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**BIOFUEL FEEDSTOCK FROM RIPARIAN BUFFERS:
A WIN-WIN FOR CLIMATE AND WATER QUALITY?**

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ABSTRACT: Researchers have hypothesized that producing biomass crops in riparian buffers can simultaneously produce biofuel feedstock and improve water quality performance (Abrahamson et al. 1998; Rockwood et al. 2004; Volk et al. 2006). Biomass harvesting can overcome the problem of declining rate of nutrient uptake as buffer vegetation ages and cycling of sequestered nutrients through decomposition back into mobile forms. Harvesting biomass from buffers can sustain the nutrient trapping function by exporting the nutrients contained in standing biomass and renewing vigorous nutrient-sequestering plant growth. Fast-growing biomass crops can enhance nutrient trapping even further. Perennial biomass crops, such as switchgrass, hybrid poplar, and willow, have been reported to export as much as 143 kg N ha⁻¹ yr⁻¹ and 26 kg P ha⁻¹ yr⁻¹ (Fike et al. 2006; Vogel et al. 2002; Kelly et al. 2007), amounts which might otherwise leach into waterways. Profit from the biomass crop can also help to sustain landowner interest in maintaining this management scheme and its water quality benefit.

Achieving this win-win scenario, however, hinges on whether landowners choose to manage the crop for maximum biomass yield or not. Nutrient scavenging by biomass crops will be diminished if fertilizer is applied for increasing biomass yield. For example, maximum yield of switchgrass has been reported to be attained when fertilizer N is applied at rates as high as 189 kg N ha⁻¹ yr⁻¹ *greater than* the amount of N that would be exported in the biomass crop (Vogel et al. 2002; Thomason et al. 2004). Woody crops appear to respond similarly (Adegbidi et al. 2001). Excess fertilizer nutrients would exacerbate water quality degradation. Pesticide application for controlling insects and diseases in biomass crops carry additional water quality risks.

Motivating landowners to manage for biomass AND water quality presents challenges. Regulation may be used to restrict fertilizer application in riparian zones similarly to setback distances that already exist for some pesticides. However, a regulatory approach may be unpopular among landowners. Alternatively, landowners could be compensated for accepting lower yields through market mechanisms such as water quality credit trading. Regardless of the approach taken, achieving water quality benefits from growing biomass crops in riparian zones will not be realized without some limitation placed on biomass production practices.

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