4.2 metric tons/ha; conventional farms: 4.8 metric tons/ha) (*4–6*). Crop yields of organic and conventional farming systems in high-intensity production regions of Europe show higher differences (*7*) than those in the United States, where yields of both systems can even be similar (*8*, *9*).

The results from our comparison trial are suitable mainly for mixed farms in central Europe. Sustainable local production is needed in developing countries to nourish the growing population. The question is whether organic or conventional farming meets this goal best. Organic farming may be applicable in developing countries because it relies mainly on local resources and combines traditional knowledge with modern agronomic techniques.

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References

1. D. C. Pimentel *et al.*, *Science* **267**, 1117 (1995).
2. D. Tilman, *Proc. Natl. Acad. Sci. U.S.A.* **96**, 5995 (1999).
3. J. Pretty *et al.*, *Agric. Syst.* **65**, 113 (2000).
4. H. P. Ryser, personal communication.
5. Agro Treuhand SO/BL, Postfach 140, CH-4533 Riedholz (Switzerland); report, data available at the Landwirtshaftliches Zentrum Ebenrain, CH-4450 Sissach/BL, P. Simon.
6. P. Mäder, A. Berner, C. Bosshard, H. R. Oberholzer, P. Fitze, paper presented at the 13th International IFOAM Scientific Conference, Basel, Switzerland, 28 to 31 August 2000.
7. F. Offermann, H. Nieberg, *Economic Performance of Organic Farms in Europe* (University of Hohenheim, Hago Druck & Medien, Karlsbad-Ittersbach, Germany, 2000), vol. 5.
8. See http://apps.fao.org/page/collections?subset=agriculture.
9. L. E. Drinkwater, P. Wagoner, M. Sarrantonio, *Nature* **396**, 262 (1998).

Organic Farming and Energy Efficiency

IN THEIR REPORT "SOIL FERTILITY AND BIODIVERSITY IN ORGANIC FARMING" (31 May, p. 1694), P. Mäder *et al.* demonstrate that most organically grown crops in their study were more energy efficient per unit crop than conventionally grown crops. This is contrary to other research (*1*, *2*). In their study, organically grown winter wheat yields were only 10% below those of conventional crops of the region. How does this compare with Vaclav Smil's finding that worldwide output of grain would fall by at least half if grown without synthetic fertilizer (*3*)? Mäder *et al.* conclude that organic fertilizers generated on the farm itself are a realistic alternative to conventional farming systems. What

Oct., p. 356) highlights the inequitable situation of women in the natural sciences. However, unlike in sports, women in science do not need separate teams to be established to enable them to succeed. They will achieve parity once they are provided with a "level playing field" upon which they can compete directly with men. My observation is that the scientific contributions of female scientists tend to be undervalued and their opinions discounted by men. This unconscious bias among many male scientists allows the men to believe that there is no discrimination against women and that they are merely acting to "maintain academic standards." The bar is set higher for women scientists, and it continues to be raised throughout their careers. Independent objective assessment of the achievements of men and women scientists and their contributions within their institutions could help to alleviate this bias.

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Atacamite in Jaws and Printed Wiring Boards

IN THEIR REPORT "HIGH ABRASION RESISTance with sparse mineralization: copper biomineral in worm jaws" (11 Oct., p. 389), H. C. Lichtenegger *et al.* identify atacamite in the jaws of *Glycera dibranchiata*, list four polymorphs, and mention its formation in very arid climates and in seawater. Atacamite also forms under very specific electrochemical conditions as conductive anodic filament (CAF) in printed wiring boards (*1*). These filaments occur between conductors held at a potential difference and result from an electrochemical migration process that initiates at the anode and proceeds along separated glass fiber/epoxy interfaces. Dendritic growth differs from CAF formation. In dendritic growth, the metal ions go into solution at the anode but plate out at the cathode, forming needles or tree-like formations. In contrast, CAF forms initially at the anode and the filament extends with time to the cathode, producing an electrical short circuit. One wonders whether the conditions of this inorganic route to atacamite shed light on the biological processes used in forming atacamite as a biomineral.

In printed wiring boards, temperatures of 75°C, 85°C, or 95°C combined with 85% relative humidity, 150 or 200 V potential difference between copper conductors (0.5- or 0.75-mm spacing), and different solder flux formulations produce CAF in printed wiring boards. A necessary con-