



# THE BRAMBLE

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THE NEWSLETTER OF THE NORTH AMERICAN RASPBERRY & BLACKBERRY ASSOCIATION, INC.

## In February, blackberry and raspberry growers, academics, and industry members came together to celebrate the 20th annual North American Raspberry and Blackberry Association (NARBA) conference.

Historic Wilmington along the Cape Fear River in North Carolina served as the gathering's scenic backdrop. Over 230 attendees and 19 vendors filled the convention center for two days of educational talks ranging from the fundamentals of caneberry production, advancements in breeding, and innovative management strategies in IPM, just to name a few.

Thanks to the 2024 conference partnership between NARBA and the North Carolina Caneberry Association, attendees were able to learn a great deal about NC's blackberry and raspberry industry and its evolution. Dr. Gina Fernandez from NC State University, took the audience on a trip down memory lane from

the birth of the industry in NC to today's statewide wholesale production. The growth of the industry in NC was made evident during the grower spotlight presentation from Cal Lewis, owner of Lewis Nursery and Farm, when he showed the farm's diversification strategy to grow strawberries, blueberries, and blackberries as well as long-cane raspberries to extend seasons and to stay competitive.

The NC Commissioner of Agriculture, Steve Troxler, delivered an inspirational key note speech highlighting the strength of the state's agriculture as well as the challenges of rapid land development facing the industry and how the Department of Agriculture is fighting for state-wide farmland preservation programs to



The North Carolina Caneberry Association was the host sponsor of the 2024 20th Annual NARBA Conference in Wilmington, North Carolina. Board members gather for a photo with NC Commissioner of Agriculture, Steve Troxler.

**"The arrangements and coordination were one of the best we have had."**

~ Conference Survey Respondent

protect NC farms. The speech struck a chord with attendees across North America who are facing similar development pressure.

*Continued on page 3*



Laura McDermott, Regional Berry Specialist, Cornell Cooperative Extension, opens the Fundamentals of Caneberry Workshop at the 2024 20th Annual NARBA Conference in Wilmington, North Carolina, on February 26th, 2024.

## Table of Contents

2024 Conference Recap.....	1, 3, 6, 7, 9
Briefly Speaking .....	2
Events.....	2
2024 Executive Council Elections .....	2
2024 Farm Tour Recap .....	3, 5, 9
Spring Caneberry Chores.....	4
2024 Conference Presentations Available....	4
New Council Member: Pete Rizzo.....	11
Arkansas Blackberry Growers Association Award of Thanks .....	11
Research Foundation.....	11, 12
2022 Census Data Report .....	12
Seasonal Report: Caneberry Pollination.....	14, 15, 16
Research Report: Virus Diagnostic Protocol.....	16, 19, 20
Seasonal Report: Blackberry Rust.....	20, 21, 22
2025 NARBA Conference Announcement ....	22



**The BRAMBLE** is a quarterly publication of the North American Raspberry & Blackberry Association (NARBA), and is a benefit of membership in the association. For membership information, reprint permission, and advertising rates, contact:

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## Information for Members

NARBA's "Account Manager" feature now allows you to have your own login and password. We created a tutorial video which walks members through the steps to reset their password and highlights the features of this section: <https://youtu.be/SQyPKwI5gyM>

## EVENTS

Please contact NARBA if you have upcoming events you wish to be included.

**January 9th-11th, 2025 – SE Regional Fruit & Vegetable Conference,** Savannah, Georgia

**Week of February 3rd, 2025 – NARBA Annual Conference,** Hawaii (Island To Be Announced).

**October 7th-9th, 2025 – Berry Health Benefits Symposium,** Philadelphia, Pennsylvania

## Briefly Speaking

Hello everyone,

It was so wonderful to see so many of you in Wilmington North Carolina for our 2024 NARBA annual conference. And for those of you who were not able to join us this year, we look forward to seeing you in 2025 in Hawaii!

This year's conference was a very successful event and brought together over 230 people from across the United States and internationally. It was one of the largest events we have hosted in recent years and Darcy and her team deserve all the praise for their efforts to bring all of the details together. We also really appreciate the collaboration with the North Carolina Caneberry Association. Their local knowledge and partnership was key to the success of the event.

I always come away from NARBA conferences with new knowledge, new connections and a long list of notes and ideas to follow up on. It is a great refresh before the season gets going. And this year the blackberry season already seems to be off and running! Many plants in Arkansas leafed out 10-15 days ahead of average.

As we shift into field season don't forget that we are looking for ways to provide opportunities for networking and education between our annual meetings. Keep an eye out for some webinars we are working to line up for later this spring or fall. Also make sure you follow us on social media, we are active on [Facebook](#) and it is a great way to stay up to-date with what is going on in the caneberry industry on a weekly basis.

As always please don't hesitate to reach out to me directly to share your ideas for how to keep NARBA growing and serving the caneberry industry! I always enjoy hearing from all of you.

- Amanda McWhirt, NARBA President & Region 6 Representative, Associate Professor- Fruit and Vegetable Extension Specialist, Department of Horticulture, University of Arkansas System Division of Agriculture - [amcwhirt@uada.edu](mailto:amcwhirt@uada.edu)



## NARBA NEWS

### Executive Council Elections

At the NARBA Annual Meeting on February 28th, 2024, members elected three candidates for the four open seats on the Executive Council (NARBA's board of directors). Three seats were filled by incumbent representatives returning for a second term, and we welcomed a new representative for the Region 2 position. These members have been elected for three-year terms running 2024-2027.

**Region 2:** Peter Rizzo, Nourse Farms, South Deerfield, Massachusetts

**Region 6:** Amanda McWhirt, University of Arkansas, Little Rock, Arkansas

**At Large:** Ken Hopps, Sun Belle, LLC, Schiller Park, Illinois

**At Large:** Karen Blaedow, NCSU Extension, Hendersonville, North Carolina

NARBA's 2024 officers were elected at an Executive Council meeting on February 26th, 2024 via unanimous votes: Amanda McWhirt as NARBA's president, Whitney Phillips as Vice President, and Ben Butler as Treasurer.

To see which states are in which region and contact information for all members of the Executive Council, see the back page of the newsletter. Also see page 11 for an introduction to our newest board member, representing Region 2, Peter Rizzo, Horticulturist at Nourse Farms.



Continued from page 1

Attendees lucky enough to attend the sold-out North Carolina farm and industry tour on the last day of the conference were treated to an in-depth look at North Carolina State University's Castle Hayne Horticulture Crops Research Station, Carolina Berry Group's long-cane tunnel production, and a research update on the trials being conducted using locally sourced pine bark substrate at Lewis Nursery and Farms. The Lewis'

**"The combination of educational sessions and farm tours on the same day makes for a very long day. Please consider running the farm tours on a day dedicated for that purpose."**

~ Conference Survey Respondent

farm staff and family then rolled out the welcome mat for attendees and provided a farm tour meal that exemplified true southern hospitality. For many, the dinner was a first-time experience with menu choices ranging from a low country boil to eastern NC BBQ to an oyster roast. As the North American caneberry community enjoyed this meal together the room was filled with chatter and camaraderie and proved a perfect conclusion to a very successful conference!❖

Article by  
Karen Blaedow,  
North Carolina  
State University,  
North Carolina  
Caneberry  
Association and  
NARBA At-Large  
Board Member



## NORTH CAROLINA FARM TOUR

### Warm & Windy 2024 NARBA Farm Tour

Article by Caitlyn Randall, North Carolina Department of Agriculture

March winds bring April showers and April showers bring May (raspberry and blackberry) flowers. It was a windy day indeed for the 2024



John Garner, Research Operations Manager at the North Carolina State University Horticulture Crops Research Station at Castle Hayne, talking to tour attendees. **Photo credit:** Caitlyn Randall

Raspberry & Blackberry Conference farm tours that took place on February 28th. North Carolina (NC) decided to start its windy season early, it was also in its false spring, as many North Carolinians often joke, with 70-degree temps in late February. But hey, the farm tour attendees were happy about the warmth... even if we had to hold onto our hats.

The farm tours followed a three-day conference at the Wilmington Convention Center on the beautiful Cape Fear River. The conference provided education from industry leaders, workshops and words from NC Commissioner of Agriculture,

Steve Troxler. After the conference, attendees were filled up on classroom knowledge and they were ready to get out in the field to explore.

The first stop on the farm tour was the Castle Hayne Horticulture Crops Research Station owned by North Carolina State University (NCSU) and the North Carolina Department of Agriculture and Consumer Services. Blueberries are primarily grown here, as well as raspberries and blackberries. Beautiful pink buds were already on some plants, which my camera appreciated, instead of bare

branches. Farm tour guests heard from staff about daily operations, research, working with sandy soil, heat, and tropical storms. Guests had the opportunity to look at the equipment used on the farm, step inside large coolers purchased on surplus from Fort Liberty, walk the grounds, and ask staff questions.

It was an hour bus ride through rural Eastern North Carolina to our next stop. Backroads, like the ones we were on, are what I grew up traveling on in the South. It was fascinating watching out-of-state and out-of-country guests marvel at the tall skinny pine trees lining the roads,

Continued on page 5



Vince Ferrante, Executive Vice President of Carolina Berry Group, explains to tour participants their set-up for long-cane raspberries. **Photo credit:** Caitlyn Randall



## Spring Caneberry

### Chores

*This list was developed and reviewed by Dr. Gina Fernandez, Small Fruit Specialist at NC State University and Dr. Marvin Pritts at Cornell. Chores and timing may be somewhat different in your area or for your cropping system. For recommendations for the Pacific Northwest, we encourage you to subscribe to the email "Small Fruit Update" <https://nwberryfoundation.org/the-small-fruit-update/>*

#### Plant growth and development

- ☐ Plants deacclimate quickly so buds become more susceptible to abnormally low temperatures after periods of warmth.
- ☐ Bud differentiation (additional flowers formed)
- ☐ Bud break
- ☐ Flowering
- ☐ Primocane emergence

#### Pruning and trellising

- ☐ Check buds and canes for damage – prune out any damaged canes.
- ☐ Finish pruning and make sure that all floricanes are tied to the trellis and old expended floricanes have been removed before budbreak.
- ☐ For fall-fruited raspberries and blackberries, make sure canes are mowed to the ground before primocane emergence.
- ☐ Rotate shift trellises to horizontal position before budbreak; rotate to upright position immediately after flowering.

#### Weeds

- ☐ Weed growth can be very vigorous at the same time as the bramble crop peaks. Don't let weeds get out of control. Many preemergent herbicides are most effective when applied prior to primocane emergence in spring. Some growers are having success with biodegradable mulch to suppress weeds the year of planting.
- ☐ Hand-weed perennial weeds in and around plots.

most important season for control of insects and diseases. Know what your pests are and how to control them.

#### Water management

- ☐ Caneberry plants need about 1-2 inches of water/week. This amount will be especially critical during harvest.

#### Nutrient management

- ☐ Nitrogen applications are most effective when done in two parts. Apply the first just prior to primocane emergence in spring and the second about 4 weeks later. Or, follow recommendations for seasonal fertigation application in your region.

#### Food safety

- ☐ Review food safety requirements for your farm for 2024.
- ☐ Review existing plans and forms and make updates and improvements.

#### Marketing and miscellaneous

- ☐ Service and clean coolers.
- ☐ Make sure you have enough containers for fruit in the coming season.
- ☐ Prepare advertising and signage for your stand.
- ☐ Contact buyers to finalize orders.
- ☐ Hire pickers.
- ☐ Prepare signage for field orientation; it is easier to tell pickers where to go if rows are numbered.

#### Monitoring crop ripening

- ☐ After buds start to swell, if temperatures fall below 28°F, check for injury in blackberry
- ☐ Record bloom and peak crop dates for each cultivar you grow to help with predicting future ripening dates

#### Insects and diseases

- ☐ Growers with a history of cane diseases and/or mites often find that certain fungicides (e.g. lime sulfur) and oils are most effective just prior to bud break. The period of time in the spring when the plant is flowering is the



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## Conference Presentations

The 2024 NARBA Conference Presentations are now available in the Members-Only section of our website. Once logged in to your Account Manager, visit: <https://www.raspberrylblackberry.com/member-login/conference-proceedings-archive/2024-conference-proceedings/>

Each talk listed has a PDF or video link and will open the presentation slides or a video of the presentation recording. All members have been sent information on how to access the presentations. If you have any questions, please contact the NARBA office at [info@raspberrylblackberry.com](mailto:info@raspberrylblackberry.com)



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then passing open grass fields, where the straightaways turned into cow pastures or crop fields. I chuckled at one guest pointing out chicken houses, claiming, "That's fitting considering all the fried chicken restaurants here!"

We arrived at our second stop, The Carolina Berry Group in Chadbourn. This operation is privately run and looked quite different from the farm we had just toured. The areas we visited were all under hoop houses, with plants in pots versus the ground, the plants were also supported by poles, there was drip irrigation, and the ground was laid with weed-resistant material. During the heat of the summer, The Carolina Berry Group hires a plane to paint the tops of the hoop houses to provide shade

**"Tour was great, nice to see growers in action and wonderful BBQ dinner."**

*~ Conference Survey Respondent*



*Tour guests were treated to a beautiful sunset as we wrapped up our farm visits at Lewis Nursery and Farms. Photo credit: Caitlyn Randall*

for their plants. This farm prides itself on hiring local labor as much as possible.

Lastly, we found ourselves in Rocky

Point at Lewis Nursery and Farms, Inc. This family-run farm works in partnership with North Carolina State University to do hands-on research. Since North Carolina State University is a state-supported university, Lewis Nursery and Farms must open itself to the public while in a relationship with NCSU. Lewis Nursery and Farms was happy to share their slice of heaven with us, and heaven it did look! The sun was beginning to hang low in the Carolina sky as we adventured through the hoop houses, golden fields of dried grass, and sniffed the heavenly scent of winter berries.

We were going to feast on the farm, but the roar of the March winds said no. We partook in food and fellowship at a packing house with beer, wine, sweet tea, lemonade, a Carolina oyster roast, low country boil, Eastern NC BBQ, fried chicken, mac and cheese, green beans, slaw, and hush puppies. For dessert was local ice cream sandwiches. Even though the farm

*Continued on page 9*

# NARBA 2024 Conference

**230**

**ATTENDEES**

**120**

**FARM TOUR  
PARTICIPANTS**

**18**

**SPONSORS**

**19**

**INDUSTRY  
EXHIBITORS**

**9**

**POSTER  
PRESENTERS**

**30**

**SPEAKERS**

**10**

**COUNTRIES  
REPRESENTED**

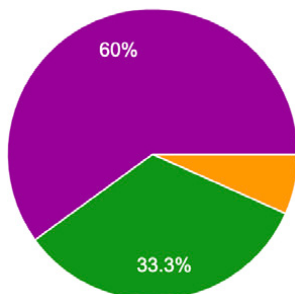
**45**

**TOTAL TALKS**

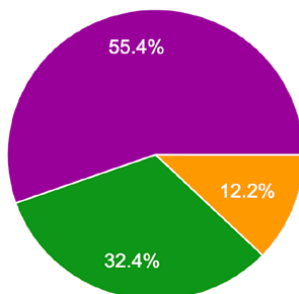
## Conference Attendee Survey

### Overall Program Evaluation | 75 respondents

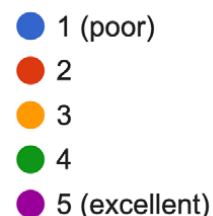
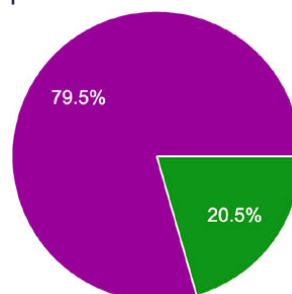
How would you rate the conference?



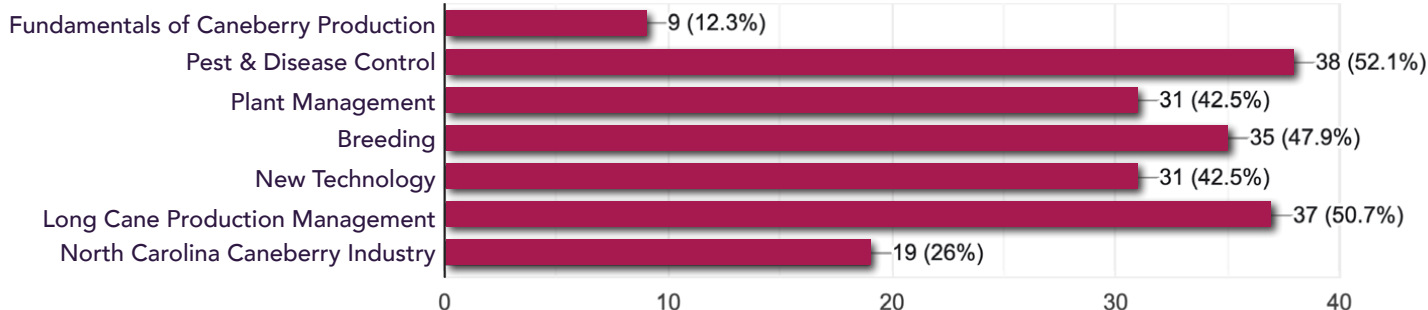
Quality of the conference content?



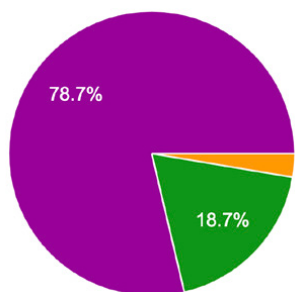
How was the registration process?



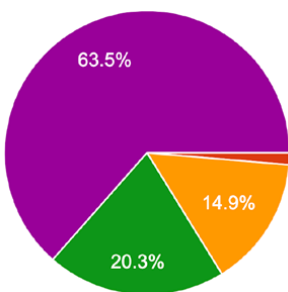
Which topics were of the most interest?



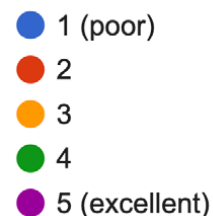
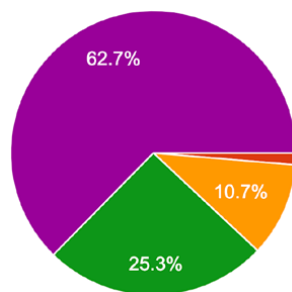
Quality of the conference facility?



Quality of the lodgings?



How was the location (Wilmington, North Carolina)?





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Continued from page 5

would have been beautiful for dinner, it was nice to see the operation of the packing house. With our faces “strawberried” from the sun, our noggins full of new knowledge, and our bellies stuffed from a Southern meal, it was time to call it a day. I would say, it was a “berry” good time being a tourist on these farms in sweet Eastern North Carolina.

Y'all come back now! ❖

**About the Author:** Caitlyn Randall works for the North Carolina Department of Agriculture and Consumer Services (NCDA&CS) full-time as a Communication Specialist. NCDA&CS has a branding program called Got to Be NC where farms across the state showcase their pride in being North Carolina grown, raised, caught, or made. Caitlyn is a North Carolina native who enjoys photography, cooking, boating, and time with family. To see more of Caitlyn's agriculture photography visit Carolina Farm Photography on [Instagram](#) and [Facebook](#).

## 2024 CONFERENCE & FARM TOUR PHOTO GALLERY







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*Action photo spraying narrow rows*

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## NARBA NEWS

### New Region 2 Executive Council Member: Peter Rizzo

We welcome Peter Rizzo as the Region 2 (CT, NH, NY, MA, ME, RI, VT) representative, and invited him to introduce himself.



Peter Rizzo is a horticulturist at Nourse Farms, where he plays a versatile role beyond traditional horticulture duties. Alongside his responsibilities in horticulture, Peter oversees new variety trialing and collaborates with breeders and license holders on licensing and royalties. With a deep understanding of the business, Peter excels in direct customer interactions, leveraging his broad knowledge to provide exceptional service. Holding a bachelor's degree in sustainable agriculture with a focus on fruit and vegetable production from UMASS, Peter is committed to advancing agricultural practices and increasing fresh produce availability to underserved communities. His career goals include sharing knowledge and technical expertise with growers to foster sustainable practices and address food accessibility challenges. ❖

## ARKANSAS BLACKBERRY GROWERS ASSOCIATION AWARD

Last month at the Arkansas Grown Conference and Expo the Arkansas Blackberry Growers Association presented an award of thanks to Dr. Amanda McWhirt, University of Arkansas Extension Horticulture Production Specialist. The award was given in recognition of McWhirt's exemplary service in organizing the Grower's Association and in appreciation of her work in promoting best practices for blackberry production in Arkansas and across the nation.

"Amanda was the one that got us together and organized the Association," said Dan Smith, Secretary/Treasurer for the Arkansas Blackberry Growers Association. "Since the University of Arkansas is known nationwide for blackberry varieties, we needed a concerted effort to promote blackberries in our state."



*Matt Wilson presents Dr. Amanda McWhirt with the Arkansas Blackberry Grower's Association Award of Thanks.*

The Association held its first annual meeting at the start of 2019 and has been promoting blackberries in Arkansas ever since. Now the association has 60 members including members from TX, MS, MO, OK and KS. The Association sponsors two annual field days, two newsletters and an annual educational conference. The Association also offers several promotional materials to their members, developed in partnership with McWhirt's program.

"Amanda was instrumental in organizing the Arkansas Blackberry Growers Association and she has been an asset to the Association ever since," Smith said. "We're thankful to have her as a part of our organization and are happy to give her this award of recognition."

Dr. Amanda McWhirt is also set to serve as the President of the North American Raspberry and Blackberry Association in 2024. ❖

## RESEARCH FOUNDATION NURSERY CONTRIBUTION PROGRAM

In September 2007, the North American Bramble Growers Research Foundation initiated a voluntary Nursery Contribution Program to raise funds for bramble research. Because raspberries and blackberries represent minor crops in all but a few states, there is a great need for the industry to step up and fund research. The program is modeled on an existing assessment program of the North American Strawberry Growers Foundation.

Raspberry and blackberry nurseries are asked to make a voluntary self-assessment of \$.01 for each plant they sell (\$1.00 for each hundred plants). Starting in fall of 2007, nurseries were contacted about this new program, with donations beginning in late 2007 for annual plant sales. These donations have more than doubled funds available to the Foundation for research grants.

*Continued on page 12*

Continued from page 11

If you are a nursery who has contributed in the past, expect an email with updated forms for your 2024 contribution during the month of April or visit [www.raspberryblackberry.com/research-foundation/donate/](http://www.raspberryblackberry.com/research-foundation/donate/) to download the current contribution form. If you are a new member or other industry member looking to contribute a portion of your sales to the Research Foundation, please contact [info@raspberryblackberry.com](mailto:info@raspberryblackberry.com). We will recognize contributing members in the 2024 Summer Bramble. ❖

## **Please Support Raspberry & Blackberry Research Through a Donation to the Research Foundation**

All donations are tax-deductible. Send a check to NABG-RF at PO Box 56587, Portland, OR 97238 or donate online at [www.raspberryblackberry.com/research-foundation/donate/](http://www.raspberryblackberry.com/research-foundation/donate/).

## **AG CENSUS DATA REPORT**

### **USDA National Agricultural Statistics Service Releases 2022 Agricultural Census**

February 13th marked the release of the 2022 Census of Agriculture, providing data on 1.9 million US farms being operated by 3.37 million farmers across the country. This is the 30th in the series of Ag Census reports which began being compiled in 1840. Information is gathered every five years

throughout 50 states, Puerto Rico and outlying territories. Data from the very detailed Census is available at many levels, national, state and county and is also categorized by Congressional districts, watersheds and zip codes. The last Census of Ag was held in 2017. This new census provides updated information which can be used as key guidance for government agricultural policies and for agriculturally related business planning, to name just two items.

The Ag Census, when compared with the last issued report from 2017, shows quite a number of changes in the agriculture arena. Some highlights of the report show that while the number of producers (USDA's term for American farmers) remains steady, the number of farms decreased by 6.9% since 2017, showing a trend toward the growth of larger acreage farms and the decline of small farms. The age of farmers continues to rise with the average age being 58.1 years, mirroring the aging US population in general, but the number of young producers, those under 35, increased slightly by 3.9%. The largest farms with sales of \$5 million or more accounted for fewer than 1% of all farms but 42% of all sales. Farms with less \$50,000 in sales made up 74% of all farms and 2% of sales.

Surprising no one, California topped all other states for sales of agricultural products with \$59 billion in sales. The largest county in California, Fresno, had larger individual agricultural sales than 23 individual states.

Blackberries and Raspberries had their share of statistics in the new Ag Census showing both gains and losses in these berry crops nationwide. The 2022 Ag Census showed there were 9,537 total blackberry farms nationwide, up from 9,006 farms in 2017 for an increase of 5.6% in farms growing blackberries, Marionberries and dewberries. The nationwide acres planted in blackberries in 2022 totaled 20,401. This figure showed a significant increase (defined by the USDA as over 5%) of 18.2% over the 2017 figure of 16,671 acres in use at that time.

Raspberry crops were counted together regardless of whether they

were red, black, or yellow in the 2022 Ag Census. The total number of raspberry farms in 2022 numbered 7,197 down slightly from the 2017 farm statistics showing 7,828 farms. This is a very small decline of 2.7% in the total farm numbers over five years. Raspberry acreage nationwide showed a larger decline with 23,254 acres in production in 2017 shrinking to 21,770 by 2022, a 6.3% decrease in total number of raspberry acres in production.

Boysenberry farms numbered 323 in 2022 down from 329 farms in 2017. Boysenberry acreage moved from 564 acres in 2017 to 389 in 2022. Loganberries, the smallest berry crop in the Census, saw growth in the number of farms with 125 farms in 2017 moving up to 131 farms in 2022. Loganberry acreage jumped from 84 acres in 2017 to 117 acres in 2022.

To see a breakdown of the number of berry farms and berry acreage by state comparing the 2017 and 2022 Census of Agriculture figures click on this link [https://www.nass.usda.gov/Publications/AgCensus/2022/Full\\_Report/Volume\\_1\\_Chapter\\_2\\_US\\_State\\_Level/st99\\_2\\_032\\_032.pdf](https://www.nass.usda.gov/Publications/AgCensus/2022/Full_Report/Volume_1_Chapter_2_US_State_Level/st99_2_032_032.pdf)

Accessing the 2022 Census of Agriculture is easy to do using their quick stats link: <https://quickstats.nass.usda.gov/>

After accessing this page choose among several categories and data filters to reach your choice of crop and the type of statistics you are interested in. One note, berries are found under the group "fruit & tree nuts" and from there, under the commodity heading, you can access all types of berries or fruit type you want to see. You can do broad or narrow searches for statistics relating to many sectors of agriculture and for those interested in grant funds, this study is a gold mine of important information. ❖





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## SEASONAL REPORT

### Blackberry and Raspberry Pollination

Article by Ramesh Sagili, Ph.D,  
Professor-Apiculture, Department of  
Horticulture, Oregon State University

Insect pollination is critical to maximize blackberry and raspberry yields even though both blackberry and raspberry plants are mostly self-pollinating. Lack of adequate number of bees for pollination during flowering period (bloom period) is a common cause for poor yield and fruit quality in blackberries and raspberries. Honey bee colonies are predominantly used for blackberry and raspberry pollination. Natural wild bumble bee populations also provide significant pollination in blackberry and raspberry. The number of honey bee colonies required per acre (stocking rate) to achieve adequate pollination in

a specific crop depends on several factors, such as the attractiveness of the crop, strength of the colonies employed for pollination, non-managed bee population density in that location, availability of competing nectar and pollen sources, and prevailing weather (Delaplane and Mayer, 2000). The absolute requirements pertaining to the number of honey bee colonies per acre have not been established, but there are recommendations regarding the number of colonies per acre for several important agricultural crops (Sagili and Burgett, 2011). The average honey bee colony requirement for blackberries and raspberries is 2 colonies per acre (Sagili and Burgett, 2011).



**Figure 1.** A standard Langstroth frame covered with honey bees (photo credit: Ramesh Sagili)

#### Honey bee colony strength / quality:

The quality and strength of honey bee colonies rented for pollination is critical in achieving adequate pollination. Hence, both beekeepers and caneberry growers should make sure that the honey bee colonies employed for caneberry pollination meet certain basic requirements pertaining to the number of frames of bees, amount of brood, food stores, number of empty frames, queen health, and colony health (Sagili and

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Burgett, 2011). These guidelines can be found in the publication titled “Evaluating Honey Bee Colonies for Pollination” (PNW 623) - <https://extension.oregonstate.edu/catalog/pub/pnw-623-evaluating-honey-bee-colonies-pollination> . When a standard Langstroth hive frame is covered with a single layer of honey bees on both sides of the frame, it will have approximately 2400 bees (Sagili and Burgett, 2011) (Figure 1).

#### **Honey bee colony efficiency/ Placement of colonies in the field:**

Generally, smaller colonies dispatch a smaller percentage of bees as foragers whereas larger colonies dispatch higher proportion of the population as foragers (Sagili and Burgett, 2011). Hence, employing larger colonies for pollination is beneficial. Honey bee colony placement in caneberry fields is also an important factor to consider to enhance pollination and yields. Generally, beekeepers prefer to drop the hives in groups, as distributing hives in smaller numbers throughout the field is laborious and often not feasible. It is recommended to distribute the hives

uniformly in groups in a field for best results (pollination) (Goodwin, 2012; Li et al., 2022). Honey bee colonies should be ideally placed in the fields for pollination when caneberry bloom is about 10% in order to avoid distraction of bees to other relatively more attractive resources available in the surrounding landscape. However, both blackberry and raspberry flowers are attractive to bees as they provide significant amounts of nectar and pollen.

#### **Promoting honey bee health:**

Honey bee colonies employed for crop pollination often face several challenges including inadequate forage (nectar and pollen) and pesticide exposure. Caneberry growers can assist beekeepers in improving and sustaining honey bee health during pollination and thus enhance pollination in caneberries. Beekeeper-grower cooperation is the most effective way to reduce pesticide exposure to bees. The underlying cause of most pesticide exposure incidents is a lack of information or awareness. Most pest-control



*Honey bee foraging on Marionberry flower (photo credit: Scott Lukas)*

programs can be modified so that little or no pesticide exposure occurs, without undue cost or inconvenience to the grower. The beekeepers and growers both benefit from developing working relationships and familiarizing themselves with each other's management practices. Following are a few points for caneberry growers to consider to promote health of honey bee colonies employed for pollination: (1) Growers are suggested to call the beekeepers at least 10 days before crop bloom and

*Continued on page 16*

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Continued from page 15

convey the approximate delivery dates for honey bee colonies for pollination and also provide information on any pest control planned before the bloom (2) If appropriate, use pest control products before crop bloom as a way to avoid spraying pesticides when bees are foraging in the crop (3) If feasible, restrict insecticide and fungicide sprays to early evening (9pm-midnight) when bees are not foraging (4) If there is an absolute need to apply an insecticide during full bloom then the growers must contact the beekeeper to discuss the option of moving their colonies out of the fields (5) Consult the publication titled "How to Reduce Bee Poisoning from Pesticides" (PNW 591) to determine residual times for pesticides and when to move bees into the fields for pollination. A phone app version of the guide is available on iTunes under the name 'how to reduce bee poisoning' and in the Google Play Store under the name 'bee safety' (6) Caneberry growers should ensure that the beekeepers have access to their colonies during pollination to manage

(feed, provide medication etc.) them (7) Inform neighboring growers and pesticide applicators about location of honey bee colonies employed for pollination. ❖



*Honey bee foraging on Himalayan blackberry flower (photo credit: Ramesh Sagili)*

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## RESEARCH REPORT

### Adoption of a Standardized Virus Diagnostic Protocol for Blackberry and Raspberry in Mexico and Later Validation through a Field Survey

*This research was supported with an American Bramble Growers Research Fondation (NABGRF) Grant awarded in 2023. The following report was submitted by the project leader, Alfredo Diaz-Lara, Tecnológico de Monterrey*

**Project Duration:** 03/01/23 - 12/31/23

#### Objectives:

1. Obtain and standardize individual RT-PCR assays for raspberry and blackberry viruses.
2. Empirically test and validate the new assays using positive controls.
3. Screen select raspberry and blackberry fields for viruses in Mexico.
4. Incorporate new genomic data into a more complete characterization of genetic variation across Rubus viruses.
5. Disseminate research progress and results.

*Continued on page 19*



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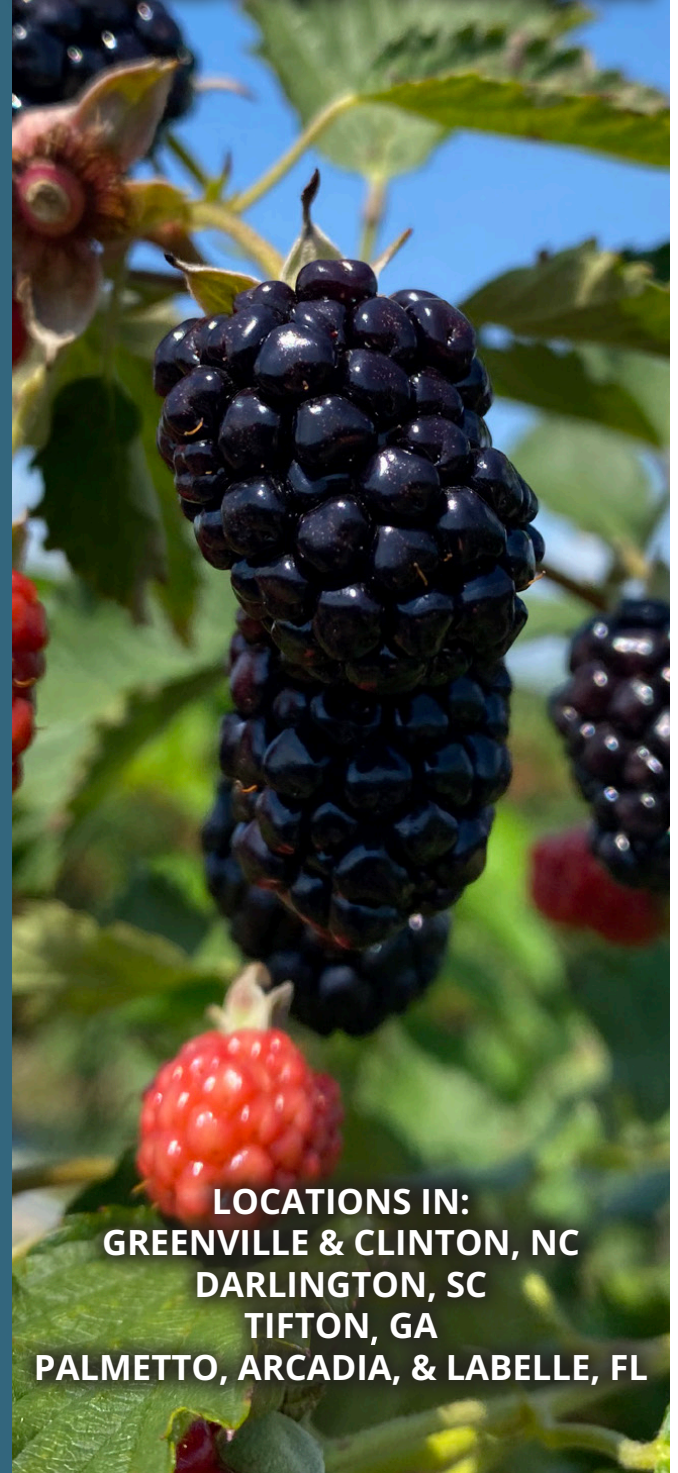
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Continued from page 16

### **Accomplishments:**

*Objective 1:* Overall, ten different reverse transcription-PCR (RT-PCR) assays using the primers listed on Table 1 and corresponding protocols were obtained from the Arkansas Clean Plant Center (ACPC, University of Arkansas System). The ACPC is part of the National Clean Plant Network (NCPN) in the USA; consequently, the obtained assays have previously been validated in multiple occasions by different NCPN centers. Subsequently, RT-PCR assays were optimized under the local conditions at the Bioengineering Center in Tecnológico de Monterrey (Mexico) to ensure that each Rubus virus is efficiently amplified. Hence, adjustments to these assays mainly involved a change in the annealing temperature of the primers. Given the genetic diversity known to exist for some of the studied viruses, RT-PCR assays may involve more than one set of primers.

*Objective 2:* All the virus assays included in Table 1 (see full report including table data available here: <https://www.raspberrylblackberry.com/research-foundation/reports/>) were challenged using infected material and healthy plants (virus free controls). The positive controls were obtained from the ACPC via an import permit, and they are used as routine controls in the testing process at the ACPC. These positive controls were RNA extracts from diseased plants and/or virus-mimicking positive controls (ViMAPCs). The ViMAPCs are a novel technology developed by the University of Arkansas System, which avoids the need of a natural infection by the targeted virus. As a result of this initial validation, these assays specifically and efficiently detected the different studied pathogens, generating clean amplicons with the corresponding size. On the other hand, healthy plants tested negative during the screening using the RT-PCR assays.

*Objective 3:* To further test the efficiency of the new assays, during the spring and summer of 2023, a total of 30 samples were obtained from raspberry and blackberry populations with a historically high incidence of pathogens or with virus-like symptoms (Figure

1). These Rubus populations included commercial fields located in Jalisco, Michoacan and Guanajuato (Table 2) (see full report including table data available here: <https://www.raspberrylblackberry.com/research-foundation/reports/>).

As a result, five Rubus samples tested positive for black raspberry necrosis virus (BRNV), strawberry necrotic shock virus (SNSV), cherry leaf roll virus (CLRV), tomato ringspot virus (ToRSV) and Rubus yellow net virus (RYNV) by the RT-PCR assays. Subsequently, virus infection was confirmed by Sanger sequencing. The identification of the previous mentioned viruses represents the first detection of RYNV, BRNV, SNSV, CLRV and ToRSV infecting Rubus plants in Mexico. These results provide updated information on virus occurrence in berry crops in Mexico and help growers in their disease management decisions.

*Objective 4:* As part of this research project, genetic diversity of Rubus viruses identified in Mexican commercial fields was investigated by Sanger sequencing. Consequently, 5 partial genome sequences of RYNV, BRNV, SNSV, CLRV

and ToRSV were obtained and deposited in the GenBank database. The nucleotide sequence of these isolates exhibited considerable homology with known variants previously characterized from the USA. The addition of new genetic data results in a more complete description of genetic variation across the studied pathogens.

Continued on page 20



**Figure 1.** Blackberry and raspberry plants collected during the field survey.

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Continued from page 19

**Objective 5:** Results of this study have been presented during growers' meetings organized by the Tecnológico de Monterrey. A press release will be shared with local growers and stakeholders; likewise, a peer-reviewed scientific article is being prepared and will be submitted to the Plant Disease journal by the end of March 2014. A poster will be presented during the 2024 American Phytopathological Society (APS) annual meeting. Lastly, the novel detection tools (RT-PCR assays) are being shared with diagnostic labs, public and private, and plant pathologists involved in the berry industry in Mexico.

#### Summary:

The most efficient way of controlling viruses in raspberry and blackberry involves using pathogen exclusion strategies aided by early detection. The main goal of this project was to harmonize the Rubus virus testing conducted in Mexico with USA's protocols. Thus, the here-adopted testing process will be made available to local diagnostic labs aiming an effective

control of raspberry and blackberry viruses in Mexico and beyond. This work is suitable as there has been a significant increase in movement of plant material inside and outside the country, highlighting the necessity for more robust pathogen detection analyses. Additionally, RT-PCR assays were used to screen select raspberry and blackberry populations for targeted viruses. As a result, five Rubus plants collected in Michoacan, Jalisco and Guanajuato were determined positive for RYNV, BRNV, SNSV, CLRV and ToRSV, such plants exhibited different virus-like symptoms. This is the first report of RYNV, BRNV, SNSV, CLRV and ToRSV infecting Rubus in Mexico, which expands the known virus population (virome). The next logical step should be implementing procedures to prevent outbreaks of virus diseases in berry crops in Mexico. ❖

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## SEASONAL REPORT

### Is it Blackberry Leaf Rust or Orange Rust?

Spring is the time of year for blackberry growers to consider how they will deal with rust disease in their crops. Growers often assume the worst when they hear the term "rust" in regard to their



Bright orange aecia on blackberry leaves. Lower leaf surfaces become covered with blister-like pustules (aecia). (Photo credit: Jay W. Pscheidt, 2021)



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fields. What comes to mind first is the devastating orange rust disease. However, there are two types of rust disease in southern blackberry production - orange rust and cane and leaf rust.

According to the University of Arkansas, "Orange rust, the most common and serious rust disease attacking brambles, is caused by the fungus *Gymnoconia peckiana* (G. *interstitialis*). Orange rust infects most wild blackberries and their domesticated cultivars, including the thornless types, all cultivars of black raspberries and most purple raspberries and dewberries. Orange rust is a systemic rust, meaning that it survives inside the entire plant from year to year. It rarely kills plants but causes them to be stunted and weakened so they produce little or no fruit. Cane and leaf rust can cause defoliation and some fruit reduction in severe cases, but this disease is not systemic like orange rust. In Arkansas cane and leaf rust is usually only a minor problem." (<https://www.uaex.uada.edu/publications/pdf/FSA-7563.pdf>)

It is important for farmers to understand the difference between

Orange rust and cane or leaf rust to avoid destroying plants that can be treated and still produce fruit.

To learn more about these two blackberry plant diseases and how to identify them, the NARBA website offers concise information on identification and also links to effective treatments for both types of rust. Visit [www.raspberrylblackberry.com/is-it-blackberry-leaf-rust-or-orange-rust/](http://www.raspberrylblackberry.com/is-it-blackberry-leaf-rust-or-orange-rust/).

For growers in the western US, a recently updated publication from the Pacific Northwest Pest Management Handbook (<https://pnwhandbooks.org/plantdisease/host-disease/blackberry-rubus-spp-orange-rust>), details how



*Infected primocane of Black Diamond with orange aecia on the left and healthy primocane on the right. (Photo Credit: Jay W. Pscheidt, 2021.)*

the rust fungus, previously identified as common in eastern North America, is now being found in the Pacific Northwest as well. As early as 1913, orange rust was found in Douglas, Hood River, Umatilla, Union and Wasco counties in Oregon. In 1997 an isolated field of Kotata

*Continued on page 22*

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*Continued from page 21*

blackberries in the Willamette Valley was discovered to be infected with orange rust and removed a few years later. In 2018 and 2021 the disease was found in Black Diamond blackberry fields in Marion County. Orange rust affects wild Himalayan blackberry plants and has been identified on wild plants in Benton, Clackamas and Marion counties. Red raspberry plants are resistant to orange rust, but black raspberry plants are susceptible. Susceptibility to orange rust in the Pacific NW varies between cultivars and from location to location within cultivars.

Two forms of the rust fungus have

been identified: a short cycle form - *Gymnoconia nitens* with aeciospores that develop in the spring leading to systemic infections and *Arthuriomyces peckianus*, also producing spores that develop in the Spring, that do not develop systemic infections, but produce telia which can have teliospores in the fall leading to systemic infection at that time.

County Extension agencies can help identify the type of rust infection for help in treatment. It is important for growers to scout for rust disease in the spring and summer and quickly remove and destroy infected plants including the roots. When replanting, use plants from a clean source or from tissue-cultured plants.

The PNW Pest Management Handbook offers information on chemical control for both forms of rust disease but states that “none will cure existing infections”.

The best advice is to monitor fields beginning in the spring and through the summer months for evidence of rust disease and work with county and state extension to conclusively identify the type of rust spores found and take appropriate action immediately. A listing of county and state extension offices can be found on the NARBA website here: <https://www.raspberryblackberry.com/for-growers/directory-of-research-and-extension-caneberry-expertise/> ❖



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