Care Needed in Comparisons

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In a recent letter to the editor (*BioScience* 55: 820), Alex Avery cites our research results—available only as an abstract at the time—to challenge the conclusions of an article entitled "Environmental, Energetic, and Economic Comparisons of Organic and Conventional Farming Systems" (*BioScience* 55: 573–582), written by David Pimentel and colleagues. As Avery stated, we concluded that soil erosion potential (as measured by soil aggregate size distributions in the top 5 centimeters of soil) is similar in chisel-till and organic cropping systems, and that soil erosion potential in both is considerably greater than in a no-till cropping system in the Beltsville Farming Systems Project (*www.ars.usda.gov/Research/docs.htm?docid=8816;* Green et al. 2005).

We also used the Water Erosion Prediction Project (WEPP) model (Flanagan and Nearing 1995), which takes the crop rotation cycle and management practices into consideration, to predict soil erosion among the three cropping systems. Results of 100-year erosion simulations, which were not included in the abstract, show that while predicted soil loss in the no-till system (8.5 megagrams per hectare per year) was much lower than in the other two systems, predicted soil loss in the organic system was about two-thirds that in the chisel-till system (43 and 64 megagrams per hectare per year, respectively).

Each of the three cropping systems is a three-year rotation of corn, rye (cover crop), soybean, winter wheat, and legume (double-cropped soybean in the conventional rotations and a hairy vetch winter cover crop in the organic system). The difference in winter cover most likely explains the lower WEPP-predicted erosion in the organic system, compared with the chisel-till system.

We chose to study soil erosion in cropping systems with very similar crop rotations in order to isolate the management of cropping systems (no-till, chisel-till, and organic) as our independent variable. The design of our long-term cropping systems study makes this project one of the few long-term agricultural research projects in the world that allows such comparisons. Although we chose to eliminate rotation length as a factor in our study, it is important to recognize that longer crop rotations are fundamental aspects of organic cropping systems, and that a comparison of conventional and organic cropping systems with similar crop rotations may not completely reflect the impact of organic farming on the environment in actual farming practice. The Rodale study, for example, was designed to capture these farming practice differences.

Finally, it is important to recognize that many organic farmers and researchers who study organic farming systems are fully aware of the benefits of reducing tillage in organic cropping systems. We sincerely hope that our research will help bring attention to the need for reducing erosion potential in organic and conventional farming systems and will help engender support for the development of cropping systems that both reduce soil erosion and minimize the impacts of agricultural activities on the environment.

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