

DETERMINING THE CAUSE OF PLANT PROBLEMS

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With the lateness in the season, there's been ample time to observe problems during the production year. Hopefully, if you have had vegetable crop problems, you have found the cause of the problem in time to correct it. It is important to determine the source when there is a crop failure or the loss of plants in the field so future action can be taken to avoid the problem.

One scenario I dealt with this summer involved a phytophthora root rot disease in peppers. After a little more investigation the grower noted that there had been some problems with the peppers in this part of his garden last season.

However, he took the chance of growing peppers there once again resulting in a more severe problem this season. While there are some problems that may be from just a chance occurrence in one season, many can carry from one season to the next such as phytophthora root rot.

Trying to determine the cause of a plant problem can take some detective work. There are some basic steps however that can help identify the cause. The 2005 Vegetable Production Recommendations provides a step by step process to help solve potential problems.

1. Start by looking to see if there is a pattern to the symptoms. If there is, does it correlate with a certain area in the field such as a low spot or poor drainage area? Does it correlate with time of planting or fertilization rate or method?
2. What is the history of the problem? When were first symptoms noticed, what are the fertilization and liming practices, what pest management practices have been used and when, and what have been the environmental conditions-i.e. temperatures, moisture conditions?
3. Are there pests present or is the problem related to cultural practices?
 - a. Are there insects present or evidence of their feeding? In my own garden something was obviously consuming my pepper and tomato plants based on the missing foliage and the large fecal pellets on the ground and plant. After further scouting the culprits (tomato hornworms) were found, removed and destroyed to stop the problem.
 - b. Do the symptoms suggest a disease problem? The symptoms are usually not uniform but are specific for certain crops.
 - i. Are there dead spots or lesions on the roots, stems, leaves or flowers? Many diseases can cause spots on plants.
 - ii. Is there discoloration in the vascular tissue (inside the plant)? This was the case with a bacterial wilt problem in a tomato field this summer. The inside of the plant had some obvious brown coloration. Cut the plant into and examine it longitudinally and across the stem to see if there's discoloration. Several of the wilt diseases can cause vascular discoloration.
 - iii. Is there fungal or bacterial growth present? Grey mold is quite obvious on crops like strawberries with its rapidly growing mycelium (gray fuzzy growth). Powdery mildew is another example of a fungal growth that can be seen.
 - iv. Is there evidence of viral problems? Viruses are easily recognized as such with the distorted growth that results and the yellow/green coloration they often cause. Though a virus may be suspected, it is more difficult to determine which virus is causing the problem. Viruses are also frequently the result of an insect problem that has transmitted the virus from plant to plant.

- c. Do the symptoms indicate a cultural problem? Cultural problems could be
 - i. A nutrient deficiency.
 - 1. Nitrogen - light green or yellow foliage most notably on the older leaves.
 - 2. Phosphorus - purple coloration of leaves and plants may be stunted.
 - 3. Potassium - brown leaf margins and leaf curling.
 - 4. Magnesium - interveinal (between the veins) chlorosis (yellowing)
 - 5. Boron - development of lateral growth and hollow brownish stems. May also have cracked leaf petioles.
These can be easily prevented by soil testing before planting and adequate fertilizer application.
 - ii. A nutrient toxicity - toxicity of minor elements such as boron, zinc and manganese. Soluble salt injury could cause the plants to wilt even when wet.
 - iii. Soil problems - poor drainage, compaction or soil structure.
 - iv. Pesticide injury - don't forget to look at the residual of herbicides used on non-vegetable crops and their effect in subsequent years on vegetables.
 - v. Climatic damage - high or low temperature injury, lack of water, frost or freeze damage. One case earlier this summer involved a brown discoloration on peaches which was the result of frost injury in the spring.
 - vi. Physiological damage - physiological damage or air-pollution injury. Some parts of our state are so developed that air-pollution could be a problem.

If you can't figure the problem out on your own, call your local extension agent to assist. We have many resources including the diagnostic labs on the Virginia Tech campus to assist if we can't solve the mystery. Though there are some cases that we never totally understand. It is important to try to solve the problem while the plants are still alive. It's very difficult once everything is dead in most cases to determine the original problem. Frequent field scouting during the season to catch pests while present in small numbers, following good rotation and sanitation practices, and applying nutrients based on soil tests can go a long way in helping to prevent problems.