volume and pesticide. These worksheets are easy to follow and direct applicators through calculations in a step-by-step manner.

- Backpack Sprayer – One Minute Method (Given area)
- Backpack Sprayer – 1/128 Method
- Boom Sprayer – One Minute Method
- Boom Sprayer – 1/128 Method
- [Greenhouse Sprayer Calibration and Spray Calculation Worksheet](#)

### **Teaching Methods**

This program uses a variety of methods and modalities: well-produced videos with music and narration, lecture, demonstrations, hands-on participation, theoretical application and calculations on worksheets, questions and answer.

Because this information and these resources were intended to address a specific need while being inserted into a wide variety of programs and events, teaching methods have and will vary by venue, but this information lends itself to students being given a fictional scenario, and using actual equipment in a hands-on fashion to determine ideal spray volume and calculate correct pesticide amount while reinforcing proper sprayer use, technique and coverage.

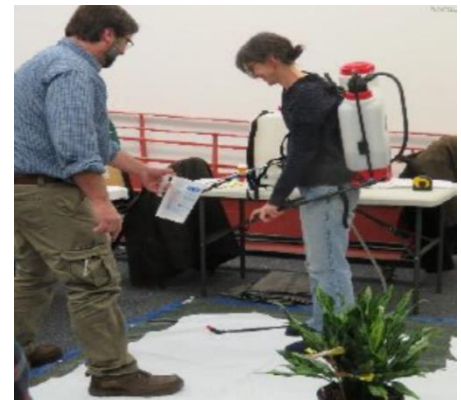


Figure 1 Hands-on calibration in Vermont

## Results

In the three years since this program began, over 650 professionals have been present at a training, workshop or webinar.

The videos have cumulatively had 969 views.

Greenhouse Sprayer Calibration and Spray Calculation Worksheet has been downloaded by 21 individuals.

Over 600 copies of these worksheets have been handed out at each of the in-person events.

## Impact Statement

In 2019, 40 acres of turf and surrounding landscape were reported as sprayed with a sprayer calibrated through this program.

In 2020, 14 acres of greenhouse were reported as sprayed with sprayers calibrated through this program.

Growers at in-person and virtual events reported an increased understanding of sprayer calibration and calculation. This increase should result in increased accuracy in mixing sprays and increased efficacy of sprays resulting in better pest and disease control with less wasted pesticide and fewer repeat applications.

At one training that included multiple topics and took place over three days and three states, 92 of the 126 participants filled out exit evaluations:

- an average of 92% of evaluation respondents reported learning new techniques they intended to incorporate in 2020.
- The sprayer calibration portion ranked higher on “educational value of each workshop session” than the average.
- Attendees reported:
  - “sprayer use, calibration and chemical use amounts has always been confusing. This workshop really helped clarify the issue. “
  - “(I’m) Thinking more about backpack sprayer application rates/method”
  - “Great hands-on, Good info on calibration & use of spray sensitive paper, George (Hamilton) always great.”
  - “Calibration was something that we never taught, should spend more time on this”
  - “Cool demo, learned how to calibrate my backpack sprayer”

## Evaluation

One of the strengths of this program is its ability to be easily incorporated into existing programs and industry events which may have greater appeal than the topic of sprayer calibration, allowing this important information to be conveyed in an easily accepted, digestible manner. This creates a challenge for evaluation of economic or environmental impacts, however.

Participants in trainings are given exit evaluations to self-report knowledge and experience gained as well as intent to incorporate techniques into their business operations.

Site visit work is followed up by conversations to ascertain treated area impacted by the training and calibration.



*Figure 2: Discussing Coverage on Shrubs with Landscapers. 6/21/2018 Peabody, MA*



*Figure 3: Discussing Control Flow Valves on a Backpack Sprayer with Landscapers. 9/19/2018 Rochester, NH*



Figure 4: *Discussing greenhouse sprayer calibration with growers in Maine*



Figure 2: *Discussing proper spray coverage with growers in Vermont*