Reasons for increased leaf rust abundance in wastewater treated willow plantations

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Willow leaf rust (*Melampsora epitea*) abundance has been shown to increase in case of wastewater irrigation. Since the mechanisms behind that impact are not clear, additional studies have been carried out to determine weather the variation could be due to differences in canopy density or changes in plant leaf morphology. Results revealed that in areas with higher canopy density the rust abundance was higher compared to sparser areas. However, this tendency was clone specific and significant only in case of *Salix viminalis* clones which infection starts from the lower part of the canopy.

Specific leaf area, a widely used leaf morphological trait, was significantly correlated to rust abundance. The leaves with higher leaf area per weight had more rust pustules (irrigated) and those with lower area per weight were less infected (non-irrigated). This implies that wastewater irrigation could have an impact on leaf morphology and cause higher susceptibility to willow leaf rust. By correlating these results with our previous studies we can conclude that wastewater irrigation could significantly increase the leaf rust abundance on willow partly because of higher shoot density and partly due to changes in leaf morphology. Clarifying whether these changes are due to additional water or nutrient application would be the topic of next studies.