

that it can be applied *as needed*. NCWC can capitalize on favorable conditions to reduce costs, work, and management. For example, if rainfall is delayed after planting, conditions have permitted me to complete effective weed control with one rotary hoeing and one cultivation. In contrast, CWC systems are committed to the cost of herbicide before post-planting conditions are known. CWC has no flexibility to capitalize on cost-saving opportunities.

Crusting is one problem after planting. For CWC systems, breaking a crust with a rotary hoe is a wholly additional cost. For NCWC systems, the crust-breaking tillage can be an additional benefit of the first scheduled rotary hoeing, so that its cost can be disregarded.

Another threat is early crop failure from many causes: heavy rain, hail, lost weed control, or plant diseases. Crop failure may create two problems peculiar to CWC. The first is the inflexibility of herbicides discussed above. For NCWC, crop failure means that some weed control costs can be avoided. The other potential problem after crop failure is herbicide incompatibility between the lost crop and the replacement crop. Suppose that a field of milo is destroyed by hail on approximately June 15. The most obvious planting option available would be soybeans. There is a good possibility that soybeans would be incompatible with the milo herbicide. Even if the damaged crop is replaced with the same crop, it is difficult to determine whether enough of the original herbicide remains or whether a second application would be too much.

Two additional notorious problems of CWC are herbicide

drift and weed resistance to herbicides. Herbicide drift can damage the applicator's other crops as well as those of neighbors. NCWC has no potential to harm other crops. The fast developing problem of weed resistance to herbicides continues to include more kinds of weeds and expand to more areas of the United States, another problem unique to CWC systems.

#### Conclusion

CWC generates problems at every stage of the growing season. Problems peculiar to this system include crop rotation restrictions, greater machinery costs, possibly extra pre-plant tillage, a small margin for error in application, herbicide-stressed crops, application demands at the busy planting time, inflexibility in coping with various crop conditions after planting, herbicide drift, and weed resistance to herbicides.

NCWC is beset with its own significant challenges. Concerns include informed diversified crop rotation, lengthened planting dates to coordinate the workload of mechanical weed control, and meticulous timing and application of mechanical weed control. Further, extremely wet growing seasons challenge NCWC and reduce the farmer's options. It is important to note, however, that these special concerns are surmounted by learning new skills and better management, not by additional capital outlays.

It is not clear how to tally which system "wins" this competition. I have described how chemical weed control--advertised as convenient in making weed control easier--causes numerous complications, inefficiencies, and unresolvable problems, which do not plague chemical free weed control approaches with row crops.



## UPCOMING EVENTS

**March 11-14. International Conference on Agriculture and the Environment** at Columbus, Ohio. Organized by The Ohio State University. Environmental, ecological, economic, and social issues are focus. For more information, call (614) 292-8209.

**March 15-17. Food safety and pesticide poisoning** are key topics at the **Pesticide Forum**, a 10th anniversary event sponsored by the National Coalition Against the Misuse of Pesticides (NCAMP). Information is available from NCAMP at 701 E Street, SE, Washington, DC 20004, (202) 543-5450.

**March 18-20. Farming for the Future: In-Service Training in Organic and Sustainable Agriculture**, to be held on the Cornell University Campus, Ith-

aca, New York. Sponsored by the Northeast Organic and Sustainable Farmers Network. Open to extension, USDA, and other agriculture professionals. For registration information, contact Judy Green, Cornell Farming Alternatives Program, (607) 255-9832.

**March 21-22. A symposium on Prospects for Lupins in North America.** Ramada Hotel, St. Paul, Minnesota. Sponsored by Minnesota Extension Service. For information, call Extension Special Programs at (800) 367-5363 or (612) 625-2722.

**April 9-11. Use of Cover Crops for Erosion Control** is focus of a Soil and Water Conservation Society Spring Conference at Jackson, Tennessee. Contact the Society at 7515 Northeast Ankeny Road, Ankeny, IA 50021,

(515) 289-2331.

#### LETTERS TO THE EDITOR INVITED

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