LETTERS

Worthy investigations

Views are exchanged on whether "agricultural intensification" and "sustainability" are compatible. New developments in high-temperature superconductivity are examined, and two groups of researchers explore a nonproverbial "hill of beans" (right) and what it can tell us about "the natural development of hillslopes."


ROLF AALTO

Agricultural Strategies

The article "Agricultural intensification and ecosystem properties" by P. A. Matson *et al.* (25 July, p. 504) provides much useful information, but seems to imply that intensification and sustainability are incompatible.

Given population pressures, a more sustainable agricultural system must be more, not less, intensive, and intensification can, in fact, allow sustainability. For example, intensification usually provides increased ground cover through rapid plant growth, multiple cropping, or reduced tillage, which in turn reduces soil and water loss and increases soil biomass. However, the most important benefit is that intensification of agriculture on more suitable land can reduce the need to cultivate marginal land or allow marginal land to be cultivated in a more benign manner.

Everyone concerned with renewable natural resources, a livable environment, and adequate food supply should agree that we must intensify agriculture in order for it to be sustainable. The sophisticated strategies the authors suggest (labor, knowledge, management) are certainly more intensive than a monoculture system. Why not say so?

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Response: We hope (and believe) that our article in no way implied that agricultural intensification is incompatible with sustainability. We identified some of the ecological and environmental consequences of the particular intensification route that agriculture has taken over the past 50 years. At the same time, we described several strategies, such as integrated nutrient management and integrated pest management, that can help to reduce some of these negative consequences. As Massey points out and as we stated in our article, these latter strategies are knowledge and management intensive. Our article dealt with how understanding and manipulation of ecological processes can contribute to these strategies and provide an alternative route to sustainability and intensification.

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High-Temperature Superconductors

Developing new approaches for improving the critical current density (J_c) in bulk high-temperature superconductors is important to the commercialization of these materials in power transmission cables and other applications (*1*). I. Chong *et al.* (Reports, 2 May, p. 770) (*2*) describe significant improvements in J_c for lead (Pb)- doped $Bi_2Sr_2CaCu_2O_{8+\delta}$ (Bi-2212) single crystals. Pb-doping of the bismuth (Bi)-based copper oxide superconductors has been studied extensively in polycrystalline and single crystal materials, because it was discovered that this process facilitates the formation of the higher critical temperature (T_c) phase (*3*) now known to be $Bi_2Sr_2Ca_2Cu_3O_{10+\delta}$. Chong *et al.* focus on the subset of this work that has investigated Bi-2212 single crystals. They state that earlier studies of $Bi_{2-y}Pb_ySr_2CaCu_2O_{8+\delta}$ did