

Yavapai Gardens

Master Gardener Newsletter

October-November 2020



Table of Contents

Some like it hot . . . but most do not . . .	1
Grow a Dwarf Tomato . . .	3
Meet a Master Gardener—Lesley Alward . . .	5
MG Recognition . . .	5
MG Announcements . . .	6



Some like it hot . . . but most do not: How High Temperatures delay pollination and ripening.

Thanks to the Nebraska Cooperative Extension in Douglas-Sarpy Counties and John Fech, Extension Educator, for allowing me to reprint this.

(Ed Note: Before you start grumbling about growing in Nebraska is different than in Arizona, read on. This is quite relevant for us.)



Ah, summer – vacations (pre-COVID), swimming pools (pre-COVID), ice cream, vegetable gardens, and, in many places, really high temperatures. These things all go hand-in-hand (or at least they did before the pandemic.) Many gardeners feel that the heat of

mid-summer goes hand in hand with garden production; those high temps driving production on those fruiting plants like tomatoes and peppers. But. . . could they be wrong?

We've had lots of extra-hot days this summer in Nebraska, so it stands to reason that we should have really great production on those garden favorites like tomatoes, right? Then tell me why our extension office has received numerous questions this year about why tomatoes aren't setting or ripening. Heck, we even had a Facebook post go viral about tomatoes not ripening in the heat (well, for our standards – 300,000 views/2,000 shares). Could it be a disease? Nope – it's the heat. High daytime temperatures can have a big effect, but the effects are compounded when nighttime temperatures are high as well.

Tomatoes not ripening? You're not alone. Temperatures above 85 degrees will slow down the ripening process. Temperatures above 95 can stop the process all together. It turns out that high heat does two things in many of those fruiting vegetables (and of course fruits) that we grow. First, it inhibits pollen production, which in turn reduces fruit set. Second, heat inhibits gene expression for proteins that



Tomato Floral Structure

aid in ripening/maturation of the fruit. Heat stress also reduces photosynthesis (Sharkey, 2005) in many different plants, which would slow down plant processes (such as fruit development and ripening) as it reduces the availability of sugars to fuel these processes. So high heat can not only reduce the number of fruits developing on the plant, but also slow down the ripening process for fruits that have already set. And if you think that these effects only happen at super extreme temps, most of the research studying temperature effects of this nature use a common “high ambient temperature” of 32°C/ 26°C for daytime/nighttime temperatures. For us U.S. Fahrenheit-ers, that’s 89.6°F/78.8°F, which isn’t really all that hot for most of us.

Many studies show that application of this “high ambient temperature” to crops such as tomatoes, beans and corn during the pre-fertilization phases of reproduction (ie – flower/ pollen development) can negatively affect fruit set. The introduction of Porch and Jahn (2001) gives a pretty good overview of literature detailing the effect in beans (*Phaseolus vulgaris*). I’ll sum it up here: heat stress while the pollen is forming (called sporogenesis) led to pollen sterility and failure of pollen to release from the anthers (dehiscence). It also led to flower abscission (basically the plant aborts the flower) and reduced pollen tube formation (how the pollen nucleus gets through the stigma to the ovule for pollination) when applied during the period of pollen sac and ovary development. And application during flower opening (anthesis) resulted in pollen injury (sterility) and reproductive organ abscission. All these effects lead to reduced fruit/seed set in beans. (Interestingly, heat stress at the ovary development phase also led to parthenocarp – basically the pods developed, sans seeds, without fertilization.)

However, we get the most calls about tomatoes (they’re the top crop for most home gardeners). Is it the same issue? Yep. Numerous

studies (Sato, et al., 2000; Pressman, et al., 2002; Abdul-BAki, 1992) show the same effect in tomatoes. Pressman, et al. (2002) linked the effects on pollen to changes in carbohydrates in the anthers (reduced starch storage and carbohydrate metabolism).

To add insult to injury, high temperatures also slow down or stop ripening of crops like tomatoes. Picton and Grierson (1988) found that 35°C (95°F) temperatures altered the gene expression in tomato fruits – inhibiting the expression of polygalacturonase, which softens cells walls, allowing the fruit to ripen. Reduced photosynthesis would also reduce the availability of sugars for fruit development and ripening.

But there’s hope, both this season and in the long term! The effect on the plants is not permanent. When temperatures drop below that “high ambient temperature” threshold pollen production, and therefore fruit set, will return to normal (if the plant is healthy). Sato, et al. (2000) found that pollen release and fruit set resumed within a few days after heat-stressed plants were “relieved” and temperatures dropped back into the optimal range of 26-28°C/22°C (78.8-82.4°F/71.6°F). So many of those plants will become productive again (good news for my own tomatoes and beans, which had an initial flurry of production then went on vacation), especially as we head into fall. And efforts are under way to develop and test heat-stress resistant cultivars.

The last point may be more important than you realized. These production problems plague many areas around the world at current climactic norms. Many fear that increasing temperatures will limit the productive capacity of many areas of the world that are already struggling. It is easy to see how the difference in just of just a few degrees can take your veggie production from prolific to paltry.

You can also try to reduce the heat a bit yourself for an immediate fix. Shade cloth can help reduce temperatures a little bit, which may make all the difference in your garden if you’re just slightly over the “high ambient temperature” threshold.

But in the meantime, if your vegetable garden has taken a summer siesta it will get around to producing again one day. You’ll just have to take



Tomatoes Under Shade

good care of the plants in the meantime. And perhaps it's a blessing in disguise – when it's that hot I don't want to be out working in the garden much, either.

Sources

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Grow a Dwarf Tomato

By Debbie Allen

If you want to grow tomato plants in containers, the first bit of advice you hear is usually to choose “bush” tomatoes, which do not grow overly large and can fit comfortably in a large pot. Unfortunately, bush tomatoes are normally “determinate” types, which have fruit that ripens over a very short period. For the container gardener who wants a crop for the whole season, indeterminate plants are a better choice. Indeterminate plants continue to grow and produce until frost, but they tend to be big and need to be staked or caged. Now there is a third option for container growers: the dwarf tomato.

Dwarf tomatoes have existed for over a hundred years, but for some reason have never achieved popularity. In 2005 a tomato enthusiast, Craig



Indeterminate tomato on L (Cherokee purple), Dwarf tomato on R (Dwarf Tasmanian Chocolate) August 10, 2020

LeHoullier from North Carolina, was inspired to develop new dwarf varieties that would be suitable to the limited-space gardener. He discussed the idea with Patrina Nuske Small of Australia, and a world-wide program, the Dwarf Tomato Project was born. Their goal was to find volunteers to develop new and interesting dwarf varieties. The challenge for the volunteers was to breed their new plants through enough generations to reach a genetically stable, non-hybrid variety. Over 100 enthusiastic volunteers have been working on the project and over 60 varieties are now available in a wide range of colors, sizes, and flavors. Some are determinate, but most are indeterminate.

Dwarf tomatoes share several basic traits. Above all,



they are small. Dwarfs usually grow to only three or four feet tall. They might need a small cage or stake, but they remain compact. Even as young plants they are distinctive. They are shorter than their non-dwarf

companions and have a thick central stem. The leaves are a darkish blue green and are “rugose”, with a puckered, wrinkled appearance. The yield, while respectable, is not quite great as indeterminate plants, but neither is the space taken.

Dwarf tomatoes are ideal for growing in containers on decks and patios due to their compact size, but they are equally suitable for growing in the ground. They can be planted closer together than the larger indeterminate plants. This allows the gardener to experiment with a greater variety of color and size in the same space.

An important quality of these new dwarf tomatoes is that they are all Open Source Seed Initiative pledged: “You have the freedom to use these OSSI-Pledged seeds in any way you choose. In return, you pledge not to restrict others’ use of these seeds or their derivatives by patents or other means, and to include this pledge with any transfer of these seeds or their derivatives.”

Dwarf tomatoes are an exciting new development for growers, allowing them to expand their choices wherever they choose to grow the plants.

Sources: there are several places you can get seed. Check your favorite seed source as they are



Still ripening tomatoes on the Dwarf Tasmanian Chocolate, Aug 22, 2020

becoming more available or check some the sources below.

TomatoFest is a good resource for finding dwarf tomatoes. It would be a good start for for more information and seeds for Dwarf Tomatoes. <https://www.tomatofest.com/>

Victory Seed <https://www.victoryseeds.com>

Totally Tomatoes <https://www.totallytomato.com>

For Tomato aficionados I suggest you have a look at The World Tomatoes website. Gorgeous pictures, good information about varieties, list of seed suppliers, gardening information. <https://worldtomatosociety.com/>

If you are interested in more information about dwarf tomatoes: <https://www.craiglehoullier.com/dwarf-tomato-breeding-project>



Meet A Master Gardener—Lesley Alward

By Linda Guy

The wild and native landscapes speak most to Master Gardener Emeritus Lesley Alward who grew up car camping with her family, and whose first choice for unwinding is a walk in the woods or puttering in her 2-1/3 acres of juniper-oak woodland in Williamson Valley. Lesley is an extremely active volunteer in our community, particularly at the Highlands Center for Natural History, having served 10 years on its Board (past president), designing eight of its Schoolyard Habitat Gardens and chairing the last 10 year's HCNH fundraisers Wander the Wild, which will be a virtual experience this year.

Lesley wasn't always a gardener. In the late 1980's, she left her career as a collegiate women's volleyball and swimming coach, to move to the San Francisco Bay area to assist a family member. Time spent working with her highly regarded landscape designer brother Steve soon led to her own landscaping business and contractor's license. With her license in hand, Lesley was able to install the gardens that Steve designed, most of which were for individuals with mobility challenges.

She is now deploying these skills in the design and installation of an accessible native garden with several other Master Gardeners at the Discovery Center in Cottonwood. The focus is low-water-use native plants and it features a figure-eight pathway design with separate mass plantings for butterflies



and hummingbirds. Still a teacher at heart, Lesley always promotes the “gospel of native plants and habitats.”

Lesley has known Prescott since her childhood from annual visits to family friends in Iron Springs. The needs of her aging parents relocated her permanently in 2003; she lives in their former residence. To keep herself busy back then, she double-dug 2,700 square feet of a likely alluvial plane, contoured it and planted a market garden, selling her produce at the local farmers market for two years. Eventually a gopher incursion led her to briefly abandon the garden before converting the

area to a butterfly habitat rich with native milkweed and relocating a smaller vegetable space to an upper level near the home. Her many improvements include installation of rainwater harvesting cisterns.

Soon after arrival in Prescott, she enrolled in Master Gardener training, becoming one of the

“Magnificent Seven” of the class of 2005, all of whom remain very active members of the MGA (Sherry Howard, Herdis Maclellan, Angie Mazella, Diane McKelvey, Cathy Michener and Rose Williams). Lesley is



a fixture at the annual Monsoon Madness fundraiser and the HCNH native plant sales. She presents regularly on behalf of the MGA Speakers Bureau, most recently “Maximizing the Success of Your Home Garden” via Zoom. Audiences at Ollie, the Highlands Center and many local garden clubs have benefited from her training and years of experience.

Social by nature, among her favorite pastimes is dining with friends. Her partner, Melba, is culinary-trained, and Lesley considers their home, affectionately referred to as “The Old Kettle Club,” among the best restaurants in town. How could it not be with her talent in the garden?



Congratulations and Thanks to the Master Gardeners

It's been a tough year with the pandemic closing the offices and ending most of our activities. In spite of that Master Gardeners across the county have persisted in continuing to help the community. The Master Gardeners below have all stepped up and passed milestones in their efforts to keep going. With the Recognition Picnic being canceled this year, please take the time to say congratulations and thank you to the Master Gardeners below if you see them. They deserve the accolades. Even if you didn't reach one of these benchmarks thanks to all the Master Gardeners who put in time. The extra effort it took this year to participate is very much appreciated.

150 Hrs

Laurie Cameron
Jo Glaves
Maria Goodman
Cynthia Jones
Bob Reynolds
Tony Troianello
Ro Turner

250 Hrs

Donna Davis
Trudy Eccelston
Pam Edwards
Tom Ganser
Harriet Jack
Kristin Lohay
Leroy Miller
Cindy Pitcher
Sue Poling
Dick Sitts
Anne Temte
Tracy Wiederainders
Doug Winckler

500 Hrs

Ann Baugh
Nancy Christie
Lori Dekker
Emily Lane
Jenn Moreland
Diane Thornbrugh

1000 Hrs

Debbie Allen
Leigh Ann Frankel
Lois Janowski
Barbara McCurry
Cindy Tirotta

1500 Hrs

Connie Loving

2000 Hrs

Bill Marmaduke

3000 Hrs

Sue Smith

4000 Hrs – President's Volunteer Service Award

Bob Gessner

Emeritus

Garry Neil
Gwynne Reese
Lois Rosenow
Barbara Saul





Congratulations

for completing your first 50 hours

Pam Demel – mentor Laura Mineer

Suzie Delgado – mentor Scholly Ketcher

Camp Verde Farmers Market

The Master Gardeners have been such valuable helpers this season. They have manned our entry /exit, enforced our rules, had rude customers, been compassionate, given free seeds. I appreciate them all; Sharon Marmaduke, Pam Edwards, Colleen and Karen (do not remember their last names. <https://www.facebook.com/verdevalleyfarmersmarket/posts/3426746990709202>

Jane Davie, Market Manager.



The photo was staged, and they were maintaining social distancing while at the market.

Yavapai Gardens Searches

The Yavapai Gardens newsletters are on our website as pdf files and are not searchable. However, the specific horticulture topics found in each newsletter are now noted next to the newsletter link. Hopefully this will help if you are looking for a particular subject. Thank you Jo Graves and Kim Corcoran for compiling the data. <https://extension.arizona.edu/yavapai-gardens-newsletters>

2020 Newsletter Deadline Schedule

Publish Date Deadline

Feb-Mar—Feb 1—Articles Jan 5, announcements Jan 25
April-May—April 1—Articles March 5, announcements Mar 25
June-July—June 1—Articles May 5, announcements May 25
Aug-Sept—Aug 1—Articles July 5, announcements July 25
Oct-Nov—Oct 1—Articles Sept 5, announcements Sept 25
Dec-Jan—Dec 1—Articles Nov 5, announcements Nov 25

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Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Jeffrey C. Silvertooth, Associate Dean & Director, Extension & Economic Development, Division of Agriculture, Life and Veterinary Sciences, and Cooperative Extension, The University of Arizona.

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MG NEWSLETTER



Next Meetings

Meetings are still taking place on Zoom. Check Mary Barnes emails for all the information on participating. She is also sending out information on events and programs on zoom you can watch.

**The next MGA meeting is Oct 21st via Zoom.
Speaker to be announced.**

Local museums, various organizations and universities are offering a variety of public programs on zoom. Easy to sign up and they can be interesting if you are looking for something to do.

This years Recognition Picnic is canceled.

Both the Prescott and Camp Verde offices are still closed for now.