

Disease-Resistance: Building Blocks for Healthy Vegetable Crops

WITH MODERN GENETICS, GROWERS HAVE MANY OPTIONS OF HIGH-QUALITY VEGETABLE VARIETIES THAT WILL MEET GARDENERS' EXPECTATIONS.

By Jeannine Bogard

When it comes to vegetable gardening, the ultimate pay-off is a harvest basket brimming with fresh produce. For vegetable gardeners, it is all about plant performance, fruit production, flavor and bragging rights about their bounty and culinary experiences. For home gardeners to have a positive growing experience and produce a quality crop, they must be given the building blocks of a healthy productive garden, which begins with the grower. Good cultural practices and crop rotation are well-known procedures to most ornamental growers, but to provide the strongest building blocks for quality vegetable plants, growers should also consider the use of disease-resistant varieties.

Bedding plant growers providing retail-ready vegetable transplants can play a greater role in improving the success rate of gardeners by offering disease-resistant varieties grown in combination with good cultural practices. Many disease-resistant varieties may not have the name recognition of long-time favorites, but with the growing trend of producing food at home, there is a need to spotlight more modern genetics, which increase the ability of a plant to reach its fullest potential.

Disease-resistant varieties allow vegetable plants to grow and fruit when under pressure of a pathogen, its vectors and/or environmental factors that can promote infection and disease. Gardeners



Bedding plant growers who produce retail-ready vegetable transplants can help improve the success rate of home gardeners by offering disease-resistant varieties grown in combination with good cultural practices.

will be encouraged to garden even more when they discover how easy disease-resistant plants are to grow, while producing higher quality fruit and greater yield potential.

Natural Resistance

Disease-causing pathogens come in many forms, the most common being fungi, bacteria, viruses, phytoplasmas and nematodes. Over time, some plants have developed natural resistance to specific pathogens. However, nature does not guarantee that the level of resistance will remain the same over time or that the pathogen itself will not shift to work around the plant's defense mechanisms.

When plants develop natural resistance to disease, it is not unusual for fruit yield and quality to suffer. For this reason, many "heirloom" and open-pollinated vegetable varieties have fallen out of favor with for-profit produce growers. If not for home gardeners holding onto the nostalgia of these plants, many of these varieties would cease to exist. With smaller gardens becoming the norm and more new vegetable gardeners, these under-performing varieties could possibly discourage future purchases of retail-ready vegetable transplants.

Breeding for Resistance

Plant breeders who use traditional breeding methods can strategically develop varieties that have resistance to specific pathogens or particular races of pathogens. There are several approaches to build disease resistance. The preferred method is to build "horizontal resistance," which is based on multiple genes that provide a stable and quantifiable range of resistance that will be less likely to break down over time.

Another approach is to develop "vertical resistance," which is based on a single gene specific to a particular race of pathogen. However, this approach is less desirable because it is unstable; if either the gene or the pathogen changes, the resistance is likely to become obsolete.

Breeders and producers of disease-resistant varieties should periodically re-test for disease resistance to ensure the trait still remains in the variety.

While a plant may be resistant to a particular disease, this resistance does not transfer to other diseases. For

example, if a plant is resistant to fusarium wilt it does not mean it is also resistant to verticillium wilt.

Degrees of Disease Resistance

Varietal resistance is based on field and laboratory

observation. Since environmental conditions and local practices may affect variety characteristics and performance, actual crop yields, quality and level of claimed pest and pathogen resistances depend on many factors beyond the control of the varieties

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Top: Varietal resistance is based on field and laboratory observation. Shown here are diseased vs. disease-resistant peppers.
Bottom: Diseased vs. disease-resistant tomatoes.

originator. No warranty can be made for crop yield, quality and level of claimed pest and pathogen resistance.

At Syngenta, vegetable resistance is labeled as “High Resistance (HR),” “Intermediate Resistance (IR)” or Tolerant (T) to a specified pest or pathogen.

High resistance describes plant varieties that restrict the growth and development of the specified pest or pathogen under normal pest or pathogen pressure when compared to susceptible varieties. However, highly resistant varieties may still exhibit some symptoms under heavy pest or pathogen pressure.

With IR, the plant variety will restrict the development of the specified pest or pathogen, but may

exhibit a greater range of symptoms or damage compared to highly resistant varieties. Intermediately resistant varieties still show less severe symptoms or damage than susceptible varieties when grown under similar environmental conditions and/or pest or pathogen pressure.

Tolerance describes the ability of a plant variety to endure abiotic stress without serious consequences for growth, appearance or yield. A tolerant plant will usually show fewer symptoms than sensitive plant varieties when grown under similar conditions of abiotic stress.

Know Your Seed Source

Over the last 25 years, bedding plant growers have worked closely with flower breeders to improve

the quality and performance of seeds and seedlings. As vegetable popularity continues to increase, growers will come to expect the same performance as their flower varieties and will need to work with seed producers to ensure they are getting the highest quality seed.

Currently, there is a high number of open-pollinated and heirloom varieties grown for retail-ready vegetable transplants. The majority of these are non-proprietary varieties and growers have observed inconsistencies in purity, seed quality and disease resistance. For example, it is well known that what is grown as Brandywine tomato on the East Coast may not be the same variety as a Brandywine tomato on the West Coast. When there are multiple producers of the same open-pollinated variety it means each producer uses his own standards for seed quality and purity, a variable not present with only a single producer of proprietary genetics.

Bedding plant growers will want to be sure they are working with reliable professional seed producers that have the resources to process, condition and size the seed; test for purity, seed quality and seedling performance; screen and treat for seed-borne diseases; and store the seed in a temperature- and humidity-controlled environment until ready for distribution.

Leading seed brokers will source seed from reliable and reputable producers of open-pollinated, heirloom and hybrid varieties. Avoid the temptation to purchase open-pollinated and heirloom varieties from unknown sources. What seems like a good deal on the front end may end up costing more time, labor and other inputs when you are facing an important customer shipping date for finished vegetable plants.

Seed to Fork

Disease-resistant hybrids and proprietary open-pollinated genetics offer many benefits for growers and gardeners to create a healthy garden. When making variety selections, be sure to look for high quality seed supplied by production experts, and that seed resistance is validated through field or laboratory observations.

When developing disease-resistant varieties, plant breeders take great pride in ensuring flavor, yields and vigor are preserved in today's genetics. With modern disease-resistant

genetics and high-quality seed, growers can confidently offer high-performing vegetable varieties that will meet or exceed a gardener's harvest expectations and lead to increased gardening and greater experiences in the future. 

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