ENVIRONMENTAL FOOTPRINT COMPARISON TOOL

A tool for understanding environmental decisions related to the pulp and paper industry

GREENHOUSE GASES

EFFECTS OF NON-WOOD FIBER USE ON GREENHOUSE GAS EMISSIONS

Agrifiber Procurement

In their accounting of the effects of agriculture on greenhouse gas emissions, Robertson and Grace (2004) developed an accounting illustrating the significance of nitrogen fertilizer, agricultural liming and fuel use, as well as N_2O and CH_4 emissions. Robertson and Grace relate the results of actual measurement campaigns in a number of crop systems that show fertilization global warming potential ranging from 50 to 60 g CO_2-equivalents/m^2 per year. The authors go on to show the results of nine years of measurements in a maize-soybean-wheat cropping system in the Midwest United States. Data associated with the practice of conventional tillage show an aggregate greenhouse gas emission rate corresponding to a global warming potential of 1.14 metric tons CO_2e per hectare. Of this, 46% is attributable to N_2O emissions and 24% to fertilizer-related CO_2 emissions. This illustrates the dominance of fertilization in the emission equation.

The use of no-till cultivation has been demonstrated to show a significant, though perhaps transitory, reduction in the net emission level as additional soil carbon is sequestered to a new equilibrium level. Mosier et al (2006) have spoken to this, as well as an issue related to soil organic carbon dynamics. Their experiments evaluated global warning potential for a number of management regimes involving irrigated corn cultivation over a three-year period. Among the scenarios was conventional tillage with a fertilizer application rate of 134 kg nitrogen per hectare. For that scenario, the annual assessments of global warming potential ranged from 800 to 1800 kg CO_2e per hectare per year, and averaged 1.3 metric tons CO_2e per hectare. This estimate was derived through the typical way in which CO_2 exchange is estimated, i.e., measurement of the change in soil organic carbon.

References

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