Integrated Cranberry Crop Management for Wisconsin

Cranberry

Crop Management Newsletter

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TOO FEW FRUIT OR TOO MANY FLOWERS?

In financial investing it is always good advice to diversify portfolios. Diversification could include short term and long term instruments coupled with high-risk and lower risk investments. The exact blend of investments would depend on the time frame of your investment goals and your aversion to risk. Every investment portfolio is slightly different, but in each case, the goal is to protect the principal and create growth to be realized in the future.

Plants also make investments for the future. Different plants invest their resources in different ways. For example, the common mustard weed Arabidopsis can complete its life cycle of germination, growth, and seed production in 30 to 45 days. Compare that to an oak tree that may be 15-20 years old before the first acorn is produced and which will live for hundreds of years. A dandelion will produce viable fruit and seed from every flower while an apple tree will produce a fruit from about 20% of flowers. While plants employ different reproductive strategies they all work to provide for viable progeny.

Ecologists have four hypotheses as to why plants such as cranberry produce more flowers than fruit. 1) to select the best fruit and seed number by aborting inferior fruit, 2) to compensate for uncertainties of pollination, resource availability, or adverse weather such as frost or hail, 3) providing large amounts of pollen to ensure pollination of viable flowers by producing an overabundance of flowers, and 4) having many flowers blooming at the same time would attract more pollinating insects.

To test these hypothesis two Canadian researchers recently conducted some pollination and fruit removal experiments. In one experiment they provided natural insect pollination, hand pollination (with insects excluded), or excluded insects with screened cages. At the end of the season they measured fruit set, fruit mass, and seed number per fruit.

Excluding insects substantially reduced fruit set, fruit size, and seeds per fruit (Figure 1A, B, C). Manual pollination where the supply of pollen to the flowers was more than adequate for fruit set did not increase fruit set or fruit size but resulted in slightly fewer seeds per fruit. Removing either the upper or lower three flowers did not significantly fruit set or fruit size, but when only the upper three flowers were left (lower flowers removed) the number of seeds per fruit was reduced (Figure 1D, E, F). In both treatments about two fruit set per upright.

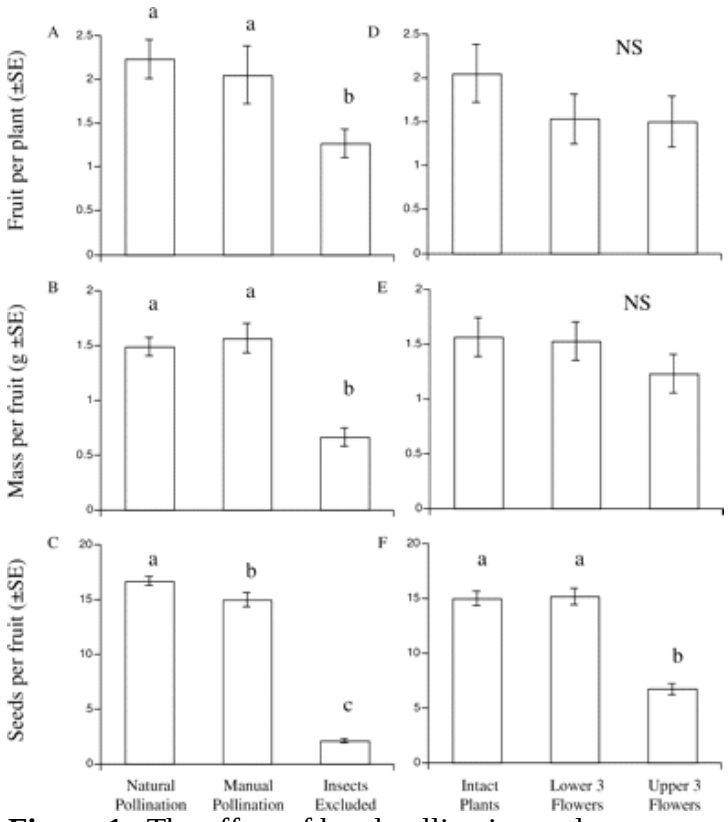


Figure 1. The effect of hand pollination and insect exclusion along with flower removal on fruit set, size and seed number in 'Stevens' cranberries.

In another experiment these researchers examined by flower position at what time during the fruit development period abortion occurred. They found that 93% of fruit abortion took place after the onset of fruit development with only 7% occurring during flowering. The researchers microscopically examined the styles of the aborted flowers and discovered that fruit abortion may be related to pollination because there were fewer germ tubes in the styles of aborted flowers.

To another series of uprights the researchers either left uprights intact or they removed the lower three flowers or the upper three flowers and recorded the incidence of fruit abortions on those that remained. The results are shown in Figure 2. When no flowers are removed the incidence of fruit abortion is higher in the upper positions than in the lower positions (Fig. 2A). When the upper flowers are removed the incidence of fruit abortion is not different from the situation with intact uprights (Fig 2B). When the lower flowers were removed the incidence of fruit abortions is much lower than for intact uprights (Fig 2C).

This is similar to the work of Birrenkott and Stang who removed the lower two flowers at hook, flowering, or fruit set stages of fruit development and measured fruit set in the remaining flowers. They found that removing the lower flowers or fruitlets resulted in 45%, 46%, or 36% fruit set when removed at hook, flowering, or fruit set

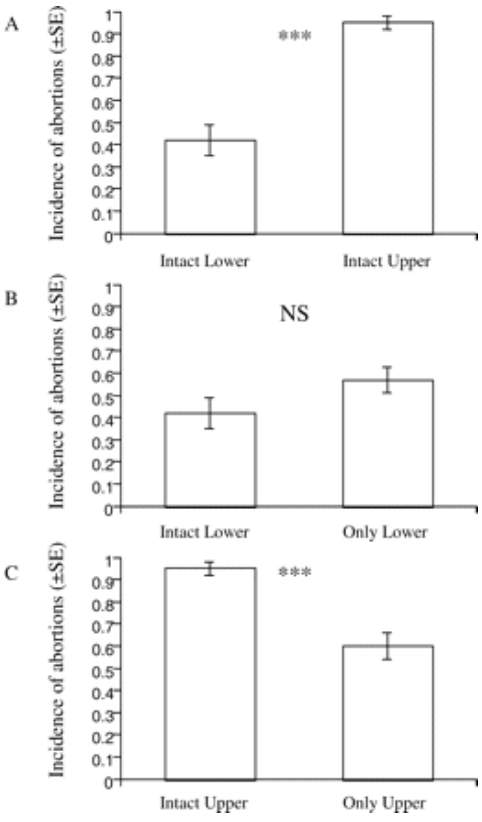


Figure 2. Effect of flower removal on cranberry fruit abortion as a function of flower removal.

stages, respectively. This compares to 25% fruit set in upper flower positions when the lower flowers were not removed (Fig 3). When hooks were removed and augmented with hand pollination 58% of upper flowers set fruit compared to 17 or 19% fruit set when hooks were not removed (Fig 4).

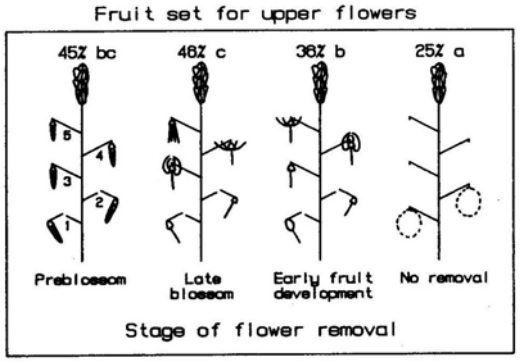


Figure 3. The effect of removing lower position flowers at different times on the fruit set of flowers in upper positions.

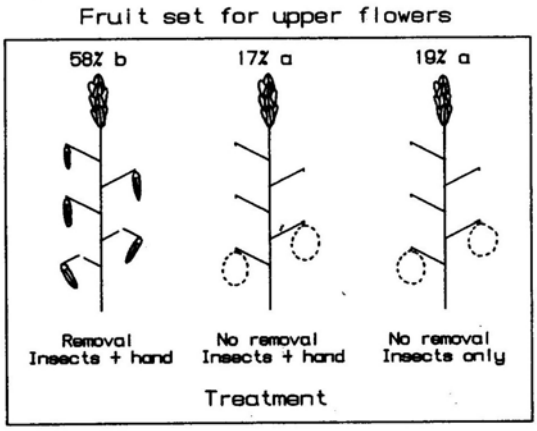


Figure 4. The effect of removing lower position hooks on fruit set of upper flowers.

Brown and McNeil conclude from their work: "Thus the proximate cause for the low fruit set in distal (*upper*) cranberry flowers under natural conditions appears to be resource competition between developing fruits, whereas the ultimate or evolutionary causes for the overproduction of flowers in cranberry may (1) allow selection for optimal fruit and seed size and/or quality through selective abortion, (2) result in additional fruit set in years of high resource availability, (3) serve as pollen sources to sire fruit on other plants, and (4) provide an assurance policy for fruit lost to unpredictable events." In short, the low fruit set in cranberry may not be too few fruit, but too many flowers!

In this article we learned:

- Insects are important pollinators for cranberry and excluding insects will reduce fruit set and size.
- Developing fruit compete for limited resources.
- Removing lower fruit results in higher fruit set of upper flowers.

Teryl Roper, UW-Madison Extension Horticulturist

References:

Birrenkott, B.A, and E.J. Stang. 1990. Selective flower removal increases cranberry fruit set. HortScience 25:1226-1228.

Brown, A.O. and J.H. McNeil. 2006. Fruit production in cranberry (Ericaceae: Vaccinium macrocarpon): A bet hedging strategy to optimize reproductive effort. Amer. J. Bot. 93:910-916.

ON CONFIDENCE

The dictionary defines confidence as: "A feeling of assurance, especially of self-assurance." Confidence is essential to being an effective cranberry grower. In the years that I have been working with the cranberry industry I believe I have seen ongoing erosion in grower confidence, even among those with many years of experience. I'm not entirely sure why this is, but I have some theories.

A generation ago information relating to cranberry production was limited and growers learned what they knew by trial and error on their own marshes. Information learned this way provided confidence in the results. There is more research done by others today and growers understandably

don't have the same confidence in others' results. Further, the amount of information about various aspects of cranberry management has grown substantially in the past few years. We've not done a sufficiently good job of converting the scientific literature into plain English that growers can understand. The science is not that hard, it's mostly the language that gets in the way. Growers doing more of their own on-farm research (with controls) would increase grower confidence.

There are more consultants and salespeople hawking their wares than ever before. I don't wish to paint with too broad of a brush here or to indict all consultants and salespeople. However, some are more trustworthy than others. Some obfuscate facts and purposely try to create doubts to make the sale of goods or services. Some have little real research to back up their claims. When growers hear conflicting information their confidence erodes. If you doubt what is being said ask for research data and see if it sounds reasonable. If it sounds too good to be true, it probably is.

A generation ago long distance telephone was expensive and reserved for only the most important of conversations. Long distance telephone service now is cheap and we call about trivial things. Where growers in different regions of a state or the country used to suffer isolation, now it is too easy to compare problems and solutions. The Internet compounds the problem. Exchanging ideas is wonderful and useful, but sometimes a solution from one part of the state or country won't work in a different place with different soils, pests, or climates. Perhaps we were better off when the only person we could conveniently share notes with was the neighbor across the fence.

Speaking of neighbors, there is a lot of "me too-ism" in the industry. One grower applies fertilizer or a pesticide and we think that we need to do that too. Just because your neighbor does something doesn't mean that you have to do it too—even if he is considered an excellent grower. He isn't farming your soil, cultivars, bed construction, etc. Have confidence in what you know.

We can also develop confidence in other people. For example, if marsh owners hire good, competent managers (and compensate them appropriately) they can have confidence in their ability to manage without intrusive oversight. I would argue that hiring people with a college degree would be money well spent. It is not that college graduates are necessarily smarter, but they have been taught to think and solve problems and they have demonstrated their ability to learn and understand. Hiring very good people, not necessarily the lowest cost people, will pay off in the long run.

The world is an increasingly complex place. Simple models of yesteryear won't necessarily describe the same situation today. Complexity needn't be negative. With a little bit of study you too can understand complex things. Don't assume that other people know more about your situation and property than you do. Have confidence in your ability to understand and have confidence in what you know.

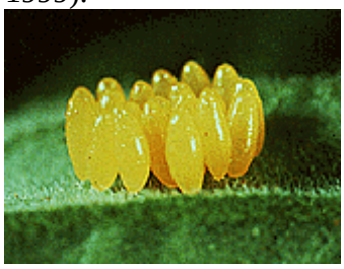
Teryl Roper, UW-Madison Extension Horticulturist

THE FASCINATING LIFE OF A LADYBUG

Did you know that there are about 5,000 different species of ladybugs worldwide and over 400 of those species live in North America alone (Seagraves, 2001)? I didn't, and I was very surprised even though we see them everywhere. They are very common in the state of Wisconsin, and sometimes we might think that they can

be more of a pest than a benefit. But the truth is they are a very big help to plants and growers.

Ladybugs can lay 1,000 eggs in their entire lifetime (Seagraves, 2001). The female ladybug lays all of the eggs beneath a leaf or stem in a yellow group (Junfin, 1999).



Provided By: Frank and Adele Junfin

Ladybug eggs

Once, the eggs are laid, it takes about a week for them to turn into larvae (Junfin, 1999).

Provided By: R. Bessin, University of Kentucky Entomology

A ladybug larva eating aphids

Once the ladybug is in its larva stage, it begins to eat pests, such as aphids, in order to survive. Each larva is spiny and black with some bright spots on its body (Bessin, 2004). After about three to four weeks of eating pests, the larva enters a pupa stage (Junfin, 1999). Each larva usually pupates on individual leaves (Bessin, 2004), and stays in the pupa stage for about one week until the adult appears (Junfin, 1999).

After the adult emerges, they begin to feed on pests such as aphids, small worms, and insect eggs (Junfin, 1999). Then the cycle of reproduction starts all over again.

Provided By: Frank and Adele Junfin

An adult ladybug feeding on an aphid

Ladybugs are orange with black spots on the covers of their wings (Junfin, 1999). During the winter season, some species of adult ladybugs hibernate in groups. They usually hide under debris in order to survive until the next spring (Bessin, 2004).

Ladybugs are fascinating creatures. This is because one ladybug can eat up to 5,000 aphids throughout its entire lifetime. They also can protect themselves from predators by releasing a fluid from their joints. This fluid contains an odor and tastes bad to predators (Bessin, 2004).

As you can see, ladybugs have very interesting lives. They are a very big advantage to humans and plants, and are useful when controlling pests. They control an aphid population and have unique stages of life. This is why ladybugs are so wonderful to have around.

Jill Hinrichsen, Lady Bug IPM Intern

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Bessin, Ric. Ladybugs. December 2004. University of Kentucky Entomology. 22 June 2006 <http://www.uky.edu/Ag/Entomology/entfacts/fldcrops/ef105.htm>.

Junfin, Frank and Adele. Ladybugs. 1999. Kunafin. 21 June 2006 < http://www.kunafin.com/ladybugs.htm>.

Seagrave. Ladybugs. 2001. Mrs. Seagraves' Quest Classroom. 25 June 2006 <http://www.geocities.com/Athens/Atrium/5924/ladybugfacts.htm>.

Orthene 24(c) registration renewed

The section 24(c) labeling to reduce the pre-harvest spray interval of Orthene 75S and Orthene 97 from 90 days to 75 days has been approved by the Wisconsin Department of Agriculture, Trade, and Consumer Protection effective immediately. This will allow growers to continue to make a post-bloom application. Further information listed on the supplemental label (1) forbids tank-mixing with other organophosphate insecticides, such as Diazinon, when used post-bloom, (2) restricts usage to 1.0 lb active ingredient per acre per crop cycle, and (3) prohibits application during bloom. Be sure to have a copy of the supplemental label in your possession if you intend to make a post-bloom Orthene application within the 90 to 75 day PHI period.

From quiet homes and first beginnings,
Out to the undiscovered ends,
There's nothing worth the wear of living,
But laughter and love and friends

Author unknown

SUMMER FIELD DAY

The 2006 cranberry summer field day and trade show will be held at City Point Cranberries in Pittsville on Wednesday August 9. Exhibits open at 8:30. Educational mini-sessions begin at 10:00 and will report on pesticide screening work and nutrition management. The semi-annual WSCGA business meeting will be held at 1:15 pm.

Lunch is available for purchase from the WSCGA office and should be ordered before the field day. A lunch ticket order form is available on the Internet at: http://www.wiscran.org/Sum%20Mtg%20Notice-Web.pdf.

Be polite, prepare yourself for whatever you are asked to do, keep yourself tidy, be cheerful, don't be envious, be honest with yourself so you will be honest with others, be helpful, interest yourself in your job, don't pity yourself, be quick to praise, be loyal to your friends, avoid prejudice, be independent . . . . and read the newspapers.

Bernard Baruch