

Why Has Kura Clover Failed to Persist in Northern Europe?

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Kura clover remains productive in Wisconsin pastures more than 20 years after sowing, and there have been no documented cases of stand loss to disease, freezing damage, or mismanagement in northern USA. In Europe, attempts to grow Kura clover have failed in Poland, United Kingdom, Ireland, Czech Republic, Germany, Norway and Sweden. These failures were attributed to poor seedling vigor, inability to compete with weeds or companion grasses, or failure to nodulate. We propose Sclerotinia crown and stem rot as a probable cause of Kura clover failure in northern Europe.

Four experiments were initiated in three locations in Poland to compare Kura clover yield to other perennial legumes, and to determine productivity of mixtures of Kura clover and winter cereals. In the first set of experiments, Kura clover, red clover, white clover, and alfalfa were sown into separate plots in spring 2009 at two locations. In spring the year after sowing about 50% of Kura clover had died but other legume stands were excellent. About 80% of red clover, 40% of white clover, and 90% of Kura clover had died by the following spring, but several remaining Kura plants appeared vigorous and healthy.

In the second set of experiments at two locations we achieved excellent spring Kura establishment, but in spring the year after establishment there were patches of dead plants, with estimated stand losses of from 30 to 80%. Stands filled in through rhizome spread of surviving plants over summer, and stand density was improved in autumn the season after sowing. A no-till drill was used to sow winter cereals into half of the Kura clover plots in autumn and the following spring nearly all clover in these plots had died. Control plots without grain-drill disturbance had about 30% of plants surviving. Some of the surviving plants in both disturbed and control plots appeared healthy.

In spring 2011, 24 months after sowing experiments, sclerotia were found in all Kura clover plots. We collected unhealthy plants from the field and isolated *Sclerotinia trifoliorum* from damaged roots and crowns. This pathogen was propagated and applied to Kura clover seedlings in controlled environment according to NAAIC protocol and after 10 days 79% of seedlings had died. In Wisconsin we have failed to infect Kura clover with *S. trifoliorum* (isolates from WI red clover) in the field and glasshouse, but have infected at 80% rate in the growth chamber following NAAIC protocol.

Sclerotinia crown and stem rot is a minor disease of clovers in northern USA, and it has never been observed to infect Kura clover in the field. *Sclerotinia* crown and stem rot is considered one of the most significant red clover diseases in northern Europe, and has now been documented as a barrier to use of Kura clover there.

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