10 August, 2007

TO ALL FLUE CURED TOBACCO GROWERS

Dear Grower,

TOBACCO MOSAIC VIRUS: AN ECONOMICALLY IMPORTANT DISEASE OF TOBACCO

Tobacco Mosaic Virus (TMV) is a mechanically transmitted virus disease of tobacco. In addition to tobacco the disease also affects other members of the Solanaceous family, including potato, tomato, pepper and paprika.

**Symptoms**

The virus causes various symptoms on tobacco the main one being a mosaic of dark-green areas and chlorotic light-green areas. Mottling is mostly noted on the top of the plant or young tissue. Other symptoms include various degrees of chlorosis, curling, mottling, dwarbling, distortion and blistering of the leaves, dwarbling of the entire plant, distortion and discoloration of flowers. Infection by this virus does not kill the plant but has been reported to result in up to 30% yield loss and 50% loss of quality.

Fig 1: Mosaic of light and dark green chlorotic areas
Additionally, TMV is primarily transmitted mechanically, by any means that results in the virus coming in contact with injured cells of a host plant while insects primarily transmit the other viruses.

**Transmission**
Transmission occurs mechanically and naturally through contact and incidental wounding. The virus can therefore be spread from affected crops or weed hosts. This can occur when hands and clothing become contaminated while handling affected plants or tobacco products. The virus is also easily transmitted by smokers and tobacco product users by touching plants and equipment with tobacco contaminated hands and clothing. In the lands, if an infected seedling or plant is touched the next 8-10 plants can also become infected. Infection from the previous season's debris is also possible. Although the virus is transmitted primarily on worker's hands and equipment, anything that mechanically moves the virus from a source to a healthy plant can transmit it. Chewing insects, such as flea beetles and grasshoppers, are capable of transmitting the virus, but such transmission is very rare in nature.

Important sources of infection therefore include:

1. **Tobacco Products** - All forms of tobacco (cigarettes, tobacco and snuff) may carry TMV so it is advisable that these products not be used by workers, especially around seedbeds and during transplanting. Spraying plants with milk prior to pulling and transplanting will reduce the number of plants that become infected. It should always be used during transplanting in situations where tobacco use by workers cannot be prevented. Transplants should be sprayed until runoff with one pound of dried milk in a gallon of water immediately prior to pulling.

2. **Tobacco Trash** - Tobacco mosaic virus will survive for years in dried tobacco tissue (scrap, stalks and roots) so anything that may be contaminated with pieces of leaf, stem, or root tissue should be cleaned prior to use in the crop. This includes float trays that may have infected roots in the walls of the tray.

3. **Soil-Borne Virus** - tobacco mosaic virus overwinters in infected stalk and root tissue and infection occurs at transplanting when a plant is pushed against a piece of virus-infected tissue. The number of transplants that become infected in this way will depend on quantity of overwintering tissue surviving. The virus will overwinter in dead as well as living plant tissue, but dead tissue contains less active virus than living tissue.

4. **Other Crops** - Tomato, pepper, and eggplant are hosts of the TMV and in addition to not being used in rotation should not be handled prior to working in tobacco. Fruit from these crops also contain active virus and should not be handled while working in tobacco.

5. **Weeds** - A number of weeds are known to be hosts of TMV, and weeding must be conducted timely.

6. **Secondary Spread**: Most of the mosaic plants in heavily diseased fields are infected by virus that would have been spread from a few tobacco plants infected
from overwintering sources of the virus. Secondary spread can be reduced by removing primarily infected plants from the field or by cultivating in a manner to prevent spread of the virus. In seedling production, clipping is a very effective means of spreading TMV. Seedlings should be scouted closely for TMV at each clipping.

Management
It is important to use certified seed for the establishment of seedbeds. Remember, the virus is very stable and survives in plant debris and soil, therefore **do not grow tobacco for at least 2 years in seedbeds or fields where a diseased crop has been grown**. Sanitation is the main mode of control of this virus. While resistant cultivars are valuable their use should not preclude sanitation.

Recommended Sanitary Measures

1. **Seedbeds**
   - Areas under seedbeds must be fenced off and must have only one entrance with the recommended sanitation facilities (footbath, soap and running water).
   - Wash hands with soap and rinse with running water before entering the site, especially if seedlings are to be handled.
   - Dip soles of footwear into QAC/Jik bath.
   - Do not smoke or take snuff or chew tobacco in the seedbed area.
   - Handle seedlings only when necessary.
   - Before and during clipping periodically dip clipping tools in a suspension of a copper fungicide/QAC or sodium hypochlorite to prevent spread of bacterial diseases.
   - Infected seedlings should be removed and burnt or buried when first noticed. Remember to wash hands thoroughly afterwards.
   - All covers, tools and other materials used for preparing seedbeds/floatbeds should be soaked for at least 3-4 hours in sodium hypochlorite, QAC or any other surface disinfectant. (formalin (37%), diluted 1:25 with water was very effective for this purpose, however it is carcinogenic and its use is no longer recommended).

2. **Field**
   - Do not smoke or take snuff or chew tobacco.
   - Wash hands with soap and rinse with running water before starting any field operations.
   - You can rogue out and burn infected plants.
   - Whenever rogueing is not possible because many plants may be affected, then when carrying out any operation such as cultivation, topping etc start with the uninfected fields before moving to the infected fields.
   - Maintain proper rotations. These along with efficient discing and ploughing will reduce infection from soil and plant debris.
3. The problem of TMV carry-over in stalks and roots can be reduced by crop rotation or by using a mosaic resistant variety. Growers can reduce virus carry-over by doing a thorough job of stalk and root destruction. This will significantly reduce, and may in some situations eliminate, infection during transplanting from infested old crop debris. Plants that do become infected should be removed prior to the first cultivation to prevent spread of the virus.