



Integrated weed management can reduce need for herbicides

The use of herbicides on crops causes environmental concerns. A new French study assesses the performance of cropping systems to manage weeds and finds that these techniques could control arable weeds in the long-term and reduce reliance on herbicides.

In Europe, herbicides provide the conventional means of managing weeds on farmland. Although effective, herbicides are expensive and can build up resistance in weeds. More importantly, herbicide residues are frequently found in rivers, streams and lakes.

This study evaluated four cropping systems based on Integrated Weed Management (IWM) as a means of reducing weeds whilst using less herbicides. IWM uses a variety of complementary strategies. The four systems varied in terms of crop rotations, soil tillage, mechanical and chemical weeding and crop management. One system used no herbicides at all. The researchers compared the results of the IWM systems to a standard system over six years in a semi-continental region in eastern France.

As would be expected, the mean average annual number of herbicide treatments was lower in the IWM systems than in the standard system. Under IWM, the amount of herbicide was reduced by between 71 and 100 per cent.

The study also found that the environmental impacts were lower for the IWM systems in terms of contamination in ground and surface water, in air and on non-target organisms. A recognised indicator (I_{pest}) was used to measure these impacts.

In terms of managing weeds, overall weed density averaged over the six years was about the same (only very slightly higher) in IWM cropping systems than the standard system. Moreover, weed densities stayed the same throughout the course of the study. The combination of non-chemical techniques used in IWM therefore avoided any increase in weed infestation that could have been expected with low use of herbicides.

This suggests that, despite cutting back on herbicides, the IWM systems are about as effective at weed control as herbicides. When looking at different types of weeds, IWM systems were more effective at dealing with winter species than annual, summer broad-leaved species.

The study concludes that IWM can successfully reduce reliance on herbicides whilst still controlling weeds on a long-term basis. In all scenarios, the amount of weeds remaining was low enough to avoid any significant yield loss. However, the authors point out that the complexity of combining a variety of measures could deter farmers from adopting IWM systems. Techniques such as mechanical weeding and seedbed preparation are time-consuming. They also warn that the impact of shallow soil cultivation used in some of the IWM systems may increase soil erosion. In fields at risk of erosion, IWM systems may have to use no-tillage and permanent soil cover.

While the study did not address issues of economic profitability or other environmental impacts, the authors suggest that IWM systems should produce fewer greenhouse gases than herbicides and improve biodiversity.

Source: Chikowo, R., Faloya, V., Petit, S. and Munier-Jolain, N.M. (2009). Integrated Weed Management systems allow reduced reliance on herbicides and long-term weed control. *Agriculture, Ecosystems and Environment*. 132:237-242.

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Additional information: The LIFE-funded SWEEP project aimed to reduce herbicide emissions from weed control on hard surfaces to levels acceptable to major stakeholders (water companies and water boards). Find out more information from the project's website: www.dob-verhardingen.nl/uk/General/