

Integration of soil, crop and weed management in low-external-input farming systems

M LIEBMAN & A S DAVIS

Iowa State University, Department of Agronomy, 3218 Agronomy Hall, Ames, IA, 50011-1010, USA

Received 28 June 1999

Revised version accepted 20 September 1999

Summary

Greater adoption and refinement of low-external-input (LEI) farming systems have been proposed as ways to ameliorate economic, environmental and health problems associated with conventional farming systems. Organic soil amendments and crop diversification are basic components of LEI systems. Weed scientists can improve the use of these practices for weed management by improving knowledge of four relevant ecological mechanisms. First, multispecies crop rotations, intercrops and cover crops may reduce opportunities for weed growth and regeneration through resource competition and niche disruption. Secondly, weed species appear to be more susceptible to phytotoxic effects of crop residues and other organic soil amendments than crop species, possibly because of differences in seed mass. Thirdly, delayed patterns of N availability in LEI systems may favour large-seeded crops over small-seeded weeds. Finally, additions of organic materials can change the incidence and severity of soil-borne diseases affecting weeds and crops. Our research on LEI sweetcorn and potato production systems in central and northern Maine (USA) suggests that these mechanisms can reduce weed density and growth while maintaining crop yields. Low-external-input farming systems will advance most quickly through the application of interdisciplinary research focused on these and other ecological mechanisms.