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Itchy Seeding Fingers

Setting out big, fat transplants in the middle of May is so satisfying! Suddenly, you have row crops! But did you transplant them when they were in prime condition? Consider the ideal condition of field-ready transplants.

Fruiting and heading crops, like tomatoes, peppers, and cabbage should have stout but herbaceous stems and have a generally low profile. Leggy plants are more exposed to wind, which can cause desiccation and breakage. If stems are beginning to look woody, they are past prime. Being stuck in a cell tray, root systems are limited in where they can explore to obtain nutrients. Stresses can set in rapidly, which causes stunting and woodiness. A common cause of stress is lack of adequate nutrients. Available nutrients can be provided by either a) growing in sizable cells (or small pots) containing enough media that continues to release pre-incorporated nutrients, or b) by regularly feeding with water soluble or rapidly mineralizing nutrients, especially N, P, K, Ca, and Mg. Nutrient stresses usually cause older leaves to yellow and drop. (If younger leaves are yellowing, this could be iron deficiency, and this may be from high pH me-



dia or alkaline water supply.) But under-watering can also cause nutrient deficiency symptoms. Remember that nutrients must be taken up by plants in their ionized forms in water. No water? No ions. How is under-watering possible? It's actually a common problem, and root balls should be regularly popped out to check if water is reaching the bottoms of the cells. Media becomes hydrophobic if it's allowed to dry out completely. Overhead hand-watering has to be thorough. It happens: you're busy running around doing other things and you knock out the watering too quickly, or you've employed someone with less experience and they are working too fast. It's also possi-



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How to Grow Saffron in Rhode Island

By Fari Gheshm and Rebecca Brown, URI Plant Science

Saffron is the dried stigmas of *Crocus sativus* flowers. It is used as a natural flavor and coloring in rice dishes, beverages, dairy products, baked goods, and sweets. This ancient and well-known culinary spice is also important in pharmaceuticals, cosmetics, perfumes, and as a textile dye.

Consumption of saffron is increasing in the U.S. due to increased interest in natural foods and changing demographics. Increased demand for healthy, plant-based foods and the growing food industry have triggered Saffron consumption. It is mostly grown in semi-arid regions of the Mediterranean and West Asia, though it can grow in many environments between 30 to 50 degrees north latitude and tolerate temperatures ranging from -7°F to 104°F. The crop requires soil with good drainage and a neutral pH, but it is tolerant to saline soil and irrigation water and can be grown in soils with textures ranging from silty loam to clay. Increasing soil organic matter has been shown to significantly increase saffron yields, although soils in many traditional production areas have extremely low organic matter.

A significant portion of the global saffron crop is produced in a southern region of West Asia. Climate change is making this region even hotter and drier than in the past, reducing saffron yields. Most saffron sold in the US is imported from West Asia, often indirectly. Unstable climate, drought, desertification, political instability, and trade restrictions threaten this supply and make it challenging to ensure the imported product's quality, purity, and safety. This situ-

ation creates an opportunity for a local saffron industry in the Northeast, where conditions are more favorable for saffron production. The shortened supply chain between producer and consumer allows for increased confidence in the quality of the product. Saffron is a new crop with a different life cycle from crops currently grown in the Northeast, creating new opportunities for farmers.

Saffron botany

Saffron grows from solid spherical bulbs called corms. In the fall, each corm can produce between 1 and 4 fragrant flowers following a summer dormant period. Depending on weather conditions and farm management, leaves emerge before or after flowers in the fall. After flowering, vegetative growth continues through the winter and spring until early summer, when the plants return to dormancy. Each flower has six purple petals, three golden-yellow stamens, and one red pistil. This famous pistil is made up of 3 stigmas that, when dried, is the saffron spice. The saffron crocus is completely sterile and does not set viable seed. Therefore, the crop must be propagated by the multiplication of corms. Each corm survives only one season, but new corms, called daughter corms, are formed during vegetative growth in the Spring.

Growing Saffron

Planting: Before planting, the field should be prepared by digging, rototilling, or moldboard plowing. Care should be taken to kill any perennial vegetation and

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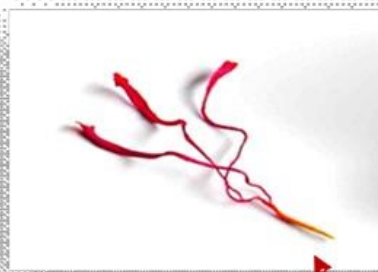
Corm



Stigma

Anther

Petal



Pistil



ble that there are warm or windy microclimates in the greenhouse that cause plants to dry out faster, especially those in small cells.

When plants are in a poor state, the best you can do for them is get them planted out into the field as soon as possible. But what if it's just too early for that because of cold or wet soil, or danger of frost? You must slow them down and prevent them from stretching out too much.



Delays, delays, delays...

It's possible that delaying seeding by seven to 14 days will actually only set you back by a few days. Here is a key point to consider about that brief but important period during which you raise your transplants: when you start transplants later, the average daily temperature is higher, the day length is longer, and the height of the sun is ever increasing. In fact, light intensity and duration increase most rapidly at that time of the year. The point is that you can probably grow field ready tomato plants in 6 weeks, not 8 weeks. Peppers and eggplants do take a little longer, but we tend to be more shy about putting those in the field until it really seems safe from frost. So start those later, too. And as for cucurbits- unless you are transplanting them into a very protected situation in which you have pre-warmed the soil and plan to cover thoroughly with plastic or row covers, wait until the end of April or even the beginning of May before seeding. They really only take 3 weeks.

DIFFing, and DIPing or DROPing

By starting later, you will also avoid the temptation to keep a cold greenhouse at night, which certainly

can save you money but can be detrimental to your transplants. That's because the more drastic the day/night temperature difference, the more that plants stretch, preventing you from achieving the nice, stout plants that you want. Keeping the temperature higher at night reduces the stretching. This method of preventing elongation of plants is called (oddly) DIF. This refers to the difference between day and night temperatures. Having a negative DIF (which prevents elongation) means that you have a higher average nighttime temperature than average daytime temperature. But research has shown that you don't have to

keep the temperature warm all night long. The same effect can be had by keeping it warm at night, and then sharply dropping the nighttime temperature by 5°F to 10°F for two to three hours starting before dawn. This technique, developed by a group of researchers from several universities, is called (oddly) DIP or DROP. It means you don't have to burn extra fuel all night long, just up until 3 or 4AM. Starting your seeds later (late March to early April) may mean burning more fuel nightly, but it will be for a few weeks less, and your plants won't get ahead of you. You must then keep feeding lightly to avoid both deficiency and excessive succulence. In the end, it's better for your transplants to be a bit behind schedule than to be ahead of schedule.

Being Realistic

If this is your first season raising transplants for the field, then this is a big learning year. If you have a few seasons under your belt, then you are beginning to understand what are realistic goals versus what are aspirational goals. It's good to push yourself, but stuff always happens, especially weather. You're also getting acquainted with how your soil behaves in terms of warming and draining. Set realistic anticipated field transplanting dates and work backwards from there.



Saffron- Continued from Page 2

create a weed-free planting area. Corms should be the size of a walnut with a weight of more than 0.3 oz., and free from any disease or contamination. Corms are planted when they are dormant. Studies have shown that the best time to dig corms and plant new fields is when the corms are in deep dormancy, generally from mid-May to early July. Moving corms at the wrong time will interfere with flower bud development, thereby reducing flower numbers and saffron yields. Most saffron corms for sale are shipped from overseas. The logistics of shipping and international trade results in growers in the Northeast usually receiving and then planting corms in late August or early September, which is late. Delay in optimal planting date causes reduced yields in the first year.

Saffron planting can be done by machines or by hand, in raised beds, furrows, or in rows on level ground. The key point is that rows should be parallel and equally spaced. Planting in rows is particularly important if weeds are to be controlled with mechanical cultivation. Also, the terminal buds of the corms should be facing upwards. Corms should be planted



at a depth of 6 to 8 inches to keep them safe from winter cold and summer heat. Planting up to 5 corms per hole is possible, but overcrowding corms can reduce yields and decrease the number of years until it is necessary to separate daughter corms. We recommend planting at a density of no more than 12 per square foot, as higher densities reduce the number of flowers per corm or the production of daughter corms. Growers can expect to keep fields in production longer when corms are planted at lower densities. Lower planting densities delay when it is necessary to dig and replant daughter corms.

Weeding: Weeding saffron fields can be performed by hand, tools, or lightweight machines. Although hand weeding is the safest and most effective method, it is most labor-intensive and costly. For this reason, mechanical weeding with simple and uncomplicated machinery is recommended. Heavy machinery should not be used in the field, as it will ruin the sensitive saffron corms.

In Northeastern states, summer annual weeds may germinate in saffron fields throughout the summer dormant period. Some annual winter weeds can germinate from late summer through the fall and continue growing after saffron comes out of dormancy. Saffron fields must be kept weed-free during the growing and dormant seasons. Particular attention should be placed on removing weeds after saffron flowers and again in early spring.

Mammals as saffron pests: deer and rabbits feed on the green leaves from November through early spring. Chewing damage from deer and rabbits looks similar to each other. When rabbits find a food source, especially when there are no other greens around, they will often stay near a garden, mostly



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hiding during the day and feeding in the morning and evening. Using 2 or 3 applications of a liquid repellent could be effective. Corms are also a food source for voles. Fencing or galvanized hardware cloth on top of the saffron field before shoots emerge in the fall can keep rodents out of the field (see pictures on previous page.) However, hardware cloth makes weeding difficult, so it needs to be removed in the summer when plants go dormant.

Saffron harvest: The most time-sensitive and labor-intensive stage of growing saffron is harvesting and processing. Flowers should be harvested daily, and the stigmas removed and dried within hours of harvest. Flowering time depends on climatic conditions. The flowering period of saffron in the Northeast generally starts around Oct 15 and continues for 20 days, with maximum flowering on the 7th to 9th day. The best time to pick saffron flowers is early in the morning before many flower buds open. Separating stigmas from the flowers improves with practice but is a time consuming task. There are many methods to drying stigmas, but the moisture of stigmas should be between 10 to 12%. The drying method affects the quality and value of commercial saffron.

Saffron research at URI

Research conducted at URI assessed the survival and productivity of growing saffron in southern Rhode Island. This research was conducted from September

2017 to December 2019 at URI's Gardner Crops Research Center in Kingston, RI. The first experiment showed that saffron can survive and produce an excellent yield in southern Rhode Island. Research also confirmed that winter protection and a corm density higher than 15 corms/ft² is unnecessary and counterproductive. The optimal frequency of digging and replanting corms has not been identified for saffron production in the northeastern United States, but 11 corms/ft² produces an acceptable yield for three consecutive years.



Watch URI's [Saffron Webinar!](#)

Be sure to look at 2020 URI Research Reports



Reports from 2020 include Fall Broccoli and Muskmelon

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Supplies May Be Limited: The Pandemic and Panic Buying

Jim and Michelle Garman, Garman Farm, Middletown

It's not exactly news that the pandemic has had a significant impact on supplies for small growers. We are no exception. In the past, influenced by Ben Hartman's books, we liked to run our operation lean, making two major seed purchases (one in late winter and one in summer), and then fill in the gaps when needed. Row cover? Same approach. We'd start with six rolls, then order them one by one until we had just enough to squeak through November. We don't have a ton of space for storing bulky equipment, so that approach worked well for us.

There's no more running lean. Reduced work force at suppliers and a fair amount of hoarding by growers have made that impossible. We have heard reports (or ominous rumors) that row cover fabric has been diverted into mask production, but it may be in short supply simply because growers are buying it up in unprecedented quantities.

Acquiring good seed, and particularly good organic seed, has been a challenge this year. Fedco, one of our favorites, has been almost impossible. Earlier this winter, Fedco was opening order windows at 12 noon, then shutting down when the day's quota had been met. A fellow who volunteers for us got locked out of ordering at 12.01.48 one day. Fedco has since shifted to making appointments for ordering while indicating that shipping time could still be four to six weeks.

Johnny's has been a little more consistent. Our rep explained that Johnny's usually packs a million units of seed during the quiet months of November and December. In 2020, ordering never slowed down, and they were only able to pack 100,000 units. With a few exceptions, Johnny's has been open only to commercial growers for more than a month, which makes a difference; furthermore, we had some seed arrive from them via FedEx the other day, which was a first. If you need 250 seeds of something and you have the right Call Center rep, they will occasionally sell you ten 25-seed packets for the 250-seed price. High Mowing has been on top of its game, and their system of managing back orders is unparalleled, with every back order arriving exactly on time, so far.

Blaming home gardeners for the shortages may have been accurate last year, but that's not the case now. Johnny's sold out of Ovation Greens Mix in 1/4-lb. packages, but has plenty of packets and pounds, which suggests that it is small growers like ourselves, burned last year, who are doing much of the buying. Eli at Nolt's Produce Supplies and Ray at Nolt's Greenhouse Supplies both told us that demand for the simplest products, like Landmark Trays, is the highest they have ever seen, and home gardeners are not buying cases of 288s.

Inevitably there was nothing for us but drop the lean approach and buy everything we needed for the season by mid-February. If you don't have everything yet and your tolerance for "might ship in a few weeks" is low, we have a few tips. URI Extension reminded us that NE Seeds in East Harford is reliable, and although they may not have quite the range of varieties as the bigger houses, they came through quickly, shipping in three days. Although row cover from DuBois is expensive (and metric, sigh), they offer free shipping on orders over \$200. And you can always call Eli; he gave us a worst-case scenario of three weeks for irrigation supplies, and they shipped in a week.. We have to find a place to store all this gear now.

DIF/DIP Sensitive Crops

Not all plant species react strongly to this phenomenon, but here is a list of plants which DO

African Daisy	Croton	Pansy
Ageratum	Cyclamen	Petunia
Aster	Dahlia	Polka Dot Plant
Astilbe	Dianthus	Poinsettia
Basil	Easter Lily	Portulaca
Begonia	Eggplant	Rose
Broccoli	Fuchsia	Salvia
Brussels Sprouts	Geranium	Snap Bean
Cabbage	Hypoestes	Snapdragon
Cauliflower	Impatiens	Streptocarpus
Celosia	Italian Bellflower	Sweet Corn
Chrysanthemum	Kalanchoe	Sword Fern
Coleus	Morning Glory	Tomato
Cosmos	Oriental Lily	Verbena