Changes in Willow Biomass Production Over Multiple Rotations.

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Willow biomass crops are being developed for the production of biomass for bioenergy, biofuels and bioproducts. An important attribute of plants in this system is their ability to resprout after being harvested. Both economic and life cycle assessment modeling of this system in the U.S. typically makes use of seven three-year rotations. However, much of the information that is reported on this system is focused on first rotation yields. Limited data suggests that yields increase in the second and subsequent rotations, but yield data over multiple rotations is sparse. Trials with unimproved willow cultivars planted in the 1990s suggests that there is an increase in yield from first to second rotation and that yield remains above first rotation levels for many rotations. Results will be reported from older trials, harvested through five and seven rotations, that support this trend. Recent results that include improved cultivars selected from breeding programs indicates that increases from first to second rotation yield are related to first rotation yields. Plots with lower yield have a higher increase in the second rotation than cultivars with a higher first rotation yield. Data from a set of four trials with improved cultivars that have been harvested three times suggests that yields are more stable over time and less variable than older unimproved cultivars. Projections of willow yield over multiple rotations is important because it has impacts on economic and environmental impact models.

Key words: perennial crops, multiple rotations, yield.

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Timothy Volk has over 25 years of experience working in the fields of forestry, agroforestry, short-rotation woody crops, bioenergy and phytoremediation in the Northeastern United States and West Africa. He is currently a senior research associate at the State University of New York College of Environmental Science and Forestry (SUNY-ESF) in Syracuse, NY. He is responsible for a series of research projects focused on the development of shrub willow biomass cropping systems as a feedstock for bioproducts and bioenergy and the use of willow as an alternative cover for industrial waste sites. He is also actively involved in research and development of harvesting systems for short rotation woody crops and sustainability assessments of bioenergy systems, including life cycle assessments of willow biomass crops and woody biomass from forests.