

# Green Thoughts

## *Conversations and ideas about growing at The Spring Gardens*

Weeds are plants that we don't want. There is nothing intrinsically evil about them. But they are in the way.

### Weeds

They can crowd out the plants that we do want, and they may be toxic. When we took over our current plot at the Spring Gardens the previous plot holders had

### Plant interactions

grown mint. It makes a nice tea but it is a perennial and quite invasive. Its roots go fairly deep. We decided to dig up most of the mint and kept the remainder in a container in our plot.

Unfortunately, the mint was to the container what Willy Sutton was to jails. They both found ways to sneak out. We finally said basta. We dug up the rest of the mint and became a mint-free zone.

### Poison Ivy

The first time I ended up in combat with a weed started innocently enough. My family and I had gone for a picnic, in a field near Chadd's Ford. We sat on a blanket and watched the bucolic scene. Horses lolling around. Gentle breezes wafting over the rolling hills. That very night I started itching and I broke out in a rash. Poison ivy! I got some calamine lotion and waited it out. Until then I didn't know what poison ivy looked like. It was one trial learning. I then found that there was poison ivy in my own backyard here in Philly and my adjacent neighbor's back yard had it also. Remember the old ditty?:

She comes on like a rose but everybody knows  
She'll get you in Dutch  
You can look but you better not touch

Poison ivy, poison ivy  
Late at night while you're sleepin'  
Poison ivy comes a-creepin' around

She's pretty as a daisy but look out man she's crazy  
She'll really do you in  
If you let her under your skin

Measles make you lumpy  
And mumps'll make you lumpy  
And chicken pox'll make you jump and twitch  
A common cold'll fool ya  
And whooping cough'll cool ya  
But poison ivy, Lord it'll make you itch!

You're gonna need an ocean of calamine lotion  
You'll be scratchin' like a hound  
The minute you start to mess around

It's not that hard to get rid of poison ivy. The roots are right at the surface as it comes a-creepin' around and sending out many feet of runners. Put on long plastic gloves and pull up the plants. Put them in a pile and wait. I did a science project with my daughter when she was in first grade. I was the test subject and we determined how long the stuff is noxious. Seven hours after the

plants were picked I rubbed some leaves on my skin in a little 2 by 3 inch patch on my right arm. It made me itchy. Seven days later I rubbed some on my left arm. There was no effect (at least on my skin). Anything for science and my children. It took 3 seasons to rid the two backyards of poison ivy. Good riddance. I haven't seen any poison ivy in the Spring Gardens. Let us know if you have. The wonderful Leiber and Stoller song (lyrics above) was written in those innocent pre-vaccination days. Most people who are currently seniors remember going through bouts of measles and mumps and chicken pox.

### **Horseradish**

Despite warnings, we introduced horseradish to our plot. It is a perennial in the brassica family (which includes broccoli and Brussels sprouts). If you like bitter herbs that's your ticket. Chopped up horseradish can be used as a garnish with roast beef or on sandwiches or in Bloody Mary cocktails. Also, for you with a scientific bent, horseradish produces a peroxidase which has many scientific applications. It is an enzyme that is quite stable and sturdy and can be easily visualized. It can be used to trace connections of nerve fibers peripherally or in the central nervous system. Its neuroanatomical use made quite a splash when first introduced 45 years ago. It is still used.

The horseradish roots can be an inch diameter and can spread horizontally several feet. It produces very large leaves. Once it is established it is hard to get rid of. The

problem is the roots can store a lot of energy and so it stays alive a long time. If it is blocked from the sun it uses its stored energy to produce new shoots and roots. After 2 or 3 years with no sunlight it weakens. With no shoots, there are no leaves, and so there is no photosynthesis to put more energy back into the plant. With a little assist from the gardener it eventually calls it quits.

### **BINDWEED**

According to some of our fellow gardeners, the most evil of the weeds in the garden is *Bindweed*. It is in the same family as morning glories. Bindweed affects some Spring Gardeners as kryptonite affects Superman.

One year of Bindweedgate is enough  
*R. Nixon*

According to The Spruce (found on-line):

"Bindweed is a perennial vining plant that snakes its way across the ground and over fences, plants, or any other stationary thing in its path. It has medium-green, arrow-shaped leaves and white-pinkish flowers that look like those of morning glories [they are related]. Bindweed can grow four feet or more in length and has deep, strong roots. It is regarded as an [invasive plant](#), since it is so persistent that it can easily choke out native species. In northern climates, it is a less robust plant but still noxious and capable of causing havoc in the garden. Bindweed grows from both seeds and roots. The seeds remain viable for up to 30 years in the soil, so this is not a plant that you want to allow to set seed if you can help it. If you have bindweed, be sure to get rid of it before it flowers and sets seed. However, bindweed grows easily from underground roots and rhizomes, and this is typically why you'll see bindweed popping up everywhere, even if you've never let it go to seed. Even a tiny section of root in the soil is enough to allow bindweed to grow and spread in the garden."

You can see why people get paranoid.

“Vigilance and persistence are the two most useful weapons in your arsenal against bindweed. Watch for signs of this vine, and remove it as quickly as possible. The best way to get rid of bindweed is to cut it off at soil level. Don't bother pulling it up; it will just sprout wherever you tore the roots--and it is virtually impossible to get all the roots out. By continually cutting it off at ground level, and doing it as soon as you possibly can, you will eventually starve the plant (since it will be unable to photosynthesize), and it will die. Be patient! You may have to do this many times, but it will eventually do the trick. Bindweed thrives in open, cultivated ground and soil that is rich in nitrogen, such as that found in gardens and farms. Since we can't change that and we can't stop seeds that have been waiting in the soil from germinating, all we can do is deal with bindweed when we see it. Some gardeners find that plants or mulches that shade the ground may prevent bindweed from sprouting. Tough stemmed plants like pumpkins are not damaged by bindweed and shade the ground in a manner that keeps bindweed from sprouting.”

“Believe it or not, even this garden villain has a few uses. You can use pieces of bindweed as [ties](#) in place of twine when tying and [staking plants](#). The [flowers](#) (which are actually very pretty) attract [beneficial insects](#) and exude a soft fragrance. The leaves and stems can also be used to make an all-natural dye.”

From the tales that have been told about Bindweed you would expect it choking off and crushing other plants. I have never seen it that bad. At least around beans and peas and tomatoes and oregano and thyme. I snip it off when I see it and it is tolerable. Of course my standards could be low.

This Spring coming to a local movie theater near you:

**Dr. Strangeweed or, How I learned to stop worrying and love bindweed**

## Plant interactions

Years ago a graduate student I knew, let's call him Ben, had a fiancé who was an agronomist studying plant roots of a particular species. She discovered that the roots exuded toxins to inhibit other plants from growing nearby. It was a whole world which I knew nothing about and found fascinating. I didn't get much information out of her since she had other things on her mind – wedding plans and memories of being abducted by aliens. We asked Ben if perhaps this abduction might affect marital bliss. He himself did not believe in aliens and he thought he could convince her that there weren't really any aliens out there. Good luck to that - he couldn't convince her. Nonetheless, they did get married. However, she soon disappeared. I have no idea where to. And I never learned more about her root toxins. But she was way ahead of her time regarding root toxins.

Plant biologists have gotten very interested in how plants interact with individuals of their own species and with individuals of other plant species. They have a fancy word for this which I recently learned - Allelopathy. Technically it is a phenomenon by which an organism produces one or more [biochemicals](#) that influence the germination, growth, survival, and reproduction of other organisms. These biochemicals are known as allelochemicals and can have beneficial (positive allelopathy) or detrimental (negative

allelopathy) effects on the target organisms and the community. The topic is enormous.

In a recent Science article [Science 4 Jan. 2019] it was noted that “some species constrain how far their roots spread, others change how many flowers they produce and a few tilt or shift their leaves to minimize shading of neighboring plants, favoring related individual.” Evolutionary ecologist Susan Dudley grew American searocket plants “in pots with relatives or with unrelated plants from the same population. With strangers, the searocket greatly expanded its underground root system, but with relatives, it held these competitive urges in check, presumably leaving more room for kin roots to get nutrients and water.” How they can tell relatives from non-relatives, I don’t know. A Spanish biologist found that a local species of *Moricandia* grown in pots “with kin put out more flowers, making them more alluring to pollinators”. Especially productive was when the plants were most crowded with relatives.

Sagebrushes when they are injured by herbivores release volatile chemicals that “stimulate neighboring sagebrush to make chemicals toxic to their shared enemies.” When you think about it, that’s an interesting communication system. And mustard plants “growing next to their relatives shift the arrangement of their leaves to reduce shading of their neighbors, but don’t do that when the neighbors are unrelated.” Similarly, when sunflower kin are “planted close together they arrange themselves to stay out of one another’s way. They incline their shoots alternately toward

one side of the row or the other...and when they are planted 10 to 14 related plants per square meter [very high density for commercial growers] ...they got up to 47% more oil from plants that were allowed to lean away from each other than plants forced to grow straight up.”

On the same theme, I found another example of negative allelopathy in my backyard where a weed, the wild strawberry, *Fragaria virginiana*, grows well. I have a little grassy “lawn”. But in the vicinity of wild strawberry plants there is dead zone where nothing else grows. Are the roots of the plant choking off other plant varieties or do the roots produce a natural herbicide that kills other plant species? If you know, please tell Green Thoughts.

Roots are complicated structures and produce all kinds of molecules. Think about that when you are sipping a cold glass of root beer. It was so-called because it was originally flavored with the root of the sassafras plant which produces a tasty molecule called “safrole” later found to be carcinogenic. Food chemists came up with a substitute which has a similar taste and isn’t a carcinogen.

### Plant pests

I still remember my horror the first time I saw one of my prized tomato plants with many less leaves than it had the day before.



The plant didn’t

Tomato horned worm larva. (photo from Amanda Hill)

look diseased, but there were some branches with no leaves and other branches had their full complement of leaves looking green and healthy. On close inspection there was a curled-up green leaf that wasn't a leaf, it was a 2 inch caterpillar (larva) called a tomato horned worm. It was well camouflaged. Its color matched the color of the tomato leaves but it was a leaf-eating machine. Just two or three of these horned worms could defoliate a tomato plant in a day. The plant couldn't protect itself. I had to pick off the horned worms by hand and their insides were packed with partly digested tomato leaf goo. It turns out there usually aren't too many tomato horned worms. So if you catch them early enough, you are free of them for the rest of the season and the tomato plants pick up again. Once the caterpillar matures it turns into a large moth. I don't know of any natural defense against these horned worms.

Tomatoes are also attacked by white flies. Fellow gardener Russ Troyer found an article originally in PLoS ONE showing how marigolds planted near tomatoes are protective:

### **How the humble marigold outsmarts a devastating tomato pest**

March 1, 2019, [Newcastle University](#)



Tomato flower and small fruit

Scientists have revealed the natural weapon used by marigolds to protect tomato plants against destructive whiteflies. Researchers from Newcastle University's School of

Natural and Environmental Sciences, carried out a study to prove what gardeners around the world have known for generations—marigolds repel tomato whiteflies. The experts have identified limonene—released by marigolds—as the main component responsible for keeping tomato whiteflies at bay. The insects find the smell of limonene repellent and are slowed down by the powerful chemical. The findings of the study have the potential to pave the way to developing a safer and cheaper alternatives to pesticides. Since limonene repels the whiteflies without killing them, using the chemical shouldn't lead to resistance, and the study has shown that it doesn't affect the quality of the produce. All it takes to deter the whiteflies is interspersing marigolds in tomato plots, or hang little pots of limonene in among the tomato plants so that the smell can disperse out into the tomato foliage.

The research team, led by Dr. Colin Tosh and Niall Conboy, has shown that it may be possible to develop a product, similar to an air freshener, containing pure limonene, than can be hung in glasshouses to confuse the whiteflies by exposing them to a blast of limonene. Newcastle University Ph.D. student Niall said: "We spoke to many gardeners who knew marigolds were effective in protecting tomatoes against whiteflies, but it has never been tested scientifically. "We found that the chemical which was released in the highest abundance from marigolds was limonene." This is exciting because limonene is inexpensive, it's not harmful and it's a lot less risky to use than pesticides, particularly when you don't apply it to the crop and it is only a weak scent in the air.

Limonene makes up around 90% of the oil in citrus peel and is commonly found in household air fresheners and mosquito repellent. Dr. Tosh said: "There is great potential to use limonene indoors and outdoors, either by planting marigolds near tomatoes, or by using pods of pure limonene. Another important benefit of using limonene is that it's not only safe to bees, but the marigolds provide nectar for the bees which are vital for pollination. The researchers carried out two big glasshouse trials. Working with French marigolds in the first experiment, they established that the repellent effect works and that marigolds are an effective

companion plant to keep whiteflies away from the [tomato plants](#). For the second experiment, the team used a machine that allowed them to analyse the gaseous and volatile chemicals released by the plants. Through this they were able to pinpoint which chemical was released from the marigolds. They also determined that interspersing marigolds with other companion plants, that whiteflies don't like, doesn't increase or decrease the repellent effect. It means that non-host plants of the whiteflies can repel them, not just marigolds.

Whitefly adults are tiny, moth-like insects that feed on plant sap. They cause severe produce losses to an array of crops through transmission of a number of plant viruses and encouraging mould growth on the plant.

Dr. Tosh said: "Direct feeding from both adults and larvae results in honeydew secretion at a very high rate. Honeydew secretion that covers the leaves reduces the photosynthetic capacity of the plant and renders fruit unmarketable." Further studies will focus on developing a three companion plant mixture that will repel three major insect pests of tomato—whiteflies, [spider mites](#) and thrips.

**More information:** Niall J.A. Conboy, Thomas McDaniel, Adam Ormerod, David George, Angharad M.R. Gatehouse1, Ellie Wharton, Paul Donohoe, Rhiannon Curtis, Colin R. Tosh

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## Companion Plants

Fellow gardener Pat Schuyler sent Green Thoughts a chart showing which plants can be planted next to each other and which not. (A similar chart is on the Spring Gardens website.)

Pat Suggests: "Consult the chart (next page) to see which vegetables make the best companions—and which don't! We'd suggest separating foes and friends on opposite sides of the garden, or at least 4 feet away."

CROP	FRIENDS		FOES
<u>BEANS</u>	Beets Broccoli Cabbage Carrots Cauliflower Celery Corn Cucumbers	Eggplant Peas Potatoes Radishes Squash Strawberries Summer savory Tomatoes	Garlic Onions Peppers Sunflowers
<u>CABBAGE</u>	Beans Celery Cucumbers Dill Kale Lettuce	Onions Potatoes Sage Spinach Thyme	Broccoli Cauliflower Strawberries Tomatoes
<u>CORN</u>	Beans Cucumbers Lettuce Melons	Peas Potatoes Squash Sunflowers	Tomatoes
<u>CUCUMBERS</u>	Beans Cabbage Cauliflower Corn	Lettuce Peas Radishes Sunflowers	Aromatic herbs Melons Potatoes
<u>LETTUCE</u>	Asparagus Beets Brussels sprouts Cabbage Carrots Corn Cucumbers Eggplant	Onions Peas Potatoes Radishes Spinach Strawberries Sunflowers Tomatoes	Broccoli
<u>ONIONS</u>	Beets Broccoli Cabbage Carrots Lettuce	Peppers Potatoes Spinach Tomatoes	Beans Peas Sage
<u>PEPPERS</u>	Basil Coriander Onions	Spinach Tomatoes	Beans Kohlrabi
<u>TOMATOES</u>	Basil Coriander Onions Asparagus Basil Beans Borage  Celery Dill Lettuce	Melons Onions Parsley Peppers Radishes Spinach Thyme	Broccoli Brussels sprouts Cabbage Cauliflower Corn Kale Potatoes  Kohlrabi

## Snapshots of the Spring Gardens taken on 16 April 2019

Strawberry plants look very sturdy but any flowers that were on the plants seem to have been knocked out by recent heavy rain and wind gusts. Some gardeners are getting a jump on summer. They have already planted tomatoes and peppers. They are betting that the likely date of the last spring frost has past. So perhaps the rest of us can think about earlier planting of warm-weather crops next year. Wintered-over spinach looks promising, bug-free and large. Early planted peas have shot 5 inches up. And, the sour cherry trees are in flower!



peppers



strawberry plants



spinach

tomato  
plants



peas





sour cherry trees  
in bloom

Please send your ideas, thoughts,  
suggestions and observations to:  
[e.gruberg@temple.edu](mailto:e.gruberg@temple.edu)  
that address can also be used for getting  
on the mailing list for **Green Thoughts**, or  
getting off.

Prepared by Ed Gruberg

Back issues of Green Thoughts can mostly be found  
on The Spring Gardens Website under Resources