How to Grow Saffron in Rhode Island

Department of Plant Science and Entomology, University of Rhode Island

R. Gheshm and R.N.Brown

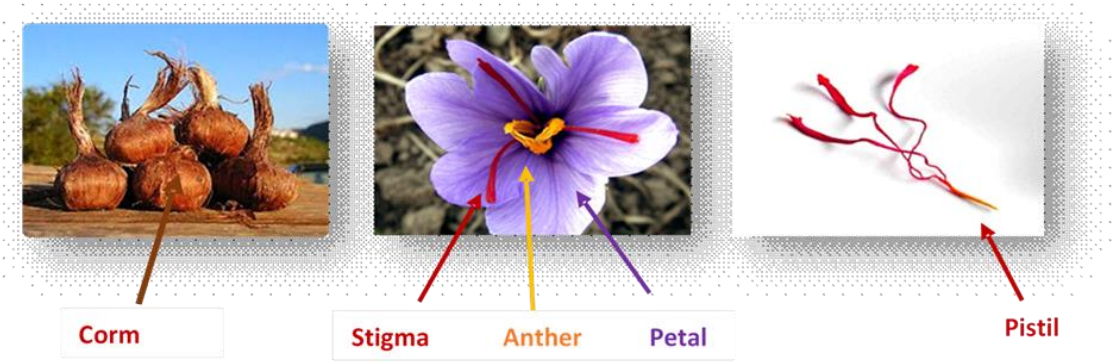
Saffron is the dried stigmas of *Crocus sativus* flowers. It is used as a natural flavor and coloring in rice dishes, beverages, dairy products, baked goods, and sweets. This ancient and well-known culinary spice is also important in pharmaceuticals, cosmetics, perfumes, and as a textile dye. Consumption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

Saffron is mostly grown in semi-arid regions of the Mediterranean and West Asia. However, saffron grows best in a wet and temperate climate. Saffron 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. However, 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 situation 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- 4 fragrant flowers following a summer dormant period. Depend 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[1]. 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.



[1]. The female part of the flower contains 3 stigmas

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 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 125 corms per m^2, 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, a rich weed seed bank allows many weeds to 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.

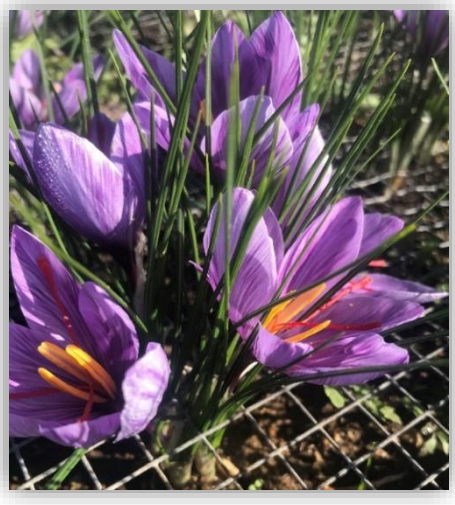
Mammals as saffron pests: Saffron is an excellent source of green leaves for deer and rabbits from November through early spring Damage from deer and rabbits looks similar since both chew saffron leaves. When rabbits find a food source, especially when there are no other greens around, they will often stay near a garden, mostly hide during the day, and feed in the morning and evening. Using a liquid fence as a repellent and spraying 2 or 3 times could be effective. Also, saffron corms are a food source for voles and moles. Fencing the field or galvanized hardware cloth on top of the saffron field before shoots emerge in the fall can keep rodents out of the field. However, hardware makes weeding difficult, so it needs to be removed in the summer when plants go dormant.

Saffron experimental field in South Kingston. The experimental field was protected against voles by laying down galvanized hardware cloth with half-inch square mesh from September to July. Mesh was big enough for saffron to grow through and small enough to keep voles from feeding on corms. The photo was taken on November 3, 2018 (Left). Saffron experimental field during flowering in October (Right).

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 in the end, 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.



Bunch of Saffron flowers in the second year. The photo was taken on 24 October 2018.

Additional Resources

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The North American Center for Saffron Research & Development. Available at https://www.uvm.edu/~saffron/resources.html

Dr. Rahmatallah Gheshm is an Agro-ecologist and postdoctoral fellowship in the Department of Plant Sciences and Entomology with almost 29 years of vegetable cropping and saffron production experience.

Dr. Rebecca Brown is a Professor in the Department of Plant Sciences and Entomology. She leads the research, teaching, and extension programs on vegetable crops.

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FOR MORE INFORMATION

Email: rgheshm@uri.edu

Department of Plant Science and Entomology, University of Rhode Island.

Email: hfaubert@uri.edu

URI Gardening + Environmental Hotline gardener@uri.edu