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This publication was compiled and edited by:

Christelle Guédot Extension Fruit Entomology Specialist Department of Entomology University of Wisconsin-Madison

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#### **ROOT GROWTH PATTERNS IN CRANBERRIES - UPDATE ON YEAR 2**

AMAYA ATUCHA and BETH WORKMASTER

Department of Horticulture, University of Wisconsin-Madison

Root systems of plants present two primary functions: uptake of water and nutrients, and anchorage. However, secondary functions such as storage, production of growth regulators, interaction with soil microorganisms, and propagation can have a significant impact on the plant's performance. The main goal of this project is to characterize root growth patterns among cranberry cultivars. Understanding root growth dynamics in cranberry vines, and how biotic and abiotic factors may alter them, will allow growers to adjust and target production practices (e.g., irrigation, fertilization, agrochemical applications, disease control, etc.) to precise root growth stages, increasing production efficiency, quality and sustainability, and reducing environmental impacts.



Figure 1. Image of cranberry roots in relation to size and root order.

#### Methods

A total of sixteen minirhizotron root observation tubes (clear cellulose acetate butyrate (CAB), 2" ID, 24" long) were constructed and installed in an angled position in the root zones of selected beds of 'Stevens' and 'GH1' in the Tomah area during the fall of 2014 (Fig. 2). During 2015, all beds received and application of Casoron, a pre-emergence herbicide, the first week of May at a rate of 32 lb/ac. During 2016, half of the beds received Casoron the last week of April at the same rate as in 2015. A total of 8 root observational tubes were located in areas where the Casoron treatment (C) was applied, and 8 root observational tubes were located in areas with No Casoron treatment (NC). Root image analysis was performed using WinRhizoTron analysis software (Regent Instruments, Quebec, Canada) and JMP statistical analysis software.





#### **Results and Discussion**

During 2016, new root production started in the month of June in both treatments, a month later than what we observed in 2015 (Fig. 3). Even though there was a month difference in the initiation of new root growth between 2015 and 2016, in both years new root growth was synchronized with the beginning of bloom (Fig. 4). New root production peaked after harvest in the No Casoron treatment (NC), which was also observed in the Casoron treatment (C), however not as substantial as in the NC (Fig. 3). Both treatments continue to produce new roots until late November. The complete set of data

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from 2015 (Fig. 1) plus the preliminary data from 2016 (Fig. 2) report that new root production in cranberries occurred primarily between fruit set and harvest, which means the initial stages of upright growth, bloom, and fruit set are mainly supported by reserves.



**Figure 3.** Preliminary data on root production (expressed as a percentage of all new roots produced in 2016) in 'Stevens' beds for treatments with and without Casoron applications.



Figure 4. Root production during 2015 (top graph) and 2016 (bottom graph).

Preliminary data on root diameter showed no differences in root diameter between C and NC treatment (Fig. 5). However, when looking at distribution of new root production in the soil profile the C treatment presented shallower roots than the NC treatment (Fig. 6). In the C treatment 75% of all new roots born in 2016 where located in the first 2.5 inches of soil, while in the treatment with NC 75% of the new roots where located in the first 4.5 inches of soil.



**Figure 5.** Average root diameter (mm) for cranberry roots in areas applied with Casoron (C) and without Casoron (NC) in 2016.



**Figure 6.** Root distribution in the soil profile (cm) for new roots of 'Stevens' (ST) in areas applied with Casoron (C) and without Casoron (NC) in 2016. Cranberry roots in areas with Casoron presented 50% of new roots in the first inch of soil, while 50% of new root production in areas not treated with Casoron concentrated in the first 2 inches of soil.

Preliminary data analysis on mycorrhizal root colonization in cranberry roots showed a significant difference in the percentage of root length colonized by the fungi (Fig. 7) First order roots has significantly higher root colonization than third order roots, but were not significantly different from second order roots. Previous research, in closely related species such as blueberries, have shown a similar trend in which first order roots with intact cortex and epidermis layer have a higher colonization of mycorrhizae than root of higher order. This observation supports our hypothesis that nutrient and water are primarily up taken by lower order roots, while higher order roots that are able to overwinter are mainly part of the structural framework of the root system.



**Figure 7.** Percentage of root colonization by mychorrhizal fungi in roots of first, second, and third order. Roots samples were gathered in summer of 2015 from 16 soil cores collected within 2 meters from each minirhizotron tube. Letters respresent significant differences among root orders after mean separation with Tukey's HSD (p<0.05).

#### Summary

A complete set of data for 2015 and a preliminary set of data for 2016 show that new root production coincides with bloom, and it continues until after harvest. The highest rate of root production happened during and after harvest, which corresponds to the cessation of vegetative growth on the above ground portion of the plants. Roots activity and production extends past harvest into mid-late fall, which might suggest that more attention should be paid to soil moisture levels during fall given that roots are still up taking water and nutrients. Over 90% of new roots are located in the first 4 inches of soil, which could be related to irrigation management in the marsh where the study was located. However, data collected during 2015 at a second marsh with a significantly different irrigation practice, also exhibited similar root distribution in the soil profile as the marsh in the Tomah area.

#### **CRANBERRY COLD HARDINESS IS SUPERCOOL**

#### BETH ANN WORKMASTER, CAMILO VILLOUTA and AMAYA ATUCHA

Department of Horticulture, University of Wisconsin, Madison

#### SUMMARY

- Supercooling is the physical phenomenon by which small isolated amounts of water remain in a liquid state at temperatures below 32°F (0°C).
- Supercooling is the survival strategy for the buds of many species of woody plants.
  - Buds are able to supercool through the establishment of barriers to the growth of ice that occurs in much of the rest of the plant's tissues.
  - The freezing of supercooled water inside plant tissue is lethal; these plant tissues are not able to recover when water inside their cells freezes.
- Differential thermal analysis (DTA) is a technique to electronically identify and visualize the heat given off (exotherms) by the freezing of supercooled water.
- We have been studying the supercooling properties of cranberry terminal buds as one method to assess their cold hardiness.
- Cranberry terminal buds do appear to supercool, but we still have much to learn about this phenomenon and the patterns of LTEs and the subsequent damage to the interior of buds.

Spring and fall are the seasons where the greatest shifts in cranberry terminal bud cold hardiness occur. Previous work focused on changes in the springtime from just before bud break until the establishment of new growth. While this provided a detailed look at this critical time, more information is needed about changes in the plant's resistance to freezing temperatures, especially as the plant prepares for and enters dormancy in the fall, as well as when dormancy requirements are fulfilled in the spring and the buds are ready to grow in response to favorable temperatures. Previous cold hardiness testing has not included investigation of just how terminal buds are able to survive significant freezing temperatures. Our current work seeks to identify the freezing stress resistance mechanisms of terminal buds and to more fully document the plant's seasonal changes of cold hardiness.

#### The supercooling phenomenon

Although the thawing of ice (solid water) occurs reliably at 32°F (0°C), the opposite reaction, the freezing of liquid water, does not. Small amounts of mostly pure liquid water are sometimes able to remain in a liquid state at temperatures well below freezing. This occurs when various environmental factors, called "nucleators", are not able to interfere with the natural energy that vibrates water molecules. Examples of ice nucleators include: dust, bacteria, vibrations, and even ice itself. Nucleators "catch" the more slowly moving water molecules at low temperatures, and in that moment the crystalline structure of ice is able to start growing. While an amount of water remains liquid at temperatures below 32°F (0°C), it is said to "supercool".

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The freezing of supercooled water occurs rapidly and the associated "heat of fusion" that is released is called an "exotherm".

#### Supercooling and cranberry plant buds

The interior tissues of the buds of many species of woody plants, like trees and shrubs, survive by the freezing stress resistance mechanism of avoiding the formation of ice in their tissues, or in other words, by supercooling. In order for plant buds to supercool, the interior bud tissue and its associated water must be isolated or cut off from the water or ice in the rest of the plant. Examples of these "ice barriers" have been identified in grape and peach. It is thought that barriers develop in response to preparation for dormancy and the experience of cold winter temperatures. In the cold hardiness investigations done so far on cranberry buds, we have not known if they have to ability to supercool. If they do, this may have implications for the patterns of damage possible. If they do not develop the ability to supercool, then ice would form in the spaces between the cells throughout the plant, and tissue would survive if it was able to withstand the gradual growth of that ice.

*Differential Thermal Analysis.* The supercooling ability of woody plant buds is studied with the use of the technique of differential thermal analysis, or DTA (Figure 1). This technique involves the recording of the exotherms from the freezing water in plant samples via temperature change detecting plates, called thermoelectric modules, and monitoring software hooked up to a voltmeter. With this equipment, we are able to "see" at what temperatures the plant water freezes by visually identifying "low temperature exotherms", or LTEs, when the data is graphed.



**Figure 1:** Example of output from the differential thermal analysis (DTA) system to determine the temperatures at which supercooled water freezes in cranberry terminal buds (shown as the LTEs, or low temperature exotherms).

In our initial tests this past spring and fall, we have been able to identify LTEs in the freezing of cranberry terminal buds, which suggests that they do develop the ability to supercool. In our results, we have identified the following patterns:

- LTEs occur at progressively lower temperatures with the onset of plant dormancy and the shift to colder temperatures throughout the fall and early winter.
- As the plants experienced the first major cold period in early December, we were able to detect LTEs in a lower percentage of the buds sampled.

Due to the very small nature of cranberry buds and the possible current technical limitations of our equipment, much remains unclear.

*Effects of freezing temperatures in cranberry terminal buds.* As plant tissue experiences decreasing freezing temperatures, the risk for damage increases. We have identified two types of damage to cranberry terminal buds in association with the freezing of their supercooled water. One area of damage is the flower initials found at the center of the buds. When buds that have exhibited a LTE in our experimental system are cut open and inspected after a period of incubation, we find individual flower initials that are brown and dead. Another area of damage appears to be at the base of the terminal bud where the bud transitions to the upright stem. This area typically appears darker and often brown. This damage may inhibit water transport to the bud and is a phenomenon we are investigating.



**Figure 2:** Examples of damage associated with the freezing of cranberry terminal buds. On the left is a bud that exhibited an LTE during a DTA freezing test, indicating the freezing of supercooled water in the bud). Individual flower initials are damaged, showing symptoms of browning. On the right is a close-up of the transition area between the upright stem and the terminal bud. This area typically appears darkened as the result of freezing damage.

#### **Conclusion**

From our initial studies into the freezing stress survival mechanisms of cranberry buds, it appears that portions of buds, such as flower initials, develop the capacity to supercool, while other portions, such as the bud scales, survive by the strategy of allowing ice to form in the spaces between their cells. The pattern of damage to cranberry floral initials is consistent with what is seen in the buds of other supercooling species. Over the course of the fall, LTEs were detected over a range of temperature that included lower temperatures as the ambient air temperature became colder. The percentage of buds tested that exhibited an LTE decreased with the first experience of significant cold weather in early December. We will continue our work in this area to further our understanding of cranberry bud freezing stress resistance strategies and the associated technical challenges.

#### **CRANBERRY POLLINATION**

#### JANET VAN ZOEREN and CHRISTELLE GUÉDOT

#### Department of Entomology, University of Wisconsin-Madison

Cranberry blossoms require pollen from another flower to set fruit, and optimal pollination requires active pollen transfer by bees. The cranberry flower hangs upside-down, with the opening facing the ground and the pollen and nectar tucked up inside the flower. Bumblebees are well suited to pollinate these flower types because they "buzz pollinate", whereby they disconnect their wing muscles from their wings and vibrate them rapidly. This

causes the pollen to drop down and cover the bee. Due to the ability to buzz pollinate, each individual bumblebee is a highly efficient pollinator of cranberry.

Honey bees, on the other hand, do not buzz pollinate, but have to climb into the flower to extract the nectar and pollen. They are therefore less efficient at removing and transferring pollen, and may even remove nectar without coming into contact with the pollen at all, "robbing" the flower without offering any pollination service. However, although each



individual honeybee is less efficient than a bumblebee, honey bees still do most of the pollination work in cranberry. This is simply due to the large numbers of honeybees available during bloom – each honeybee hive contains approximately 40,000 workers, while bumblebee boxes contain only 10-300 workers per colony.

Both honeybees and bumblebees are available to rent or buy commercially, and nearly all Wisconsin cranberry growers supplement native pollinators with one or both commercial species. Bumblebees are also native here and these and other wild native bees are present to varying degrees on most cranberry marshes. However, colony collapse disorder in honeybees, and general pollinator decline amongst native bees, is cause for concern for cranberry growers. Here we will touch on two strategies for improving pollination on the marsh – through reducing pesticide exposure to bees, and habitat enhancement for attracting wild bees. These subjects will be covered more fully in a Best Management Practices for pollinators publication, which will be published this spring.

#### **Reducing Pesticide Exposure**

Many of the most important, and often easiest to implement, management strategies to improve pollinator health include reducing bees' exposure to pesticides. Although eliminating the use of pesticides is rarely feasible, you can help promote bee health by considering the following strategies in your pollinator protection plan.

1. Use reduced risk chemistries. In general, the most detrimental insecticides include

systemic insecticides, older broad spectrum chemistries such as carbamates and organophosphates, and neonicotinoids. Some newer chemistries, such as diamides and insect growth regulators, are highly specific, showing little detrimental effect on pollinators or other beneficial insects. The image at right outlines the toxicity of some commonly used insecticides. Based on the results of the clicker session from 2014, most cranberry growers already focus on reduced risk chemistries during bloom – only 5%



reported using highly toxic insecticides during bloom, 9% use somewhat toxic ones, and 33% use the least toxic chemistries (Clicker Session 2014).

**2. Avoid pollinator/insecticide contact.** Being aware of where and when bees forage on the marsh can help you apply pesticides in a way that will minimize harm to pollinators. Most bees forage beginning in early morning and continuing throughout the day, until shortly before sunset. Therefore, the best time to apply a pesticide, especially during bloom, is in the late evening or at night. If it is critical to apply a pesticide during the day, honeybees can be chased off the marsh by irrigating immediately before applying the pesticide.

Even when you are careful not to spray cranberry flowers directly, pollinator flight patterns may bring bees into contact with the pesticide. Because honeybees can forage up to 3 miles away from the hive, they may come into contact with pesticides applied to nearby crops or weeds that are in bloom, up to 3 miles away from your hives. Additionally, in order to avoid pesticide drift, don't spray when winds are over 10 mph, or if the relative humidity is below 50%, avoid using pesticides with small particles, and be sure to calibrate your boom to optimize spray pressure and volume. **3.** Research into effects of fungicides and fertilizers Although insecticides are the most often implicated in damaging bee health, recent research suggests some fungicides and possibly other spray applications can have an adverse effect on pollination. Bernauer et al. (2015) found that bumblebee hives, when fed fungicides, had fewer workers and lower total bee biomass than those not fed fungicides. Ongoing work in the Guédot lab seems to suggest that spray applications may repel honeybees away from the cranberry plants. Future work is needed to determine which fungicides and other sprays are most detrimental to pollination. As we and other labs continue to learn more about non-insecticide pesticides and their effects on cranberry pollination, we will continue to keep you informed.

#### Habitat Enhancement for Wild Bee Health

Native wild pollinators often fly in worse weather conditions than honeybees, and can be a valuable "back-up" pollination plan, even on a marsh with many supplemental honeybee hives. In order to survive and



thrive, these native pollinators need appropriate nesting sites and a season-long nectar source. Aside from the cranberry-specific information provided here, more information about planning a native pollinator garden and nest sites can be found at the Xerces website (www.xerces.org).

*Floral nectar resources.* When planting a bee garden to improve cranberry pollination, you will want to choose at least ten different species of flowers that flower in early spring to late summer. Spring-blooming flowers include bloodroot, spring beauty, and bluebells. Fall-blooming flowers include wild bergamot, aster, purple hyssop, milkweed, and Canada goldenrod. As a general guideline for selecting where on your marsh to establish a floral resource for native pollinators, it is best to find an area that is sunny and close to the beds. Additionally, it is better to establish a plot that is large and round, rather than many small or irregularly shaped patches.

*Nesting habitat.* In addition to a consistent food source, wild bees need somewhere to build their nests. About 70% of native bees in Wisconsin are ground-nesters, with the remaining 30% building tunnels in stumps, twigs, or cavities. To attract ground-nesting bees, you need bare, sandy or loamy soil sites. This is generally easy to come by on a cranberry marsh, as long as you are careful not to plant grass or till all the landscape surrounding your marsh. Tunnel-nesting bees simply require standing dead trees, pithy bushes such as elderberry or sumac, or undisturbed grassy areas. You can also create artificial nesting sites for both ground- and tunnel-nesting bees.

#### "Best Management Practices" publication

In collaboration with the Wisconsin Cranberry Board, we will be putting together a Best Management Practices publication for pollination in cranberry. This will include more details about the previously discussed topics, as well as more diagrams and images. It will be available in a hard copy, and will also be maintained online and updated as further research takes place. Please stay tuned as we will be finishing and providing you with this best management practices resource by summer 2017.

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#### **CRANBERRY FRUIT ROT MANAGEMENT IN 2017**

#### PATRICIA McMANUS

#### Department of Plant Pathology, University of Wisconsin-Madison

Several cranberry marshes had very high levels of fruit rot by the time of harvest in 2016. In some cases, fungal pathogens were involved. The evidence for this is that in our fungicide trials, the best fungicides reduced fruit rot from about 30-60% in the untreated checks to less than 5%. We also were able to grow known pathogens from rotten berry samples. In other cases, standing water was likely the main cause of poor fruit. At most locations, the combination of pathogens and standing water was probably to blame. After bad fruit rot years, growers often wonder if they should intensify their spray programs the following year. My former graduate student, Lindsay Wells-Hansen, and I conducted research in an attempt to answer this question: Is the amount of fruit rot in one year a good predictor of fruit rot in the following year? Our research suggests the answer for Wisconsin growers is "no."

Early in 2013, we marked out plots in multiple beds at two locations in Wisconsin and at the Rutgers University research station in New Jersey. All beds had a history of bad fruit rot. The plot areas were not sprayed with fungicides in 2013, 2014, and 2015. The very same plots were sampled for fruit rot in each of those years. In New Jersey, the amount of fruit rot in two Stevens and three Crimson Queen beds either increased from one year to the next, or was high and stayed high in the absence of fungicide treatment (Fig. 1). In Wisconsin, the amount of fruit rot in GH1 and Stevens beds at two marshes was considerably lower than in New Jersey, and it generally decreased from one year to the next in the absence of fungicides (Fig. 2). This does not mean that the way to get rid of fruit rot is to not spray, but it does suggest that in Wisconsin, bad fruit rot in one year does not necessarily mean a worse problem the following year.

We also looked at the persistence of fruit rot pathogens from one year to the next. At the research station in New Jersey, pathogens that predominated in one year tended to predominate in the following year. In Wisconsin, however, the main pathogens present fluctuated from one year to the next, suggesting again that what happens in one year is not a good predictor of what will happen the following year.

In deciding what to do this year (Fig. 3), if your fungicide spray program worked in 2016, then don't change a thing for 2017. If it did not work, ask yourself if you did everything right in 2016. Did you use a recommended fungicide at the right time at the right rate, and did you have good coverage? Do you store your fungicides properly so that powders stay dry and liquids don't freeze? Have you calibrated the sprayer in recent memory? Are the nozzles functioning? If the answer to any such questions is "no," then take steps to correct these errors rather than doubling up on fungicides in 2017. If you can honestly say that you did everything

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right, then fungi are probably not the main cause of fruit rot. That being the case, it makes no sense to intensify fungicide spraying in 2017. This doesn't mean skipping fungicides altogether if you have a high-value bed with a history of fruit rot, but there is no reason to *increase* use in 2017. Rather, do whatever you can to minimize the time that beds are wet. Correct drainage problems, and irrigate in the morning rather than evening so that vines will dry quickly after you turn off the sprinklers, rather than stay way for many hours.



Figure 1. Percent fruit rot at the cranberry research station in New Jersey.



Figure 2. Percent fruit rot at the cranberry research station in New Jersey.



Figure 3. Steps in deciding whether to intensify spray program in 2017.

#### **OPPORTUNITY TO USE NATIVE NEMATODES FOR CRANBERRY PEST CONTROL**

SHANE FOYE<sup>1,2</sup> and SHAWN STEFFAN<sup>1,2</sup>

<sup>1</sup>Department of Entomology, University of Wisconsin, Madison <sup>2</sup> USDA-ARS, Vegetable Crops Research Unit, Madison WI

The sparganothis fruitworm, *Sparganothis sulfureana* Clemens (Lepidoptera: Tortricidae), the cranberry fruitworm, *Acrobasis vaccinii* Riley (Lepidoptera: Pyralidae), and the redheaded flea beetle, *Systena frontalis* Fabricius (Coleoptera: Chrysomelidae) are common insect pests of cranberries in central Wisconsin. Currently, growers spray various pesticides to control these pests, so a biological control option for these insects might be helpful (van Zoeren and Steffan 2015). One reason why a biological control option for these pests could assist cranberry growers is that biological control agents can be less harmful to insect predators than pesticides (Lynch and Thomas 2000). Currently, there are no successful, commercially available biological control agents for any of these pests.

One historically successful biological control tactic is the use of entomopathogenic nematodes (EPN). These small, translucent roundworms invade insect hosts in order to complete their life cycles, killing the host in the process (Kaya and Gaugler 1993). In Washington state, EPN were equivalent to pesticides in terms of their abilities to reduce populations the black vine weevil *Otiorhynchus sulcatus* F. (Coleoptera: Curculionidae) (Booth et al. 2002). Although generic EPN products have been evaluated for flea beetle control in Wisconsin, reliable results were not found (Bozak et al 2013). This is attributable to the fact that almost all nematodes are superior at finding certain insect species than others, so a "one-size-fits-all" approach for pest control is unlikely to work in the unique cropping system of cranberries. This is the exact reason we confined our search for bio-control candidates to the acidic, cold marshlands of Wisconsin.

It is possible that generic EPNs haven't been efficacious in Wisconsin because these commercial EPN strains cannot survive the harsh environment of central Wisconsin. Some evidence suggests EPN species differ in terms of cold tolerance (Shapiro-Ilan et al 2014) and pH tolerance (Kanga et al 2012). These differences are relevant to cranberry biocontrol programs, because of Wisconsin's relatively cold temperatures, and because cranberry growers acidify their marshes to inhibit weed growth (Caruso and Ramsdell 1995). Furthermore, efforts to control cranberry girdler *Chrysoteuchia topiaria* Zeller (Lepidoptera: Pyralidae) with EPN have revealed that different EPN species are more or less effective against different hosts (Simard et al 2002). It is likely that commercial EPN species are poorly suited to killing Wisconsin's specific pests.

In an effort to find an EPN species that is well-suited to Wisconsin, and capable of killing the native pests, we sampled various wild cranberry marshes in central Wisconsin. Sampling took place throughout the summer of 2015, and resulted in the recovery of three types of nematodes from the same species in the group known as the Oscheius nematodes isolates of the *Oscheius*. Previous work has shown that they are capable of killing sparganothis fruitworms and cranberry fruitworms in laboratory settings, but as of 2016, it was unclear as to whether or not they could control flea beetles. Therefore, in the summer of 2016, an experiment was conducted to see if these nematodes could suppress redheaded flea beetles in sods collected from cranberry marshes.

In the early weeks of April 2016, 40 one-square-foot sods were collected from a commercial marsh in central Wisconsin. These sods were randomly divided into four groups of ten sods each. One group was treated with Belay WSG <sup>®</sup>, another group received Diazinon AG 600<sup>®</sup>, a third group was treated with a combination of all three nematode isolates, and just water was applied to the last group

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(n=10 sods each. The EPN treatment consisted of 90,000 infective juveniles per sod, a density typical of most temperate soils. Applications were made when sods were approximately at mid-bloom, which occurred in June. Belay was applied at 12 fl oz/acre, Diazinon was applied at 51 fl oz/acre, and the EPN treatment was 90,000 IJ's per sod. All treatments were applied using watering cans. Treatments were delivered in 400ml of water per sod, and watered in with an additional liter per sod.

All treatments resulted in significantly lower adult flea beetle emergences, compared to the control (Figure 1). The sods in the Belay  $^{\circ}$  treatment had on average 96.7% fewer flea beetles than the sods of the control treatment (x = 1.7 flea beetles  $\pm$  0.97, Figure 1). The sods in the Diazinon  $^{\circ}$  treatment saw the second lowest number of flea beetles per sod, followed by the sods treated with EPN (x= 3.3  $\pm$  1.00 and 5.8  $\pm$  2.4 SE respectively). We found no significant differences between EPNs, Diazinon, or Belay.

In addition to the potential insect control benefits of the native EPNs, there are possible fungicidal properties associated with one of our nematode species. Specifically, a bacterial species of the *Stenotrophomonas* genus was isolated from within this nematode. Previous research has shown that this bacterium can produce antifungal compounds, so in the summer of 2016, infected cranberry tissues were collected from a commercial operation and cultured in the Currie Laboratory, Dept. of Bacteriology, at the University of Wisconsin-Madison. Once the fungi were cultivated, they were grown on a nutrient gel along with the bacterial species, to see if the fungal growth would be suppressed by the bacterial cells. According to the qualitative results of this initial bioassay, there appears to be substantial reduction in fungal growth, due to some unknown substance produced by the bacterial cells (Figure 2).

Considering that the nematodes recovered from central Wisconsin can suppress multiple relevant cranberry pests, and the nematode possesses a bacterial symbiont that can suppress fungal growth, we think that the nematode has a high potential for use as a biological control agent on multiple fronts. Our lab is considering different mass production mechanisms, to provide growers with suitable supplies of these nematodes. Furthermore, we will need to better understand the distribution of flea beetles in the beds, because if these insects form predictable clumps in the marsh, we may not have to treat the entire surface area of the bed, and thus we can focus our treatments on "hotspots." This information would help growers that use either pesticides or nematode applications. We are also considering a future study aimed at better understanding the chemicals produced by the bacterial symbiont of the nematodes.

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Figure 1. Average number of adult flea beetles that emerged from cranberry sods that were treated with either water (control), a nematode species (*Oscheius wisconsini*), Diazinon, or Belay. Different letters denote statistically significant differences between the averages, and brackets denote standard error.

#### First set of trays

Second set of trays



Third set of trays



Figure 2. The top left set of trays shows bacterial cells cultured from the nematode. The second set of trays shows fungal colonies collected from cranberry plants. The third set of trays shows bacterial and fungal cells growing in the same plates, with bacteria on the left side of each plate, and fungi on the right. Note how the fungi are confined to their half of each plate, and that there are blank "buffer zones" between the bacterial and fungal colonies. This indicates that the bacteria are inhibiting the growth of the fungi, preventing them from occupying the whole plate, as they did in the absence of bacteria.

#### **GENETICS AND GENOMICS SUMMARY**

#### JUAN ZALAPA

#### USDA-ARS, Vegetable Crops Research Unit, Madison WI.

We have completed our cranberry molecular mapping efforts and have now developed three fully saturated SSR and SNP maps for three crosses (MQxCQ, MQxST, and GRYG). We also generated an integrated consensus high-density cranberry map based on the three populations. Our work represents the most advanced and sophisticated molecular mapping effort ever performed in the entire Ericaceae family, which includes cranberries, blueberries, and lingonberries, and has brought cranberry to the forefront of genomic research in fruit crop species leading to the future deployment of molecular breeding strategies.

To better understand the genetic architecture and structure of traits and gain essential information for molecular breeding, we have been collecting cranberry trait data for several years. Thus, we have started to map yield and quality traits in our molecular maps to discover universal genes that can be used during molecular breeding across genetic backgrounds. We are particularly interested in finding and characterizing genes with minimal genetic x environmental interactions to allow the development of cranberry cultivars with consistent superior performance across different growing areas under changing environmental conditions. I will present a summary of the molecular resources we have developed to date, including the finished molecular maps, as well as a list of traits collected to date, and current efforts in trait mapping.

The study of trait performance and trait estimation is critical to develop trait prediction models. However, trait data collection is difficult and time consuming mostly due to the perennial and biennial bearing nature of cranberry and the effects of environmental fluctuations across marshes, both locally and nationally, and across years, over the short- and long-term. In the near future, we will continue to make our priority to collect and utilize trait to produce fundamental knowledge and develop new and efficient breeding strategies. For example, we have been working on developing technology to facilitate the collection of trait data. Thus, we recently released a software called GiNA, which uses simple cranberry pictures to perform detailed trait statistical analysis to help us collect data more efficiently. The software has generated interest from Ocean Spray to collect data at their receiving stations. We anticipate collecting trait data from the existing mapping populations for the next 5-10 years while concurrently integrating the derived trait data, molecular data, and breeding program efforts. Regarding the breeding program, we have started testing of a high-density nursery for high-throughput phenotypic selection and breeding augmented by genetic and trait molecular information.

#### UPDATE ON MATING DISRUPTION IN CRANBERRIES: THE STORY OF SPLAT®

ELISSA CHASEN<sup>1, 2</sup> and SHAWN STEFFAN<sup>1, 2</sup>

<sup>1</sup>Department of Entomology, University of Wisconsin, Madison <sup>2</sup> USDA-ARS, Vegetable Crops Research Unit, Madison WI

#### Take-home points:

- Mating disruption has the potential to be an effective pest management tool for Wisconsin cranberries.
- In 2016, SPLAT<sup>®</sup> deployment was mechanized with the use of Unmanned Aerial Vehicle (UAV).
- In the near future, mechanization efforts will focus on boom application.

Since 2012, the USDA Cranberry Entomology Lab has been developing a mating disruption (MD) program for cranberry production. MD programs work by emitting synthetic female sex pheromones into the air, making it difficult for males and females to find each other and mate (Minks and Cardé 1988, Cardé and Minks 1995, Sanders 1997). This prevents fertilization of eggs and thereby prevents larvae from hatching. Ultimately, a successful MD program should be able to cost-effectively replace 1-to-several insecticide applications.

Mating disruption in Wisconsin cranberry production is particularly promising because flight initiation of the three most important moth pests – cranberry fruitworm (CFW), sparganothis fruitworm (SFW) and blackheaded fireworm (BHFW) - are well correlated in time (Steffan et al. *in press*). Additionally, the chemical composition of the pheromones for each of these species has been determined and is already mass-produced in laboratories to create insect lures. This means that a single application could be used to prevent mating of all three species of pests.

Two challenges in MD programs are 1) being able to deploy a pheromone carrier at a high enough point-source density that the authentic female pheromone plumes are masked, and 2) finding a material that will continue to release pheromone throughout the duration of the adult moth flight. These are necessary challenges to overcome in order to ensure that the female pheromone is "masked" throughout flight, thus preventing the next generation of fruit-destroying caterpillars.

We have resolved these issues by working with SPLAT<sup>®</sup> (ISCA Technologies, Riverside, CA), a novel wax and oil blend, as the carrier. Our research shows that one dollop of SPLAT releases the pheromone slowly over the duration of all three moth flights. Additionally, this material has been shown to be successful when manually deployed (Deutsch et al. 2013). Our preliminary work in 2012 determined an appropriate point-source density that was able to disrupt moth mating. At this time, we were deploying SPLAT using hand-held caulking tubes (Deutsch et al. 2013).

One way to measure the efficacy of MD is by monitoring pheromone-baited traps: if MD is successful, fewer moths will be found in the traps because the pheromone plume from the trap will be

"masked", just as the pheromone plume from the adult female would be. Results from this first year were promising, but not as drastic or consistent across marshes as we would have liked.

In 2013, our application technology improved from caulking guns to grease guns (Deutsch et al. 2014). By looking at 2012 and 2013 data together, we were able to determine that our MD program successfully disrupted BHFW moths from finding each other. Our 2013 data also showed very promising results for CFW disruption. But yet, SFW disruption still eluded us.

This propelled us into our 2014 decision to drop SFW from the 3-species MD blend (for that season) and increase the concentration of CFW pheromone. Data from 2014 demonstrate significant disruption for CFW is possible with the proper pheromone concentrations (Fig. 1) and that we continued to disrupt BHFW mating with high efficacy (Fig. 2). Most importantly, we also showed a decrease in damaged berries, sampled over three weeks, in beds that were treated with MD (Fig. 3).



**Figure 1**. Adult male cranberry fireworm (*A. vaccinii*) (mean  $\pm$  1 SE) caught in pheromone traps in 2014. Trap-catch in Control (solid line) and SPLAT<sup>®</sup>-treated (broken line) beds was compared over time.



**Figure 2**. Adult male blackheaded fireworm (*R. naevana*) (mean  $\pm$  1 SE) caught in pheromone traps in 2014. Trapcatch in Control (solid line) and SPLAT<sup>®</sup>-treated beds (broken line) was compared over time.

Our latest advancements in the cranberry MD program: in the 2016 field season, we successfully applied SPLAT to several acres of commercial cranberry beds via unmanned aerial vehicles (UAV). We have mechanized the deployment of SPLAT using electronic actuators to push the material through the tubes at known geographic intervals (Fig. 4). The UAV was piloted successfully over the cranberry beds using a direct GPS link and pre-programed flight itinerary.





**Figure 4.** SPLAT deployment mechanized with a UAV in the summer of 2016.

**Figure 3**. Damaged cranberries collected per time effort (mean  $\pm$  1 SE) for control and SPLAT<sup>®</sup>-treated beds over three different sample dates in 2014. Time steps are one week apart.

In order to continue refining this system, we will be retrofitting standard boom systems to apply SPLAT over commercial acreage. The SPLAT blend for 2017 will include pheromones for CFW, BHFW, and SFW.

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#### **CRANBERRY FRUITWORM DEGREE-DAY MODEL**

ELISSA CHASEN<sup>1, 2</sup> and SHAWN STEFFAN<sup>1, 2</sup> <sup>1</sup>Department of Entomology, University of Wisconsin, Madison <sup>2</sup> USDA-ARS, Vegetable Crops Research Unit, Madison WI

#### Take home points:

- Degree-day models can help growers to more precisely time pest control tactics by accurately predicting pest life-stages.
- We have determined the upper and lower developmental temperature thresholds needed to calculate degree-day accruals for the most significant pest of cranberries in Wisconsin, the cranberry fruitworm.
- We are making progress towards the completion of a cranberry fruitworm degree-day model by correlating degree-days with cranberry fruitworm flight phenology.

Background. Degree-days (DDs) are a measure of time and temperature; they are calculated based on daily high and low temperature, along with species-specific developmental temperature thresholds, and provide a running total of temperature-modified "time," as the insect experiences it (Pruess 1983, Moore and Remais 2014). Degree-day models, then, take advantage of the temperature-mediated development of insects by linking ambient temperature to their development, making these models valuable tools in integrated pest management. Degree-day models help to anticipate the timing of the first moth flight, which provides a target date for trap deployment. Degree-days also let pest managers know when peak emergence is occurring in real-time, as opposed to guessing at the peak after it has already passed. At the most fundamental level, DD accumulations serve as flags for the different life stages through which any pest must pass (Legg 2004). In this way, these DD models sharpen the existing IPM toolbox by increasing management efficacy, helping to ensure that management efforts (i.e., sampling, biological control releases, insecticide applications) occur within the time frame in which pest presence is predicted (Welch et al. 1978). The ability to predict when discrete life stages will be present is particularly useful for pest management because specific treatments often target specific life stages of an insect pest (e.g., ovicides target eggs).

#### Cranberry fruitworm developmental thresholds.

In the summer of 2015, we completed the first step in the creation of a cranberry fruitworm degree-day model: determining the upper and lower developmental temperature thresholds (Chasen and Steffan 2016).

<u>Methods</u>. Cranberry fruitworm larvae were collected from commercial cranberry marshes in central Wisconsin. Once the larvae were brought back to the laboratory, each individual was weighed and placed into cranberry fruits (Figs. 1 and 2). Each fruit containing larva was placed into a controlled environmental chamber. Experimental set up consisted of eight temperatures and 10 larvae (replicates) per temperature. Larvae were re-weighed every couple of days to monitor growth, and cranberry fruits were replaced at each weighing interval.

<u>Results</u>. Growth rates were significantly affected by temperature (Fig. 3). By fitting a polynomial equation to the growth rates by temperature, we were able to calculate the upper and lower

developmental thresholds (points on the model fit where slope = 0). The lower and upper thresholds are  $6.6^{\circ}$ C and  $30.3^{\circ}$ C (44°F and 87°F).

<u>Discussion</u>. These results allow us to calculate degree-day accrual specific to cranberry fruitworm development (Chasen and Steffan 2016). We have created a degree-day lookup table to help with daily calculations (Fig 4). We have begun to correlate life-history events with these degree-day accruals. In 2016, we monitored CFW flight at five marshes in central WI. Their flight phenology is shown in figure 5.



Figure 1. (A) Cranberry fruit, cut open to create access to the inner chamber for a CFW larva. (B) CFW larva within a cranberry.



Figure 2. Diagram of experimental set-up for each larvae. The upright, with leaves and fruit containing larva (A) are held in place with a cotton swab (C). The upright, fruit and larva are contained in individual chambers constructed of clear acrylic tubes (B) and placed in a flower pick filled with water (D).



**Figure 3.** Larval growth rates at each temperature treatment. Points on the line where the slope = 0 indicate developmental thresholds (lower threshold,  $6.6^{\circ}$ C and upper threshold  $30.3^{\circ}$ C).



		15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63	66	69	72	75	78	81	84
	44	0	0	0	0	0	0	0	0	0	0														
	47	0	0	0	0	1	1	1	1	1	1	2													
	50	1	1	1	1	1	1	2	2	2	2	4	5												
	53	2	2	2	2	2	2	3	3	3	4	5	7	8											
	56	3	3	3	3	3	4	4	4	5	5	7	8	10	11										
e	59 62	4	4	4	4	5	5	5	7	8	/	8 10	10	11	13	14	17								
tur	65	6	6	7	7	7	7	8	8	9	10	11	13	14	16	17	19	20							
era.	68	7	7	8	8	8	9	9	10	10	11	13	14	16	17	19	20	22	23						
эdс	71	8	9	9	9	10	10	11	11	12	13	14	16	17	19	20	22	23	25	26					
Gen	74	10	10	10	11	11	11	12	13	13	14	16	17	19	20	22	23	25	26	28	29				
Ē	77	11	11	12	12	12	13	13	14	15	16	17	19	20	22	23	25	26	28	29	31	32			
nu	80	12	12	13	13	14	14	15	15	16	17	19	20	22	23	25	26	28	29	31	32	34	35		
ž	83	13	14	14	15	15	16	16	17	18	19	20	22	23	25	26	28	29	31	32	34	35	37	38	
Š	86	15	15	16	16	16	17	18	18	19	20	22	23	25	26	28	29	31	32	34	35	37	38	40	41
	89	16	16	17	1/	18	18	19	20	20	21	23	24	26	27	29	30	32	33	34	36	37	39	39	41
	95	10	17	17	18	18	19	20	20	21	22	23	25	26	27	29	30	32	33	34	35	37	38	38	39
	98	17	17	17	18	18	19	20	20	21	22	23	25	26	27	29	30	31	32	33	35	36	37	37	38
	101	17	17	17	18	18	19	19	20	21	22	23	24	26	27	28	29	30	32	33	34	35	36	36	36
	104	16	17	17	18	18	19	19	20	21	21	23	24	25	26	27	29	30	31	32	33	34	34	35	35
	107	16	16	17	17	18	18	19	19	20	21	22	23	24	26	27	28	29	30	31	32	32	33	33	34

#### Minimum temperature

**Figure 4.** Degree-day lookup table for cranberry fruitworm (lower threshold 44°F, upper threshold 87°F, double sine wave and intermediate cutoff). To determine degree-day accumulation, find the intersecting box for the daily high and daily low temperature. Keep a running total to monitor degree-day accumulation and correlate it with cranberry fruitworm phenology throughout the growing season.



**Figure 5.** CFW flight phenology correlated with CFW degree-days. Horizontal dotted lines represent flight initiation (lower line) and peak flight (upper line, at percent flight = 50). Vertical dotted lines represent the degree-day accruals at each of these benchmarks. Flight data from 2016 show that flight initiation occurs at ~960 DD and peak flight occurs at ~1,540 DD.

By comparing the percent of flight with degree-day accumulation from 2016, we see that flight begins at ~960 DD and that peak flight (when 50% of moths have flown) occurs at ~1,540 DD. Peak flight is an especially important indicator that can help managers assess the damage potential of current year pest population. For example, if the degree-days associated with peak flight have accumulated and very few moths have been counted, it may not be warranted to make an insecticide application for this pest because other factors have suppressed their population.

One important consideration regarding this phenology model is that it is currently based on only one year of data. Before recommending the use of this model for pest management decisions, we intend to validate it through future studies. Additionally, other life-history benchmarks that will be important to consider, such as time for egg-laying and time for larval emergence, have yet to be determined. We are working on determining these degree-day correlations in the laboratory.

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#### **CRANBERRY SCREENING PROGRAM – REVIEW OF 2016 FIELD TRIAL PERFORMANCE**

JACK PERRY<sup>1</sup>, JED COLQUHOUN<sup>1</sup>, PATRICIA McMANUS<sup>2</sup>, and CHRISTELLE GUÉDOT<sup>3</sup>

<sup>1</sup>Department of Horticulture, <sup>2</sup>Department of Plant Pathology, <sup>3</sup>Department of Entomology

University of Wisconsin-Madison

#### **Fungicides & Diseases**

<u>2016 Disease Status</u> - disease pressure was generally intense across the Wisconsin cranberry productions area

- Proline and Abound + Indar seems to be the industry standards
- 2016 field trials 8 Locations: 3 trials for fruit rot, 3 trials for early rot, 2 trials for cottonball.
- Proline, Abound + Indar, Abound, Evito and Bravo provided good control of both fruit rot and early rot.
- Tilt/Orbit, Proline, Abound + Indar, Indar and Evito provided good control of cottonball
- Although Regalia and Tavano/Oso generally suppressed fruit rots and cottonball compared to the untreated checks, but they did not perform as well as the top tier of fungicides. They are approved for organic cranberry production.

#### New Fungicides for 2017

**Quilt Xcel 2.2L** is a Syngenta package mix of Abound & Tilt/Orbit; tested at 22 oz/acre = \$30/acre. **Kenja 3.3SC** is a Summit Agro USA product; tested at 15.5 oz/acre; did not provide acceptable control of fruit rots or cottonball

<u>Reducing the Number of Fungicide Applications</u>: To reduce production costs there has been an interest in reducing the number of or eliminating all fungicide applications. Two applications of fungicides/season have been the standard recommendation. To investigate, 2 applications vs 1 application vs 0 applications of each Bravo, Abound + Indar, Proline and Regalia were tested. Four fruit rot trials each with heavy disease pressure were conducted. In these trials, two applications of Bravo, Proline, Abound + Indar provide good disease control; a single application of these products did not provide adequate disease control. Two applications of Regalia provided suppressed fruit rot; a single application of Regalia was inadequate.

Two decision factors may be considered in determining the need for the number of fungicide applications for a season: 1) if April and/or May are excessively wet from precipitation or frost protection irrigation there may be an increased potential for diseases 2) if the bed has a chronic history of disease. The recommendation for best control is for two applications. Two applications allow for some latitude in timing and cover an extended infection period. One application is risky and precise timing of the application is critical. No fungicide application is not recommended.

#### **Insecticides and Bugs**

<u>2016 Insect Review</u> – The insect pressure in 2016 was generally moderate, requiring control measures in most cases. Fruitworms were present and required control measures. Fireworms were isolated problems and tipworms were scarce. Flea beetles continue to receive considerable concern from growers and crop consultants and were a major problem in 2016.

In 2016, 17 insecticide trials were conducted to evaluate registered and candidate insecticides for control of fruitworms, fireworms, tipworms, spanworms, flea beetles and leafhoppers. Insecticides

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evaluated in the 2016 trials were Altacor, Assail, Belay, Delegate, Diazinon, Imidan, Intrepid, Confirm, Lorsban, Rimon, Cormoran, Venerate, Grandevo, and 5 experimental insecticides. Registered products performed as expected. Altacor was highly effective for the control of most insects evaluated. Most of the worm-specific products, including Intrepid, Delegate, and Confirm were efficacious for the control of fruitworms, blackheaded fireworms and loopers. Venerate and Grandevo provided commercially acceptable insect control. Control of late season flea beetles is a challenge as control measures may be required relatively close to harvest - this precludes the use of several efficacious products that have longer pre-harvest intervals.

#### New Insecticides

*Cormoran 1.5 SC* is a package mix of Rimon (novaluron) and Assail (acetamiprid) from ADAMA. The cranberry use rate is 12 fl.oz./acre and the label impressively lists 22 insect pests as controlled.

**Candidate Products:** Five candidate insecticides were evaluated in 2016. Four had good activity on several of Wisconsin insect pests. Three of these are in-progress for registration.

<u>Flea Beetles</u> – Flea beetle has become more and more of a cranberry pest in recent years, probably due to the decreased use of organophosphate insecticides that incidentally controlled it in the past. Flea beetles are relatively easy to control although multiple insecticide applications may be required. Insecticides that effectively control flea beetles and are registered for use on cranberries are Actara, Assail, Belay, Lorsban, Cormoran, Diazinon, Imidan, Altacor, Sevin, Orthene, Venom and Delegate.

	Tip Worm	Fruit	Sparg	Span Worm	Fire	Flea	Leaf Honner	Bee Toxicity
A   +		wonn		vvoiiii	wonn	Deetle	порреі	TOXICITY
Altacor	+	+++	+++	+++	++	++	+	
Assail	+	++	++	++	++	+++	++	ххх
Belay	+	++	++	++	++	+++	++	ххх
Closer	-	+	+	+	+	+++	+++	x
Confirm		+++	+++	+++	++			
Delegate	+	+++	+++	+++	++			xx
Diazinon	+	+	+	++	+	+++	+++	ххх
Grandevo		++	++	+++	++			
Imidan		+	+	+	+	+++	+++	ххх
Intrepid		+++	+++	+++	+++			
Knack		++	+	+++	+			
Lorsban	+	+	+	+	+	+++	+++	ххх
Rimon	+	++	++	+++	+	+	-	x
Venom						+++	+++	XXX

#### **Registered Cranberry Insecticides – What Works for What**

+++ >80% control, ++ 70-80% control, 60-70% control; x = bee toxicity

#### Weeds and Herbicides

The objectives of the 2016 herbicide trials were to 1) seek control for weeds that escape our current herbicide programs and 2) integrate pre-emergent and post-emergent herbicides. <u>Escapes.</u> Weeds that are not being controlled by our current herbicide programs include maples, willows, popples, oaks, dewberry, northern St. Johnswort, leatherleaf, poison ivy and mosses. Mesotrione (Callisto and other registered trade names) will not control willows, popples, and oaks and only temporarily injures maples but does not kill them. Glyphosate in a wiper application worked fairly well in most cases for these woody species but the kill was slow. The new supplemental label for Weedar 64 (2,4-D) in a wiper application, similar to what was available in the past, will help control several of these escapes when used in an integrated program with other herbicides. Data from our recent wiper studies was used to justify the return of this product to the cranberry market.

Sphagnum moss is not a new pest in cranberries, but seems to be spreading among marshes. With that in mind, we initiated a research program this season to investigate potential control options. One experimental herbicide in particular looks promising and will be evaluated further. This herbicide may also aid in residual control of other cranberry weeds and broadleaves in particular. We're also working with the federal IR-4 minor crops pesticide registration program to move this experimental herbicide toward registration and will have multiple IR-4 study locations in 2017 to accelerate this process. It should be noted, however, that these solutions are not silver bullets; in many cases, moss will regrow and spread until drainage is improved and soil moisture is optimized.

<u>New Herbicides</u>. Herbicide development has slowed with the introduction of herbicide-resistant agronomic crops, but with that said there are three candidate products pending cranberry registrations. We will continue to evaluate and refine these potential options.

<u>Generic Callisto.</u> In 2016, five generic formulations of mesotrione (Callisto) became available. Those are Bellum (Rotam North America), Explorer (Syngenta), Incinerate (Winfield Solutions), Sotrion (Growmark) and Willowood Mesotrione 4SC (Willowood). In field evaluations there weren't weed control or crop tolerance differences observed among the generic products and Callisto.

#### **Future for Cranberry Pesticides**

Currently there are three new insecticides, three new herbicides and five new fungicides in the pesticide registration processes.

Some products in our pesticide arsenal are at risk:

· · ·	
Bravo	Export residues
Evito	Export residues
Proline	Export residues
QuinStar	Export residues
Belay	Threat to bees
Assail	Threat to bees
Lorsban / Organophosphate Insecticides (OPs)	Threat to the environment
	Export residues

<u>Always remember to:</u> 1) Read and follow the pesticide label and 2) check with your handler(s) for approval to use pesticides.

#### **2017 CRANBERRY SCHOOL GROWER SURVEY RESULTS**

<sup>1</sup>AMAYA ATUCHA and <sup>2</sup>MATT LIPPERT

<sup>1</sup>Department of Horticulture, University of Wisconsin, Madison <sup>2</sup>University of Wisconsin-Extension, Wood County, Wisconsin Rapids

Results of the live survey of growers present in the room at the 2017 Cranberry School are presented below. The survey was conducted using Turning Point 5 (Turning Technologies, LLC) software and clicker hardware. Growers were provided with clickers to allow for live anonymous responses to be collected. Questions were displayed on screens and respondents were allowed to select answers. After all responses were collected, the polling was closed, and the results of the survey were displayed on the screens. The "count" column indicates the number of growers that responded and the "percent" column indicates the % of respondents. Thank you for participating!

#### 1) Production practices among my fellow growers and me differ most in:

		Responses		
		(percent)	(count)	
Frost Protection		9%	5	
Irrigation		33%	19	
Nutrient Management		43%	25	
Pest control		10%	6	
Other		5%	3	
	Totals	100%	58	

#### 2) Most of my decisions of fertility and nutrient management in new hybrid varieties come from?

		Respo	nses
		(percent)	(count)
Experience & history		10%	6
Tissue test results		3%	2
Visual assessment of my vines		21%	12
b & c		45%	26
I'm still experimenting		21%	12
	Totals	100%	58

#### 3) Did you apply nitrogen before bloom in 2016?

		Respo	nses
		(percent)	(count)
Yes		48%	29
No		52%	32
	Totals	100%	61

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#### 4) Will you apply Nitrogen before bloom in 2017?

		Responses		
		(percent)	(count)	
Yes		37%	22	
No		63%	37	
	Totals	100%	59	

#### 5) Do you apply K before bloom?

		Respo	nses
		(percent)	(count)
Yes		57%	35
No		43%	26
	Totals	100%	61

#### 6) Do you apply fertilizer after harvest?

		Responses		
		(percent)	(count)	
Yes, Nitrogen		2%	1	
Yes, Potassium		3%	2	
Yes, both N & K		3%	2	
No		92%	57	
	Totals	100%	62	

#### 7) How much Potassium fertilizer (K2O lb./ac.) do you apply, on average, each year?

		Responses		
		(percent)	(count)	
20-50 K2O lb./ac.		15%	9	
51-75		18%	11	
76-100		15%	9	
101-150		34%	21	
>150		19%	12	
	Totals	100%	62	

#### 8) Decisions of rates and timing of K fertilizer are based on \_\_\_\_?

		Respo	nses
		(percent)	(count)
Experience ( based on previous years)		29%	18
Tissue test result		6%	4
Visual assessment of my vines		17%	11
b & c		43%	27
I'm still experimenting		5%	3
	Totals	100%	63

#### 9) Do you apply K fertilizer even when tissue test results are in the normal to high range?

		Responses	
		(percent)	(count)
Yes		81%	51
No		19%	12
	Totals	100%	63

#### 10) When do you apply most of your Potassium fertilizer?

		Responses	
		(percent)	(count)
Spring, before bud break to help crunchy vines		5%	3
Growing season, after bud break		42%	26
After fruit set		53%	33
Fall, to help with cold hardiness		0%	0
	Totals	100%	62

#### 11) Do you apply K fertilizer in Spring and Fall to help with crunchy vines and cold hardiness?

		Responses	
		(percent)	(count)
Yes		15%	9
No		85%	53
	Totals	100%	62

#### 12) What do you think is the most important factor affecting fruit firmness?

		Responses	
		(percent)	(count)
Variety		30%	18
Fertilization		10%	6
Environmental factors (i.e., rain, heat)		55%	33
Irrigation		5%	3
None of the above		0%	0
	Totals	100%	60

#### 13) In the past 2-3 years, what has been the trend in fungicide use on your marsh?

		Responses	
		(percent)	(count)
Increased		29%	18
Decreased		10%	6
Stayed about the same		34%	21
We haven't used fungicides in the past 2-3 years		27%	17
	Totals	100%	62

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#### 14) In the past 2-3 years, what has been the trend in use of chlorothalonil (Bravo, Echo, Equus, Daconil) fungicide on your marsh?

		Responses	
		(percent)	(count)
Increased		3%	2
Decreased		30%	18
Stayed the same		13%	8
We haven't used chlorothalonil in the past 2-3 years		53%	32
	Totals	100%	60

#### 15) I feel confident that I can identify berry scarring associated with viruses.

		Responses	
		(percent)	(count)
Yes		42%	27
No		58%	37
	Totals	100%	64

#### 16) In general, what time of day do you apply fungicide?

		Responses	
		(percent)	(count)
Whenever it's convenient- my time is limited		13%	7
Early morning		75%	42
Mid-day		0%	0
Evening/night		13%	7
	Totals	100%	56

#### 17) Do you irrigate for evaporative cooling purposes?

		Responses	
		(percent)	(count)
Yes		46%	30
Never		54%	35
	Totals	100%	65

#### 18) If you utilize evaporative cooling, at what temperature (ambient) do you begin irrigating?

		Responses	
		(percent)	(count)
< 90oF.		3%	1
90-92oF.		23%	8
93-95oF.		11%	4
> 95oF.		40%	14
Not sure.		23%	8
	Totals	100%	35

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#### 19) If evaporative cooling, for what length of time do you irrigate on average?

		Responses	
		(percent)	(count)
< 20 minutes		24%	8
20-30 minutes		24%	8
31 minutes to 1 hour		36%	12
> 1 hour		12%	4
Not timed –I run until the air temperature decreases		3%	1
	Totals	100%	33

#### 20) Is moss a problem on your marsh?

		Responses	
		(percent)	(count)
No, I don't have any		20%	12
I have some, but a minor problem		75%	46
I have a lot, and it's become a major problem		5%	3
	Totals	100%	61

#### 21) Is Northern St. Johnswort a problem on your marsh?

		Responses	
		(percent)	(count)
No, I don't have any		17%	11
I have some, but a minor problem		63%	40
I have a lot, and it's become a major concern		20%	13
	Totals	100%	64

#### 22) Are late season weeds, such as dewberry, problematic on your marsh?

		Responses	
		(percent)	(count)
No, I don't have any		13%	8
I have some, but a minor problem		61%	39
I have a lot, and it's become a major problem		27%	17
	Totals	100%	64

#### 23) Do you use Stinger on your cranberries?

		Responses	
		(percent)	(count)
No, not at all		46%	29
Yes, every year		32%	20
Yes, every 2-3 years		14%	9
Yes, but not more than once every 4 years		8%	5
	Totals	100%	63

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# **2016 ANNUAL REPORT** WISCONSIN STATE CRANBERRY GROWERS ASSOCIATION

# WISCONSIN STATE CRANBERRY GROWERS - Association



## **ANNUAL MEETING**

### January 18, 2017

#### Agenda

1:00 PM Call to Order

Minutes from the 2016 Summer Meeting

• John Stauner, Secretary

**Election of Directors** 

• Steven Bartling, Chair - Nominating Committee

Report of the President

Tom Gardner

Report of the Executive Director

Tom Lochner

Special Presentations:

WSCGA Public Policy Program Strategies, Tactics and Action

• Ron Kuehn, Legislative Counsel, DeWitt Ross and Stevens

WSCGA Communications Programs – Setting the Stage for a Positive Image for Cranberry Growing in Wisconsin

Kathryn Whitlock, Laughlin Constable

Report of Committees

Other Business

2:30 PM Adjourn



#### WSCGA Summer Meeting Minutes – August 10, 2016

#### Brockway Cranberry Black River Falls, WI

The 2016 Wisconsin State Cranberry Growers Association Summer Meeting was called to order by President Tom Gardner on Wednesday - August 10, 2016 at 1:30 PM at Brockway Cranberry Inc. in Black River Falls, Wisconsin. Tom Gardner welcomed the growers in attendance, and thanked the host marsh staff and WSCGA staff, including Tom Lochner, Alex Skawinski, Crystal Johnston, and Tod Planer for coordinating the Summer Field Day event, along with the WSCGA Education Committee members. A recognition plaque was then presented to Jim Bible, owner of Brockway Cranberry, Inc., for hosting this year's Field Day event.

**Royalty** - The Cranberry Festival Royalty group from Warrens, WI was introduced by Tom Gardner. Members introduced themselves and shared information about the upcoming Warrens CranFest. Members included:

- Princess Ellie Eswein
- Princess Cassie Carney
- Queen Alison Krultz

**Secretary's Report –** Tom Gardner referred to the 2016 Winter Meeting Minutes printed on pages 50-51 in the Summer Field Day Meeting Program Book. David Amundson moved and Karl Pippenger seconded a motion to waive reading of the January 20, 2016 Meeting minutes and to approve minutes as printed. Motion carried.

**WSCGA Board Members** – Tom Gardner introduced to the audience each member of the WSCGA – Board of Directors, including:

- Tyler Walker, Vice President
- Steven Bartling - Nicole Hansen
- John Stauner, Secretary
  Karl Pippenger, Treasurer
- Mark Mahonev
- David Amundson Carl Salzwedel

**Special Guests –** Tom Gardner introduced special guests attending the event and in the audience, including:

- Mary Ann Lippert, Wisconsin Dept. of Administration
- Nancy VanderMeer, Legislator
- Patrick Tessman, candidate for State Senate
- Dan Baumann, Wisconsin Dept. of Natural Resources
- Terry Humfeld, Cranberry Institute
- Michelle Hogan, Cranberry Marketing Committee

**Cranberry Marketing Committee (CMC) Report** – Michelle Hogan, Executive Director of the CMC, provided an update on 2016 crop projections, international sales, carry over, domestic sales, USDA purchases, international and domestic market promotion efforts, and the clinical study in China.

**Legislative Counsel Report** – Ron Ragatz of DeWitt Ross & Stevens, provided background information on the COLA/LCO v DNR lawsuit and information related to possible outcomes of the case. Ragatz stressed the fact that the case will affect cranberry growers on the county, state and nation wide level.



**Marsh Recognition –** Tom Gardner noted that each year at the Field Day event, the WSCGA recognizes milestone marsh anniversaries. President Gardner announced the 25<sup>th</sup> anniversary of CJ Searles Cranberry Co. in Babcock, Lost Lake Cranberry in Manitowish Waters, and Moccasin Creek Cranberry in Wisconsin Rapids. As none of the previous growers were in attendance, recognition plaques will be mailed to them. In recognition of the 125<sup>th</sup> anniversary of the Valley Corporation cranberry marsh in Tomah, Tom Gardner made a plaque presentation to Ed Grygleski.

**Executive Director's Report -** President Gardner invited Tom Lochner to present his Executive Director's report to the members. Lochner thanked Jim Bible and his crew at Brockway Cranberry, the WSCGA Board of Directors, and the WSCGA staff of Alex, Cris and Tod for event planning and support. He expressed his appreciation to the UW Extension faculty, to Matt Lippert, and to the other members of the Education Committee for their leadership and participation in providing the mini-clinics. Lochner also thanked the WSCGA Associate Members who were exhibiting, the on-site vendors and Mocha Mouse catering, the Associate Member Committee, the event volunteers from the Black River Falls FFA and high school football team, and the WSCGA Grower Members in attendance for their support.

Lochner provided a short summary and brief remarks on four primary topics of interest to Wisconsin Growers:

- Legislative Ron Ragatz of DeWitt Ross & Stevens was present to speak to the audience. Lochner stressed that the Association needs support from both Wisconsin and national cranberry growers;
- Promotion Recent sampling efforts have been conducted with Green Bay Packers, State Fair and UW Badgers;
- Research The Cranberry Futures Capitol Campaign continues while WCREF is currently looking at sites for the research facility and is in the process of receiving funds from USDA ARS;
- 4. Special Recognition Tod Planer will be retiring in 2016, after 12 years of serving as project coordinator of the Whole Farm Conservation Program. Lochner recognized the many invaluable contributions Planer has made to the cranberry industry over his 30 years with Wood County Extension and 12 years with WSCGA. A recognition plaque was then presented to Tod Planer for his dedication and years of service to Wisconsin cranberry growers.

#### Old Business - None

#### New Business - None

#### Announcements

- WCREF Sporting Clay Shoot coming up on August 26, 2016
- WSCGA Winter Meeting and Winter Trade Show date is January 18, 2017

**Adjournment** – There being no further business, Tom Gardner entertained a motion to adjourn. David Amundson made a motion to adjourn the meeting. Karl Pippenger seconded the motion. All were in favor and motion carried. The Summer Meeting was adjourned.

Respectfully submitted, Alex Skawinski on behalf of WSCGA Secretary John Stauner



#### President's Message – Tom Gardner

Welcome to the WSCGA 2017 Winter Meeting and Trade Show. This time is a great opportunity to visit with folks from the grower community, share ideas and learn from others, along with supporting the Associate members that are here to showcase their products and services.

Thank you to all who work hard to make this event successful – especially the WSCGA staff, along with the Education Committee and UW Faculty. Thank you for your commitment to the industry; your efforts are greatly appreciated.

As the New Year dawns, we have an opportunity to look at our businesses and what has worked well in the past and perhaps try some new things, some of which you may learn about here. One thing we can count on is the fact that change is ever present. We can choose to react or respond. Hopefully we can respond and be proactive in our approach to the future and our industry. New challenges are always present and working on them together through a strong, effective, unified, cooperative association helps everyone involved. Together we can do more than if we choose to go it alone.

The WSCGA is a solid organization moving forward and working on behalf of the grower community. Your commitment and participation is crucial in making our industry stronger and more resilient when the challenges come our way. Thank you for your participation, effort and support. The staff and leadership of the WSCGA will continue to work hard on your behalf. Have a great meeting!

#### From the Executive Director – Tom Lochner

Annual reports are designed to give members a picture of the organization that they are prepared for and to summarize performance during the preceding year. We try to do that in this document but also to give a bit of a look ahead to what issues we face in the upcoming year.

The year 2016 has been, for your growers association, a successful one. Our financial position is strong. While our revenues from operations were slightly below our budget target, our expenses came in well below what was set in the budget. We ended the year with a positive cash flow from our operations. Revenue from grower dues was above budget, and last year which is a positive sign for the organization.

While there have been some disappointments on regulatory issues such as added sugar there have also been some successes. Part of the challenge that we face is many times when we are successful, no one notices. When a rule change does not negatively impact growers or a law does not pass because of our work, growers don't notice. We have been successful to date avoiding crises or major public policy issues. We do recognize that this could change in an instant so we have to be vigilant and prepared to respond.

A large part of our efforts involves building relationships with policy makers, aligned organizations or members of the media. This is an ongoing, daily activity. Fortunately, we have our members to help build these relationships and tell the cranberry story. We also have the team of grower leaders, communication consultants and Legislative and Legal counsel to act when needed.

No doubt, the future for growers economically is murky. There has been some movement in the numbers related to inventories and sales that are trending the right way but still more needs to be done to increase



demand and more importantly increase grower returns. But like all farmers, cranberry growers are generally optimistic and look at the future in the long term. At the WSCGA we too take a long term approach to making sure that we meet our mission statement, which is to enable growers to prosper through the provision of quality programs. The Board, committees and staff remain committed to that objective.

#### **WSCGA Annual Report**

The Wisconsin State Cranberry Growers Association was formed in 1887 to serve the state's newly emerging cranberry industry. Some 130 years later, the organization continues to work to meet its mission of providing quality programs for members to enable the industry to prosper.

WSCGA is organized as a non-profit, non-stock corporation governed by a nine-member Board of Directors. The Board is advised by a number of committees and working groups on topics ranging from Public Policy to Promotion, Grower and Public Education. The Association employs professional staff and consultants. The Board, committees, staff and consultants work together as a team to develop and implement programs and policy for the organization.

The 2016 Annual Report highlights activities by the Association on behalf of its membership throughout the course of the year. These successes are due to the hard work of the grower and associate members who volunteer their time and talent to work with the Association's professional staff and contractors to advance the mission of the organization. We hope all growers and members of the industry will thank those who continue to work on their behalf and to join the WSCGA in these efforts.

#### THE TEAM – WSCGA Board of Directors 2016

#### Tom Gardner – President

Tom is part of Gardner Cranberry and Hay Creek Cranberry located near Pittsville. Tom joined the Board in 2012. He serves on the Public Policy and Environmental Affairs Committee, and the Personnel Committee.

#### Tyler Walker – Vice President

Tyler works with his family at Walker Cranberry Company in the town of Cranmoor, west of Wisconsin Rapids. He was elected to the Board in 2011. He serves on the Public Policy and Environmental Affairs Committee, and the Personnel Committee.

#### Karl Pippenger - Treasurer

Karl is part of the team at Cranberry Lake Cranberries in Phillips and owns and operates his own small cranberry marsh, "Pip's Cranberries." He participated in the 2013-14 Wisconsin Cranberry Leadership Development Program. He joined the Board in 2015, is the chair of the Administration Committee, and serves on the Nominating Committee.

#### John Stauner, Secretary

John owns and operates James Lake Farm near Three Lakes, Wisconsin. John was elected to the



Board in 2008 and Treasurer in 2012. He sits on the Administration Committee while also serving on a number of working groups.

#### **David Amundson**

David's family operations, Wisconsin Moss Company and Amundson Cranberry, are located outside of Babcock where he farms with his wife, Jill. David was elected to the Board in 2009, served as Vice President in 2011, and as President in 2012-13.

#### Steven Bartling

Steven and his family own and operate Bartling's Manitowish Cranberry in Manitowish Waters. Steven serves as chair of the Nominating Committee and is a member of the Education Committee and Information Technology Subcommittee. He participated in the WCREF Cranberry Leadership Development Program in 2012-13. He was elected to the Board in 2016.

#### Nicole Hansen

Nicole is part of Cranberry Creek Cranberries in Juneau County. She was elected to the WSCGA Board in 2009. She served as Vice President in 2010. She chairs the Research Committee, serves on the Education Committee and Nominating Committee, and represents the cranberry industry on the Board of Directors of the National Institute for Sustainable Agriculture. In 2013, Governor Walker appointed her to a seat on the citizen's Board that oversees the Wisconsin Department of Agriculture, Trade and Consumer Protection.

#### Mark Mahoney

Mark joined the Board in 2011 and is part owner of Owen Rock Cranberries in Adams County, which served as the host site for the 2012 Summer Meeting, Field Day and Trade Show. He serves on the Public Policy and Environmental Affairs Committee, Personnel Committee, and Research Committee. He served as President in 2013 through 2016.

#### Carl Salzwedel

Carl and his family own and operate Salzwedel Cranberry near Warrens, Wisconsin. Carl was elected to the Board in 2009. He is a member of the Public Policy and Environmental Affairs Committee, the Research Committee, and has served as the WSCGA representative on the Cranberry Museum, Inc. Board of Directors.



#### **WSCGA** Committees

#### Public Policy and Environmental Affairs Committee

The committee is responsible for the development of recommendations on policy related to environmental issues as well as other state and federal regulatory and legislative actions that arise as part of the public policy advocacy program. The committee also makes recommendation on disbursements from the restricted account for water and wetlands.

WSCGA Public Policy and Environmental Affairs Members

Bill Hatch - Chair	Mark Mahoney
Mike Bartling	Bill Metcalf
Tom Gardner	Fran Podvin
Bryan Heuer	Dan Rayala
Gary Jensen	Andy Reitz
Randy Jonjak	Russ Rifleman
Bill Klouda	Gary Roberts
Greg Knorr	Carl Salzwedel
Lerov Kummer	Scott Schultz

Craige P. Scott Clare Searles Ben Tilberg Ryan Walker Tyler Walker Luke Weiland

#### Administration Committee

The committee advises the WSCGA Board on the internal operations of the association. Its major responsibility is development of a recommendation for an annual budget for the WSCGA.

#### Administration Committee Members

Karl Pippenger - Chair	Bill Hatch	Russ Rifleman
Bob Duckart	Mike Moss	Scott Schultz
Greg Fanning	Fran Podvin	John Stauner

#### **Education Committee**

The main emphasis of the WSCGA mission is education, both of growers and the general public on cranberry growing. A large portion of this responsibility is assigned to the Education Committee, making it one of the key committees in the association. The committee meets with UW Extension faculty and others during the year to review and plan the various education programs for the association including the Wisconsin Cranberry School, early season workshops and the Summer Meeting and Field Day.

#### WSCGA Education Committee Members

Christelle Guédot - Chair	Matt Lippert
Jim Bielmeier	Tod Planer
Dani Faber	Andy Reitz
Steve Hahn	Jayne Sojka
Nicole Hansen	Nodji Van Wychen
Jason Hatch	Pam Verhulst
ou con naton	

Lindsay Wells-Hansen Russ Sawyer Ben Tilberg

#### **Public Relations Committee**

The committee is responsible for developing and implementing communication and promotion projects to generate a positive image of the industry in the state. That responsibility includes working with the media to tell the industry's story and working with other groups to help promote the state's largest fruit crop.







WSCGA Public Relations Committee Members

*Nodji Van Wychen – Chair* Robert Detlefsen Amy Gebhardt Mike Gnewikow Fawn Gottschalk Ed Grygleski Leroy Kummer Gabriella Liddane Jessica Rezin Doug Rifleman

Scott Schultz Mary Smedbron Bill Wolfe

#### **Research Committee**

The Board of Directors established the committee to provide growers with a forum to discuss research needs with University of Wisconsin research faculty and the cranberry research community on a national basis. The committee works cooperatively with the Wisconsin Cranberry Board, Inc. (WCB), The Cranberry Institute (CI), and others to identify grower research needs, coordinate projects to avoid duplication and to help establish priorities.

#### WSCGA Research Committee Members

Nicole Hansen – Chair Suzanne Arendt Steven Bartling Stephen Brown Robert Detlefsen Danielle Faber Mike Gnewikow Fawn Gottschalk Edward A. Grygleski Jeff Habelman Leroy Kummer Gabriella Liddane Mark Mahoney John Moss Doug Rifleman Ben Ryner Carl Salzwedel

Russ Sawyer Scott Schultz Jayne Sojka Ben Tilberg Pam Verhulst Andy Walker Lindsay Wells-Hansen Bill Wolfe

#### Information Technology Subcommittee

This year the Board named a subcommittee of the Education Committee to work on redesign of the WSCGA Grower website and to analyze the best available technologies to provide growers with needed information. The group is utilizing a \$39,500 Specialty Crop Block Grant from Wisconsin DATCP to create new tools for growers, crop consultants and researchers to use in the field.

WSCGA Information Technolog	gy Subcommittee Members	
John Moss, Chair	Dani Faber	Ben Tilberg
Steven Bartling	Russ Sawyer	Pamela Verhulst

#### Associate Member Committee

The Associate Member Committee provides input on topics including Associate Membership benefits, Summer & Winter Trade Shows, WSCGA *NEWS* advertising, Program Book & Buyers Guide publication advertising, sponsorships and member surveys. Committee members are polled for input on topics related to membership related topics and inquiries. The group meets prior to the Summer Meeting & Trade Show for an on-site visit and event planning.

WSCGA Associate Member Committee Members

- Tom Altmann Amy Boson Derek Johnson
- Casey Koback Paul Roberts Dawn Ruiter

Jay Weidman



#### WSCGA Staff

#### Tom Lochner, Executive Director

Tom Lochner was named the first WSCGA Executive Director in 1988. Since then, the association has grown into a well-respected voice for the Wisconsin cranberry grower. The association has expanded its education, communications and public policy programs. It also took on the responsibility of providing administrative services to the Wisconsin Cranberry Board, Inc. to enable it to implement its research, education and promotion programs. In 2004 the WSCGA also assisted the Cranberry Museum, Inc. develop and operate the Wisconsin Cranberry Discovery Center in the Village of Warrens.

As the chief staff person, Tom represents WSCGA in interactions with University Research and Extension faculty and administration, as well as with Federal, State and local governmental organizations. He is also responsible for coordinating the activities of staff and various consultants who assist with communications and public policy programs. He serves as a liaison with industry groups, such as the Cranberry Institute and the USDA Cranberry Marketing Committee. He also serves as the lead spokesperson for the organization, giving presentations to groups across the state.

Over the course of his career, Tom has worked with the Board and committees on growing the programs and membership of the association. He believes in a team approach to program planning and development. This approach has resulted in active committees, an engaged and high performing Board, and high grower participation in WSCGA programs.

#### Alex Skawinski

Alex Skawinski joined WSCGA in December 2015. As the Administrative Assistant, she is responsible for keeping the office in Wisconsin Rapids up and running smoothly. Her responsibilities include the Associate Member programs, the Associate Member Committee, and working with the WCREF Development Fund Committee to plan and hold the annual Cranberry Open Golf Outing and the Sporting Clay Shoot.

She also manages the annual Trade Shows for WSCGA, which are premier events in the industry. For the Winter Trade Show, she coordinates exhibit space registrations, including online booth registration via Booth Boss, as well as sponsorships and booth upgrades. At the Summer Trade Show, participation is also high on the part of exhibitors.

Alex works with Crystal Johnston on the Cranberry School registration, coordinating the publication of the WSCGA *NEWS*, and keeping the WSCGA website up-to-date and fresh with event information and resources. She has also taken on additional responsibility of working with the Information Technology Subcommittee to revamp the WSCGA Grower website.

#### Crystal Johnston

Cris joined the staff at WSCGA in 2005 as a part time bookkeeper. Her main responsibility is to keep the financial records for the association. She also assists as a back-up for staff support and assists at meetings and WSCGA events. This past year, Cris took on additional responsibilities as Clerical Assistant. She now manages the databases for the membership, the assessment forms and filings



for the Wisconsin Cranberry Board, Inc. and serves as the office manager in purchasing supplies and equipment for the association.

She also serves as the bookkeeper for the Cranberry Museum, Inc.

#### **Association Consultants**

#### Tod Planer, Farm Conservation Planning Coordinator

Upon his retirement as the Wood County Extension agent in 2002, Tod began a second career as a contractor for the WSCGA. In that role, he helped to develop and implement Whole Farm Conservation Plans for cranberry growers. Early efforts included tail water recovery pilot projects and nutrient management. They evolved to evaluating a suite of conservation practices and their applicability to cranberry farms. Through these evaluations and pilots, Technical Standards were developed to allow growers to be eligible for NRCS cost-sharing programs.

In the past three years, he has been working on energy conservation and alternative energy generation on cranberry farms. This has resulted in support of pilot projects on wind, solar and hydro generation. In October of this year Tod retired "full time" and now is enjoying spending time with his wife Diane and his children and grandchildren.



#### Dewitt Ross and Stevens, Legislative Counsel

DeWitt Ross & Stevens is a full service law firm with experienced attorneys in virtually all areas of practice. Throughout the firm, there are attorneys who Ross & Stevens in have developed expertise in niche areas but still understand the big picture.

The Government Relations team of DeWitt Ross & Stevens is the largest lobbying group in Wisconsin. Because they are located directly on Madison's Capitol Square, often times WSCGA strategize with Legislative Counsel Ron Kuehn and Jordan Lamb, and later head to the Capitol for meetings with legislators and other key policymakers.



Ron Kuehn began his career at Dewitt Ross & Stevens upon graduation from the University of Wisconsin Law School in 1971. Early in his career, he directed his practice into business law and, after a few years, expanded to government relations. Today, he exclusively works in state and federal government relations as the leader of the DeWitt Ross & Stevens, and Wisconsin's largest government relations practice group. Ron has been representing WSCGA since 1988, when the industry faced the most significant

challenge to the rights of growers to access water. Throughout the years, Ron has worked for WSCGA on issues ranging from environmental to property taxes to transportation.

A key component of the ongoing governmental relations program is establishing relationships through regular communication with legislative and agency leadership, as well as with the grower community. These efforts over the past 20 plus years have positioned the industry so that it is able to respond to challenges, as well as initiate regulatory and legislative changes to help growers businesses.





**Jordan Lamb's** expertise in environmental regulation is a particular asset to WSCGA and our members, as they navigate the interplay between state and federal regulations and running a successful business. She is a major voice for us in the development and current rewrite of the State non-point source pollution program in NR151 and ATCP50. She played a major role in the development of Wetland Reform Legislation in last session of the Legislature and in developing protocol for dealing with floodplain issues with

FEMA, DNR and county zoning offices. She has provided leadership on issues related to groundwater, drainage, artificial and navigable water bodies to name a few.



#### Laughlin Constable, Communications and Public Relations

Laughlin Constable (LC) is a multi-faceted and full service agency. The LC team is made up of a group of talented and creative public relations professionals with a wide variety of backgrounds. LC provides access to expertise for communications and public relations programs for WSCGA.



**Evan N. Zeppos,** APR, has more than three decades of professional achievement and experience as a public relations counselor. With experience in both the private and public sectors, he is recognized as a leading expert in public relations and has a unique blend of national, state and local involvement on major issues management and public relations challenges and opportunities. Zeppos also has earned national accreditation from the Public Relations Society of America.



*Kris Naidl*, APR, began working with WSCGA in 1994 and she has assisted the cranberry industry with a number of efforts, including strategic communications work to affect change in state regulations, branding, publicity and media relations, issues management, digital strategy and more. She has earned her national accreditation from the Public Relations Society of America (PRSA), and has been honored on numerous occasions from PRSA for her communications work to support Wisconsin's cranberry industry.



*Katie Whitlock* is a Senior Account Executive at Laughlin Constable, where she works on a variety of projects, including strategic planning, news writing, publicity, media and community relations, social media management, special event promotions and more. She has been with Laughlin Constable for five years and a key member of the WSCGA team for the past year.



#### **WSCGA Service to Industry Award**

The WSCGA Board of Directors presents the Service to Industry Award to individuals or groups who have provided outstanding service to the industry and association. The award is the highest recognition that the association provides. This year the organization is pleased to provide recognition to two individuals



#### Senator Tammy Baldwin

Tammy Baldwin is a Wisconsin Native; born in Madison she attended Madison West High School. She received her Bachelor's degree from Smith College and went on to obtain a Law Degree from UW Madison. She served on the Madison City Council and the Dane County Board of Supervisors and was elected to the Wisconsin Assembly in 1992. She became the state's first female member of congress when she won election to represent the Second Congressional district in 1998. She was

elected to the US Senate in 2012.

Senator Baldwin has served as co-chair of the Congressional Cranberry Caucus and in that role led efforts to work with USDA on purchases of cranberry products under the Section 32 Program. She worked hard with the industry to express concerns about the proposal by FDA to modify nutrition labels to create an added sugar line on the labels. Working with Representative Duffy, Senator Baldwin secured language to expand the funding for support of USDA ARS research on cranberries. Those funds will be used to establish a research station in Wisconsin and to expand research done by ARS in Wisconsin.

Her office and staff have been extremely supportive of cranberry growers. For her support we are pleased to name her as a recipient of the 2017 WSCGA Service to Industry Award.



#### Representative Sean Duffy

Congressman Sean Duffy was born and raised in Hayward, Wisconsin. He became a nationally recognized professional lumberjack athlete and worked his way through law school by performing in lumberjack shows and exhibitions. After graduating from law school he practiced law in Hayward before becoming the District Attorney of Ashland County. In 2008 he was elected to the House of Representatives.

Rep. Duffy too has been active in the Congressional Cranberry Caucus, supporting purchases by USDA, opposing efforts by FDA to modify nutrition labels to create an added sugar line on the labels. He also worked with the industry and Senator Baldwin to secure expanded support for cranberry research by USDA ARS. The additional resources will be combined with private funds to establish a research station in Wisconsin and to expand research on cranberries by USDA ARS on the Madison campus.

Rep. Duffy and his staff have been supportive of Wisconsin's state fruit and its growers. For this support we are pleased to present him with the 2017 WSCGA Service to Industry Award.



#### WSCGA Program Activites – 2016

#### **Public Policy Advocacy**

#### Policy Statement of WSCGA Public Advocacy Program

The WSCGA's Public Policy Advocacy Program strives for state and federal legislative outcomes that allow Wisconsin growers to farm in an environmentally and economically sustainable manner. Public Policy Program position statements and activities are weighed against this goal:

Wisconsin cranberry growers support legislation, rules and policies that balance the conservation of important natural resources and the stewardship of resources by growers against the economic needs and benefits of cranberry growing in Wisconsin.

The following are priority areas for the WSCGA Public Policy Advocacy Program:

#### Environmental Policy and Regulation

The greatest threats – and opportunities – for the industry in public policy are in the area of environmental regulation. Whether it pertains to water access and quality, wetlands or the use of chemicals for crop production that growers use, WSCGA members expect their association to represent their interests.

#### Water Access

An abundant and high quality water supply is the key to the success of cranberry growing in Wisconsin. As such, the highest priority for the WSCGA is to maintain and protect growers ability to access surface and groundwater for their farming operations. Conducting normal farming operations to maintain and enhance water use and conservation must be protected and must continue to be allowed with limited regulation.

#### Water Quality

Cranberry farming practices face increasing scrutiny as to their impacts on water quality. WSCGA has lead efforts with UWEX, USDA NRCS, DNR and DATCP to address Best Management Practices to protect water quality. Maintaining the definition of return flow from irrigated agriculture as a non-point source is a priority for the WSCGA. Changes to the state water regulatory program need continuous monitoring. TMDL development for cranberry waters and the Statewide Nutrient Management Strategy are also priorities for WSCGA.

WSCGA also intervened on behalf of Wisconsin growers in litigation against the State of Wisconsin which seeks to have cranberry growing classified as a point source of pollution. That case is in the Dane County Circuit Court where Ron Ragatz of DeWitt Ross and Stevens is serving as legal counsel for the association.

#### Federal/State Linkage

In many cases with environmental regulation, there is a strong and important relationship between Wisconsin and federal laws and regulation. This is the case with the Clean Water Act and floodplain regulation. As changes take place in federal programs, they impact the state as the delegated



authority to administer those programs. At the same time, attempts to reform or revise state regulatory programs require federal approval. WSCGA and its Legislative Counsel continue to be vigilant in these areas.

With these identified priorities, WSCGA staff and leadership will closely communicate with the WSCGA Legislative Counsel to evaluate issues as they arise, assess risk and threats to the industry, and then determine the level of activity that is required to meet the organization's goal and mission.

#### Legislative and Legal Issues Update

The 2017-18 Wisconsin Legislative session has just begun and the WSCGA state advocacy team is ready to represent growers before the Wisconsin legislature and state agencies.

#### 2017-19 Biennial Budget Bill

The most pressing issue that will arise early in 2017 is the debate and approval of the 2017-19 state biennial budget. Every two years, the State of Wisconsin must adopt a 2-year budget. The state's fiscal year runs from July 1 of odd numbered years to June 30 of even-numbered years. Governor Walker will deliver his proposed biennial budget to both houses of the legislature in February. The legislature will then review and amend the budget throughout the spring before sending it back for final gubernatorial review near the end of June.

The WSCGA is already focused on two key budget issues: transportation funding and funding for UW-Madison and the UW System.

<u>Transportation Funding.</u> The WSCGA, along with numerous other business, agricultural and municipal organizations, is urging the legislature to *consider all funding options* for generating additional revenue for the state transportation fund. In particular, we support the review and careful consideration of initiatives to generate additional revenue for local road infrastructure, as maintaining access to the transportation system is critical to maintaining our ability to get fruit to processing and distribution. This issue will be hotly debated in 2017.

<u>UW Budget Funding.</u> The WSCGA also strongly supports maintaining or increasing funding to UW Madison and the UW System. We know that there is a meaningful and distinct connection between applied research and a healthy agricultural economy. As such, this will be a critical budget issue for our advocacy program.

#### Groundwater Quantity – High Capacity Well Legislation

The WSCGA growers tend to rely more on access to surface waters, but we also have many growers who utilize high capacity wells. As such, we have and will continue to support legislation that will provide certainty for our continued access to and use of groundwater for farming.

Last session, each house of the legislature passed slightly different bills that would have provided certainty for farmers who need to repair, replace, reconstruct or transfer ownership of a high capacity well. Once again, WSCGA will work with legislative leaders to urge passage of this legislation early in the 2017 session.



#### Groundwater Quality – Revisions to NR 151

In response to concerns over pathogens found in drinking water wells in Kewaunee County, the Wisconsin Department of Natural Resources has opened Wisconsin Administrative Code s. NR 151, to adopt a targeted performance standard for agricultural runoff in karst areas. While the development and adoption of this specific targeted performance standard will not specifically affect Wisconsin cranberry growers, the movement by the DNR to start addressing sensitive areas in the state that are not meeting water quality standards by using the NR 151 targeted performance standard process is of interest to all farmers. The WSCGA advocacy team will continue to monitor the development of this administrative rule revision in 2017.

#### ATCP 50 Update - NRCS 590 (2015)

In 2015, the Natural Resource Conservation Service (NRCS) adopted changes to NRCS Conservation Standard 590, which is the federal standard for nutrient management if you are receiving NRCS cost-share funding. In addition, the State of Wisconsin incorporates the 590 standard into Wis. Admin. Code s. ATCP 50, the state's Soil and Resource Management Program. Accordingly, the Wisconsin DATCP has reopened ATCP 50 to revise it to incorporate the updated 590 standard.

Many of the changes to NRCS 590 deal with the application of manure to cropland. Accordingly, the impact of the changes for Wisconsin growers are limited to those provisions that deal with the development of nutrient management plans and the application of nutrients, generally. The WSCGA Board and advocacy team is currently carefully revision the proposed changes to ATCP 50 to determine whether our farmers will be impacted or have concerns. This rule will be developed throughout 2017.

#### **Elk Reintroduction**

The Wisconsin DNR continues to expand the reintroduction of elk into Jackson County. Although the Department has elected to proceed with this provide over the objections of the WSCGA, the Department has been working with us to implement a fencing program for those growers within the projected elk range who desire fencing to protect their cranberry beds from elk damage. Although the current program expired on December 31, 2016, the Department is considering extending the fencing program for growers who need an elk damage solution in the future.

#### Drainage District Legislation

The WSCGA has been working with legislators and other interest groups to protect the current "suspended" status of the Leola Drainage District from a budget bill provision that passed last session and that would require all suspended districts to be terminate by the Wisconsin DATCP. Cranberry growers and other agricultural interests have been privately managing drainage within the Leola District. WSCGA is supportive of legislation that would preserve that status for Leola.

#### Wisconsin River TMDL

Section 303(d) of the Clean Water Act (CWA) requires delegated states, like the State of Wisconsin, to determine every two years whether waterbodies are impaired, which means that they are not meeting designated uses or water quality criteria. The CWA is aimed at improving impaired waters such that they meet water quality standards. One tool used to improved impaired waters is the development of a TMDL.



TMDL stands for "total maximum daily load." It refers to the maximum amount of pollutants that a surface water can receive in a day and still meet water quality standards. TMDLs are developed for particular surface waters by the DNR and the US EPA.

The DNR is currently in the midst of developing a TMDL for the Wisconsin River. The Wisconsin River TMDL study area spans Wisconsin's central corridor from the headwaters in Vilas County to Lake Wisconsin in Columbia County, covering 9,156 square miles, approximately 15 percent of the state. It affects most of Wisconsin's cranberry growers.

As such, the WSCGA continues to monitor and participate in the development of this TMDL, as it could be used, at some point, to develop targeted nonpoint source performance standards for agricultural runoff in the Wisconsin River watershed.

#### Legal Update – Coors v. Wisconsin Department of Natural Resources

On June 10, 2016, James Coors, Lac Courte Oreilles Lakes Association, Inc. ("COLA") and Lac Courte Oreilles band of Lake Superior Chippewa, (the "Tribe") filed a lawsuit against the Wisconsin Department of Natural Resources ("DNR") and the Natural Resources Board. *Coors v. Wisconsin Department of Natural Resources*, Dane County Circuit Case No. 16-CV-1564. The filing is a mixture of a petition for judicial review of an administrative agency decision and a civil lawsuit asking the Judge to determine certain legal issues.

The Petition includes five claims against the DNR. However, the claim that is of most interest to members of the Wisconsin State Cranberry Growers Association ("WSCGA") is the Fifth Claim. In that claim, Coors, COLA and the Tribe (the "Petitioners") allege, in part, that a "significant source of nutrient pollution in Lac Courte Oreilles, including Musky Bay, are cranberry growing operations that discharge polluted water through canals and other discrete conveyances into the lake." The Petitioners ask the Court to "declare that the <u>cranberry growing operation polluted discharges</u> through discernable, confined, discrete conveyances <u>are point sources</u> . . ." They also ask that the Court enter a judgment in which, among other things, the Court would:

Find that DNR's determination that <u>pollution to Musky Bay</u> is from nonpoint pollution sources to be erroneous, and declare that the pollution discharges from discrete conveyances on the <u>cranberry</u> <u>operations</u> meet the definition of a "point source" in Wis. Stat. § 283.01(12)(A).

The effect of a determination that a cranberry grower's discharge of return waters to a water body through a pipe or ditch is a "point source" would be that the grower would need a point source discharge permit, something that has not been required under the DNR's current interpretation of "point source." The United States Environmental Protection Agency has also not required cranberry farms to have a discharge permit. The requested legal ruling would have impacts for all Wisconsin growers and may have effects beyond Wisconsin. Accordingly, the WSCGA has petitioned the court and has intervened as a party to this lawsuit in order to defend the long-standing position that cranberry discharges are nonpoint sources.

To date, there has been limited formal activity in the lawsuit. The judge has not yet set a schedule for the case.



#### WSCGA Federal Governmental Issues – 2016

The WSCGA Federal advocacy program was very active in calendar-year 2016. Federal activities include working with agencies on issue's and members of congress and the Congressional Cranberry Caucus. The following is a list of issues addressed by the WSCGA during calendar year 2016. These include work by Broydrick and Associates on behalf of WSCGA and direct activities by WSCGA with other state and national groups.

#### **Research Funding**

In 2015 WSCGA was able to secure an increase in the budget for the USDA ARS Cranberry Research Program of \$750,000. Since the budget increase the WSCGA has been providing support to the Wisconsin Cranberry Research and Education Foundation to develop a cooperative agreement to make the funds available for the establishment of a cranberry research station. In September of 2016 a final agreement was signed to secure the funds for the project.

First and second year funding will be available to support the station. Funding in following years will be used to increase support of the two ARS positions at UW Madison and to add a third ARS Cranberry research program as well

#### Pest Management Tools

WSCGA has adopted a general policy to support the development of a toolbox of management practices for growers to use in their farming operations. These practices include cultural – such as flooding for pest control or sanding – as well as the use of chemical control options. The chemical control options may include new, softer pest specific compounds and traditional broad spectrum control. The organization encourages integrated use of these tools by growers through IPM.

As a result WSCGA advocates to continue registrations for pesticides as long as their judicious use does not present an environmental or food safety risk. The association works with the Cranberry Institute and other organizations to monitor proposals by EPA and others that impact grower use of pest control products and strategies. During the past year the WSCGA was active on a number of proposals.

*Bravo* – WSCGA supported efforts to re-establish a workable MRL for Bravo to continue to be able to ship fruit into the EU. These efforts included letters of support for the new tolerance, meetings with USDA trade Staff to stress importance of compound to industry and participation in task force established by the US Cranberry Marketing Committee.

*Lorsban (chlorpyrifos)* – In late 2015 the EPA proposed to revoke all tolerances for this important insecticide. The action was the result of a court case involving drinking water in the Pacific Northwest, unrelated to cranberry usage of the product. EPA was seeking comments through a public comment period that would include information on usage patterns. WSCGA provided these comments and also worked with the Cranberry Institute to submit additional comments in early January, 2017.



#### **USDA Purchases of Cranberry Products**

WSCGA has been a leader in efforts to encourage USDA to use its authority under Section 32 to purchase cranberry products for school lunch programs and other feeding programs that the agency supports. The association has worked with other groups to secure letters from members of the Congressional Cranberry Caucus and written directly to USDA requesting action. More than \$50 million in purchases were announced by USDA this year as a result of this industry wide effort.

#### Nutritional Labeling

The US FDA sought comment on a proposal to develop a Recommended Daily Allowance for added sugar and to have the information posted to nutritional labels on products. WSCGA joined with other cranberry groups to present comments in opposition to the proposal based upon the potential impact to growers as well as the lack of scientific rationale for the proposal. While FDA finally approved the rule WSCGA and the industry remain committed to educational programs to demonstrate that cranberry products remain a healthy choice for consumers.

#### **Communications & Marketing Highlights from 2016**

The WSCGA Communications Program is developed as part of a team effort with the Public Relations Committee and the team at Laughlin Constable. The overall objective of WSCGA's communications efforts is to promote the purchase and consumption of cranberries and cranberry products by emphasizing their taste, versatility and health benefits.

#### Made with Wisconsin Cranberries

Laughlin Constable supported the second year of the Made with Wisconsin Cranberries brand in 2016 by working with WSCGA's existing partners – O&H Danish Bakery and Naturipe. The team coordinated with Naturipe to announce the partnership on social media and WSCGA's website during the timely harvest/fresh cranberry season. WSCGA partnered with O&H on the first-ever Fall Festival of Flavors event, which featured cranberry samples, Ruby the cranberry mascot and a kid's activity station with the cranberry activity guide. WSCGA also participated in an



O&H e-newsletter giveaway by providing fresh cranberries for the contest winners.



#### Summer Cranberry Craze / Festival Foods Sampling

In 2016, WSCGA increased the scale of the 2015 Festival Foods in-store sampling by partnering with the Cranberry Marketing Committee on the "Summer Cranberry Craze." For 10 days in June, Festival Foods grocery stores across Wisconsin celebrated cranberries with special promotions, recipes, blog posts, a dietician TV segment, in-store samplings and more. Laughlin



Constable coordinated the in-store samplings at all 25 stores, which featured a cranberry sangria and a cranberry broccoli deli salad and encouraged shoppers to incorporate cranberries into their summer barbeque and cookout menus.

#### Partnerships/Sponsorships

WSCGA uses grants from the Wisconsin Cranberry Board, Inc. for partnerships and sponsorships with the Milwaukee Brewers Radio Network, UW Badger Sports, Green Bay Packers and American Birkebiener.

Through its partnership with the Milwaukee Brewers Radio Network, WSCGA sponsored the umpire report during each game broadcast and provided radio spots to run during four Brewers baseball series. The team at Laughlin Constable helped coordinate the effort and produce the radio scripts.



As part of the UW sponsorship, WSCGA sampled cranberries and cranberry products at UW events, WISCONSIN MORE THAN HALE WORLD'S CRANBERRIES ARE GROWN IN WISCONSIN WWIEBERBURY IS

including football, basketball and hockey games, as well as the Crazylegs Classic run. In 2016, WSCGA also sampled cranberries and cranberry products at the Green Bay Packers 5K Run, Training Camp and a Green Bay Packers preseason game. Finally, WSCGA will sponsor the American Birkebeiner in 2017, which will include the opportunity to sample and sell products as an exhibitor at the Birkie tradeshow.

#### Wisconsin State Fair

For two decades, Laughlin Constable has coordinated media efforts for the WSCGA booth at the Wisconsin State Fair. The 2016 effort featured a special edition "All-American" Cran-on-a-Stick to tie in with the Summer Olympics, which ran during the same time as the State Fair. The new product helped draw media and public attention to the WSCGA booth, which also featured the popular mini-marsh, model marsh, educational video and other food and beverage products. Laughlin Constable conducted



media drops to radio and TV stations on site, media interviews and social media ads, which together reached more than 100,000 people.

#### Web and Social Media

Laughlin Constable manages the WSCGA's social media accounts, including Facebook, Twitter, Pinterest and YouTube. This includes drafting and posting fun, engaging content on the WSCGA's social media channels and coordinating sponsored posts to boost engagement. In 2016, WSCGA's fan engagement and page likes grew exponentially. Facebook page likes increased more than 250 percent and Facebook posts reached more than 1.1 million people. LC also assists with the WisCran.org content and analytics reporting.







#### Fall Harvest Media Relations & CCTV

Each year, Laughlin Constable assists with WSCGA's media efforts surrounding the annual cranberry harvest. This year's media strategy included the early announcement of crop projection figures tied to Wisconsin cranberry messaging, as well as pitching media and coordinating marsh visits and interview requests throughout the harvest season. Additionally, a primary focus of the harvest season was working with CCTV, China's largest TV station. Laughlin Constable brought CCTV to Wisconsin to visit a cranberry marsh, an Ocean Spray receiving and manufacturing facility, the CranGrow facility and the Cranberry Discovery Center. The trip resulted in three broadcast TV segments that aired in China and online. Overall, media relations efforts during harvest resulted in more than 57 million impressions in the United States and more than 1.2 billion impressions in China.





#### Fall Food Blogger Effort

This year, in addition to working with media during the fall harvest, WSCGA partnered with two national food bloggers – Well Plated and Sweet Phi. The bloggers each visited a marsh during harvest and

posted photos of their experience to their social media channels during their trip. They were each sent home with fresh cranberries that they used to develop a cranberry recipe. They then shared a blog post with their recipe, photos from their marsh visit, and cranberry facts/

Well Plated with Wisconsin Cranberries. October 19 at 6:57am \* @

Free up your oven with this easy, DELICIOUS recipe for Slow Cooker Brussels Sprouts with Cranberries and Feta. The crock pot does the work! For the recipe —> http://www.weliplated.com/slow-cooker-brussels-sprouts/ Pin for later —> https://www.pinterest.com/pin/189503096800750103/ Plus, I'm sharing all about my trip to a Wisconsin cranberry farm, including when I climbed into the bog!

their blog and social media accounts. Together, the bloggers reached more than 1 million consumers.

messaging on

#### Sweetphi Blog October 18 at 6:16am · @

Happy #tacotuesday - I'll be celebrating with these delicious steak tacos w a fresh cranberry salsa which is new today on the blog, plus I'm sharing some photos of visiting a cranberry marsh with Wisconsin Cranberries http://www.sweetphi.com/steak-tacos-cranberry-salsa-recipe/





#### **Research Programs**

#### **Research Coordination and Administration**

Although he WSCGA does not have a direct research program it does provide administrative services to the Wisconsin Cranberry Board, Inc. Under this agreement, WSCGA provides the needed administrative services for the WCB. This allows WCB to maximize its investment in research, education and promotion programs on behalf of the Wisconsin growers. WCB is able to hold down administrative costs by sharing these expenses with the Association.

As part of this service, the WSCGA also works with other cranberry groups to coordinate research activities to avoid duplication, and to create synergies and partnerships to maximize the investments by growers.

#### **Education Program Highlights**

Education is a major component of the WSCGA Mission. The organization's Education Committee works throughout the year to present programs for growers on improving management practices with the goal of allowing growers to operate their farms in an economically sustainable manner.

#### Wisconsin Cranberry School

The 2016 Wisconsin Cranberry School was held at the Holiday Inn Hotel & Convention Center in Stevens Point, WI. With more than 400 registrants, the event provided educational sessions, an interactive grower management session, and a forum for growers and related affiliates to exchange ideas and best practices in the cranberry industry. The School is the signature education event for the WSCGA.

The annual program is sponsored as a collaborative effort by the Wisconsin Cranberry Research & Education Foundation (WCREF), the Wisconsin State Cranberry Growers Association, and UW-Extension.

A Pesticide Applicator Training and Certification (PAT) session with information and exam was provided on-site as a one-stop convenience to growers by Wood County Extension, and facilitated by Matt Lippert.

A communications and public relations presentation was provided by Kris Naidl of Laughlin Constable, Milwaukee. A popular session utilizing live CLKR technology provided growers with insights into industry management practices. A range of questions were posed to the audience; growers responded with their respective answers on the hand-held device, and could see an immediate summary of the results, which showed the percentages for each answer of each question.

Presentations by session speakers covered a diverse array of topics, from plant and insect phenology to cranberry variety improvement research, from cranberry virus and disease issues to the cranberry genetics and genomic program, from soil moisture monitoring to nutrient management and honeybee hive location research. There were also update research sessions on cranberry varieties and their resistance to insect pests, carnivorous arthropods activity after spring floods, fungicide applications effect on bee fidelity, pheromone mating / moth birth control in cranberries, cranberry pesticides update reports, and problematic weed management strategies.



#### Nutrient Management Training Sessions Held April

In mid-April about 50 people attended the Nutrient Management training sessions held at two locations and co-sponsored by the WSCGA, USDA / NRCS and UW Extension.

The full-day workshop in Wisconsin Rapids was designed to help cranberry farmers write their own nutrient management plans to meet DATCP requirements. Wisconsin DATCP also requires that farmers complete a department-approved training course at least once every four years to maintain their qualification.

Half-day nutrient management sessions were held in Tomah and Wisconsin Rapids, for those seeking refresher training on the topics.



Presentations were provided by Judy Derricks, Jon Field, and Tom Frederickson from the NRCS, along with Pam Verhulst from Lady Bug IPM and Amaya Atucha from UW Extension. Since the start of the program more than 400 growers have participated in the training to become qualified to write a nutrient management plan for their farm.

#### Early Season Grower Workshops Held April 28

The WSCGA and UWEX co-sponsored two early season grower workshops – one at Valley Corporation in Valley Junction, and the other at Elm Lake Cranberry in Wisconsin Rapids on Wednesday, April 28. More than 150 participants attended the two workshops, available to growers at no charge.

These events are held each spring to update growers on new management practices and strategies for the growing season, review of winter impacts on crop, new crop production tools available, and informal discussions on the upcoming growing season. Topics included Bravo restrictions / possible replacement options, growing degree day calculator, virus research updates, weed management strategies, pollination, cold hardiness and root physiology.

A discussion of the use of Unmanned Aerial Vehicle (UAV) in cranberry was provided by Brian Luck of UW Extension. Updates and presentations were provided by UW researchers Amaya Atucha, Jed Colquhoun, Jack Perry, Patty McManus, Christelle Guedot and Beth Workmaster. Crop consultants also provided observations from the field.

#### Summer Meeting, Field Day and Trade Show

The 129th Summer Annual Meeting, Field Day and Trade Show were held at the Brockway Cranberry in Black River Falls. With beautiful summer weather and a great turnout, this year's event was hosted by Jim Bible and his marsh staff. An estimated crowd of over 1,000 people attended and participated in the event. Marsh bus tours were held from 9:00 a.m. - 2:30 p.m.. There were also 3 mini sessions for growers to attend and 87 on-site exhibits. More than 800 lunches were served between 11:00 a.m. and 1:00 p.m.



#### WSCGA NEWS

Each month, members of the WSCGA are provided with up to date information on the cranberry industry, news, activities and anything that would be of interest to the growers of Wisconsin's number one fruit crop. WSCGA coordinates the publication of the newsletter and solicits articles from a cross-section of organizations and individuals. The *NEWS* is distributed in both print and electronic form with over 500 people on the subscription list.

#### Weather Forecasting

The Wisconsin Cranberry Board, Inc. has provided funding for weather forecasting services for decades. WSCGA administers the program for the industry. Working with forecasters from Great Lakes Weather Services, daily forecasts are available online and via a toll free number. The forecasts are specific to cranberry farms and are an important tool for growers as they make decisions about management practices such as frost protection. The forecasts are available April 15 through October 31.

#### Associate Member Programs

The WSCGA has an active program for the businesses that support the industry in the state. Associate Membership in WSCGA allows these companies to participate in a wide variety of marketing opportunities. The most popular are the Winter and Summer Trade Shows, Advertising programs in the WSCGA *NEWS* and the Summer Meeting publications. Associate members are also actively involved in industry events such as the annual Cranberry Open Golf Outing and the Sporting Clays Shoot. A committee of the Associate membership works with WSCGA Staff to develop and conduct these programs. Highlights for 2016 include:

#### Winter Trade Show

The event conducted in conjunction with the Wisconsin Cranberry School and the WSCGA Winter Meeting, the 2016 Trade show was held on Wednesday, January 20 at the Holiday Inn Hotel and Convention Center in Stevens Point WI. The 2016 show included 84 exhibitors. In addition to the Expo Room and Main Hallway, exhibitor booth space was provided in the commons area adjacent to school session meeting rooms. All exhibitors are Associate Members of the WSCGA.

Trade show time was also increased for Cranberry School attendees, after the morning Opening Session. For maximum flexibility, the extra time allowed school registrants to visit exhibits prior to the start of the Cranberry School from 8:00 to 9:00 a.m., during scheduled breaks, and during the 3 designated lunch times. Trade Show exhibitors provided samples, demonstration, shared new materials, exhibited on-site equipment, and introduced new products and services.

#### Summer Trade Show

The 2016 Summer Trade Show was held in conjunction with the WSCGA Summer Meeting and Field Day at Brockway Cranberries in Black River Falls. The trade show included both indoor and outdoor booths with over 80 total booth spaces occupied for the event on August 10. The Summer Trade Show is the largest grower event held by the WSCGA.



NOTES



# **WSCGA MISSION:**

The mission of the Wisconsin State Cranberry Growers Association is to enable the cranberry industry in Wisconsin to prosper through the provision of grower information, responsible environmental stewardship, sound governmental policies and effective public communications.