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## The First Report of Fertile Andean Blueberry – American Cranberry Hybrids Has Been Published

By Mark Ehlenfeldt, Fernando De La Torre, Juan Zalapa, and Allison Jonjak

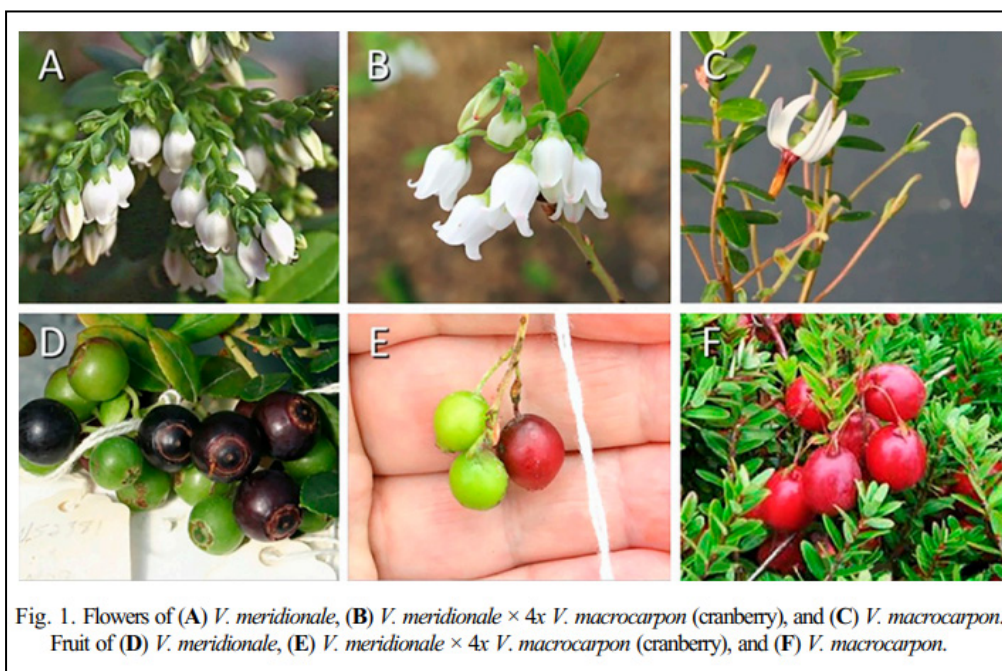
In Fertile Intersectional F1 Hybrids of 4x Andean Blueberry (*Vaccinium meridionale*) and 4x American Cranberry (*Vaccinium macrocarpon*)<sup>1</sup>, authors Mark Ehlenfeldt, James Polashock, Nicholi Vorsa, Juan Zalapa, Fernando de la Torre, and James Luteyn announce the successful breeding of a “Cran-Blue.”

One parent is our familiar *Vaccinium macrocarpon* (a 4x variety), and the other parent is *Vaccinium meridionale*—a tetraploid blueberry native to mountainous locations in Jamaica, Colombia, and Venezuela. This father was chosen because its concentrated spring flowering period and its growth habit are desirable traits for mechanical harvest.

The first generation of *macrocarpon* x *meridionale*

had flowers and fruits that were between the two parents, and grew vigorously. Fertility of the flowers' male and female parts were tested, and acceptable results were found—this is exciting. When breeding across species, infertile crosses are not too difficult to obtain, but fertile crosses are noteworthy. Fertility tests conducted using the *macrocarpon* x *meridionale* cross as a male parent suggest that this cross may be able to be used in conventional cranberry breeding without much difficulty.

These crosses are promising to add into the cranberry gene pool—increased flower number and fruit set will become available. Modifying fruit quality (for example, introducing anthocyanins into the fruit flesh as well as the skin) based on these traits may also be possible.



The work of breeding crosses relies on manual manipulation—pollen is collected using paintbrushes, and refrigerated & desiccated if storage is required. Graphite tipped pencils are then dipped into pollen, and pollen is applied to the desired stigmas. A fully insect-free greenhouse is required for this work.

To avoid incorrect chromosome outcomes, the F<sub>1</sub> hybrids' ploidy levels were checked using flow cytometry.

To evaluate female fertility, pollination and fruit set records were kept. Fruit were then collected when they were ripe. Fruit size was measured and seed was extracted, and then seeds were classified as good, good/fair, fair, fair/poor, poor, or aborted. Those rated from “good” to “fair” were judged likely to be capable of germinating.

Seeds were then germinated in a greenhouse, and after developing 3 true leaves, transferred into 36-cell flats to grow. In their second season, the primary hybrids were transplanted to 3-liter pots.

Male fertility was tested by a staining and visual evaluation. Pollen samples were rated from “very good” (almost all tetrads), “good” (tetrads and triads), “fair” (mostly triads), and “poor” (mostly aborted grains).

The crosses in this study were highly successful for an intersectional cross, with 20.7 seeds per fruit. 500+ young and vigorous hybrids are growing in the greenhouse from this cross.

These hybrids show an “intermediate” growth habit between blueberry and cranberry, as seen in Figures 1 and 2. Plants grown in the greenhouse grow with a vining habit, but plants grown outdoors are growing more upright and display some branching. Unlike cranberry, these hybrids have not developed a red/purple leaf color upon entering dormancy—and in fact no specific “dormancy” was observed. Leaves were retained and growth appeared to end as days got shorter and cooler. In some cases, prior-year leaves were not lost until new growth began in the spring.

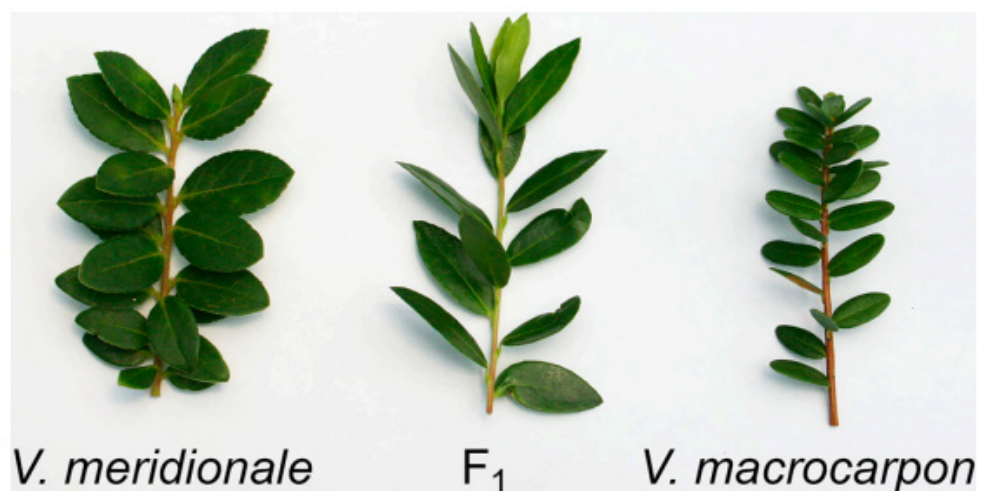


Fig. 2. Leaves of *V. meridionale*, an F<sub>1</sub> hybrid, and 4x *V. macrocarpon*.

Flowers on the crosses have been observed across the full spectrum of similarity to the mother and the father of the cross, but most were more similar to *meridionale* than *macrocarpon*. Fruit, as well, was variable in shape—meaning that future research can be assisted by selecting those fruits which have the most desirable traits with which to expand the available gene pool. CColor variation was observed: from red blush over an apple-green base, to cranberry red, to a deep red-purple. Some crosses displayed flesh pigmentation in very ripe fruit.

Many variations in fruit structure were expressed as well—most common was a fruit with internal locules similar to the cranberry, but with locules much smaller.

Cooperatively, hybrids were shared among New Jersey and Wisconsin breeding facilities. In New Jersey, many hybrids were back-crossed with macrocarpon; in Wisconsin, many hybrids were selfed. A diverse complement of genetics will be developed in this way.

These successful fertile crosses are a milestone in *Vaccinium* breeding. The introduction of new germplasm into the accessible gene pool will allow for the introduction of many desirable traits into cranberry breeding programs.

1. Fertile Intersectional F1 Hybrids of 4x Andean Blueberry (*Vaccinium meridionale*) and 4x American Cranberry (*Vaccinium macrocarpon*) Mark K. Ehlenfeldt and James J. Polashock, Nicholi Vorsa, Juan Zalapa, Fernando de la Torre, James L. Luteyn <https://doi.org/10.21273/HORTSCI16824-22>
2. Ehlenfeldt MK, Ballington JR. 2017. Prolific triploid production in intersectional crosses of 4x *Vaccinium corymbodendron* Dunal (section Pyxothamnus) by 2x section Cyanococcus species. Euphytica. 213:238. <https://doi.org/10.1007/s10681-017-2027-9>.
3. Ehlenfeldt MK, Luteyn JL. 2021. Fertile intersectional F1 hybrids of 4x *Vaccinium meridionale* (section Pyxothamnus) and highbush blueberry, *V. corymbosum* (section Cyanococcus). HortScience. 56:318-323. <https://doi.org/10.21273/HORTSCI15523-20>.
4. Ehlenfeldt MK, Polashock JJ, Ballington JR. 2018. *Vaccinium corymbodendron* Dunal as a bridge between taxonomic sections and ploidies in *Vaccinium*: A work in progress. North American Blueberry Research and Extension Workers Conference. <https://digitalcommons.library.umaine.edu/nabrew2018/proceedingpapers/proceedingpapers/15>.

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## Sprayer Calibration

By Dan Heider and Allison Jonjak

YouTube Video: [How are sprayers calibrated for accurate applications?](#)

To ensure even applications at your desired rates, connect, inspect, and calibrate your sprayer's wet kit several days before you plan to make your first application.

### *Check even flow*

Ensure all connections and drops are watertight. Fill your tank with water and bring it up to pressure. Walk the length of the boom, checking the spray pattern of each nozzle. Note any with irregular spray patterns, cat whiskers, or blockages. Turn off the sprayer and disconnect each problem nozzle. Blockages can be corrected with a soft brush or by running water backward. Nozzles with uneven wear patterns should be discarded and replaced.

### *Calculate spray rate*

Using the unit conversion from Dan Heider's video, we solve

$$\text{Gallons Per Acre} = \frac{5940 \times \text{Gallons per Minute}}{\text{Miles per Hour} \times \text{Nozzle Spacing (inches)}}$$



You have your nozzle spacing directly from a tape measure.

While your boom is stationary, you can measure your Gallons per Minute. Operating at your standard pressure, collect water from a nozzle for 15 seconds. Record the water volume in ounces. Repeat for each nozzle, and take an average. Now you have spray rate in ounces per 15 seconds, so multiply by 4 to get to ounces per 60 seconds—which is the same as ounces per minute.

$$\text{Gallons per Minute} = \frac{(\text{average ounces})}{15 \text{ seconds}} \times 4$$

Now we have everything you need except Miles per Hour. Turn off the sprayer and travel 200 feet at your usual operating rate. Get up to speed before you start your measurement, so you have a consistent speed through the whole 200ft—and use a stopwatch to measure the time it takes you to travel. Convert your speed in seconds/200ft to miles per hour using

$$\text{Miles per Hour} = \frac{\text{distance (ft)} \times 60}{\text{seconds} \times 88}$$

Now you can rewrite our original equation with your specific numbers from each line.

$$\text{Gallons Per Acre} = \frac{5940 \times \text{Gallons per Minute}}{\text{Miles per Hour} \times \text{Nozzle Spacing (inches)}}$$

Most cranberry products' labels suggest a 20 gallon per acre application rate. Check your product's label to be sure. If your Gallons per Acre are higher than the label recommends, you need to drive faster or reduce your flow rate, and re-calibrate until you consistently achieve the label's recommendation. If your GPA are lower than recommended, you need to drive slower or increase your flow rate, and re-calibrate until you consistently achieve the label's recommendation.

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## Update from the Wisconsin Cranberry Research Station

*By Wade Brockman*

As we get closer to the middle of May, plants are really starting to move. Looks like lots of cold nights ahead. Hopefully a longer stretch of warm weather to come.



# Grower Updates

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## Flying Dollar Cranberry

*By Seth Rice*

Hello everybody! It's that time of year that we see the booms make the rounds of the marsh. Casoron and Evital are a must and a staple in some of these pesticide programs. Also, early shots of herbicides are being utilized right now. It's also nice to see some baby geese and wildlife wake up move around more and be more active. The scouting crews will start this week and make the rounds. We've had some reports of some early pests already. I'm not sure where we would be without them so a huge shout out to all of the IMP crews! I think with the Diazinon, everybody is still trying to find different ways to try new things and switch things up from the typical pest program that we had before. Frost watch is also in full swing (Everybody's favorite time of year...jk). This is also a good time to work on our renovations and put drain tile and underground pipe in. As far as the actual cranberries go it's pretty typical that our hybrids are farther along than our Steven's. There are signs that the buds are starting to swell and some rapid growth. Try to stay positive and be safe!



## Vilas 51

*By Jeremiah Mabie*

Hello, everyone,

We are officially off to the races up north! The last two weeks have been crazy busy as all growers got irrigation systems in and operational, booms have been applying spring herbicides and getting ready for planting. We got our first night of frost watch behind us this past weekend, looks like a few cooler nights coming up but overall it has been a gradual transition into spring. It's a busy couple of weeks here but we are all very happy to be out in the field working again.