

# Tomato Spotted Wilt Virus in Tobacco

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## Where did Tomato Spotted Wilt Virus come from?

Tomato Spotted Wilt Virus (TSWV) was first reported in 1919 in tomatoes growing in Australia and, since that time, has spread worldwide. TSWV has been in North Carolina for years but has just recently become an economic problem.

## What crops are affected by TSWV?

TSWV can significantly affect artichoke, lettuce, papaya, pineapple, peanut, tomato, tobacco, pepper, and potato crops.

## How is TSWV transmitted to tobacco plants?

TSWV is transmitted to a tobacco plant through a thrips insect, which carries the virus inside its body and injects the virus into the plant when feeding occurs. Thrips are very small and hard to see with the naked eye, but when magnified, they look like the image here. There are several species of thrips that may carry the virus.



Thrips must contract the virus during the first instar stage of its life cycle. TSWV infected thrips can infect a plant in less than a minute but do not necessarily transmit the virus each time it feeds. This is the primary reason for the random, variable effect we see in the tobacco field. Immature thrips are capable of jumping, and mature thrips may fly if disturbed. Females can deposit 50 to 60 eggs within the plant foliage. Hatching occurs 7 days after deposition. After hatching, immature (larvae) feed 6 to 7 days before entering a 3- to 4-day "sleep" stage. After the "sleep" stage, the insect emerges as an adult and continues to feed. The average lifespan of a thrips is 30 days.

Thrips obtain the virus by feeding on infected plants. The virus is carried in the body of the thrips insect and transmitted to other plants during feeding. Once a plant is infected with TSWV, particularly shortly after transplanting, it will soon die.

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## **Where does TSWV come from?**

Over 900 plant species have been identified to carry or "host" the virus. Crops like corn, wheat, and other monocot (grass) species do not carry the virus. TSWV has been detected in such crops as cotton and soybeans, but they have not been found to actually cause disease or host the virus. TSWV overwinters in many winter weed species, which are the primary source of infection in tobacco. Weeds with the greatest potential to spread TSWV are buttercup, dandelion, sowthistle, and many other winter annuals. The time when these weeds begin to "dry down" in the spring appears to be a big factor in when TSWV is transmitted to tobacco.

## **How do you identify TSWV on tobacco?**

Symptoms of TSWV vary, depending largely upon the age of the plant at the time of infection. Plants may be attacked from seedling stage through maturity (image 1). Young leaves may become yellow then reddish brown, and buds may be distorted and deformed (image 2). Concentric ringspots may develop on leaves, often combining to form large areas of dead tissue (image 3). Yellowing and death of plant tissue along leaf veins is also common. Both ringspots and veinal yellowing symptoms may occur on the same leaf. Dark oblong concentric spots and lesions may form on stalks (image 4).



*Image 1--TSMV  
within 2 weeks of  
transplanting*



*Image 2*



*Image 3*



*Image 4*



*Image 5*



*Image 6*

Death of a portion of the plant or the entire plant may occur within a few days after symptoms appear, especially early in the season. Symptoms usually appear 10 days to 6 weeks or more after infection. Some plants may seem to recover, but later redevelop symptoms. Late-season (after topping) symptoms may appear quite different from early-season symptoms of the virus, sometimes becoming confused with other diseases, like black shank (image 5) or Granville wilt (image 6).

## **What can be done to control TSWV?**

TSWV can be successfully controlled or at least reduced chemically. From what we know so far, no yield loss is expected up to about 8 to 9 percent incidence of TSWV. Yield loss is generally half that of the TSWV incidence rate in the field. TSWV is generally less in fields where Admire or Platinum were used in the greenhouse as a tray drench, but this treatment may be inconsistent. Transplant water treatments were less effective than tray drench. Experimental treatments using Actigard as a foliar spray in the greenhouse were more effective than those treatments applied after transplanting.

## **Are there cultural practices that can reduce TSWV?**

Annual broadleaf weeds in and around field borders are currently thought to be reservoirs for the virus-infected thrips. Removing infected plants, spraying for thrips, and rotating have little, if any, value in reducing TSWV incidence. Planting date is an important but inconsistent factor in TSWV loss. Early-planted tobacco seems most likely to be significantly affected by the virus, but in some years, the latest planted is most damaged. Tobacco planted closest to the "average" planting date is usually the least affected. The most consistent factor seems to be when the winter annual weeds near tobacco fields "dry down" during the spring. When these plants quickly begin to die and no longer support insect activity, thrips will move to more attractive species, like tobacco. Dry, spring weather conditions seem to contribute to higher levels of TSWV in tobacco.

## **When do you replant if the virus gets the best of your tobacco?**

Early planting, before winter annuals die down, would be ideal but not feasible or consistent from year to year. Research indicates an 8.4 percent yield loss for each week delay in planting between 3 to 6 weeks after normal transplant date. Also, yield losses at 4 weeks after a normal planting date can vary from 6.5 to 35 percent, depending on weather conditions. Recent stand loss research conducted by Dr. Gerald Peedin, retired NCSU tobacco specialist, indicates a 50 percent stand is equal to a 22 percent yield loss. Therefore, it is better not to replant at 4 weeks after transplanting with a stand loss less than 50 percent. This was a very real example faced by many growers during the 2002 season.

Recommendations for the use of chemicals are included in this factsheet as a convenience to the reader. The use of brand names and any listing of commercial products or services in this factsheet does not imply endorsement by North Carolina State University, North Carolina A&T State University, or North Carolina Cooperative Extension Service nor discrimination against similar products or services not mentioned. Individuals who use chemicals are responsible for ensuring that the intended use complies with current regulations and conforms to the product label. Be sure to obtain current information about usage and examine a current product label before applying any chemical. For assistance, contact the North Carolina Cooperative Extension Service in your county.