Importance
Pythium root rot (Figure 1) is the most common disease found in tobacco float beds in Kentucky and it can cause severe losses or delays in transplanting. Damage caused by this disease can be minimized through a combination of sound management practices and timely application of fungicide.

Symptoms
The first symptoms of Pythium root rot tend to occur on the roots that extend from trays into the float water (water roots). Water roots affected by Pythium root rot show a light-to-dark brown necrosis and slough away easily when touched. When a transplant tray containing Pythium-infected plants is turned on its side, necrotic roots often adhere to the tray’s bottom (Figure 2). Infected roots will eventually fall away and some re-growth may be observed; however, new growth will likely become infected. As the disease progresses, yellowing and stunting of transplants is common and tends to be confined to well-defined areas of a float bay (Figure 1). During the outbreak, seedlings wilt and decay can progress into plug roots (Figure 3) and sometimes lower stems of plants. Damping-off, or seedling death, can occur in severe cases (Figure 4).

Cause and Disease Development
There are several species of Pythium, a fungus-like organism, that cause root rots on tobacco seedlings. Pythium species (spp.) require water, abundant in the float system, for reproduction and movement. Initial infections likely result from germination of
resting structures (oospores) of *Pythium* spp., along with the production of zoosporangia. Swimming spores (zoospores) are liberated from zoosporangia and find their way to tobacco roots. Zoospores encyst after encountering susceptible tissue and enter the root system to establish an infection. Many cycles of zoospore production and infection are possible after initial infections occur. Water temperatures greater than 72°F favor rapid development and spread of Pythium root rot in float systems.

The most common ways for *Pythium* spp. to be introduced into float systems are contaminated water, infested soil, and recycled (and contaminated) Styrofoam trays. *Pythium* spp. are found widely in our soils and surface water, so anything that moves these sources can be a means of contaminating float beds. *Pythium* spp. can persist in the tissue of roots that have penetrated Styrofoam float trays, providing a source of inoculum when the trays are used the following season.

**Disease Management**

Quality tobacco transplants are one of the most important parts of a successful growing season. Through careful management it is possible to achieve excellent control of Pythium root rot, as well as good transplant quality and a healthy bottom line!

- **Sanitation** is an important part in the management of Pythium root rot in the float system. Use new or properly sanitized trays to prevent carryover of *Pythium* from one season to the next. Trays can be steam-sterilized by heating them to between 165°F and 175°F for at least 30 minutes, or by immersing trays in a solution of 1 part household bleach to 9 parts water for several minutes. Alternatively, trays can be sprayed with the bleach solution, covered overnight, and then rinsed to remove bleach residues. Whether steam or bleach is used to sanitize trays, try to replace trays every 3 to 4 years. Trays that have reached this...
age tend to absorb excess water, resulting in poor plant growth and greater potential for diseases in general. Never use pond or surface water to fill float beds, since water from these sources is likely contaminated with *Pythium* and other plant pathogens such as *Phytophthora* or *Fusarium*. Make sure that shoes and tools are cleaned before bringing them into a transplant facility.

- A fungicide, Terramaster 4EC, is labeled for use in float systems and is very effective against *Pythium* root rot when used correctly. Detailed information on this fungicide can be found on the product label. You can also refer to the following publications: *Kentucky-Tennessee Tobacco Production Guide* (ID-160) and *Fungicide Guide for Burley and Dark Tobacco* (PPFS-AG-T-08). For preventive use, apply 0.7-1 fluid ounces of product per 100 gallons of float water beginning 2 to 3 weeks after seeding, or when roots first enter the water. Sequential applications of 0.7 to 1 fluid ounce per 100 gallons of water can be made at least 3 weeks apart up to 5 days before transplanting; do not exceed 3.8 fluid ounces per 100 gallons of float water per season. When using Terramaster, make sure that the product is mixed thoroughly in float bays to minimize the risk of plant injury (Figure 5).

"Rescue" applications of Terramaster (1.4 fluid ounces per 100 gallons of float water) in systems with active *Pythium* root rot will halt further development of disease and symptomatic seedlings will likely recover. However, the higher rates of Terramaster used in rescue treatments increase the risk of plant injury AND recuperating plants may still harbor *Pythium*. It may also increase plant susceptibility to black shank and Fusarium wilt. For these reasons, preventive use of Terramaster is recommended over curative applications of the product. Before using Terramaster, or any pesticide, refer to the label for specific instructions and safety information. Please note that Terramaster is the only product labeled for controlling *Pythium* root rot on tobacco seedlings grown in float beds. Other products, such as Banrot, Rovral, Iprodione 50W, or Ridomil Gold SL, are not approved for this use.

**Additional Resources**
The following University of Kentucky publications are available at County Extension offices, as well as on the Internet.

- Fungicide Guide for Burley and Dark Tobacco, PPFS-AG-T-08  
- Kentucky-Tennessee Tobacco Production Guide, ID-160 (1.6 MB file)  

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*Photos by Kenneth Seebold*

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