MANAGEMENT OF BLACK ROOT ROT *Thielaviopsis basicola* IN GREENHOUSE TOMATO PLUG PLANTS

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The processing tomato industry in Ontario and the north-east USA, now rely on "locally" grown tomato transplants grown in plastic plug trays. This is in contrast to a few years ago when most of the transplants were grown then shipped from southern US states, and in particular, the state of Georgia. Northern tomato growers had to deal with a number of problems, originating from these transplants, many of which were diseases that were spread throughout the fields in Georgia causing substantial losses in yield in the commercial processing fields in the north. Consequently a new industry was developed in the north, where local growers built greenhouses suitable for growing seedling transplants, thus replacing the need for the southern transplants. One of the main advantages was the potential for the reduction of tomato diseases.

NEW PROBLEMS

The shift from growing tomato transplants from Georgia to Ontario has not gone without problems. New problems have arisen, field symptoms previously never seen, have given rise to new theories of cause and effect and new solutions developed.

FIELD SYMPTOMS

Several years ago, growers were observing long stretches of transplants in the field that were slower growing. Along the same row further on the transplants looked fine. Investigations into starter fertilizer effects, discernable field patterns, lead to the conclusion that it was a tray effect, that for unknown reasons at the time, transplants from several trays, grown in amongst hundreds of other trays, did not grow well in the field. A further observation was that whenever growers would soak their transplants in a fertilizer solution prior to transplanting by floating the trays in a specially built water holding trailer, that this tray effect in the field was reduced. In other words, the plants were able to overcome whatever was affecting them if treated with additional nutrients and/or water.

Growers had developed a rather quick solution to this problem with no further investigation warranted.

GREENHOUSE SYMPTOMS

More recently, within the past 3-4 years, a much more serious observation was noted in several greenhouses used to grow plug plants. A checkerboard effect was observed. Full trays had tomato transplants that remained shorter, eventually turning purple. With additional foliar fertilizing these plants could be salvaged and planted in the field. Most of the transplants would grow in the field with no significant concern to growers.

Growers complained however that the soilless mixture would often fall away from the root plug while transplanting.

Then 2 years ago several growers noted a large number of trays where the transplants were extremely stunted, and did not grow well in the field. Due to the serious nature of this "outbreak" the matter was investigated to determine the cause of the problem.

BLACK ROOT ROT IDENTIFIED

Roots were examined and a fungal disease called Black Root Rot, caused by *Thielaviopsis basicola,* was diagnosed. Further investigation identified that all of the stunted plants came from "used" plastic trays.

Roots were brown to black in colour with hundreds of the characteristic cigar shaped brown chlamydospores attached to the roots.

Early in this expanding industry in Ontario, growers were continuously purchasing new trays as the need demanded. After several years of rapid expansion greater use of "used" trays occurred. It was in these used trays that the problems with Black Root Rot were observed.

Often trays remained in growers fields, along the headlands, in ditches for several days or weeks after being used, until the planting season was over before returning them to the greenhouse operator. During this time they are exposed to the elements, vulnerable to wind, sand and anything else that is blown around at that time. It is speculated that *Thielaviopsis basicola* chlamydospores, surviving in soil in local fields, are blown onto the trays where they remain to germinate and infect tomato roots the next season in the greenhouse trays.

CONTROL EFFORTS

Several observations have been noted that have lead to several methods of controlling or managing this disease.

1. Use all new trays.

2. Chlorination of trays nor the use of DCD disinfectant of the trays has NOT proven successful in significantly reducing the disease occurrence.

3. Separating the “infected trays”, as observed by noting the stunted plants in the greenhouse, and placing them in a separate “sick bay” to allow the greenhouse grower to treat these trays differently has proven effective. The grower then increases the nutrition, especially the phosphorous content to encourage root growth. It has been observed that rejuvenated tomato transplants grow and yield equally well as non infected tomato transplants.

4. Tomato seedlings grown in soilless mixtures with high pH > 7.0 tended to be more susceptible to this disorder. The problem can be reduced when either the soilless mixture is kept at a pH of 6.5 or less (6.5 - 5.5) or the water being used in the greenhouse is adjusted to a pH of approximately 6.5.

CONCLUSION

It is well known in agriculture that whenever there is a significant change in a cultural practice one should be aware of a change in the pest dynamics of the operation. In the plug plant business, once the industry moved to growing local tomato transplants combined with the decision to reuse plug trays lead to the introduction of Black Root Rot. Likewise, given time solutions have been devised, some resulting in a complete elimination of the problem - the use of new trays each year, or a procedure through identification, isolation and special care through additional fertility to better manage the expected incidence of the disease. The choice as always is up to the various sectors of the industry.