We saw the first soybean flowers of the year yesterday at the Arlington Ag Research Station. As we enter the soybean reproductive growth phase there are a few things to keep in mind. The first is that soybean will produce flowers for ~3 to five weeks, depending upon planting date and environment. During that time soybean will abort anywhere from 20 to 80% of the flowers that they produce. Generally it is the first and last flush of flowers produced that are most likely to be aborted.

Next, the timing window for glyphosate applications in our early planted soybean is quickly closing. Glyphosate labels indicate that applications can be made through R2 or full flower. The R3 growth stage begins when one of the four top nodes with a fully developed leaf has a 3/16 inch long pod. Applications made after the R3 stage begins are off-label applications. On average it takes ~4 days to move from R1 (beginning flower) to R2 (full flower) and ~10 days from R2 to the start of R3 (beginning pod).

Last but not least, wheel track damage made from ground applications may start to reduce yield. Sprayer wheel traffic from first flower (R1) through harvest can damage soybean plants and reduce yield (Hanna et al. 2008). Our research suggests that an adequate soybean stand (more than 100,000 plants per acre) planted in late April though mid-May can compensate for wheel tracks made when a field is sprayed at R1. Yield loss can occur, however, when wheel tracks are made at R1 or later in thin soybean stands (less than 100,000 plants per acre) or...
late planted soybeans. Regardless of stand, plants could not compensate for wheel tracks made at R3 (early pod development) or R5 (early seed development). The average yield loss per acre is based on sprayer boom width (distance between wheel track passes). In our trials yield losses averaged 2.5, 1.9, and 1.3% when sprayer boom widths measured 60, 90, and 120 foot, respectively. Multiple trips along the same wheel tracks did not increase yield loss over the first trip.

Shawn P. Conley, Soybean and Wheat Extension Specialist, Department of Agronomy, University of Wisconsin, Madison

Insect Notes-June 20, 2017

Bryan Jensen, UW Extension and IPM Program

Armyworms are still being found at treatable levels in some corn fields. A common scenario has been corn planted after a grass cover crop. Other possibilities include spring grassy weeds and corn no-tilled into alfalfa sod. Continue to watch these fields and make special note of larval size. Once the “worms” reach the 1-1¼ size range there is unlikely to be significant “preventable” damage that would pay for an insecticide and its applications costs.

Black Cutworm calls have slowed down and most of the corn is beyond the stage where damage is likely. However, late planted corn may still be at risk. Remember the treatment decision should focus on the potential for damage not based on damage already done. Once the corn reaches V4 and/or cutworms reach the 6-7 instar stage future damage will be minimal. A head capsule gauge and table which reflects damage potential vs instar can be found on page 56 of A3646, Pest Management in WI Field Crops.

There haven’t been any reports of significant European corn borer damage yet, however, most of the early planted corn is now at attractive stage and at a stage when larvae can survive (>18 inches extended leaf height). Spot checking likely fields would be a good idea, especially if significant damage was noticed in the area last year.

Potato leafhoppers may have benefited from the recent hot weather. Start spot checking established stands. New seedings require special attention for potato leafhoppers. These stand do not get the benefit of a short cutting schedule that establish stands receive.

I would expect Japanese beetle adults to be emerging soon. I have no guesses how heavy populations might be, however, this is one insect pest that may have benefited from our warm winter. Adult emergence will happen over a period of time so continue to monitor soybeans fields for defoliation and corn when it starts to pollinating. Adults Japanese beetles are clumped in their distribution so through scouting is needed. A potential Japanese beetle look-a-like, the rose chafer, has emerged and is commonly found on sandy soils. Although soybean defoliation is possible, significant economic defoliation is unlikely.

Dicamba and Soybeans

Daniel H. Smith, Richard Proost, Nutrient and Pest Management Program, University of Wisconsin-Madison

New seed technology has expanded the usefulness of the herbicide dicamba. This also means more potential for non-tolerant soybeans and sensitive crops to be exposed to dicamba drift, volatilization, and spray contamination. New formulations of dicamba greatly lesson risk, however, only if the herbicide label is followed. The herbicide label is the law and must be read, understood, and followed. These new formulations of dicamba have very
strict label restrictions and requirements not often seen. These include, but are not limited to: spray tip selection, weather conditions, spray tank mixes, buffer strips, sprayer clean-out procedures, and maximum weed height at time of application. As farmers begin to utilize this new technology this classic publication details dicamba injury and mimics on soybean:


Printed copies are also available through the NPM Program.

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**Veg Crop Updates Newsletter June 23, 2017**

Amanda Gevens, Associate Professor & Extension Specialist, Potato & Vegetable Pathology, Plant Pathology Department, University of Wisconsin-Madison

Click here>>> UWEX Veg Crop Updates Newsletter #9

In this issue we address:

- late blight and early blight disease threshold/forecast updates (several locations at/over threshold for late blight DSVs)
- national late blight updates
- national cucurbit downy mildew updates
- note from Dr. Yi Wang – New UW-Horticulture Vegetable Production Specialist

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**Wisconsin Fruit News-June 23, 2017**

Here is the next issue of the Wisconsin Fruit News. We hope you enjoy!

http://go.wisc.edu/101k8v

* New SWD publication available!
* IPM: Host plant resistance
* Plant Disease Diagnostic Clinic update
* Insect Diagnostic Lab update
* Harvest schedule and sanitation for managing SWD

* Cranberry degree-day map and update
* Grape insect scouting report — rose chafer
* Wine and table grape developmental stages
* Nutrient management for apple orchards – an update
* Potato leafhopper in apple
* Verticillium on stone fruits
* Reduced risk insecticide: Intrepid

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**Wisconsin Pest Bulletin 6/23/17**

Krista Hamilton, Entomologist, WI Dept of Agriculture, Trade and Consumer Protection

Volume 62 Issue No. 9 of the Wisconsin Pest Bulletin is now available at:

Read or download PDF

**INSIDE THIS ISSUE**

**LOOKING AHEAD**: Annual flight of western bean cutworm moths beginning

**FORAGES & GRAINS**: Potato leafhopper counts near threshold levels

**CORN**: First-generation European corn borer larvae appearing in corn

**SOYBEANS**: Rose chafers and sand chafers causing light defoliation

**FRUITS**: Signs of codling moth injury becoming evident on apples

**VEGETABLES**: Squash vine borer egg laying underway

**NURSERY & FOREST**: Updates from this week’s nursery inspections

**DEGREE DAYS**: Degree day accumulations through June 21, 2017
Plant Disease Diagnostic Clinic (PDDC) Update, 6-23-17

The PDDC receives samples of many plant and soil samples from around the state. The following diseases/disorders have been identified at the PDDC from June 17, 2017 through June 23, 2017.

<table>
<thead>
<tr>
<th>PLANT/SAMPLE TYPE, DISEASE/DISORDER, PATHOGEN, COUNTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIELD CROPS</td>
</tr>
<tr>
<td>Soybean, Charcoal Rot, Fusarium Seedling Blight, Macro-</td>
</tr>
<tr>
<td>phomina phaseolina, Fusarium sp., Grant County, Grant</td>
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<td>County</td>
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<tr>
<td>FORAGE CROPS</td>
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<tr>
<td>Alfalfa, Aphanomyces Root Rot, Fusarium Root Rot, Phy-</td>
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<tr>
<td>tophthora Root Rot, Pythium Root Rot, Rhizoctonia, Root</td>
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<tr>
<td>Rot, Aphanomyces euteiches, Fusarium sp. Phytophthora</td>
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<tr>
<td>sp. Phytophthora sp. Rhizoctonia sp., Calumet County,</td>
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<td>Calumet County, Calumet County, Calumet County, Calumet</td>
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<td>County</td>
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<td>FRUIT CROPS</td>
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<tr>
<td>Apple, Anthracnose, Apple Scab, Coniothyrium Leaf Spot,</td>
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<tr>
<td>Discosia Leaf Spot, Root/Crown Rot, Colletotrichum sp.</td>
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<tr>
<td>Venturia inaequalis Coniothyrium sp. Discosia sp. Cyl-</td>
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<tr>
<td>indrocarpon sp., Dane County, Dane/Portage County, Dane</td>
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<td>County, Dane County, Iowa County</td>
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<td>Apricot (Manchurian), Bacterial Canker, Brown Rot, Pseu-</td>
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<tr>
<td>domonas syringae Monilinia sp., Brown County, Brown</td>
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<td>Blueberry, Phomopsis Canker, Root/Crown Rot, Phomop-</td>
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<td>sis sp. Rhizoctonia sp., Columbia County, Columbia</td>
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<td>Plum (Red), Bacterial Canker, Brown Rot, Pseudomonas</td>
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<tr>
<td>Rhubarb, Anthracnose, Pseudomonas Leaf Blight, Colle-</td>
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<tr>
<td>totrichum sp., Pseudomonas sp., Portage County, Port-</td>
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<td>VEGETABLE CROPS</td>
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<tr>
<td>Celery, Cucumber Mosaic, Tobacco Mosaic, Cucumber</td>
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<tr>
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<tr>
<td>octonia sp., Waushara County, Waushara County, Waushara</td>
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Follow us
The best of all workshops! This year our crop & pest management workshop and diagnostic troubleshooting workshop have been combined into a single day. The day starts with 2 hours of multi-disciplinary agronomic topics and culminates with 6 separate diagnostic troubleshooting scenarios.

Tuesday – July 25, 2017
Lunch is provided at noon
Tiered fee: $90 before 7/15/17, $100 after 7/15/17
Location: Arlington Ag Research Station
CCA CEU’s: 5.0*

Pigweed Species Identification & Control – Mark Renz, Extension Weed Science Specialist
- Is it pigweed? Waterhemp? Some other Amaranth species?
- This session will provide you with the tools to positively identify these troublesome weeds and discuss control options while considering herbicide resistance and recent technologies

Spray Drift Mitigation – Dan Heider, UW Integrated Pest Management Specialist
- Rain followed by more rain. When the rain stops, the wind seems to start with few good spray windows between. Are you confidently spraying on target?
- Nozzles and drift control additives will be demonstrated so you can really see what’s happening behind the spray boom

Diagnostic Troubleshooting – UW Specialists from multiple disciplines
- Fine tune your crop diagnostic skills in a fun and interactive setting. Small groups will rotate through field problems with UW Specialists role playing as farmers. Through digging up plants, asking questions and consulting references participants will make a diagnosis of the problem being observed and a recommendation for correction. Each participant will experience 6 separate diagnostic scenarios

Schedule:
8:30 - 8:50 registration
8:50 - 9:00 introduction/orientation
9:00 - 11:00 agronomic topics 1-2
11:00 - 12:00 troubleshooting sessions 1-2
12:00 - 12:45 lunch (provided)
12:45 - 2:45 troubleshooting sessions 3-6

Workshops begin in the Public Events Facility of the Arlington Agricultural Research Station. Be aware that this is not a “traditional” field day. Training sessions are designed to be in-field and hands-on. Therefore we advise that you come prepared for all types of weather.

*CCA CEU’s: Continuing education units/categories are subject to change pending approval from the Certified Crop Advisor Program.

FAST and easy ONLINE registration by credit card at- https://www.patstore.wisc.edu/ipm/register.aspx
or if NOT using credit card online: Mail registration form below to Dan Heider, UW-IPM Program, 1575 Linden Drive, Madison, WI 53706

Name: ____________________________
Address: ____________________________
Affiliation: ____________________________
Daytime telephone: ____________________________
email: ____________________________

Diagnostic Training Center Workshop, July 25 ..... $90 / $100
($100 if registration received after July 15)
Checks payable to: University of Wisconsin-Extension
solution remained in the tank, sump, or lines, this amount would be sufficient to contaminate the next 500 gallon load at the 0.01% level.

It’s important to note that even spray tanks cleaned using common procedures (rather than according to more thorough label directions) can leave measurable concentrations of dicamba. Weed researchers at UW tested a sprayer for residues after spraying dicamba. The tank was drained, washed with an ammonia-water solution which was also flushed through the booms, and re-filled with water. The water from the spray tank and water sprayed out of the boom was sampled and analyzed for dicamba (Table 1). The dicamba concentration in the spray tank’s water was extremely low, but the concentration may have been sufficient to cause minor injury symptoms. The water from the spray boom contained a higher concentration of dicamba which might cause moderate soybean injury. This concentration suggested the boom was not adequately cleaned.

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Similarly, small amounts of dicamba from the improper use of an old jug to shuttle glyphosate or adjuvants can contaminate spray solutions. The reuse of old herbicide containers in this manner is illegal. Only 0.05 oz of Banvel or Clarity would contaminate a 500-gallon load (calibrated to spray 15 GPA) at the 0.01% level. A non-rinsed jug could certainly retain this small amount of dicamba.

**Dicamba Injury and Soybean Yield Loss**

Without a doubt, extremely low dicamba concentrations can cause soybean injury symptoms. Minor symptoms, while often causing concern, do not result in yield loss. As concentrations increase, injury symptoms and the potential for soybean yield loss also increase. The level of yield loss depends on the amount of dicamba that reached the soybean and the plant’s growth stage. It’s impossible to state the exact dicamba concentration that causes yield loss due to soybean’s ability to recover from injury, differences among varieties, and variation in growing conditions among years. Yield is most often lost when severe injury symptoms persist through the growing season.

In general, experiments have shown that soybeans recover from minor to moderate dicamba injury in the vegetative stage without suffering yield loss. However, yield loss is more likely to occur when soybeans are exposed to dicamba after they begin to bloom. Fortunately, soybeans are more frequently exposed to dicamba in the vegetative stage than in the reproductive stage.

**Ways to Reduce the Risk of Dicamba Injury**

Soybean injury from dicamba usually results from mistakes during mixing, tank cleaning, or application. Spending a little extra time during these activities may prevent or reduce the risk of dicamba injury. These simple recommendations can reduce the potential for soybean injury from dicamba.

1. Clean spray tanks according to label directions.
2. Do not re-use old herbicide containers to shuttle herbicides or adjuvants.
3. Thoroughly rinse measuring containers after spraying dicamba.
4. Do not spray in windy conditions, especially if the wind is blowing towards a soybean field.
5. If possible, avoid dicamba applications during hot, dry weather to reduce volatilization.
6. Adjust boom height and spray pressure and select nozzles to minimize spray drift.

**Dicamba to soybeans**

Every year a small percentage of Wisconsin’s soybean fields show injury symptoms generally described as “leaf puckering.” Many factors can cause leaf puckering. Some causes are soybean aphids, plant viruses, and injury from growth regulator herbicides like dicamba. A number of commonly used corn herbicides contain dicamba including Banvel, Celebrity Plus, Clarity, Distinct, Marksman, NorthStar, Sterling, and Yukon. Three common ways that dicamba can reach a soybean field are as spray particle drift, vapor movement, or by a contaminated sprayer.

Investigations of soybean leaf puckering have often found the injury was caused by dicamba. Clearly, dicamba is not a soybean herbicide. However, it is found in many herbicides applied to corn fields, which may be near soybean fields.

**Spray Drift**

An important source of dicamba movement to soybean is spray particle drift. Droplet size plays a major role in particle drift. Small droplets take longer to reach the ground, increasing their susceptibility to drift. For example, a droplet from a fine spray (100 microns) takes 10 seconds to fall 10 feet whereas a droplet from a coarse spray (400 microns) takes only 2 seconds. Add a 3 mph wind, and the fine droplet will drift 44 feet while the coarse droplet will drift only 9 feet.

**Contaminated Spray**

The third source of dicamba movement to soybean is contaminated spray. This may occur from a contaminated spray tank, make-up water or nurse tank, transfer hoses, measuring containers, screens with residues, or re-used jugs. It has been reported that as little as 0.01% contamination with dicamba can cause minor leaf puckering on soybean. To illustrate how small this amount is, consider a 500 gallon spray tank that applied Clarity at 1 pt/a. If 6.4 oz (3/4 cup) of this spray

**Dicamba Volatilization**

Dicamba vapor movement is greatest under hot, dry conditions and low relative humidity. However, as little as 0.04 inch of rainfall can dramatically decrease volatilization by washing dicamba off corn and weed leaves and onto the soil where it is less likely to volatilize. Overall, the potential for dicamba vapor movement is greatest under hot, dry conditions and after the application.

**Dicamba Vapor**

A second source of dicamba movement from corn fields is when dicamba volatilizes to a vapor. All dicamba formulations volatilize, but some volatilize more than others. For example, in a study where field corn was sprayed to test dicamba volatility, the dimethylamine salt of dicamba (formula used in Banvel) injured adjacent soybeans about twice as much as when the sodium salt of dicamba (formula used in NorthStar).

Weather conditions play an important role in increasing or decreasing volatilization. For example, volatilization and potential for vapor movement increases at high temperatures and low relative humidity. However, as little as 0.04 inch of rainfall can dramatically decrease volatilization by washing dicamba off corn and weed leaves and onto the soil where it is less likely to volatilize. Overall, the potential for dicamba vapor movement is greatest under hot, dry conditions and after the application.

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This publication is available from the NPM Program, 608-265-2660, or on the web at http://ipcm.wisc.edu to download. Before publishing, please call for publication availability.

Printing of this publication was funded by the Wisconsin Soybean Marketing Board.
Dicamba symptoms appear on the soybean leaves that grow after the exposure occurs. As a result, symptoms are often not noticed for 7 to 14 days. Fully developed leaves on the plant typically do not exhibit symptoms. Usually, the next four leaves that develop after exposure are injured the most. Then, most of the final leaves grow to near full size.

On Fig. 1, trifoliate leaves 1-2 had grown before being exposed and are not injured. Trifoliate leaves 3-6 grew after the exposure and are injured. Leaves developing after the 6th trifoliate should be close to normal size and shape (7).

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Fig 1: Dicamba injury Symptoms

Fig 2: You may see a slight crinkle of leaf tips at low doses.

Fig 3: Leaves can cup up or down.

Fig 4: You may see severely puckered leaves with blunt leaf tips. Leaf tips may appear light colored due to dense covering of hairs and unexpanded cells.

Fig 5: Upper leaves may appear strap-shaped.

Fig 6: The stem can twist, swell, and split at high doses. Axillary branches often grow to compensate for the damage, but will have puckered leaves.

Fig 7: Damaged pods when plants were exposed during pod set.

Fig 9: Leaf cupping was caused by carryover of clopyralid, an ingredient in Hornet.

Fig 10: Herbicides like Dual II Magnum, Outlook, or Intro with cold, wet soil can cause a drawstring appearance, where the leaf tip is pulled in. New growth is normal.

Fig 11: Heavy soybean aphid feeding can cause leaf cupping.

Fig 12: Bean pod mottle, soybean mosaic, and tobacco streak viruses can cause downward cupped soybean leaves.

Fig 13: Bean pod mottle and soybean mosaic viruses can cause a bumpy appearance on leaves. Some viruses also cause a yellow blotchy appearance.

Fig 14: These upward cupped leaves are similar to soybean dwarf virus symptoms.

Dicamba injury Mimics

Other growth regulating herbicides such as 2,4-D and clopyralid can cup, pucker or strap soybean leaves.

Other mimics do not cause the same pattern on the plant (four or five puckered leaves followed by recovery) or leaf symptoms (injury concentrated toward the leaf tip) as dicamba.

Contact soybean herbicides like Cobra or Flexstar can cause the first leaf (1) that expands after spraying to crinkle. However, the next leaf to grow (2) is not injured. Dicamba does not cause leaf burn. See Fig. 8, to the right.

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Table 1. Dicamba residues detected in water after a sprayer was drained, washed and flushed with an ammonia-water solution, and re-filled with water.

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Every year a small percentage of Wisconsin’s soybean fields show injury symptoms generally described as “leaf puckering.” Many factors can cause leaf puckering. Some causes are soybean aphids, plant viruses, and injury from growth regulator herbicides like dicamba. A number of commonly used corn herbicides contain dicamba including Banvel, Celebrity Plus, Clarity, Distinct, Marksmen, NorthStar, Sterling, and Yukon. Three common ways that dicamba can reach a soybean field are as spray particle drift, vapor movement, or by a contaminated sprayer.

Investigations of soybean leaf puckering have often found the injury was caused by dicamba. Clearly, dicamba is not a soybean herbicide. However, it is found in many herbicides applied to corn fields, which may be near soybean fields.

The Spray Drift Task Force reported that drift from 8004 flat fan nozzles at a 20 inch height with 40 psi and an 8 mph wind was about 0.5% at 25 ft, 0.2% at 100 ft, and 0.125% at 200 ft. This level of drift may not be noticeable with many herbicides, but dicamba drift at any of these levels can cause soybean injury. In the studies, drift was greatly increased with higher boom heights or smaller droplet sizes. It is impossible to eliminate tiny drift-prone droplets, but they can be minimized with proper application techniques for correct boom height, spray pressure and nozzle selection.

Dicamba injury to soybeans

Dicamba has a vapor pressure of 2.8 mm Hg. It is this vapor pressure that allows dicamba to volatilize when the temperature is warm and the water content of the material is low. The vapor pressure of dicamba is greater than that of the other common corn herbicides, such as Roundup, and the other 2,4-D esters.

Dicamba vaporized Dicamba contaminated sprayer

Dicamba can be volatilized from the spray tank, it can also be volatilized from the air in the sprayer, it can be volatilized during mixing, tank cleaning, or application. Spending a little extra time during these activities may prevent or reduce the risk of dicamba injury. These simple recommendations can reduce the potential for soybean injury from dicamba:

1. Clean spray tanks according to label directions.
2. Do not re-use old herbicide containers to shuttle herbicides or adjuvants.
3. Thoroughly rinse measuring containers after measuring dicamba.
4. Do not spray in windy conditions, especially if the wind is blowing towards a soybean field.
5. If possible, avoid dicamba applications during hot, dry weather to reduce volatilization.
6. Adjust boom height and spray pressure and select nozzles to minimize spray drift.

Spray Drift

An important source of dicamba movement to soybean is spray particle drift. Droplet size plays a major role in particle drift. Small droplets take longer to reach the ground, increasing their susceptibility to drift. For example, a droplet from a fine spray (100 microns) takes 10 seconds to fall 10 feet whereas a droplet from a coarse spray (400 microns) takes only 2 seconds. Add a 3 mph wind, and the fine droplet will drift 44 feet while the coarse droplet will drift only 9 feet.

Contaminated Spray

The third source of dicamba movement to soybean is contaminated spray. This may occur from a contaminated spray tank, make-up water or nurse tank, transfer hoses, measuring containers, screens with residues, or re-used jugs. It has been reported that as little as 0.01% contamination with dicamba can cause minor leaf puckering on soybean. To illustrate how small this amount is, consider a 500 gallon spray tank that applied Clarity at 1 pt/a. If 6.4 oz (3/4 cup) of this spray