

**Tobacco ringspot virus**

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*Tobacco ringspot virus* (TRSV) on soybean can have a severe impact on seed yield and quality. Yield reduction ranges from 25 to 100% due to reduced pod set and seed formation with lower protein and oil content in infected seeds.

The most distinct symptom of TRSV infection on soybean is bud necrosis (Fig. 1) and excessive growth of leaves and buds (Fig. 2). Virus infection causes leaves to be thicker and darker in color. Stems of infected soybean remain green for one to two weeks longer than healthy ones and the pith of stems and branches of infected plants may exhibit brown discoloration. Infected plants are generally stunted and have a low seed formation rate. Pods are usually undeveloped or aborted because insufficient pollen is produced for fertilization. This in turn may cause production of a proliferation of new buds and pods leading to ‘green bean syndrome’.

Seed transmission is the most important mode for long-distance dissemination of the virus and the infection rate is much higher when soybeans are infected before flowering. The virus can invade the embryo where it remains viable for at least five years. TRSV is also mechanically transmissible and can be transmitted by the dagger nematode (*Xiphinema americanum*).

TRSV triggers symptomatic and asymptomatic infection on a wide host range including vegetables, ornamentals and common weed species. The elimination of indigenous weeds in soybean fields, such as *Amaranthus palmeri* (Palmer amaranth) and *Chenopodium album* (lambsquarter) is important for disease control. Given that no resistance for TRSV has been reported in soybean, it is critical to use virus-free seeds when planting. It is also desirable to minimize the populations of dagger nematode when choosing planting location since they are efficient vectors of the virus.
Figure 1. Bud necrosis caused by TRSV infection. (Photo credit: Zhou, J)

Figure 2. Excessive growth of bud on soybean. (Photo credit: Tzanetakis, I. E)