

Green Thoughts

Conversations and ideas about growing at The Spring Gardens

In a previous issue we described how surprised we were when we found that newly germinated spinach seeds need very little water to continue growing. We also remembered that we had little success growing spinach from seed in our plot. We suspected that we were over-watering the spinach seedlings. When we started giving them very little water, or none at all, we had much

*Generalizing,
& going too far*

greater success. Similarly we found that small tomato seedlings could also do poorly when over watered. And so when the growing season for

*Honey Bees:
wanting & liking*

2022 began we decided to not water our tomato plants and see how far we could push it. We bought a few store-bought plants (Sweet 100 cherry tomatoes) and the rest we grew from seed (Big Beef Hybrid – from Jung). Our non-watered plants took off: they grew 3 to 4 feet high and were covered with foliage. They flowered and set fruit in early June. We were eating cherry tomatoes before July fourth and the first of those middle sized Big Beef tomatoes were ready soon after. We should add that throughout May and June and into July there were semi-regular rains. That seemed to be sufficient to keep the plants growing without any extra watering. Then the serious heat started in early July and culminated in that heat wave of 9 consecutive days with temperatures over 90 and no rain. Zero. And still we didn't water. And we didn't mulch around the base of the plants. We speculated that the heat and dryness would drive the tomato plants to grow deeper roots seeking out damper soil. We went too far. But that's what experiments are all about – seeing how far to push the envelope. (when we see doctors who prescribe medication they too are doing experiments, that's because almost all of us are unique and don't respond the same way to meds. Doctors don't always see it that way). All our plants looked peaked. The Sweet 100s withered but the Big Beef tomatoes had some life in them.

Take home lessons

So we have started watering our tomato plants. And talking sweetly to them. New foliage has developed as well as new flowers. We are seeing the first new fruits starting to set. We added mulch around the base of each of the plants so that the soil will stay more evenly moist.

The days are getting shorter at the fall equinox but there is still a lot of warm weather ahead given there is global warming and that Philadelphia is situated a mere 35 miles or so north of the Mason Dixon line. We are learning more about what we can and can't do in watering tomato plants. We will take stock again at the end of the season.

Meanwhile, despite Spartan treatment of our tomato plants, we had been regularly

watering other veggies. Our sweet pepper plants look healthy with fine foliage and are bearing significant amounts of fruit. We are regularly harvesting our beets and the leaves look edible for those who eat them.

Finally at the end of the first week in September we planted seeds for bush beans, beets, radishes, bok choy and spinach. By 15 September the bush beans, radishes and bok choy have emerged with their seed leaves coming up for air and sun and a few days later our beet and spinach seeds joined the club.

A puzzlement: gita beans not growing up

We have had very good luck growing gita beans these last few years. They are a type of pole bean from India and form tasty very long and thin pods. Each year I let some of the beans grow until they dry out and harvest the seeds for planting in the next year. This year I planted last year's seeds. They germinated fine but they didn't grow up. They stubbornly stayed at ground level and produced just a few beans that hugged the ground. In contrast, my regular pole beans (Blue Lake) grew splendidly, reaching 5 feet. I'm perplexed about what happened to the gita beans. If anybody has any thoughts please let us know

Correspondence.

A note from our friend Ken in south Florida who reads Green Thoughts and commented on a flowering plant shown in issue #31:

We here in Florida enjoy living vicariously. Thanks again for visually sharing the bounty of the Spring Gardens. It turns out that the plant in your *Green Thoughts* that I didn't know the name of is called *Buddleia*, or butterfly bush. Although it looks nice and attracts butterflies, its invasiveness has made it outlawed in some states and, because it

displaces native plants, is considered by some to be harmful ([butterfly bush](#)). Who knew? I saw one at a house we stayed in in upstate NY, and was struck by its attractiveness to butterflies. However, the plant that truly impressed me there was a large flowering mimosa tree, which not only attracted butterflies and bumblebees, but also many hummingbirds.

Thanks again for such a wonderful display.

Best from Ken



butterfly bush in foreground

And here is a note from Pat Schuyler our former fellow gardener who now lives in Northeast Philly.

Really did enjoy your latest issue [#31]. This seems to be a spectacular year for flowers. Even the clover up here is eye catching, and lawns and fields are white with them.

Pat Schuyler

Correction

In our last issue we suggested that bees occupying the Langstroth hive up on Bee Hill (northeast corner of The Spring Gardens) were interlopers. Not true. Our resident beekeeper, Karen, informs us that she introduced a bee colony to that hive in the spring. Sorry about the misinformation.

Meanwhile, the bees on Bee Hill are doing very well. They are thriving. Judging by the number of bees lingering near the entrances to the hive, there seems to be a large colony (see below, photo taken 18 September).



hive entrances (horizontal slits), bees congregating nearby

Wanting and Liking

While on the subject of honeybees, a recent article in Science magazine by Huang et al. (23 April) describes the behavior of honeybees with respect to rewards. As background, the authors began by describing the pleasure/displeasure circuits in mammals. Other investigators have shown that when it comes to rewards, the neurotransmitter dopamine is an important “neuromodulator” for an animal *wanting* a reward rather than

liking the reward. There seems to be separate brain circuits for wanting and liking. For wanting, mammals have brain circuitry which includes connections between the prefrontal cortex, the ventral pallidum and the amygdala (there will not be a quiz). Using this circuitry mammals quickly learn what is rewarding and the neurotransmitter dopamine is useful in triggering motivation.

Huang et al. knew that honeybees are very good learners and communicators. As we wrote about in an earlier Green Thoughts, some honeybees go out to forage for food from distant flowers. When they return to the hive they communicate with naïve bees, who in turn will forage. The experienced bees tell their naïve hive-mates where a food source is, by doing a “waggle dance”. The dance includes information about the direction of the food source from the hive (relative to where the sun is) and the distance between the hive and the food source. Huang et al used artificial food sources made of sucrose dissolved in water. The authors found that during the waggle dance, *dopamine* (yes, dopamine!) level in the brain of the bee dancers goes up. The dopamine level then goes down at the end of the dance. When the dancers go out again for more sucrose, brain dopamine goes up again but goes down when the bees reach the sucrose source and start to feed. The authors also found that when they used a pharmacological agent that blocks brain dopamine, the bees don’t forage as frequently. The time between the successive visits to the flowers is increased (which is pretty much the same thing). Further, if the bees are starved by withholding food sources, their dopamine level goes up. Conversely, if their dopamine level is artificially increased they will eat more sucrose. And the increased

dopamine helps them remember for a longer than normal time where the reward site is.

Should we use emotionally loaded terms like ‘wanting’ and ‘liking’ when we are describing honeybee feeding behavior? True, it is a shorthand way of talking about food seeking and food consuming. But what is really going on in the brain of a honeybee? Search me. By finding that mammals use the same neurotransmitter, dopamine, as bees in one aspect of their feeding behavior we might suspect that they have equivalent brain circuits. However, that is not necessarily true.

But you dear reader can decide for yourself....

Years ago Valentino Braitenberg wrote a charming little book called Vehicles – Experiments in Synthetic Psychology. In the first chapter he starts with a design of a very simple vehicle that has a sensor that can detect light. The sensor is connected to a motor which can move the vehicle around. If the light is brighter the motor speeds up. In each subsequent chapter Braitenberg adds more elements to the vehicle. Nothing fancy to start with, more sensors, more wheels, more connections. He shows that he can configure a vehicle to detect a light source and circle around it or, when arranged slightly differently, when it gets close to the light source it slows down and stops. In the latter case he playfully suggests that the vehicle ‘likes’ the light source or perhaps even loves it. There is no dopamine needed nor are there any neurons for that matter, he just is ‘observing’ the behavior of the vehicle and drawing psychological conclusions about such behavior. It is a cautionary tale. It is good to keep Braitenberg’s vehicles in mind

when we are observing the behavior of bees. Or mice. Or people (other people).

Please send your ideas, thoughts, suggestions and observations to:

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that address can also be used for getting on the mailing list for **Green Thoughts**, or getting off.

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