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**THE NATIONAL INITIATIVE FOR SUSTAINABLE AGRICULTURE (NISA): PROVIDING REASONABLE
SOLUTIONS FOR THE CRANBERRY INDUSTRY**

JED COLQUHOUN

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Sustainable agriculture certainly is not new; in fact those still in the business of producing food are considered sustainable by nature. However, the interest in assessing sustainability from consumers and those in the value chain beyond the farm gate is relatively new and has proven resilient despite tough economic times.

Increasing food production, security and resiliency are critical to our planet's future. NISA efforts are inclusive of all production, regardless of scale, region or system. This holistic, non-competitive approach is needed to address global food demands.

We have two choices: we can let those outside agriculture determine what farm sustainability looks like, or we, as stewards of the land and rural America, can determine our fate. Producers need a voice in the sustainability discussion that ensures a reasonable way forward and gains credit for previous advancements. These efforts can't be cumbersome or redundant and need to respect the economic solvency of the producer. The producer-led NISA is working toward these goals.

What is the National Initiative for Sustainable Agriculture (NISA)?

NISA is a producer-led federation that will harmonize sustainability efforts within a common framework, regardless of cropping system, region or farm scale. The goal is not to judge the "sustainability" of agriculture but to provide producers with an opportunity to account for their advancements over time and communicate them broadly. We will develop a roadmap of farm management systems that will help producers to achieve verifiable sustainability outcomes, improve the environmental services and productivity of their farms, help their rural communities thrive, and satisfy sustainability expectations of the value chain.

These efforts will operate at the farm level; incorporate a framework of tools and technical information from a wide base of expertise and programs; and, with the support of regional and national experts, communicate sustainability management systems that are valid across crops and regions.

This sounds similar to other sustainability programs. Why is NISA necessary?

- **NISA is producer-driven and adaptable to changing times.** This bottom-up approach allows producers to be at the table in designing sustainability assessments that are regionally- and crop-appropriate, scaled to improve sustainability at the field level, founded on the best available science and balanced among the social, environmental and economic sustainability pillars. Such an approach also accounts for the diversity of agriculture, is neutral to production techniques, and won't competitively pit production regions or crops against each other. The alternative – those outside agriculture determining producers' fate – isn't appropriate or sustainable itself.

- **NISA is complementary to other sustainability programs, such as Field to Market and the Stewardship Index for Specialty Crops, and not redundant or overly cumbersome.** The assessment-based approach implemented by NISA will cover the gaps that currently exist in outcome-based programs. Several of these gaps exist because outcomes are difficult, expensive or invasive to quantify. The combination of assessment- and outcome-based data will create a holistic sustainability message. Sustainability assessments will not be overly cumbersome. Early test-runs with cranberry growers indicate that the survey tool can be completed in less than an hour.
- **NISA efforts will streamline sustainability efforts with customer expectations.** This approach will reduce redundant requests for sustainability metrics and provide a balanced way forward that includes producers in the developmental stage, thus ensuring that the process is not overly cumbersome. The request for such information continues to grow despite down economies, suggesting a resilient and long-term commitment by customers to developing such programs.
- **NISA will result in a communications conduit to customers and the general public that has been significantly missing for agricultural producers.** Industrial sustainability efforts have successfully focused on communicating improvements over time. Agriculture has yet to develop such a plan or communicate the gains already achieved by producers in typical sustainability parameters. The assessment-based approach, combined with appropriate outcome-based programs and a solid communications effort, will deliver a message of long-term commitment to sustainability by agricultural communities.

The NISA process is simple:

- Producers, in partnership with appropriate NGOs, academics and consultants develop a foundation, national level assessment tool for a given crop that abides by the producer-developed NISA guiding principles.
- The foundation tool is then shared with regional working groups that include producers, academics and consultants, adapted to be appropriate to local production, test-driven and revised as appropriate.
- The regionalized tool is supported by best management practice (BMP) workbooks that include the scientific basis for supporting production techniques.
- Assessment tool results are summarized regionally and nationally and used to communicate advancements in social, economic and environmental parameters over time and throughout the value chain.

Where do cranberries fit in NISA?

Cranberry production is unique compared to traditional row crops and varies regionally. A “one-size-fits all” sustainability solution isn’t appropriate and existing assessment programs aren’t a good fit. In response, we have drafted a cranberry assessment tool that is appropriate for the crop, can be adapted for production regions and has been reviewed and modified by cranberry producers. This assessment tool follows the NISA Guiding Principles and fulfills the appropriate expected outcomes such that results can be communicated to the public and throughout the value chain. While the assessment tool is customized to cranberry, “traveling in a flock” with the NISA

producer-led federation will allow for harmonized communication and messaging among agricultural producer organizations.

The cranberry sustainability assessment tool will be tested with producers in spring 2012, with an anticipated industry launch after the 2012 harvest season.

VEGETATIVE OR REPRODUCTIVE – WHAT IS IN A CRANBERRY BUD?

LISA WASKO DeVETTER, REBECCA HARBUT, AND JED COLQUHOUN

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Background

Visual assessment of terminal bud status is utilized to predict yield of cranberry. With this approach, buds that are perceivably large and round are considered to be reproductive. Small and narrow buds, in contrast, are considered to be vegetative. Reproductive buds are assumed to bear flowers and fruit during harvest years, whereas vegetative buds only produce leaves. Biennial bearing is believed to contribute to the reproductive fate of buds, so that uprights fruiting one year will be less likely to set reproductive buds and fruit the following year (Eaton, 1978).

The use of bud external appearance when predicting yield is widespread, despite its large margin of error. Work in our lab has come to question the reliability and overall relationship between bud external appearance and reproductive status. As we seek to improve our understanding of yield, it is imperative that we also better understand cranberry bud development. Previous research on cranberry bud development has been valuable, but dates back to the early-to-mid 1900s (Goff, 1901; Lacroix, 1926; Roberts and Struckmeyer, 1943). With the release of new cultivars, which are reportedly higher-yielding and may circumvent biennial bearing tendencies, renewed investigations on bud development are needed. Moreover, technological advances in microscopy can enable researchers to gain a more comprehensive view of bud development.

The following is a progress report of a project initiated to address the deficits in our knowledge of cranberry bud development. The objectives of this project are threefold and include:

1. Characterize bud development and flower initiation throughout an entire growing season.
2. Compare bud development and flower initiation across several cultivars, including two recently released cultivars.
3. Determine the relationship of bud external appearance and the presence/absence of flower initials.

Materials and Methods

Approximately 100 uprights of the cultivars Stevens, Searles, Crimson Queen, and HyRed were randomly collected from a marsh near Wisconsin Rapids, Wisconsin. Collection of uprights occurred every two weeks and extended from 5 March to 7 Dec. 2011. After each collection date, uprights were divided into two groups – fruiting and nonfruiting. Buds from each group were dissected and the presence/absence of flower initials was recorded. Due to the small size of cranberry buds, scanning electron microscopy (SEM) was utilized to monitor the progression of flower development during the predicted time of initiation.

Preliminary Results

Current results show that, excluding ‘Searles,’ many of the assumed vegetative buds actually contained flower initials. Most of the terminal buds from ‘Searles’ were dead, which made sampling and subsequent analysis challenging. Recently released cultivars were more likely to form flower initials, regardless of fruiting status during the previous or current year. These initials were first visible by 29 July in all cultivars, excluding ‘Searles.’ Figures 1 and 2 show the dissected buds of ‘HyRed’ uprights, both of which contain flower initials. Similar images were collected from ‘Stevens’ and ‘Crimson Queen’ uprights. These images show that uprights have the capacity to form flowers, regardless of their current fruiting status. Future monitoring is needed to determine the fate of these flower initials.

Figure 1. Vegetative (nonfruiting) upright with flower initials visible by 29 July 2011.

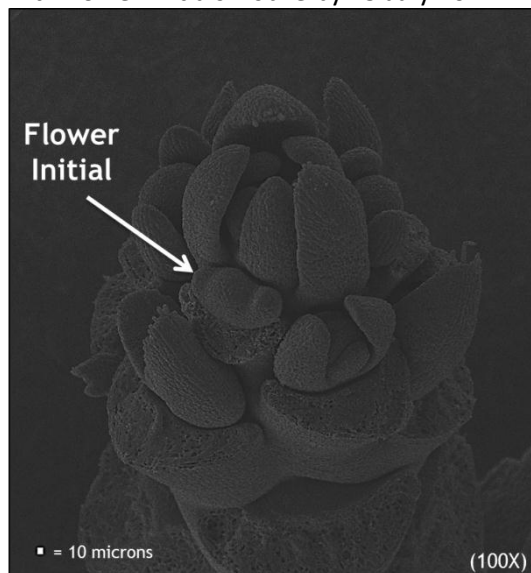
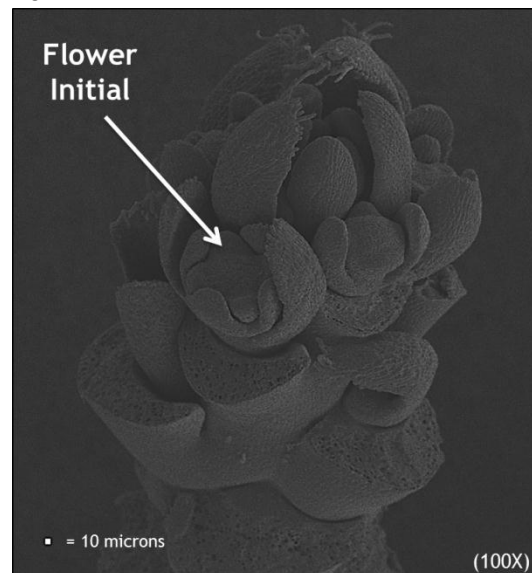


Figure 2. Reproductive (currently fruiting) upright with flower initials visible by 29 July 2011.



Future Work

This project is ongoing and sampling will continue during the 2012 season. Future work to be conducted includes:

- Determine the timing of floral initiation across cultivars.
- Relate floral initiation to growing degree day models (GDD).
- Assess the role of biennial bearing on floral initiation across cultivars.
- Further describe the relationship between bud external appearance and reproductive status.
- Reevaluate yield prediction models based on bud external appearance.

Acknowledgements

We would like to acknowledge the following for their contributions to this project:

- Wisconsin cranberry growers
- Wisconsin State Cranberry Growers Association
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- The Harbut Lab (including Emily Beaver, Jesse Dahir-kanehl, Karen Schlichter, Sarah Siebach, Clay Vanderleest, and Beth Workmaster)

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PESTICIDE SCREENING FOR CRANBERRIES

JACK PERRY, UW-MADISON

Pesticide Screening Team: Jed Colquhoun (Horticulture), Dan Mahr (Entomology), Patricia McManus, (Plant Pathology), Jack Perry (Horticulture) – University of Wisconsin - Madison

Objectives: The mission of the 2011 program was to investigate fungicides, insecticides and herbicides for use in cranberry production. Objectives were to: 1) Investigate pesticides currently registered for use in cranberries to refine their use patterns and to further identify their pest control spectrum; and, 2) Investigate pesticides not currently registered for use in cranberries for their potential to address existing pest problems.

Summary: In the 2011 growing season, thirty-three field trials were conducted on twenty-three Wisconsin marshes including 14 insecticide trials with a varying number of treatments at each site to evaluate treatments for 7 target pests and 9 fungicide trials on three marshes with 14 treatments conducted. Insecticide research focused on product evaluations for tipworm, fireworm, flea beetle, fruitworm, loopers and white grub control, as well as a refinement of recently registered insecticides. Fungicide evaluations focused on potential products for fruit rot control. The purposes of the 2011 herbicide trials were to investigate new post-applied products for possible uses in cranberries, seek control solutions for problem weeds (escapes), investigate Callisto on new plantings on high pH soils and continue to investigate herbicide candidates for dodder control.

INSECTICIDE TRIALS

Cranberry fruitworm, Sparganothis fruitworm, and black-headed fireworm are the primary insect pests in cranberries. Most acres are treated at least once per season for one or more of these pests. Tipworm, loopers/spanworms and flea beetles are secondary pests; in any given season some acres are treated for these pests. Cranberry weevil, cranberry girdler and white grubs are also occasional pests; there are no efficacious insecticides registered for the control of these soil pests.

Fourteen insecticide trials were conducted in 2011: four for fruitworms, two for fireworms, two for loopers, two for tipworms, two for flea beetle, one for leafhoppers and one for white grubs. The number of treatments evaluated varied with the pest and trial site. Recently registered insecticides, Assail, Knack, Rimon, Delegate, Belay, Intrepid, and several standards, Imidan, diazinon, Orthene, Lorsban, and several non-registered products were evaluated both alone and in tank mix combinations. Since trial sites were selected based on existing or developing insect populations all trials had moderate to heavy testable pest pressures.

All of the registered products performed much as expected. The older organophosphate products were broad spectrum across most test pests and were generally efficacious as long as the pest was present at the time of application. Controls ranged from acceptable to excellent. The newly registered products,

particularly the insecticide growth regulators (IGR) were more pest-type specific. Lepidopteron pests were controlled well, the dipterans less so and the other pests mostly not controlled by the IGRs. Although all of the IGR products were generally equally efficacious. The timing of applications with these products was critical to performance; late egg-to-early instar applications were efficacious whereas applications to later instars were significantly less effective - to be expected with these types of insecticides. Tank mixes of the newer products with the organophosphates lessened the necessity for precise timings of applications. Of the newly registered products Assail, Intrepid and Belay were efficacious. The currently registered rate of Belay (4 oz/a) provided good, but marginally acceptable control. The higher rates (6 and 8 oz/a) demonstrated improved efficacy. One of the candidate insecticides was a stellar product.

In commercial production systems concern has been expressed over the sometimes less-than-expected efficacy of Imidan. Imidan is subject to pH and the label recommends that tank solutions be buffered to pH 5.5. Six trials were conducted to determine the effect of solution pH on Imidan's efficacies. Imidan 3.0 lb/a was evaluated when applied in pH solutions of 6, 7 and 8. Imidan applied in a pH of 6 was most efficacious in the control of flea beetles, fruitworms and spanworms, less so when applied in a pH of 7 and significantly less so when applied in pH 8.

HERBICIDE TRIALS

New Post Product Trials

In our 2009 and 2010 trials three of the experimental products caused discernible crop response. For one, the crop response was detectable season long. For another, crop response was less long lasting but still unacceptable. Although the crop responses induced by either product did not result in significant yield reduction, the visual responses were unacceptable. The visual crop response induced by a third product was minor; however, several tested treatments of this product resulted in significant crop reductions.

In 2011 trials two experimental products demonstrated good promise for use in Wisconsin cranberries. The weed control spectrum for both of these products would make these great companion products for Callisto as they provide good control of weeds that are weaknesses of Callisto. One of these products provided good control of St. Johnswort, dodder and yellow loosestrife and demonstrated activity on maples. No crop responses were noted with either of these products.

Callisto on New Plantings on High pH Soils

Four small plot trials were established on cranberries planted in 2009 on high pH soils. Four rates (1, 2, 4, 6 oz/a) of Callisto with and without non-ionic surfactant were evaluated. Each rate was applied in early May when day and night temperatures were low and a separate set of the same treatments was applied in late May when day/night temperatures were more moderate. Two of the trials were conducted on Stevens cranberries and two on Grygleski GHI cranberries. Soils in the test sites had pH of 6.8, 7.3, 7.8, and 8.0.

No significant Callisto-induced crop responses were noted in any of the treatments in any of the four locations. Herbicide rate, surfactant and cold stress did not affect cranberry response to Callisto. Soil pH correction measures were applied to the entire bed and by late season cranberry stand establishment was in process.

Weed Escapes

Callisto has been used extensively in commercial production for several years. Several weeds that are not controlled by Callisto are now creating problems. Those weeds are sweet vernal grass, creeping red fescue, cinquefoil, Solomon's plume, trees (maples, willows, popples, oaks) and dewberry.

Sweet vernal grass Large infestations of vernal grass are occurring infrequently in ever-enlarging patches in some beds. One trial was conducted. Select, Select Max and Poast provided excellent control of vernal grass. Very early applications, multiple applications (if allowed by the label), maximum allowed rates and the use of an appropriate surfactant were keys to successful control. Callisto and two candidate products did not control vernal grass. Although a glyphosate wipe provided moderate control of vernal grass, satisfactory coverage was difficult to achieve.

Creeping red fescue Creeping red fescue is mostly a problem in the bed margins of new plantings. This grass is often used to stabilize dikes and problem grass is likely coming in off of the dikes by erosion or mis-applications during seeding. Two trials were conducted. By the end of the 2010 season, none of the tested treatments appeared to be adequately controlling creeping red fescue; a spring evaluation will be more definitive. Tested products are Casoron, Evital, Select Max, Poast and Callisto.

Cinquefoil. Solomon's plume Both of these weeds are becoming less problematic as Callisto is used more extensively. One trial on each of these weeds was conducted in 2011. The keys to the successful control of cinquefoil and plume are:

1. keep up a program of Casoron and Callisto early
2. use Callisto applied early (especially on plume), high rate, and with appropriate surfactant
3. expect it to take several years to achieve control

Maples, Willows, Poppies, Oaks Two trials per tree type were conducted in 2011. Callisto provided good control of willows, popples, and maybe oaks. The keys to good control with Callisto are high rates, use of a surfactant, and multiple applications beginning early in the season; mid-season applications are significantly less effective. Maples are more difficult to control. Callisto injures but does not kill them, as does one of the candidate herbicides. A combination of Callisto and the candidate product may prevent maples from successfully over-wintering. For all of these problem trees, a glyphosate wipe was efficacious though labor intensive.

Dewberry Two trials were conducted in 2011. None of the three non-registered products effectively controlled dewberry. Although two of these products had activity on dewberry they also had detrimental effects on the cranberries. The search for dewberry control continues.

Dodder Trials

In 2008 - 2010 there were successes with a non-registered product for the control of dodder. This product is pending registration for uses in cranberries. In 2011 five trials were conducted in three marshes to investigate use patterns of the non-registered product (rates, application timing, tank mixes) for dodder control. Three of these trials at City Point, WI had heavy dodder infestations and valid trials were conducted.

The candidate product continued to be highly efficacious for dodder control; application timing of this product is critical to good control. Applications need to be made when the dodder strands first begin to appear in the cranberry canopy. It is likely that this timing coincides with dodder seed germination or just before the dodder vines abscise from the soil. Later applications inhibited dodder but did not prevent dodder vine matting. Callisto caused temporary chlorosis in the dodder but did not provide control. Combinations of the candidate product and Callisto did not provide enhanced control over comparable rates of either product alone. Two other candidate herbicides did not provide control of dodder.

FUNGICIDE TRIALS

In 2007-2009 late season fruit rots caused significant problems in Wisconsin cranberry production; in some marshes 30% of the harvested crop was lost to fruit rot. The 2010 growing season was conducive to fruit rot - warm with ample, periodic rainfall. Yield losses of 25-50% were experienced. This disease complex generally affects mature beds that are in full production. In 2009 isolated incidents of early rot were consequential problems; losses of 50 - 100% of the crop were experienced. In 2010 yield losses due to early rot were isolated but usually significant when they occurred. This disease and these losses generally occurred in 2-3 year old beds.

Fruit Rot

Three trials were conducted on two marshes that have experienced significant fruit rot problems in recent years. LeMunyon and Stevens were the subject varieties. Fourteen treatments were evaluated. Treatments included various timings of applications of the registered products Bravo, Abound, Evito and Indar. Three non-registered products were also included. Disease pressure was moderate-to-heavy in all three sites. '

Bravo, Evito and Abound were the most efficacious products. Indar was less effective. The current recommendation is for two applications of a fungicide at 50% bloom and at early post bloom. Additional applications at pre-bloom did not contribute significantly to enhanced disease control. There was a trend for improved disease control when later applications were made at late berry set. None of the three candidate fungicides was effective.

Early Rot

Two trials were conducted on two marshes that experienced significant early rot problems in 2010. Grygleski GH1 was the subject variety. Ten fungicide treatments were evaluated. Treatments included two applications of the registered products Bravo, Abound, Evito, Dithane and Indar. Five non-registered products were also included. Early rot disease pressure was light-to-moderate in both sites. Bravo and Dithane provided mediocre disease control. The other products were ineffective.

UTILIZING THE UW-MADISON PLANT DISEASE DIAGNOSTIC CLINIC

LINDSAY WELLS AND PATTY McMANUS

DEPARTMENT OF PLANT PATHOLOGY, UNIVERSITY OF WISCONSIN-MADISON

The Plant Disease Diagnostic Clinic (PDDC) at UW-Madison is an excellent resource for growers and crop consultants looking to diagnose disease problems in their marshes. The clinic is run by Dr. Brian Hudelson, and over 1,500 samples are processed in the clinic annually. In 2011, we assisted the clinic with diagnoses and provided follow-up recommendations. In order to quickly and accurately determine the cause(s) of disease symptoms growers may be seeing, it is important for those working in the clinic to be provided with the appropriate information and types of plant or fruit samples.

General sample collection should include the collection of multiple, whole plants whenever possible. Dying plants are always better than dead plants for diagnosis, as dying plants provide diagnosticians with a better chance of identifying the disease(s) as it progresses throughout the plant tissue. When submitting a sample, providing additional information, such as symptoms seen in the marsh, environmental conditions, and management factors is especially important for diagnosis.

Submit the freshest samples possible. Wrap uprights, runners, and/or leaves in **moist** (not wet) paper towels immediately following collection, and place these samples into plastic bags for submission. Rotten fruit should be placed into a plastic bag containing a few air holes. Samples can be submitted in person or mailed to the clinic on the UW-Madison campus.

Once a sample is sent to the PDDC, it is processed either the same day or the day after its arrival. It is important to keep this in mind when submitting a sample; it is best if a sample arrives earlier in the week rather than on Friday afternoon or Saturday to ensure timely processing. A sample is first visually and microscopically observed for any obvious signs of disease. If necessary, the sample is incubated in a moist chamber (a container with high moisture and humidity) to induce sporulation, allowing for further symptom development. Fungal and bacterial pathogens are isolated on microbiological media to allow for identification. Generally, two weeks are required for a complete, accurate diagnosis. Once a diagnosis has been made, the results are sent to the submitter both via email and in a formal written letter. The cost for this sample processing is \$25.00. If further testing is necessary for identification, the submitter will be contacted prior to the completion of such tests. Additional information for sample collection and contact information for the PDDC, as well as where to send your samples can be found on the web at <http://pddc.wisc.edu/>.

A summary of samples diagnosed from 2009 to 2011 is shown (Table 1). Main types of disease symptoms varied from year to year. In 2009 and 2011, dying uprights, primarily from younger beds, were the most common sample submitted. Pathogenic fungi were not consistently found to be associated with the dying uprights, and of the fifteen submitted in 2011, only two tested positive for *Phomopsis*, the causal agent of upright dieback. In 2010, fruit rots were the greatest concern. By the time many cranberry disease symptoms are visible, it is often too late to spray anything that will make a

difference in the current year. However, a diagnosis can help to distinguish between problems caused by pathogens versus those caused by environmental factors such as heat stress or winter injury.

Symptom type	2009	2010	2011
Root/runner rots	1	2	0
Leaf spots	2	3	1
Dying uprights	12	3	15
Fruit rots	5	27	7

Table 1. A summary of cranberry samples diagnosed from 2009 to 2011. Main types of disease symptoms varied from year to year.

FUNGICIDE EFFICACY ON HAIL-DAMAGED FRUIT

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Hail storms are a common occurrence in Wisconsin, with a few or many cranberry growers being affected every year. Fungicides are often applied immediately following hail storms to prevent fruit rot, despite the lack of research to support this practice. We conducted field trials in 2010 and 2011 to address the question of whether fungicide applications following a hail storm reduce fruit rot incidence (% rotten fruit), and if so, which fungicides are most effective. Trials were conducted throughout the growing season to determine if the stage of fruit development and/or extent of injury had any bearing on the effectiveness of these fungicides. Two trials each year were conducted in a Tomah marsh using cultivars 'GH2' in 2010 and 'GH1' in 2011. Fungicides were applied by the grower during bloom/fruit set at this site. Two trials each year were conducted in a Necedah marsh using cultivar 'Stevens' in 2010 and 2011. No fungicides were applied by the grower during bloom/fruit set at this site. Data was obtained from a total of seven trials; one trial was omitted because it did not contain enough damaged fruit to obtain meaningful data. Hail damage was simulated by shooting pea gravel into cranberry beds using a backpack mist blower, and the fungicides Abound (azoxystrobin) or Champion II (copper hydroxide) were applied to fruit immediately following this damage. In 2010 trials, approximately $\frac{3}{4}$ cup of pea gravel was applied to each 2ft. x 2ft. experimental plot. In 2011, the amount was increased to 1 $\frac{1}{3}$ cups to ensure an adequate amount of damage.

Fruit were collected from each field trial immediately following each simulated hail treatment to assess the initial damage to fruit as a result of this treatment (Figure 1). Fruit rot incidence was then evaluated in late September and early October. The simulated hail damage increased fruit rot incidence ($p \leq 0.05$) compared with the non-damaged control in six of seven trials (one trial illustrated in Figure 2). However, fungicides did not reduce fruit rot incidence ($p \geq 0.05$) in hail-treated plots compared to the non-treated control in six of seven trials (one trial illustrated in Figure 2). In one Tomah trial conducted on relatively immature berries, fruit rot incidence in hail-damaged plots treated with Abound was less ($p \leq 0.05$) than fruit rot incidence in hail-damaged plots treated with Champion II or no fungicide (Figure 3). It is unclear why Abound protected fruit in this trial but not in the other six. It is possible that due to the systemic activity of Abound, these immature berries were able to take the fungicide up more efficiently than were the older fruit.

Summary

In six of seven trials, neither Abound nor Champ 2 reduced fruit rot in simulated hail damaged berries. However, in one of seven trials, where berries were most immature, application of Abound, but not Champ 2 reduced fruit rot in simulated hail damaged berries. In general, results suggest that if cranberries are damaged by hail, it is unlikely that an application of fungicide will reduce the amount of fruit rot at the time of harvest. An exception may be very immature fruit (e.g. less than three weeks after bloom), in which case systemic fungicides such as Abound might provide some benefit.

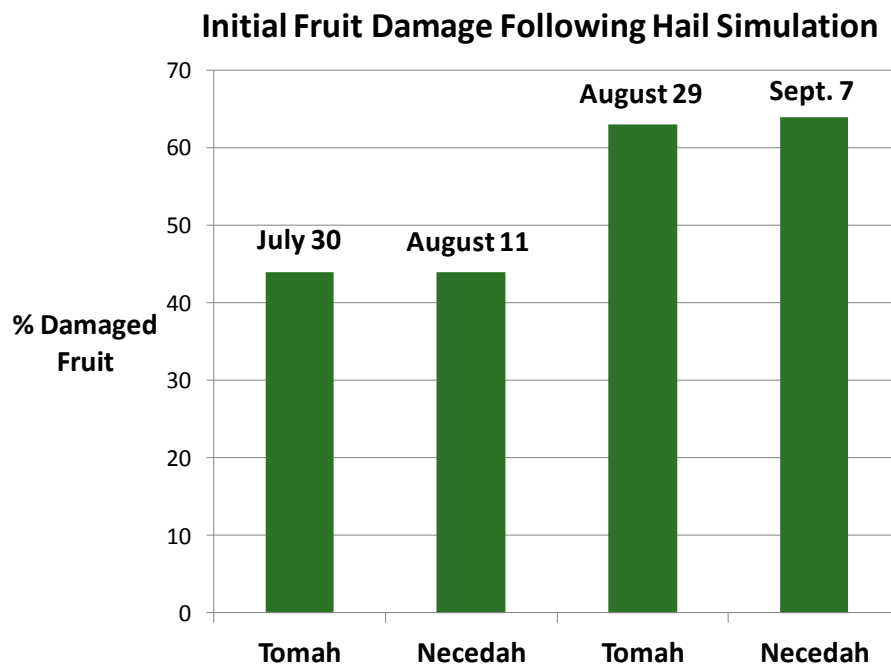


Figure 1. Initial fruit damage following hail simulation in 2011 at Tomah and Necedah marshes. Damage ranged from 44-64% in 2011, compared to 31-50% in 2010 (not shown). As fruit matured and increased in size, the percent of damaged fruit also increased. This difference may be a result of larger fruit having an increased chance at being hit, or a result of more mature fruit being more susceptible to damage. In 2011 trials, fruit more than doubled in size from July 30 to September 7.

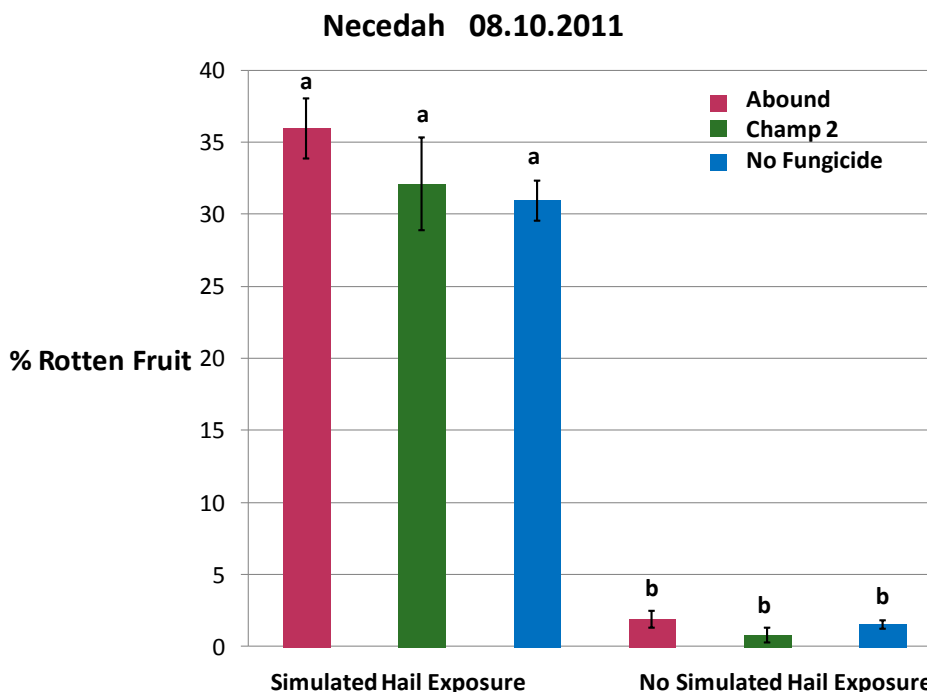


Figure 2. Simulated hail damage increased fruit rot incidence (% rot), compared with the non-damaged control in six of seven trials. Damaged berries had rot levels of 4 to 38%, whereas non-damaged berries had rot levels of <1 to 7%. Black bars are the standard error of the mean, a measure of variability. The percent rot resulting from treatments marked with the same lower case letter was not significantly different ($p = 0.05$).

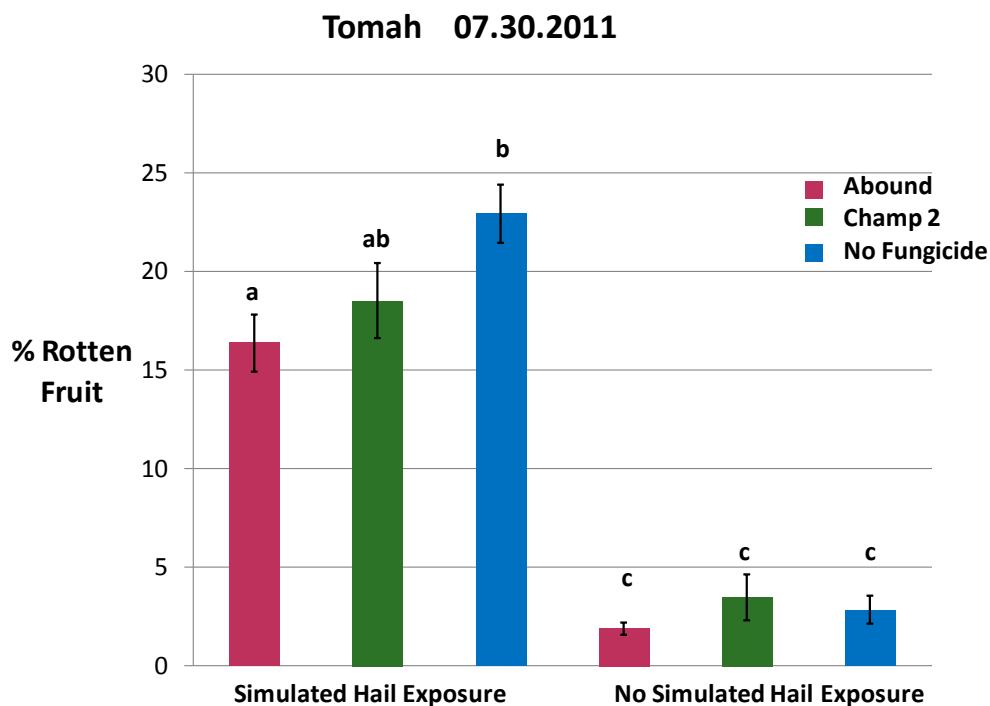


Figure 3. Tomah trial conducted on immature fruit on 07/30/2011. Simulated hail damage increased fruit rot incidence (% rot), compared with the non-damaged control. Abound significantly reduced the amount of fruit rot in damaged berries in this trial only. Champ 2 also reduced the amount of fruit rot in damaged berries, although it is not statistically significant. Black bars are the standard error of the mean, a measure of variability. The percent rot resulting from treatments marked with the same lower case letter was not significantly different ($p = 0.05$).

WORKER PROTECTION STANDARD (WPS)

LEROY KUMMER, OCEAN SPRAY CRANBERRIES, INC. AND JAYNE SOJKA, LADY BUG IPM

WPS Review

- Need to reaffirm that Worker Protection Standard are in place
 - New farms or changes in ownership of older farms
 - A quick refresher in things that we may have forgotten about
- Self Evaluation of What We Need To Improve Upon
- Things that may show up during an inspection
- EPA's Worker Protection Standard (WPS) for Agricultural Pesticides is a regulation designed to reduce the risk of pesticide related poisonings and injuries among agricultural workers (1995)
- Intended to protect @2.5 million Ag Workers and Pesticide Handlers working @600,000+ establishments (farms, nurseries, forest & greenhouses)
- WPS Addresses Requirements For:
 - Pesticide Safety Training
 - Notification of Pesticide Applications
 - Use of Personal Protective Equipment (PPE)
 - Restricted Re-Entry Periods (REI's)
 - Pesticide Decontamination Supplies
 - Emergency Medical Assistance

WPS – Who & What Are Covered

- WPS covers two types of employees:
 - Pesticide Handlers – those who mix, load or apply pesticides, those who clean or repair application equipment, or assist in the application of pesticides in other ways.
 - Agricultural Workers – those who perform task related to the cultivation or harvesting of crops or plants on farms, nurseries, forest or greenhouses
 - *Workers are defined as anyone who receives any type of compensation (including the self-employed) who perform agricultural production related duties.....does not include office employees, truck drivers or mechanics*

WPS – Who must comply?

- Are pesticides with labeling that refers to the WPS, used on the establishment for the production of agricultural plants? YES /NO
- Does the establishment hire or contract workers to do tasks related to the commercial production of agricultural plants? YES/NO
- How many workers are employed? Workers Family Members
- Does the establishment hire or contract pesticide handlers or family members to do tasks related to the commercial production of agricultural plants? YES / NO
- If the answer to either 1 or more questions is yes, the employer must comply with the Worker Protection Standard.

WPS Basic Training Requirements

- The basic pesticide safety information must include the following concepts:
- Pesticides may be on or in plants, soil, irrigation water, or drifting from nearby applications.
- Prevent pesticides from entering your body by:
- Following directions and/or signs about keeping out of treated or restricted areas
- Washing before eating, drinking, using chewing gum or tobacco, or using the toilet
- Wearing work clothing that protects the body from pesticide residues
- Washing/showering with soap and water, shampoo hair and put on clean clothes after work
- Washing work clothes separately from other clothes before wearing them again
- Washing immediately in the nearest clean water if pesticides are spilled or sprayed on the body and, as soon as possible, showering, shampooing, and changing into clean clothes
- Further training will be provided within 5 days

WPS – Training

- WI Certified Pesticide Applicator Certification meets the WPS standards for employee training
 - Certified applicators can train others (workers) in pesticide safety
 - Training tools are available through companies such as Gemplers – videos, handouts & certification cards
 - Online training classes as well

Summary of WPS Requirements

- Protection during applications – applicators are prohibited from applying a pesticide in any way that will expose workers or other persons. Workers are excluded from areas while pesticides are being applied.
- Restricted Re-Entry Levels – specified on all agricultural pesticide product labels. Workers are excluded from entering a pesticide treated area during the restricted re-entry period.
- Personal Protective Equipment – Protective Equipment (PPE) must be provided and maintained for handlers and early-entry workers.
- Worker Notification – Workers must be notified of treated areas so as to avoid accidental exposures.
- Decontamination Supplies – Workers and Handlers must have an ample supply of water, soap and towels for routine washing or in the event of emergency decontamination.
- Emergency Assistance – Transportation must be available to a medical care facility if a worker or handler should be poisoned or injured and all information provided about the pesticide to which the person may have been exposed.

What are auditors looking for?

- Proper posting of pesticide signs during the application period
- Worker Protection Central Posting Area
 - WPS posters
 - Record of pesticide applications & REI's
 - Emergency Medical Information
 - Record of Training (pesticide certifications or other records showing proof of training) – 5 years

WPS – Audit Keys

- Notification and posting of pesticide application
- Application and entry restrictions
- Personal protective equipment and pesticide handling equipment
- Pesticide safety training - 5 year
- Pesticide safety information
- Decontamination supplies
- Emergency assistance

WPS Central Posting Area

- Pesticide Safety Posters Must Be Displayed
- Emergency Medical Information
- Chemical Information – REI's & Areas Treated

Emergency Medical Information

- Provide Location of Nearest Medical Center
- Emergency Contact Numbers – Fire, Police, Medical
- Include: Name, Accident Location,
- Type of Emergency, Any Pesticide Information (Material, EPA Registration)

WPS – Required Sign



- This sign must be posted 24 hours or less prior to and during the application period
- Kept up until the REI expires and must be removed within 3 days of the REI expiration
- Size 14"x16"
- Some materials require WPS signs & oral notification

WPS Decontamination Kit

- Soap
- Water (1 gallon for worker or 3 gallons for a handler)
- Towels (single use towels)
- Change of clothes (handler)
- Emergency eyewash (minimum 1 pint for handlers)

EPA Website: Printable Publications By Title

- <http://nepis.epa.gov/EPA/html/pubindex.html>

CRANBERRY POLLINATION

HANNAH GAINES AND CLAUDIO GRATTON, DEPT. OF ENTOMOLOGY, UW-MADISON

Honey bee decline

In the past couple decades, honey bees have experienced drastic declines due to mites, disease, and more recently, Colony Collapse Disorder (CCD). When a colony suffers from CCD, the worker bees disappear from the hive, abandoning otherwise healthy brood and their queen. CCD was first documented in 2006 and since then has resulted in an annual loss of 30-90% of colonies for some bee keepers (Pettis and Delaplane 2010). While scientists have not identified a specific cause for CCD, it is likely due to a combination of biotic and abiotic factors affecting the colonies simultaneously including the Varroa mite, new strains of Nosema fungus, Israeli Acute Paralysis Virus, poor diet, insecticide exposure, and stress. Recently, scientists have also identified a parasitic fly that attacks bees and causes them to abandon their hives and become disoriented, much like the behavior observed in CCD (Core et al. 2012). This fly has been documented across the United States and has the potential to cause significant damage to the honey bee population over the next few years.

Each year, cranberry growers spend thousands of dollars on honey bee rentals to ensure that their marshes receive sufficient pollination to produce a good crop. With the continuing decline in honey bees, the availability and quality of hives may decrease. In the past five years, 20% of Wisconsin cranberry growers have already noticed a decline in availability and 15% have noticed a decline in quality of hives (Gaines, unpubl. data). California almond growers have seen prices of hive rentals reach nearly \$200/hive (Lifsher 2012), a 400% increase since 2003, and if the decline continues cranberry growers can expect to see increases in rental prices as well.

Use of managed bees in Wisconsin cranberry

While 89% of Wisconsin cranberry growers use honey bees and 21% use bumble bee colonies (instead of or in addition to honey bees) (Gaines, unpubl. data) on their marsh every summer, the stocking rate varies greatly. Based on the results from my grower survey, stocking rates range from 1 to 9 hives per acre for honey bees and 1 to 8 colonies per acre for bumble bees (Gaines, unpubl. data). Not surprisingly, one of the most common questions I get from growers is “How many hives per acre should I stock on my marsh?” More specifically, growers want to know whether increasing their hives per acre will increase their yield (fig. 1).

According to the literature, the recommended stocking rate for cranberry pollination is 2-3 hives/acre of honey bees or 2 colonies/acre of bumble bees (McGregor 1976). These recommendations are based on a review of publications spanning from the early 1900s to the 1960s. While all of these studies are related to bees and cranberry yield, most were based on data collected at one or two farms from one or two years and were not scientifically rigorous. Additionally, the

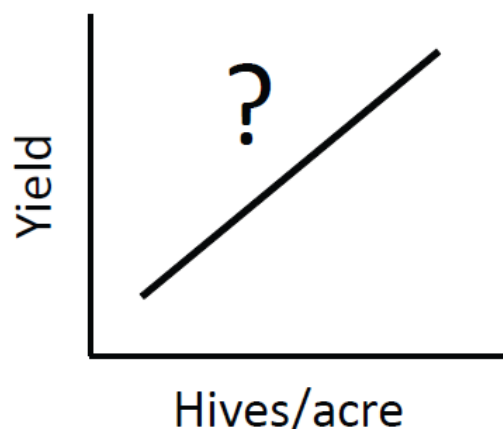


Figure 1. Growers are interested in whether their yield will increase if they stock more managed bees on their marsh during bloom

recommendations from these papers were highly variable, ranging from 0.2-10 hives/acre. Since marsh to marsh and year to year variation in yield can be so great, basing recommendations on such a small sample is not especially reliable. Given the huge variation in current stocking rates by Wisconsin cranberry growers and the lack of any rigorous studies on the topic, we are currently collecting records from the past 11 years on yield and stocking rates from as many marshes as possible. From this data we hope to clarify the relationship between stocking rate and yield.

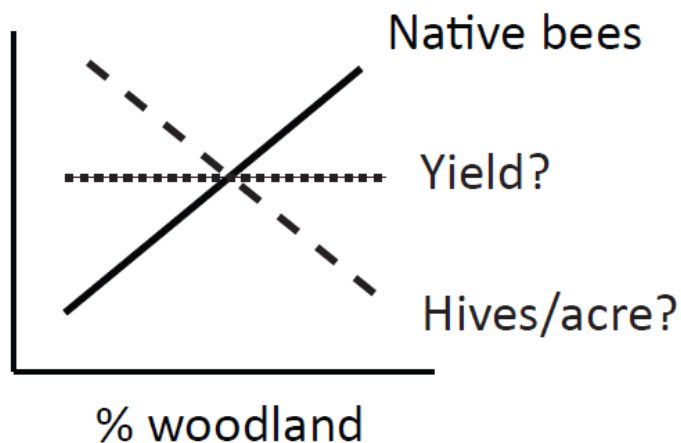


Figure 2. The required number of managed bees on the marsh may vary depending on the surrounding landscape.

One possibility, however, is that the recommended stocking rate will vary on a marsh to marsh basis. We hypothesize that the number of bees required at a marsh may vary as a function of (a) local management practices and (b) the surrounding landscape. The reason we think this may be true is that previous research has shown that native bees, naturally present in the landscape, are influenced by these two factors. Native bees are often more efficient pollinators than honey bees and are more willing to fly in cooler, damper weather. So a marsh with a high population of native bees may require fewer managed bees while a marsh with a low population of native bees may require more managed bees (fig. 2).

Native, wild bees

Native bees provide valuable crop pollination services to many crops but are often overlooked. In Wisconsin there are about 500 different species of native bees, most of which are solitary and do not make honey. Since 2008, we have collected approximately 4500 specimens representing 176 species of bees in Wisconsin cranberry marshes. Our work has shown that as the area of the surrounding landscape composed of wooded habitat increases, native bees also increase (fig. 3).

Several ways for growers to protect and encourage bees on their marshes are (1) to reduce chemical use when bees are active, (2) provide additional floral resources for bees when cranberry is not in bloom, and (3) provide nesting habitat for native bees. Additionally, the increasing availability of Insect Growth Regulators allows growers to select pest control options that are less toxic to bees. For more

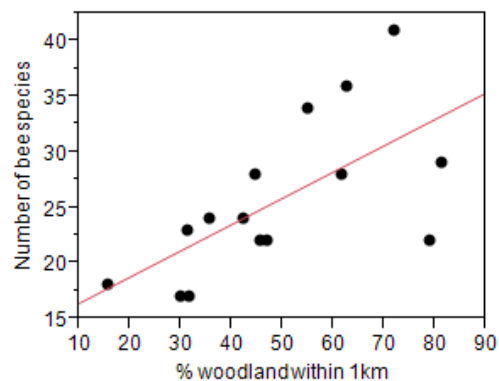


Figure 3. As the percent woodland increases in the landscape surrounding Wisconsin cranberry marshes, native bee diversity also increases.

information on how to create foraging and nesting resources for bees on your property, visit the Xerces Society for Invertebrate Conservation website (www.xerces.org) or contact me.

Future Research Plans

In 2012 my research will focus on better understanding the relationship between bees and cranberry yield. I am currently collecting past data on yield and the use of managed bees from as many marshes as possible. In the summer of 2012 I will be conducting several experiments looking at the contribution of native bees and other abiotic factors to cranberry yield.

Acknowledgements

Thank you to all of the growers who allowed me to conduct research on their properties and responded to my grower survey. Thanks to Jayne Sojka and Dan Mahr for helping me find field sites. Funding for this research has been provided by a UW Hatch grant to Claudio Gratton and from a Sustainable Agriculture, Research, and Education (SARE) grant to H. Gaines.

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Further information on pollinator conservation

The Xerces Society for Invertebrate Conservation

Toll Free number: (855) 232-6639

Website: www.xerces.org

EARLY-SEASON FLOODING FOR INSECT PEST CONTROL

SHAWN STEFFAN¹, MERRITT SINGLETON², JAYNE SOJKA³, JUAN ZALAPA⁴, TIM DITTL⁵, AND REBECCA HARBUT⁴

¹USDA-ARS Vegetable Crop Research Unit, Madison, WI, ²Dept. of Entomology, University of Wisconsin, Madison, WI, ³Lady Bug IPM, Pittsville, WI, ⁴Dept. of Horticulture, University of Wisconsin, Madison, WI, ⁵Ocean Spray, Inc., Babcock, WI

For over 100 years, the cranberry industry has been interested in the potential for spring floods to suppress arthropod populations. One critical element of this strategy is the trade-off between lethality for insects and harm to the cranberry plant. The basic question underlying our research, therefore, was the following: Can a late spring flood effectively suppress arthropod pests without harming the cranberry harvest? If so, under what conditions?

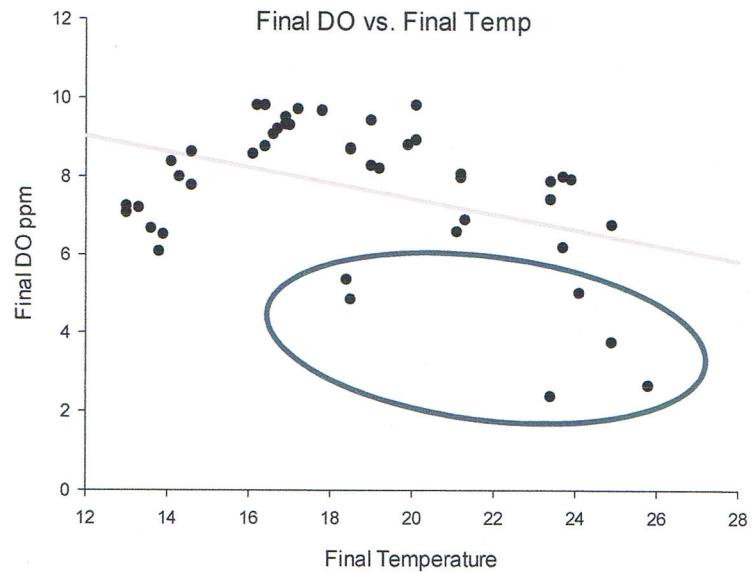


In collaboration with Wisconsin pest management consultants and growers, we set up a large-scale experiment in central Wisconsin in 2011. This work involved 23 pairs of flooded/unflooded beds (46 beds total, among 11 commercial growers), and we included not only arthropod metrics (*Sparganothis* fruitworm, cranberry fruitworm, and black-headed fireworm densities), but also plant metrics (chlorophyll, upright growth, flowers/upright, harvestable crop) and surface water metrics (temperature, dissolved oxygen, and pH).

In parallel, we conducted a submergence tolerance study in a greenhouse setting, where we could concurrently manipulate the effects of water temperature (cool, warm regimes) and submergence duration (0, 48, and 96 hrs) on three different cranberry varieties ('Stevens,' 'Ben Lear,' and 'GH1').



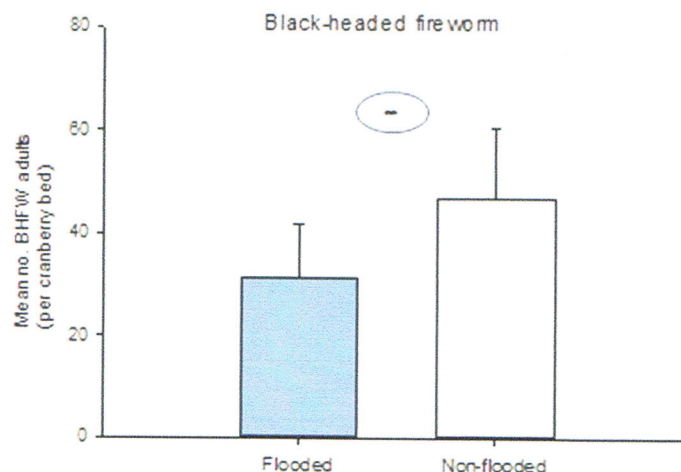
From our field data, we showed that springtime surface waters in Wisconsin were generally well-oxygenated and cool (8.2 ppm at flooding, and then 7.7 ppm as water drained; 64-65°F). As water temperature rose, dissolved oxygen (DO) declined. At the majority of the marshes, DO levels were not worrisome, although there was some evidence of hypoxia (see blue circled data points below), and we suspect this is due to elevated microbial oxygen demand in older beds.

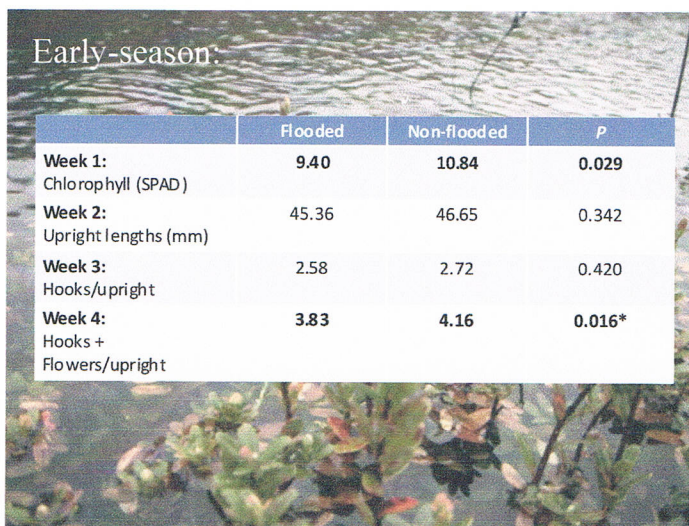


After 30-40 hours of flooding, the floodwaters warm up and lose dissolved oxygen. At week-2 post-flood, black-headed fireworm trap-catch (pheromone-baited traps) was significantly lower in flooded beds than in the non-flooded beds. Sparganothis fruitworm and cranberry fruitworm trap-catch numbers in flooded versus non-flooded beds (which received insecticide treatments) were equivalent, suggesting that the effects of the flood were similar to that of insecticide treatments alone.



Pheromone-based trapping

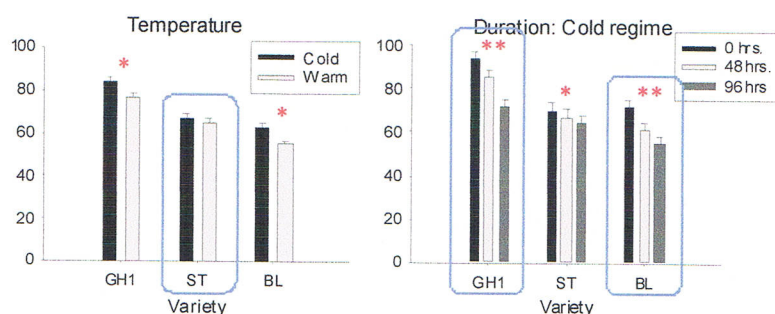




In terms of the cranberry plant, there was evidence of flood-induced stress. By week-1, chlorophyll was reduced in the leaves of flooded beds, and by week-4, flowers per-upright were significantly fewer in the flooded beds: 3.83 flowers per-upright in flooded beds vs. 4.16 flowers per-upright in non-flooded (see table below). By harvest, however, there was no difference in harvestable crop between flooded (204.3 grams/sq. ft.) and non-flooded beds (203.0 g/sq. ft.).

In the greenhouse trials, we learned that over the long term, cranberry sods can sustain complete submergence for 96-hrs, whether the water is cool or warm, as long as dissolved oxygen levels remain above approximately 40% saturation (~5 ppm). However, 7 days after treatment (see figure below; Greenhouse trials: upright length at 7 DAT), there were significant differences between controls (0 hours submergence) and 96 hours of submergence. For each variety, being submerged for the longer duration significantly reduced the growth of uprights. After 7 weeks, though, this trend was no longer evident. The response of both 'Stevens' and 'GH1' were similar among the 0, 48, and 96 hour

Greenhouse trials:
upright length at 7 DAT



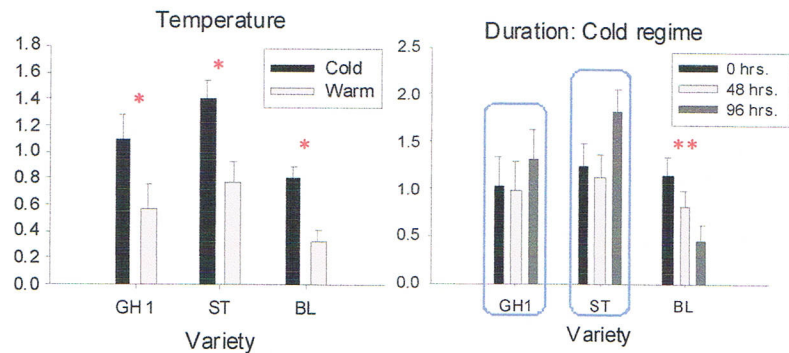
submergence duration regimes (see Greenhouse trials: hooks per upright at 49 DAT).

Notably, there was a significant difference between cold and warm effects, where warm water caused a greater reduction in upright growth 49 days-after-treatment (DAT). Interestingly, the 'Ben Lear' sods suffered much more, even in the cold water regime, but this can be explained by the markedly depleted oxygen levels in

the 'Ben Lear' water. Here we suspect there was elevated microbial activity reducing available oxygen.

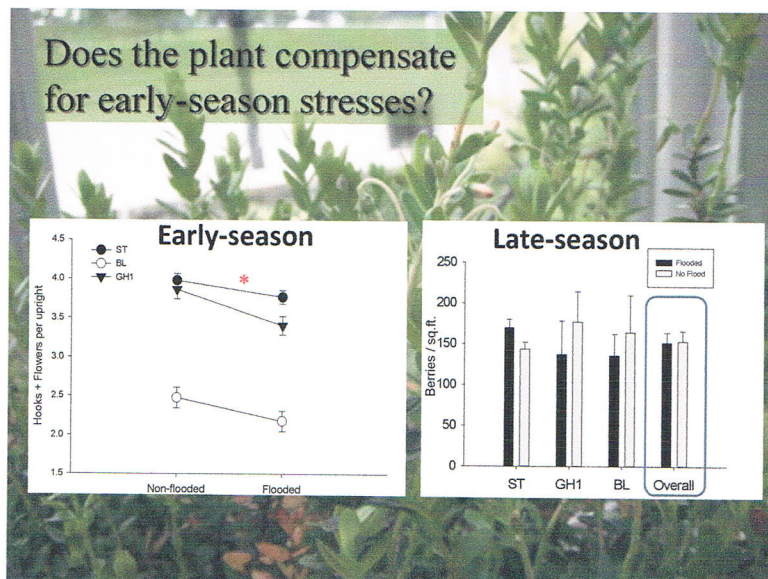
For the 'Stevens' and 'GH1' sods, the cold water regime was quite similar to water temperatures and dissolved oxygen levels in the field. This allowed us to focus on the cold water regime in the greenhouse to assess how well these plants could sustain prolonged submergence. After being submerged for 96 hrs and then being allowed to

Greenhouse trials: hooks per upright at 49 DAT



grow under natural conditions for 7 weeks, there was no difference (in terms of hooks or flowers per upright) between these plants and those that had not been submerged at all. This suggests that as long as dissolved oxygen levels are not too low (< 40% saturation), cranberry sods ('Stevens' and 'GH1') can remain submerged for prolonged periods (48-96 hrs) in the springtime without suffering significant injury.

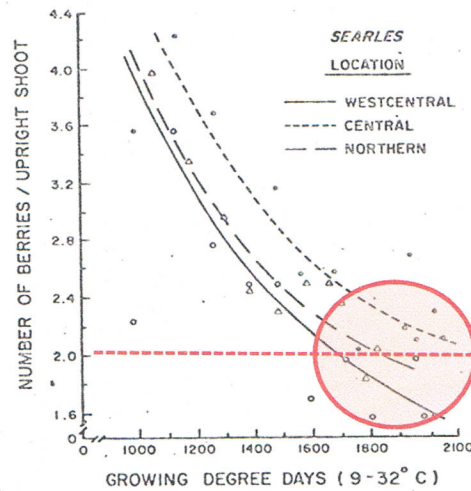
In the field, we observed a similar trend in which there was early evidence of flood-induced plant stress, yet by harvest (Sept/Oct), the difference between flooded and non-flooded beds was non-existent. Note in the figure below that early in the season (left panel, "Early-season"), there were fewer hooks and flowers per upright, but by harvest (right panel, "Late-season") there was no significant difference between flooded and non-flooded beds.



Why might this be? Does the plant possibly compensate by re-allocating resources? An old study done in Wisconsin (using 'Searles') shows how cranberries are "shed" all season, eventually reaching about 2 fruit/upright by harvest (see figure below, from Hawker & Stang 1985).

What this suggests is that stressors, like spring flooding, might reduce flowers/upright early in the season (from an average of about 4/upright to 3/upright), but this may have little bearing on harvest because the sods will only mature approximately 2 berries/upright. Thus, as long as spring flooding does not reduce the number of berries/upright to fewer than 2, there may not be a significant problem with early-season flooding.

Does the plant compensate for early-season stresses?



Hawker & Stang (1985)

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2011 Annual Report

Wisconsin State Cranberry Growers Association



WSCGA Mission Statement

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.

2012 WSCGA Associate Member Winter Meeting Sponsors

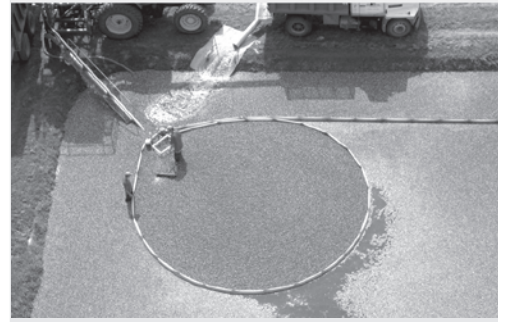
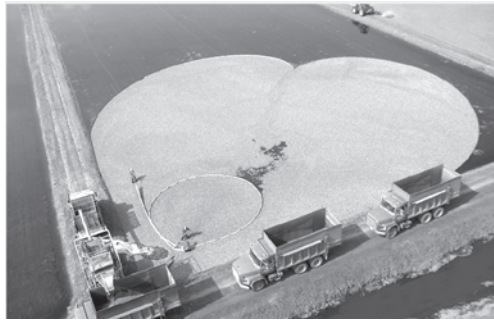
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ANNUAL MEETING January 10, 2012

AGENDA

- | | |
|---------|---|
| 1:00 PM | Call to Order |
| | Minutes From 2011 Summer Meeting
- Jim Van Wychen, Secretary |
| | Report of the President
- Mike Moss, President |
| | Report of the Executive Director
- Tom Lochner
Executive Director |
| | Report of Legislative Counsel
- Ron Kuehn
DeWitt, Ross & Stevens S.C. |
| | Report of the Committees |
| | Election of Directors
- Nominating Committee |
| | Miscellaneous Business
- Water Use Reporting, Wisconsin DNR |
| 2:30 PM | Adjourn |



WSCGA Summer Meeting - August 9, 2011

Price Cranberry Lake
Phillips, WI

Minutes

The 2011 Wisconsin State Cranberry Growers Association Summer Meeting was called to order by President Mike Moss on August 9, 2011 at approximately 1:15 PM at Price Cranberry Lake Cranberry marsh, Phillips, Wisconsin hosts for the event. A recognition plaque was presented to Greg Spacek, Marsh Manager for hosting the event, and providing the marsh tours.

Secretary's Report: Nodji Van Wychen moved and Heidi Slinkman seconded a motion to waive the reading of the minutes from the January 25, 2010 Winter Meeting and to approve the minutes as printed. Motion carried. The WSCGA Board of Directors were introduced and thanked for their work throughout the year.

Special guests were introduced: Warrens Cranberry Festival Queen, Devin Prellip, Princesses Danielle Hiniger & Taylor Burkhalter; Representatives from Congressman Shawn Duffy's Office and Senator Herb Kohl's office; Cranberry Institute Executive Director Terry Humfeld and USDA Cranberry Marketing Committee Executive Director David Farrimond.

Anniversary recognition was presented to:

Turner Creek Cranberry Co., Pittsville - 25 years
Badger Cranberry Co., Shell Lake - 100 years
Price Cranberry Lake, Phillips - 100 years

Executive Director, Tom Lochner extended his thanks to Greg Spacek and all the crew at Cranberry Lake and to Administrative Assistant Jane Anderson & Bruce Anderson for their efforts in organizing and set up for this year's Field Day. Thanks were also extended to Jon & Gloria Gottschalk, the mini clinic presenters and to Matt Lippert for providing support for the presentations. Updates were provided on UW-Madison staff and graduate study program, Wisconsin Department of Agriculture Trade and Consumer Protection –Block Grant Program; cranberry research initiative including research station and ARS scientist personnel and the new product introduced at the Wisconsin State Fair - "Cranberries on a Stick".

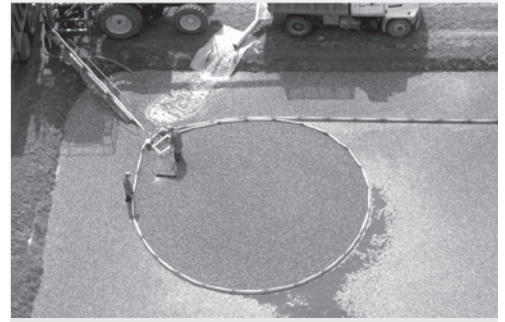
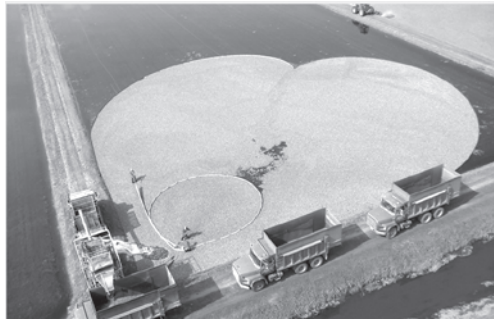
Old Business: None

New Business: None

David Amundson moved and Diane Moss seconded a motion to adjourn the annual meeting of the Wisconsin State Cranberry Growers Association. Motion carried.

Respectfully submitted,

Secretary WSCGA
James Van Wychen



President's Message - Mike Moss

On behalf of your WSCGA, I would like to welcome you to the 2012 Wisconsin Cranberry School, WSCGA Winter Meeting and Trade Show. Please join me in thanking the Education Committee for organizing another informative and interesting program for us. These two days are one example of how your Association is striving to meet our mission statement, "...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."

Wisconsin has become the leader in the Cranberry Industry. If we want to continue to lead the Industry into the future we need to evolve to meet the ever changing demands of our world. The WSCGA is only as strong as its membership. Because we have a united membership under one voice we continue to be a strong leader. We want to assure members that their money spent on dues is a proactive step toward investing in our future. Since 1887 the cranberry industry has always understood the value of working toward being proactive for the benefit of its members. Legislators are always looking for new ways to regulate the way we farm.

As we go through uncertain times your Association continues to be a stable and united force for the industry. As always, please use this opportunity to approach myself or any other board member with any questions or concerns you may have regarding your Association and industry.

Being on the board has allowed me to step off of the farm and see how things are done on a state and federal level. Through this new experience I was able to learn how government works, and see how the Association works for its membership.

Thank you for allowing me to serve as your president for the past two years. I have enjoyed learning how the Association functions and appreciated this opportunity. I look forward to seeing all of you over the next couple of days.



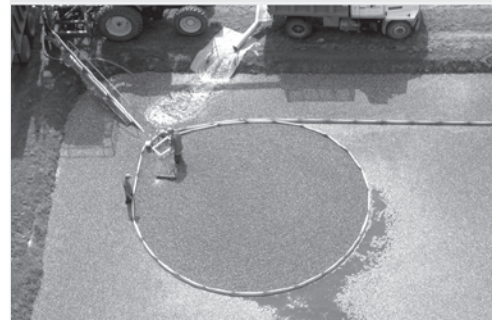
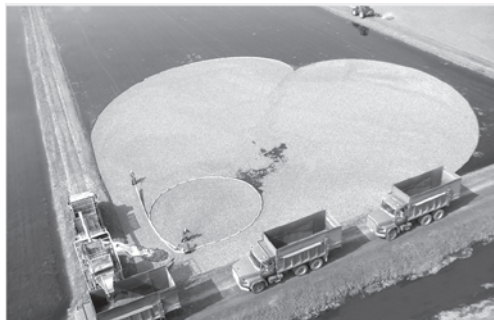
From the Executive Director, Thomas Lochner

The WSGA Winter Meeting allows us to take a look at the progress we have made in the past year and to set a course for the next. In the meeting this year we are taking a little bit of a different approach.

The Board of Directors felt it was important to communicate to the membership information about the dynamic team that works every day on your behalf. We all recognize the tremendous investment that you make in this organization. We want you to understand how the dues you pay are invested to provide returns to benefit the Association. We also want to make sure that we are conducting the programs you want and expect and how you can use the tool that is the WSCGA.

Whether it is our staff in or out of the office or the consultants we use, members should know that they are in place to serve you. The board relies heavily on committees to assist in developing programs and implementing them. The committees advise the board on important topics such as water use, quality, communications, promotions or educational programs. WSCGA is committed to making sure the programs are designed to be flexible to respond to needed changes. At the same time, we are proactive in implementing programs that position the industry for favorable outcomes in the future.

But it all starts with you the member writing the check to support the WSCGA. After that it requires your participation to insure the services of the association meet your needs. Thank you for your membership this past year and for your continued support of the WSCGA.



WSCGA Annual Report

The Wisconsin State Cranberry Growers Association was formed in 1887 to serve the state's newly emerging cranberry industry. Some 125 years later the organization continues to work to meet its mission of providing quality programs for members to allow the industry to prosper.

WSCGA is organized as a nonprofit non-stock corporation governed by a nine member Board of Directors. The board is advised by a number of committees on topics from Public Policy to Promotion, Education programs and fundraising events used in support of benevolent causes. The association employs professional staff and consultants. The board, committees, staff and consultants work together as a team to develop and implement programs for the membership.

THE TEAM

WSCGA Board of Directors

Mike Moss, President

Mike, his wife Diane and his family own and operate Elm Lake Cranberry, west of Wisconsin Rapids. Mike has served on the WSCGA board since 2007 and as president since 2010.

David Amundson, Vice President

Dave's family operation Wisconsin Moss Co. and Amundson Cranberry is located outside of Babcock where he farms with his wife Jill. Dave was elected to the board in 2009 and as Vice President in 2011. Dave is a member of the Administration Committee, Personnel Committee and the Cranberry Energy Working Group,

Jim Van Wychen, Secretary

Jim and his family grow cranberries near Warrens, Wisconsin. Wetherby Cranberry Co. has been producing cranberries for more than 100 years. Jim was elected to the board in 2006 and as Secretary in 2006. Jim also serves on the Cranberry Energy Working Group.

Heidi Slinkman, Treasurer

Heidi joined her family operation of Gaynor Cranberry, west of Wisconsin Rapids, in 2006. She also serves on the Board of Directors for the Cranberry Institute and has been a member of the WSCGA Board since 2007 and currently serves as Treasurer. She is a member of the Administration Committee, Cranberry Energy Working Group and the Leadership Development Committee.



Nicole Hansen

Nicole is part of Cranberry Creek Cranberries in Juneau County. She has served on the WSCGA Board since 2009. She is a member of the Personnel Committee, Chairs the Research Committee, is part of the Cranberry Energy Working Group as well as the Education Committee.

Mark Mahoney

Mark joined the board in 2011 and is part of Owen Rock Cranberries in Adams County, the host site for the 2012 WSCGA Summer Meeting, Field Day and Trade Show. He serves on the Public Policy and Environmental Affairs Committee, Research Committee, and as WSCGA representative to the Cranberry Museum, Inc.

Carl Salzwedel

Carl and his family own and operate Salzwedel Cranberry near Warrens. Carl was elected to the board in 2009. He is a member of the Research Committee and WSCGA representative on the Cranberry Museum, Inc. Board of Directors.

John Stauner

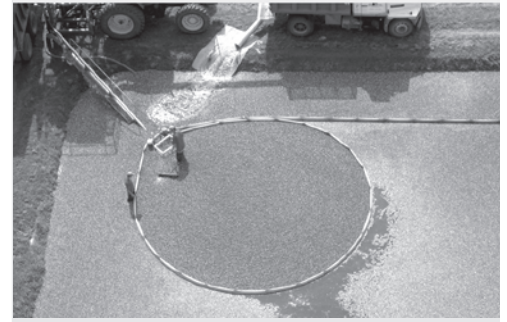
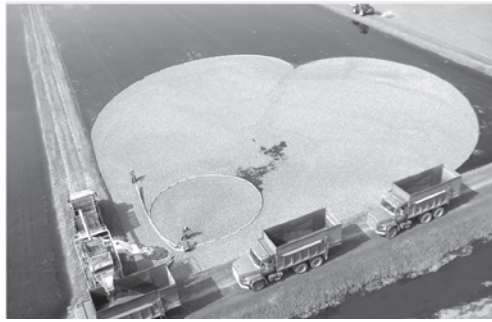
John owns and operates James Lake Farms near Three Lakes. John was elected to the board in 2008. He is a member of the Cranberry Energy Working Group and the Nominating Committee.

Tyler Walker

Tyler works with his family at Walker Cranberry Co. 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 Nominating Committee.

Rebecca Harbut

Rebecca serves as an ex office member of the board in her role as the UW Extension Fruit Crop Specialist. She assists with the Research and Education Committees.



WSCGA Committees

Public Policy and Environmental Affairs Committee

(Bill Hatch – Chair, Mike Bartling, Kay A. Finch, Bryan Heuer, Richard D. Indermuehle, Gary Jensen, Randy Jonjak, Bill Klouda, Greg Knorr, Mark Mahoney, William Metcalf, Al O’Leary, Jim Peterson, Fran Podvin, Fred Prehn, Dan Rayala, Andy Reitz, Russ Rifleman, Gary Roberts, Scott Schultz, Clare Searles, Craige Scott, Ryan Walker, Tyler Walker, Luke Weiland)

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 of disbursements from the restricted account for water and wetlands.

Development Fund Committee

(Ben Rezin – Co Chair, Vicki Nemitz – Co Chair, Asa Bennett, Al Campbell, Tim Comeau, Karen Doers, Barb Hendricks, Dustin Powell, Jamie Rezin, Doug Rifleman, John Rose, Mary Sawyer, Gordy Seamans, Drew Swendrowski, Nodji Van Wychen)

The committee is responsible for efforts by the association to raise funds in support of important programs such as undergraduate scholarships, support of graduate students conducting research on cranberries, the establishment of an experiment station for cranberries in Wisconsin and the mission of the Wisconsin Cranberry Discovery Center. Since the committee held its first event in 1991 it has raised over \$238,000 in support of these programs.

Administration Committee

(Heidi Slinkman – Chair, Bob Duckart, Greg Fanning, Bill Hatch, Fran Podvin, Russ Rifleman, Scott Schultz, Ryan Walker)

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.

Education Committee

(Leroy Kummer- Chair, Bob Eysich, Steve Hahn, Nicole Hansen, Rebecca Harbut, Jason Hatch, Matt Lippert, Tod Planer, Jayne Sojka, Nodji Van Wychen, Pam Verhulst)

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 mini-clinics.



Public Relations Committee

(Nodji Van Wychen – Chair, Kathy Henkel, Sue Indermuehle, Diane Moss, Amy Nemitz, Jim Peterson, Jessica Rezin, Andrea Weiland)

The committee is responsible for generating 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.

Research Committee

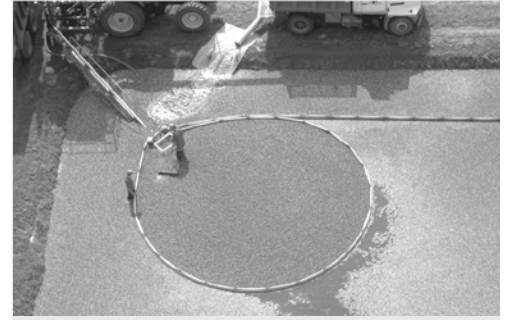
(Nicole Hansen – Chair, Suzanne Arendt, Stephen Brown, Tim Dittl, Kay Finch, Edward A. Grygleski, Jeff Habelman, Mark Mahoney, Carl Salzwedel, Scott Schultz, Jayne Sojka, Pam Verhulst, Andy Walker)

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.

Leadership Development Committee

(Greg Fanning – Chair, Amy Nemitz, Heidi Slinkman, Nodji Van Wychen)

This committee was created by the board to develop and implement a program to develop leaders from the grower community to ultimately take roles in the Association on committees, working groups or the Board of Directors.



WSCGA Staff

Tom Lochner, Executive Director

Tom Lochner was named as the first WSCGA Executive Director in July, 1989. 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 he represents WSCGA at varying meetings including everything from University Research and Extension, Federal, State and local governmental. He also is responsible to coordinate the activities of the 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 he 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.

Jane Anderson, Administrative Assistant

Jane Anderson joined WSCGA in February of 1990. As Administrative Assistant she is responsible for keeping the office in Wisconsin Rapids up and running smoothly. She coordinates the Associate Member program and works with the Development Fund Committee to plan and hold the annual Cranberry Open Golf Outing and the Sporting Clay Shoot.

In managing the Trade Shows for WSCGA she has helped build them into a premier event in the industry. The Winter Trade Show has grown to over 100 exhibitors selling out each year. At the Summer Trade show, participation is also high on the part of exhibitors approaching 100 indoor and outdoor booths. She is also responsible for keeping the WSCGA website up to date and fresh. And, when growers call with a question she is quick to find an answer or guide them to the right person to assist them.

Crystal Johnston

Cris joined the staff at WSCGA in April, 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.

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



Tod Planer, Farm Conservation Planning Coordinator

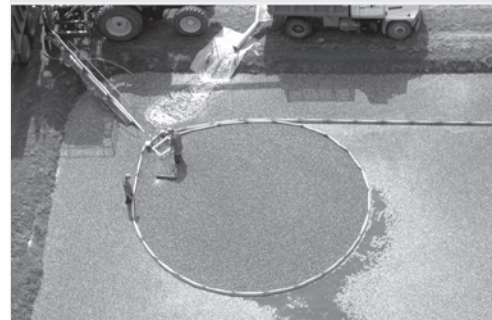
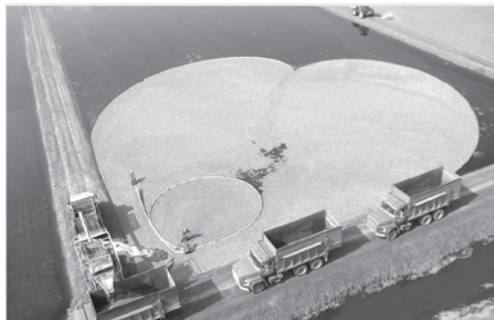
Upon his retirement as the Wood County Extension agent 2002, he began a second career as a contractor for the WSCGA. In that role he helped to develop and implement Whole Farm Conservation Plans for cranberry growers. Early efforts included tailwater recovery pilot projects and nutrient management. They 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 two 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.

Julie Ammel, USDA NRCS Cranberry Conservation Liaison

While not an employee of the association, Julie works out of the WSCGA office to assist growers with conservation programs. As an NRCS employee she works for USDA with cranberry growers.

In this capacity she helps growers apply for and receive cost sharing for conservation practices. She also helps set up and conduct sessions to qualify growers to write their own nutrient management plans to meet state requirements. Under the agreement with NRCS we have seen well over a million dollars in cost sharing funds distributed to growers for everything from nutrient and pest management to irrigation system upgrades and tail water recovery.



Association Consultants

DeWitt

Ross & Stevens s.c. Law Firm

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 have developed expertise in niche areas but still understand the big picture.

The Government Relations team at DeWitt Ross & Stevens is the largest lobbying group in Wisconsin. Because they are located directly on Madison's Capitol Square, WSCGA members often meet at their offices to strategize with Legislative Counsel Ron Kuehn and Jordan Lamb and then walk 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 1989 when the industry faced the most significant challenge to the rights of growers to access water. During the years Ron has worked for WSCGA on issues 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.

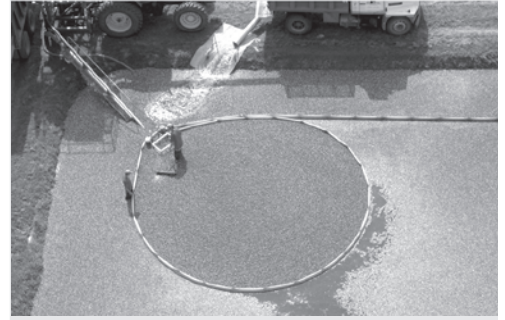
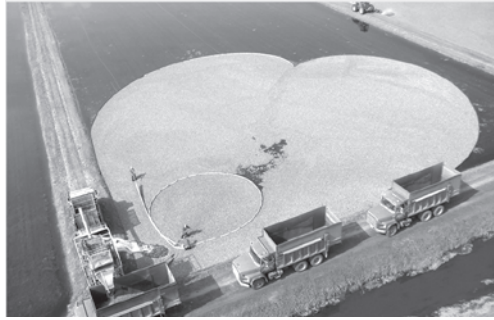


Jordan Lamb is an attorney and lobbyist whose expertise in environmental regulation is a particular asset to WSCGA and our members as they navigate the interplay between state and federal regulations and running a successful business. Jordan was intimately involved with the creation and implementation of the Great Lakes Compact in Wisconsin on behalf of Wisconsin agriculture. She also was a major voice for us in the development of the State nonpoint source pollution program and the rewrite of NR151 and ATCP50. Her attention to detail and her understanding of the interplay between statutory and regulatory changes and the business of farming in Wisconsin provides a critical component to WSCGA's representation.



Key Issues in 2011

- **DNR - Water Use Reporting.** The WSCGA has been working with the DNR water section for over a year on a protocol that growers can use to estimate water use for purposes of complying with the statewide water use reporting rules that were adopted as a part of the Great Lakes Compact. The cranberry-specific worksheets should make compliance with this administrative rule a simple and straightforward process. Recordkeeping began in 2011 and the first report will be due in the spring of 2012. The deadline corresponds to the high capacity well reporting deadline.
- **DNR/FEMA – Floodplain Regulations Applied to Cranberry Farms.** Following the breach of the levy at Lake Delton, Wisconsin embarked on a revision to many county floodplain maps. As a result, several counties focused on cranberry activities that are conducted near or in the regulatory floodway. Because of the protections in place under Wisconsin's cranberry laws and as a result of several Supreme Court cases, cranberry activities related to the maintenance and construction of dams, dikes and ditches are not subject to either local ordinances or Wisconsin statutes. Rather, federal standards apply. Therefore, in order to clarify the applicable standards for these projects and to ensure a uniform application of the laws statewide, the WSCGA is working with DNR, FEMA and the Wisconsin Counties Association on a model ordinance for counties to adopt, which will impose the federal regulatory floodplain standards on certain cranberry construction projects. We expect to conclude this process in 2012.
- **DNR – WPDES Permits for the Application of Pesticides to Waters of the State.** Following the U.S. 6th Circuit Court decision in *National Cotton Council*, the U.S. EPA was required to develop a system of general and individual permits for the application of pesticides to waters of the United States. Before this court decision, the application of pesticides was governed solely by FIFRA and no separate Clean Water Act regulation was imposed. However, the WSCGA and its legal team have determined that the application of pesticides to cranberry beds does not constitute the application of pesticides to jurisdictional waters. Accordingly, no WPDES permit for such applications should be required. We have presented this opinion to the WDNR and believe that they will concur. We expect to hear from them early in 2012.
- **Legislature – Development of Revisions to Wisconsin's Wetland Regulations.** The Legislature and the Walker Administration spent a number of months in 2011 working on legislation to reform wetland disturbance permitting in Wisconsin. The WSCGA, through its legislative counsel, participated extensively in this process. We believe we will see draft legislation intended to reform the wetland permitting process very early in 2012. Wetland legislation will be a key issue for 2012.
- **Legislature – Transportation Reforms.** In the fall of 2011, the Legislature passed and Governor Walker signed a number of transportation reforms. The fall harvest truck weight exemption was extended through December 31.
- **DOT – Relocation of Highway 54.** The DOT's proposed plan to straighten Highway 54 would have split a cranberry farm approximately in half. We worked out an amendment to the DOT's relocation plan that successfully accommodated the needs of the affected grower.
- **DNR – Frac Sand Mining.** Because of the increased interest in frac sand development in Wisconsin, many cranberry growers have been provided with an opportunity to sell or lease property to sand mining companies. Inevitably an issue arose as to whether the cranberry laws prevented the requirement for a mining permit and prevented the application of Chapter 30 permits to the mining operation. The WSCGA legal counsel determined, along with the DNR, that Wisconsin's cranberry laws are limited to cranberry activities exclusively and do apply to other activities on cranberry lands, including frac sand mining.



Key Issues Expected in 2012

- DNR/DATCP – Computing Phosphorus Losses from Cranberry Farms for Nonpoint Source Pollution Compliance.** The nonpoint source pollution performance standards allow for an alternative method for compliance with Phosphorus limits other than the P Index. Because the P Index is not applicable to cranberry farms, the WSCGA has been working with a consultant to develop an equivalent model. We expect to complete this modeling development in 2012.
- DNR – Water Use Reporting.** As we near our first reporting deadline for water use, the WSCGA continues to work with DNR on ensuring that cranberry water re-use is properly credited.
- Protecting Access to Water.** Growers in the Central Sands area of Wisconsin face special challenges to high capacity well use and drainage water use. The WSCGA will maintain its participation in the Groundwater Task Force to ensure continued access to water for growers in this area and throughout the state.
- Continuing Protection of the Cranberry Laws.**



ZEPPOS & ASSOCIATES INCORPORATED

Zeppos & Associates, Communications and Public Relations

The Zeppos & Associates team is made up of a group of talented and creative public relations professionals with a wide variety of backgrounds. The company's stated goal is to be the best public relations firm, not the biggest.



Evan N. Zeppos, APR, has more than three decades of professional achievement 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. A Milwaukee Magazine survey of local public relations professionals ranked Zeppos as the top communications professional in the metropolitan Milwaukee area. He has also earned national accreditation from the Public Relations Society of America and is a member of its Counselors Academy.



Kris Naidl, APR, joined Zeppos in 1994 at which time she began working with the WSCGA. Her work on the association's behalf has been recognized through the receipt of 15 Paragon Awards from the Southeastern Wisconsin Chapter of the Public Relations Society of America (PRSA), as well as a Best of Show Award for her strategic communications work in 2009 to assist in addressing state regulations to aid industry expansion in the state. She coordinates annual harvest and year-round communication efforts for the association.

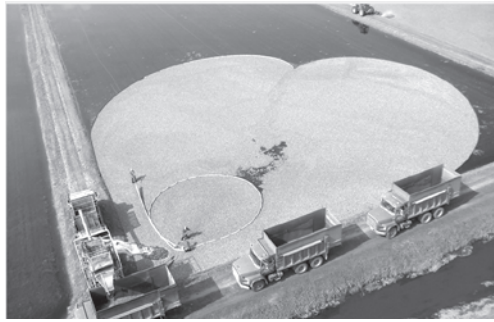
Prior to joining the firm, Naidl was the assistant director of community relations at the largest substance abuse prevention agency in Wisconsin. She has also held positions as a writer/copy editor a southeastern Wisconsin magazine and worked for a state legislator. Naidl has also earned accreditation from the Public Relations Society of America and is a member of its Counselors Academy.



Mikaela Balfany is an Account Executive at Zeppos & Associates and works on a variety of projects including strategic planning, writing, media and community relations, social media outreach, special event planning and more. She has been working with the WSCGA on ongoing national publicity efforts to promote Wisconsin's cranberries since joining the firm in 2008.

Prior to joining Zeppos & Associates, Balfany was a public information officer for a cabinet-level state agency where she was responsible for speech writing and media relations, as well as served as editor of the agency's quarterly newsletter.

These professionals and others at Zeppos & Associates have been working with the association on a variety of projects since 1990. The firm's mission with WSCGA is to help tell the story of Wisconsin cranberries not only statewide, but regionally and nationwide. These efforts have proven successful to the point that media coverage has been garnered nationally and internationally.



Highlights from the past year include:

- Harvest** – Each year Zeppos & Associates assists with the WSCGA's media efforts surrounding the annual cranberry harvest. This year's efforts focused on the crop projection announcement, a syndicated feature article on cranberry recipes, and a Google AdWord campaign to draw people to the website, as well as a special University of Wisconsin-Madison Chinese Champions event and media day at Elm Lake Cranberry Co. to officially kick off harvest. Zeppos & Associates also coordinated any additional media needs throughout the harvest season, including a day of live news broadcasts by Fox Business News from Cutler Cranberry Co. and managed the association's social media accounts throughout the busy harvest and holiday season. The harvest media effort generated more than 843 traceable media placements and gained more than 45 million impressions, more than \$400,000 in advertising value and well over \$1.2 million in publicity value.
- Wisconsin State Fair** – For more than a decade, Zeppos & Associates has coordinated media efforts for the WSCGA booth at the Wisconsin State Fair. The 2011 fair marked an unveiling of a new WSCGA product that proved to be more successful than expected – Chocolate Covered Cranberries on a Stick. With the promotion of this new product through traditional and social media, WSCGA was featured on television news throughout the state as well as several Milwaukee radio shows and websites and the Milwaukee Journal Sentinel. In the end, 2011 saw a more than 127 percent increase over 2010 booth sales and perhaps the highest booth product sales ever. Additionally, Zeppos & Associates helped identify and chose a Milwaukee promotional company to staff the booth in the Wisconsin Products Pavilion, coordinated with an actor to portray Cary Cranberry for the duration of the fair and partnered with We Energies to feature cranberries on its cooking stage on three days of the fair.
- Cranberry Night at Miller Park** – To leverage WSCGA's sponsorship with the Milwaukee Brewers, Zeppos & Associates helped coordinate Cranberry Night at Miller Park. As part of this special night, a grower was given the opportunity to throw out a ceremonial first pitch at Miller Park, special cranberry messages were prepared for both in-stadium announcers and Bob Uecker's radio broadcast, and Cary Cranberry was on hand to visit with fans and hold the finish line for the sausage race.
- Web and Social Media** – Zeppos & Associates manages the WSCGA's website and social media accounts, including Facebook, YouTube and Twitter, on an ongoing basis. This includes reviewing and updating the website to keep it fresh and relevant. In 2011, the WSCGA website was visited nearly 37,000 times by more than 26,000 unique visitors. Zeppos & Associates also works to make sure there is consistently new content on the WSCGA's social media channels. Since 2010, WSCGA's Twitter account (@Wiscranberries) has increased followers by 28 percent, and continues to build relationships with influential Wisconsin news outlets, politicians and more. The Facebook page has increased fans by 34 percent since 2010. Zeppos & Associates has used both platforms as a way to communicate to the general public what's going on in the industry, as well as build and maintain relationships.
- Curriculum** – One of the main web focuses in 2011 was creating a new curriculum website. Zeppos & Associates worked with the association and growers to revise the curriculum to better meet the needs of both teachers and students throughout the state. The curriculum is designed for teachers of grades 3 through 5 and includes lessons on cranberry history, culture, agriculture and science. Zeppos & Associates worked with growers and web programmers to develop a variety of interactive online tools that engage students in critical thinking as they learn about cranberries. The curriculum was officially rolled out at the start of the 2011-2012 school year by distributing a news release to local and agriculture publications. In order to reach teachers, Zeppos & Associates also coordinated with the Department of Public Instruction's and the Wisconsin Council for Social Studies to include information about the new curriculum in both organizations' teacher newsletters.



BROYDRICK & ASSOCIATES

Broydrick and Associates, Federal Legislative Counsel

Founded in 1981 by Bill and Cynthia Broydrick, Broydrick & Associates is a premier lobbying firm today. The Broydrick Team consists of some of the best and brightest public affairs experts around, who bring experience from the private and public sector. With offices located in Washington D.C. and Milwaukee, Wisconsin they bring a unique blend of local, state and federal savvy to their clients.



Bill Broydrick served as former Congressman Les Aspin's press secretary, managed Congressman Robert Cornell's campaign and became former Wisconsin Governor Patrick Lucey's senior administrative assistant. In 1978, Bill was elected to the Wisconsin State Assembly and in 1993, led the Office of Legislative Affairs where he served as a consultant to the Department of Defense.

In 1981, Bill founded Broydrick & Associates, directing its rise to a nationally known firm with offices in Washington, D.C. and the Midwest. He has developed a vast network of contacts and offers outstanding strategic planning and grassroots organization.



Fred Starzyk has over 15 years of legislative and political experience both in Washington, D.C. and Michigan, Fred is a seasoned operative who has achieved numerous political and legislative successes over the course of his career. He was a veteran campaign manager and senior Capitol Hill staffer for U.S. Congressman Sander Levin and managed numerous state and local campaigns in Michigan. He also lobbied on behalf of a large, statewide organization in Lansing, MI on economic development, consumer protection and environmental issues.

Broydrick and Associates have been focused on assisting the WSCGA and the Cape Cod Cranberry Growers Association as we work to enhance cranberry research on a national basis. Their work secured funding for three USDA Agricultural Research Scientists who focus on cranberry. This funding has placed two programs at UW Madison to research cranberry insect pest problems and cranberry genetic improvement. Currently they are assisting the organizations to secure funding for improvements to research facilities in Massachusetts and Wisconsin.

WSCGA Service to Industry Awards
Presented January 10, 2012

Pam Walker

Pam Walker, along with her husband Ryan and sons Tyler and Andy own and operate Walker Cranberry in the Town of Cranmoor. The fresh fruit operation is transitioning to the third generation of the Walker family

Pam has served the WSCGA and industry in a variety of roles. As president of the South Wood County Historical Corporation she created an archive of WSCGA and industry documents to make sure that they were preserved and available to future generations.

While she served as Chair of the WSCGA Education Committee education programs grew. She helped write the first Cranberry Curriculum Packet for fourth grade social studies. Under her leadership the WSCGA developed a number of educational brochures celebrating the history and environmental stewardship cranberry growing in Wisconsin. The committee also increased its participation in the planning of the annual Wisconsin Cranberry School as well as other grower educational programs.

When the Cranberry Museum, Inc. was developing the Wisconsin Cranberry Discovery Center she chaired the committee that identified a vendor to create the museum exhibit hall and then worked with a small committee to create the Display Hall Exhibits that are a key component of the Wisconsin Cranberry Discovery Center in Warrens.

Just this past year she worked with the WSCGA in securing grant funds to develop a new interactive website for school classrooms. This cutting edge tool utilized components of the program initially developed by the Cape Cod Cranberry Growers Association, materials from the WSCGA and video shot as part of an Into the Outdoors program. Pam led the effort and did most of the work which resulted in the final product now available online to schools and classrooms everywhere.

She has been an active member of the WSCGA and encouraged her two sons to become involved as well. Because of her efforts on education the WSCGA Board of Directors is pleased to present her with the Service to Industry Award.

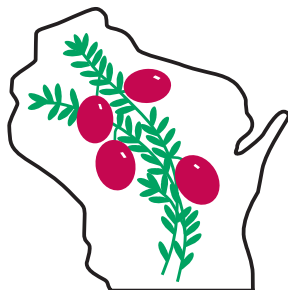
Leroy Kummer

Leroy Kummer began his career with Ocean Spray in 1988 as a summer intern working as an Integrated Pest Management Field Scout. After graduating from the University of Wisconsin – Stevens Point with a degree in Soil Science, Leroy was hired full time with Ocean Spray in the spring of 1989. Over the last twenty plus years with Ocean Spray he has advanced within the company to his current dual role as an Agricultural Scientist and as a manager at the Ocean Spray-Tomah Receiving Station.

Through the years he has provided a wide range of support for various crop researchers from across the nation. He has helped identify many potential research projects, helped secure research sites and provided field support for a variety of research programs. He has collaborated with others to create grower educational tools such as the Pocket Field Guide of Wisconsin Cranberry Insect Pests and most recently as a supporter of the work to develop the latest Weeds of Wisconsin Cranberry Marshes publication. He is the current Chair of the WSCGA Education Committee and a member of the WSCGA Research Roundtable.

Leroy has been a speaker at numerous WSCGA educational workshops and the Wisconsin Cranberry School. He assisted the WSCGA and USDA NRCS in developing technical standards for pest management and nutrient management practices. He has provided numerous growers with assistance in writing nutrient management plans.

In recognition of his career of service to the WSCGA and Wisconsin's cranberry growers the Association is pleased to present him with the Service to Industry Award.



**Wisconsin
State
Cranberry
Growers
Association**

F O U N D E D 1 8 8 7
