Integrated
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for Wisconsin

Cranberry

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SOLVING PROBLEMS

Sometimes growers find themselves in situations or with problems that they can't solve on their own based on their experience or available reference materials. In these situations they bring in outside help such as University faculty members, crop consultants, handler fieldmen, and manufacturers technical representatives. Because these people see a wide variety of properties, have expertise with specific pesticides, and have a broad background in biology we can sometimes bring experience to bear on problems growers struggle with. For the most part we are happy to share our expertise to help growers.

Because we are generally only called to look at the most difficult problems, providing us with all the information you have is critical to identifying what the underlying cause may be. Like most aspects of life, the best decisions are made with the greatest amount of information. Here are some ideas that will help you and your consultant/fieldman/technical rep arrive at the best conclusion.

1. Provide them with a list of all pesticides (insecticides, fungicides, herbicides) with dates and rates of application for the past year or two.
2. Provide scouting reports including trap and sweep net counts for the past year.
3. Provide a complete list of fertilizer applications including products and rates for the past year or two.
4. If you have weather data available for your farm or locality provide that as well.
5. Describe your irrigation practices including duration, timing and any observations.
6. List any other observations you have made regarding weather, pest populations, or anything else that is unusual.
7. If you have a hunch about what the cause may be, share it. If you think you may have made a mistake own up to it.

My experience is that many growers who have a difficult problem have a pretty good idea of the cause. It may relate to a mistake they have made and it is sometimes difficult to own up to our mistakes.

Some years ago, along with two other university professors, I was invited to visit a cranberry marsh that had vines that appeared scorched. The scorching had some pattern to it that followed the pattern from the sprinklers. We looked carefully in the canopy for pathogens, we talked about applications of pesticides, we scratched our heads a lot struggling to identify a cause for the scorching. Just as we were leaving the man-

ager asked if we thought it could be caused by no one coming to the marsh over a hot weekend to turn on the sprinklers. Bingo. That was the problem and the manager knew what the problem was. All he needed to do was to share what he knew.

Sometimes growers only give part of the information they know as a game. "We'll see how smart these people really are. If they are smart they'll fill in the information gaps and come up with the right answer anyway." I suppose that could stroke one's ego to say, "Those Ph.D.'s aren't so smart after all. I figured it out, but they couldn't." If you share all you know regarding the situation we may well come to the same conclusion as you did. But you'll never know unless you share your information.

We want to help growers figure out problems that may have happened and we want to prevent recurring mistakes. We are best able to help you when you help us by sharing all of the information you have, including your hunches and theories. Doing so will provide the best outcome and won't waste your time or our time.

Teryl Roper, UW-Madison Extension Horticulturist

Life moves in one direction only—and each day we are faced with an actual set of circumstances, not with what might have been, not with what we might have done, but with what is, and with where we are now—and from this point we must proceed: not from where we were, not from where we wish we were—but from where we are.

Richard L. Evans

We are all blind until we see
That in the human plan
Nothing is worth making, if
It does not make the man.
Why build these cities glorious
If man unbuilded goes?
In vain we build the world, unless
The builder also grows.

Edwin Markham

CALIBRATING BOOM APPLICATORS

Proper calibration of pesticide application equipment is essential not only for the performance of the equipment but also for insuring the most good for the crop. While manufacturers go to great lengths to insure the effectiveness of their equipment, there are numerous other factors that can affect the output of your equipment. The type of equipment, field terrain, wind speed, and width of boom are factors that can affect the output. As an applicator, you must consider at least these factors that can affect the output of your equipment as you prepare to make a fertilizer or pesticide application with a boom.

Sources of variation

The type of product, rate per acre, moisture or humidity, and uniformity of the granule also affect the pattern and distribution of the product being applied.

Speed of travel affects total output as much as accuracy of application. It is important with all pesticide application equipment that is calibrated at a given speed to be operated at that speed. Increasing speed beyond the calibration speed will reduce the application per unit area while slowing down will increase the amount of product applied. Speed of travel is one of the most important factors to total output.

The level of the boom probably does more to affect the pattern of distribution than any other factors. If the end of the boom is allowed to bounce up and down while drawn across the bed, the distribution pattern at each output location will change continuously. Raising the boom applies the output over a larger intended swath resulting in lower application rates, while dropping the boom down narrows the pattern and increases the application to that area. A narrow strip can result in areas of excessive product alongside strips of little or no product. This problem often relates to the pattern of stripes or blotches seen on some

beds. Front to back sway of the boom can also lead to uneven application.

Field terrain affects output usually by altering the consistency of travel across the bed. Dew, rain, or wet conditions, as well as soft dikes will result in changes of speed and maneuvering of the boom equipment. Dikes that are uneven with tufts of grass or potholes will cause the boom to sway and result in uneven application. Any variation unfortunately will result in different output patterns being applied.

The distance to the nozzle can change the airflow through the lines. The longer the boom, the greater the concern that all nozzles are outputting identical quantities. As lines get longer, the velocity or speed of the particle may decrease, affecting not only the accuracy of output but possibly the distribution pattern as well.

The spreader pan is responsible for the distribution of the product onto the bed in some systematic pattern. The distance between the spreader pans, or the spacing, and the correctness of the angle to the drop line will determine how even a coverage occurs. If the spacing varies by several inches due to a design problem or if the pan itself is not perpendicular to the end of the drop tube, uneven output occurs. Any variation in the angle of the pan will be multiplied greatly in the pattern of the product as it's applied to the bed. This can result in overlap, missed strips, or a very uneven application.

Moisture content or humidity can have a serious affect on the flow of particles through the line and the pattern of application when the granules hit the spreader pan. While it's important to keep product dry at all times, some products actually absorb moisture from the environment, resulting in inconstant application rates from one day to the next. Storing products in a dry warehouse will maintain product quality over time.

Granule or prill size and particle distribution not only affects how product moves through the distribution tubes but also how even it spreads as it hits the spreader pan. Large granules tend to travel further while small or dust particles drop sooner or can be drifted by cross winds. An uneven distribution pattern is the result. Blended fertilizer grades made up of several nutrient sources will vary far more than single nutrient materials like urea or ammonium sulfate in their pattern of distribution.

While it may not be possible in a given day to control all these factors, being able to regulate as many as possible will insure a more accurate application of the product you are applying.

Calibration procedure

When calibrating boom application equipment, two major concerns need to be addressed. We are concerned not only about the total output on a per-acre basis, but we must also be concerned with the pattern of distribution. More opportunity for error exists in the area of pattern distribution. We can be confident we applied the given amount of product on a bed only to find out that parts of the bed were overapplied while other areas received nothing. Proper equipment calibration will help to insure an even application throughout the entire bed area.

Calibration is simply knowing the amount of product that will be spread uniformly over the unit of land area. Calibrating consists of two steps: determining the area covered per time (time to travel a distance x boom width) and determining the product discharged from the boom per time. When these two steps are combined the time factor drops out and we are left with product applied per land area. Performing the precalibration test:

1. Check manufacturer's manuals for the specifics on adjustments to your boom. Use suggested setting data as a starting point.
2. Determine the distance of bed you wish to cover, to establish the calibration area (example: 100'—200').

3. Determine the boom width and effective area covered by that length of boom.
4. With your boom in motion, record the time required to travel the predetermined distance of bed used to calibrate the boom.

You should now know the length times the width of the area covered and the time it took for your equipment to cover the test area.

Relocate your equipment to a suitable location to complete the calibration test.

Steps to Calibration Test:

1. With the equipment operating correctly, fill hoppers or reservoir with product intended to be applied. Proceed to fill all lines with product.
2. Place a collection bag or container over each nozzle on the boom and secure, to ensure all product will be collected. Number each container to represent the nozzle being collected.
3. Proceed to run the boom applicator for the amount of time you determined in the precalibration test and shut off the equipment, allowing all residues to be deposited in the collection container.
4. Gather up the collection containers and weigh each separately to determine individual nozzle output. There should be no more than a plus or minus 5% variation between the output of the nozzles.
5. Weigh the total output of all nozzles and determine the amount in ounces or pounds.
6. Calculate the area covered in the precalibration test and convert to square footage or percent of an acre.

Once the boom has been calibrated for the material to be applied adjustments should not be made while the boom is in motion. If changes are made as the boom is operated the calibration previously determined won't be maintained and the uniformity of application will be compromised.

CALIBRATION EXAMPLE

The previous section described the theory and process for calibrating booms. This section will present some actual data and go through the process of calibrating a boom applicator.

The grower desired to apply 50 pounds of material per acre. The boom was 84 feet long and had 32 nozzles. Fabric bags were tied on all the nozzles and the boom applicator was operated for one minute. The bags were retrieved and the contents weighed. The nozzle outputs are shown in Table 1.

The formula for calibration is:

$$\text{Output} = \frac{\text{Spread width} \times (\text{rate}/A)}{5 \text{ (constant)}}$$

For this example the numbers are:

$$840 \text{ oz} = \frac{84 \text{ ft.} \times 50 \text{ lbs}/A}{5}$$

Dividing total output by the number of nozzles we get:

840 oz / 32 nozzles = 26.3 oz per nozzle.

Each nozzle should be releasing 26.3 oz of product per minute. Since it would be impossible to obtain this accuracy we normally allow ±5% for each nozzle and for the total output from the boom. So the maximum output would be 28.1 oz and the minimum would be 25.4 oz. If we look at Table 1 there are 4 nozzles outside of this range (see asterisks in Table 1). Corrective action such as checking the rollers and checking for obstructions in the lines should be taken to make the output fall within the acceptable range.

Total output of the boom's 32 nozzles was 856 oz. This is within 5% of the calculated value of 840 oz. Overall the boom is applying the proper amount of material, but corrections need to be made to prevent "striping" in the bed.

When this information is combined with information in the previous section

Table 1. Nozzle output from 32 nozzles on a granular applicator, 1997.

Nozzle Number	Weight of output (oz)
1	26.9
2	25.5
3	26.5
4	27.4
5	28.5*
6	26.6
7	26.1
8	27.6
9	25.8
10	25.7
11	28
12	27.3
13	27.2
14	27.3
15	27.6
16	24.2*
17	26.9
18	25.5
19	26.5
20	27.4
21	28.5*
22	26.6
23	27.6
24	25.8
25	25.7
26	28.0
27	27.3
28	27.2
29	27.3
30	27.6
31	24.2*
32	26.9
Total	856 oz

you should be able to calibrate your boom applicator accurately. Accurate calibration is vital to applying proper amounts of fertilizer and pesticides uniformly across bed surfaces. If you have not calibrated your boom applicator this year please do so before your next application. The time it takes to calibrate will be quickly repaid in both the safety and efficacy of the material you are applying.

Teryl Roper, UW-Madison Extension Horticulturist

I thank Tim Dittl and Leroy Kummer of Ocean Spray Cranberries, Inc. for the data used in this article.

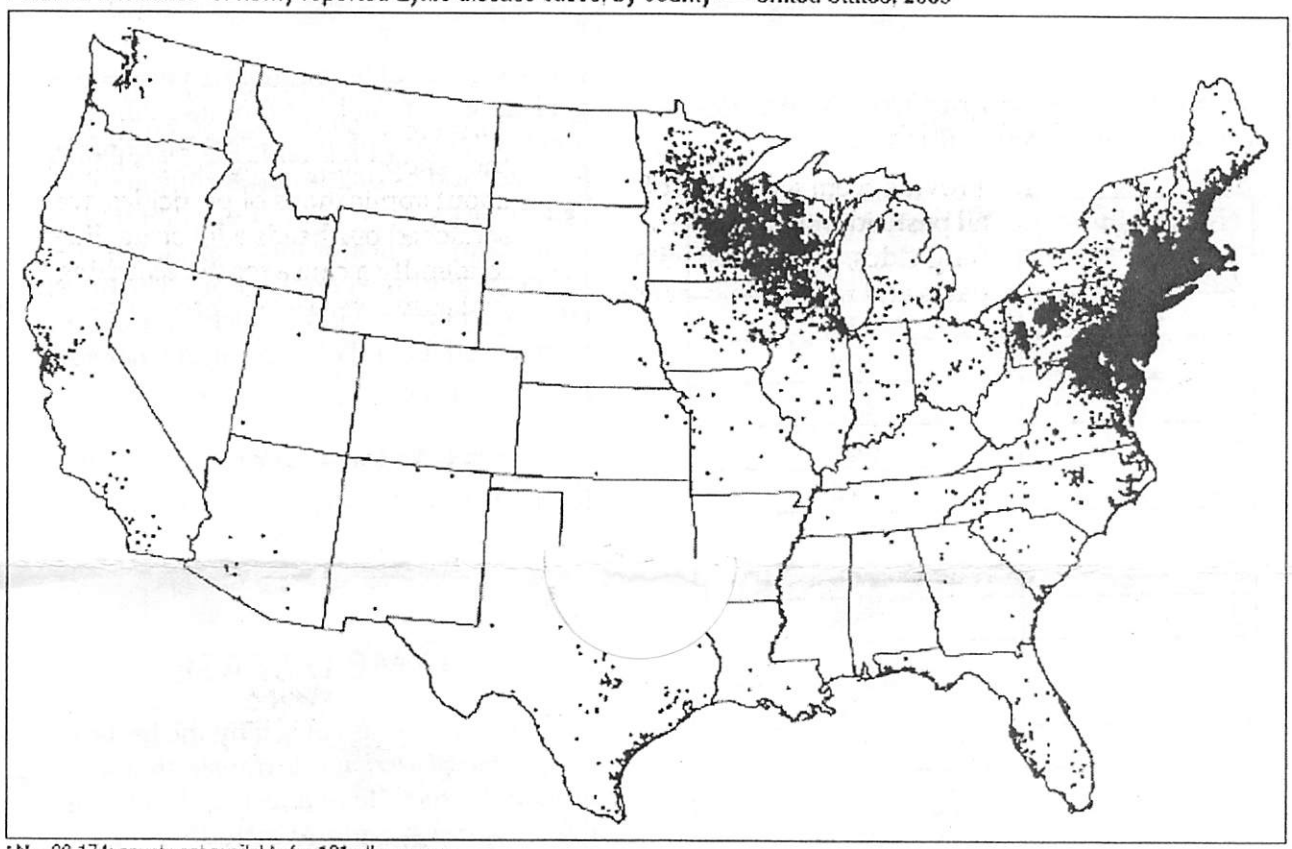
LYME DISEASE

Lyme disease is caused by the bacterium *Borrelia burgdorferi* and is transmitted to humans by the bite of infected blacklegged ticks. Typical symptoms include fever, headache, fatigue, and a characteristic skin rash called erythema migrans. If left untreated, infection can spread to joints, the heart, and the nervous system. Lyme disease is diagnosed based on symptoms, physical findings (e.g., rash), and the possibility of exposure to infected ticks; laboratory testing is helpful in the later stages of disease. Most cases of Lyme disease can be treated successfully with a few weeks of antibiotics.

Steps to prevent Lyme disease include using insect repellent, wearing long pants and long sleeved shirts, tucking pants into socks in long vegetation, and checking for and removing ticks promptly. The ticks that transmit Lyme disease can occasionally transmit other tick-borne diseases as well.

- Ticks prefer wooded and bushy areas with high grassWoods and a lot of leaf litter. These are areas to avoid.
- Take extra precautions in May, June, and July. This is when ticks that transmit Lyme disease are most active.
- If you do enter a tick area, walk in the center of the trail to avoid contact with

FIGURE 1. Number* of newly reported Lyme disease cases, by county† — United States, 2005



*N = 23,174; county not available for 131 other cases.
†One dot was placed randomly within the county of patient residence for each reported case.

overgrown grass, brush, and leaf litter.

- Use insect repellent with 20% - 30% DEET on exposed skin and clothing to prevent tick bites. Effective repellents are found in drug, grocery and discount stores.
- Permethrin is another type of repellent. It can be purchased at outdoor equipment stores that carry camping or hunting gear. Permethrin kills ticks on contact! One application to pants, socks, and shoes typically stays effective through several washings. Permethrin should not be applied directly to skin.

MIKE BRETL
FARMLAND BIRON MARSH
120 COUNTY ROAD U
WISCONSIN RAPIDS WI 54494-8803

Wisconsin Cranberry Crop Management Newsletter
Department of Horticulture
1575 Linden Drive
Madison, WI 53706

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