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Survival of the Goss's Wilt Bacterium and Management Implications

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Abstract
Goss's wilt is caused by the bacterium *Clavibacter michiganensis subsp. nebraskensis* (Cmn).

The survival of Cmn in soil and crop residues was examined by Schuster (1975). Pure cultures of the bacterium in soil did not survive for long (less than two weeks), however the bacterium was able to survive for up to 10 months in infested surface crop residue. When the crop residue (leaves, stalks, cobs and ears) was buried at 4 inches or 8 inches, the bacterium was only detected in stalks residue after 10 months. Thus, conservation tillage practices that partially bury infested crop residue should reduce survival of the Goss's wilt bacterium. Any tillage done must take into account soil conservation. Rotating to a non-host crop, such as soybean, will allow time for infested residues to breakdown and inoculum levels to decrease.

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Survival of the Goss's Wilt Bacterium and Management Implications

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Goss's wilt is caused by the bacterium *Clavibacter michiganensis subsp. nebraskensis* (Cmn).

The survival of Cmn in soil and crop residues was examined by Schuster (1975). Pure cultures of the bacterium in soil did not survive for long (less than two weeks), however the bacterium was able to survive for up to 10 months in infested surface crop residue. When the crop residue (leaves, stalks, cobs and ears) was buried at 4 inches or 8 inches, the bacterium was only detected in stalks residue after 10 months. Thus, conservation tillage practices that partially bury infested crop residue should reduce survival of the Goss's wilt bacterium. Any tillage done must take into account soil conservation. Rotating to a non-host crop, such as soybean, will allow time for infested residues to breakdown and inoculum levels to decrease.

What effect does ensiling have on the survival of Cmn?

No research has been done on the effect of ensiling on the survival of Cmn. During silage production, Cmn would be exposed to high temperatures, other microorganisms and low pH.

Although the effect of heat on the survival of Cmn has not been studied, it has been examined in closely related bacteria. Turner et al. (1983) concluded that survival of *C.m. subsp. michiganensis* (Cmm) was effectively reduced during anaerobic digestion at 95 F. Similarly Kaemmerer (2009) found *C.m. subsp. sepedonicus* was sensitive to heat during anaerobic digestion in biogas producers. Heat treatment at 127 F is used to control the sugar cane pathogen *Clavibacter xyli subsp. xyli*. Many bacterial plant pathogens are eradicated by a constant temperature of 140 F for one hour, in plant material (Noble et al., 2009). Thus, heat generated during silage production may negatively impact Cmn survivability.

The population of *C.m. subsp. sepedonicus* was negatively impacted by competition from other microbes in cattle manure slurry (Roozen and Vanvuurde 1991). Similarly, composts have been shown to reduce the survival of Cmm presumably due to competition although heat could also be involved (Yogev et al. 2009). Thus, competition from other microbes during silage production may reduce the survival of Cmn.

Low pH reduced the survival of Cmm (Ozdemir 2009). Thus, the low pH associated with silage may reduce survival of Cmn.

Survival of Cmn in bedding straw

There are no reports on the survivability of Cmn in bedding straw. If bedding straw is very dry, Cmn growth is likely to be limited, as it is for most non-sporeforming bacteria. If the bedding straw is moist, survival may be better, although growth is likely to be low due to Cmn's highly specific nutrient requirements, including the need for multiple vitamins for growth (Vidaver 1982), which may explain the general view that host plants are virtually the only habitat for this organism. Its survival on straw is also likely to be limited due to competition from other microbes associated with manure.

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