



## DISEASE MANAGEMENT: Integrated Control

**C**ontrol of pepper and tomato diseases requires **multiple tactics** used together to manage diseases from transplant production to harvest.



**Figure 1.** Wilting green leaves that initially recover overnight are among the early symptoms of crown & root rot caused by the soilborne pathogen *Fusarium oxysporum* f. sp. *radicis-lycopersici*. This disease is most effectively managed using multiple tactics including crop rotation, preventing the spread of soil between contaminated fields, nutrient and pH management, selection of resistant cultivars and fumigation. Photograph by: Ken Pernezny.

### CORRECTLY IDENTIFY PATHOGEN:

First and foremost, the diseases must be identified correctly. In our experience, many reported failures of control have been linked to misdiagnosis of the problem and not to any inherent defect in the control measures taken. Scouting services are now widely available in Florida. Growers can take advantage of the expertise of professional crop inspectors/advisors who bring diagnostic skills to the farm and who systematically inspect fields for emerging disease problems.

### USE RESISTANT CULTIVARS:

Growers should select cultivars that are resistant to diseases when available with horticulturally desirable traits. For example, tomato cultivars with resistance to *Fusarium* wilt, *Verticillium* wilt, and gray leaf spot are widely available. Recently, tomato varieties with resistance to the potentially devastating *Fusarium* crown rot have come on to the market. If one is growing in fields with a history of crown rot, these cultivars should be considered. Similarly, pepper cultivars with resistance to one or more races of the bacterial spot pathogen are commercially available and should be used whenever possible. **See Chapter 2 for more information on Resistance and Tomato & Pepper Cultivar selection.**

## SANITATION: Start Clean...Stay Clean

**Transplants** should be free of disease when set in the field. There is a greater likelihood that transplants will be disease-free if they are produced outside the areas where field production of tomato and pepper takes place. For example, southern Florida growers may want to contract with central Florida transplant producers to ensure geographical separation of transplant and field production.

**Choice of land** can be very important in management of several diseases, particularly those that are soilborne. Fields with a history of crown rot of tomato (**Figure 1**) or *Phytophthora* blight (pepper) will have the problems consistently from year to year. Avoiding cropping of the susceptible hosts in these fields will help break the cycle of yearly outbreaks.



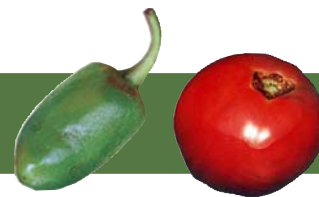
**Figure 2.** Weeds and especially volunteer crops can harbor diseases like tomato yellow leaf curl pictured above. Photograph by: Ken Pernezny.

Many hand operations are typically used in Florida tomato and pepper production. These include pruning, thinning, and tying. Pathogens, especially the bacterial spot pathogen, can be readily spread throughout fields when these intensive handling operations are carried out.

Mechanical transmission of bacteria has been shown to be reduced by handling plants when driest and periodically disinfesting workers' hands and tools with a topical disinfectant, such as isopropyl alcohol.

**Weed management** aids in plant disease control. Several pathogens, notably a number of viruses, can reside in weed hosts that serve as inoculum reservoirs for crop plants (**Figure 2**). Destruction of weeds eliminates these inoculum sources.

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*Commercial growers can not rely on only one approach (e.g., chemical control) and expect to successfully cope with the many disease problems that occur in Florida.*

### NUTRIENT AND WATER MANAGEMENT:

Some specific steps in the fertilizer program can be taken to mitigate certain diseases. As an example, liming of soil to raise the pH can significantly reduce gray mold problems. Avoidance of excess nitrogen will reduce lush foliage growth which can exacerbate diseases such as bacterial spot of tomato and pepper and target spot of tomato.

Water management is critical to overall disease management. For example, Phytophthora blight of pepper can decimate fields that become flooded. It is imperative that excess water be pumped off farms as quickly as possible, especially following tropical storm events.

Overhead irrigation can contribute to increases in bacterial spot. UF/IFAS research has shown that drip irrigation is an excellent method for reducing bacterial spot compared to overhead irrigation.

### CHEMICAL CONTROL:

Chemical control is an important part of the disease management scheme on traditional commercial farms. Many of the standard fungicides, which have been available for a while, are protectants; i.e., they must be on the foliar surface before pathogen propagules arrive if they are to be effective.

Some of the newer fungicides, e.g., the strobilurins, can have some “kick-back” action, meaning they can help alleviate disease when applied after infection occurs. However, many of these new fungicides are prone to development of resistance in pathogen populations and must be used in combination and/or rotation with more broad-spectrum fungicides.

**See FRAC tables in Chemical Control Chapter on pp. 203-204 and Appendix 6) for more information on resistance management.**

#### How does acibenzolar-S-methyl (Actigard®) work?

Some new chemicals now available (for example, acibenzolar-S-methyl) do not attack the pathogen, but, instead, elicit a resistance response in the host to ward off the pathogen.

#### Is acibenzolar-S-methyl (Actigard®) effective?

UF/IFAS research shows that this compound, when used in a comprehensive disease management program, can reduce some diseases of tomato.

*When all these and more techniques and materials are used in a well planned program, disease management and crop productivity are enhanced.*



**Figure 3.** Metalized mulch, which reflects UV light, can be used to disrupt the behavior of insects such as thrips, reducing the incidence of tomato spotted wilt. Photograph by: Eric Zamora.

*Check with your local cooperative extension personnel for further information on:*

**Integrated Disease Management**

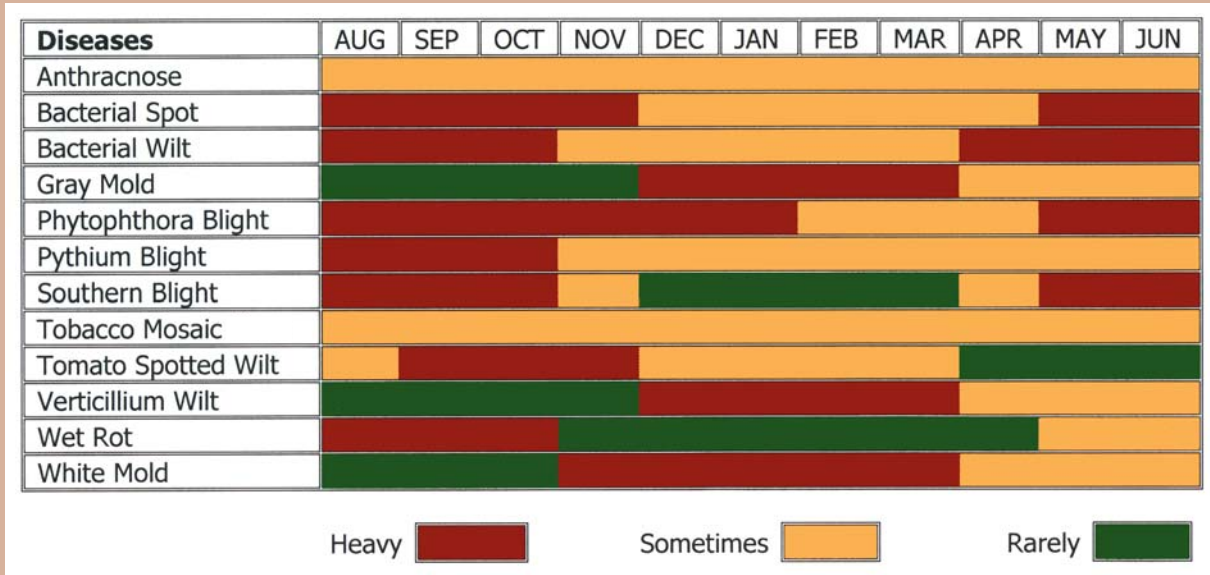
### CONTACT INFORMATION:

Dr. Ken Pernezny  
UF/IFAS EREC  
3200 E. Palm Beach Road  
Belle Glade, FL 33430  
klp@ifas.ufl.edu  
561-993-1599



## DISEASE MANAGEMENT: Disease Seasonality Charts

### PEPPER DISEASE SEASONALITY CHART:



### TOMATO DISEASE SEASONALITY CHART:

