IPM-205

UF UNIVERSITY of FLORIDA IFAS Extension

Resistant Cultivars for Florida Tomato and Pepper Production[1]

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The cheapest, easiest and most efficient way for growers to reduce losses from diseases is to plant resistant varieties.

Don't Rely on Resistance Alone

The use of resistant cultivars may cause a race shift in pathogen populations to races that are unaffected by the resistance present in the crop.

In many cases disease resistance is not absolute and may be overcome if the pathogens change or if environmental conditions overwhelmingly favor disease development.

Types of Resistance

There are two kinds of host resistance to plant diseases: **vertical** and **horizontal**.

Vertical resistance is controlled by single genes. In the plant/disease pathosystem (i.e. the interaction between a host and pathogens) each host individual may have several vertical resistance genes, which constitute a biochemical lock. Each pathogen individual may have several parasitism genes, which constitute a biochemical key. This is how vertical resistance works.

Horizontal or multi-gene resistance functions equally against most strains of the parasite. However, it does not provide the high level of resistance seen with vertical resistance.

Lock & Key Resistance

When a pathogen infects a host, its “key” either does or does not fit the “lock” of that host. When there is a variety of different “locks” and “keys,” the likelihood of a matching infection and the growth of an epidemic (or infestation) is reduced considerably.

If every door in the town has the same lock, and every household has the same key that fits every lock, the system of locking will be ruined by uniformity.

Thus, vertical resistance offers temporary resistance in agriculture. When a matching strain of the parasite appears, the resistance fails in **every** host individual of that crop and, shortly afterwards, of that entire cultivar.

1. This document is IPM-205 (IN764), one of a series from the Grower's IPM Guide for Florida Tomato and Pepper Production by the Entomology and Nematology Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Published: January 2008. Revised March 2011. Please visit the EDIS website at **http://edis.ifas.ufl.edu**.

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Limitations

Certain limitations may make breeding for disease resistance difficult or impossible. These include finding a source of genes for resistance or finding them in a distantly related crop making it difficult to impart the desired resistance into the crop. In other cases, genes for resistance may be so tightly linked with undesirable traits that they prove useless.

Some pathogens such as bacterial spot have the ability to produce several races that are capable of attacking the host in this case multiple resistance genes must be combined to provide complete protection (Figure 1).

Figure 1. Using varieties of pepper with resistance to bacterial spot is an IPM approach. Credits: Ken Pernezny, University of Florida

Tomato and Pepper Resistance

In tomato, the use of varieties with resistance to *Fusarium* and *Verticillium* is employed widely as is resistance to alternaria stem canker and gray leaf spot. Although many varieties boast nematode resistance, it is important to note that this can breakdown under heavy nematode pressure and high soil temperatures and may be less reliable under Florida conditions. In the future, it is likely that growers will select cultivars with resistance to fusarium crown rot and viruses, such as TSWV and TYLCV, as the horticultural qualities of these varieties improve and are accepted by growers.

In pepper, the use of varieties with resistance to the predominant races of bacterial spot and certain viruses is an important approach to disease management. Almost all bell pepper cultivars in commercial production in Florida contain genes for resistance to bacterial spot races 1, 2 and 3 as well as one or more viruses.

Recently new genes, which impart resistance to additional bacterial spot races, (Races 4, 5 and 6) have been incorporated into commercial varieties of bell pepper. Resistance has also been identified for *Phythopthora* (partial) in peppers.Tomato spotted wilt virus and tomato yellow leaf curl virus resistance is now available in commercially available tomato cultivars.

Acknowledgements

This document was originally produced by UF/IFAS IPM Florida as part of the Growers IPM Guide for Florida Tomato and Pepper Production, the complete guide can be found at http://ipm.ifas.ufl.edu/resources/success_stories/T&PGuide/index.shtml . This document was compiled from material in Chapter 2- Tomato and Pepper Production and was originally edited by Chapter Editor- Gene McAvoy. This EDIS document was compiled by Denise Thomas. The content can be seen in its original full-color form at http://ipm.ifas.ufl.edu/resources/success_stories/T&PGuide/pdfs/Chapter2/Resistance.pdf .