What Will Happen to the Weeds?

(credit: C. Rawluk)

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What is going on?

The dominant weeds in a region are a reflection of the crops[1] and the weed management systems[2,3,4] in that region. Physical, ecological and/or biochemical mimicry of the predominant crops allows these weeds to escape control and become the dominant weeds in the weed community. In western Canada, the predominance of summer annual cereal cropping systems over the past century has led to the selection for summer annual grassy weeds (Table 1).

What is coming up?

Climate change and, in particular a warming climate with longer growing seasons and milder winters is expected to affect annual cropping systems by an increase in both winter annual crops and longer-season crops such as corn and soybean. Winter annual crops are planted in the fall, survive the winter and are harvested earlier in the next cropping season than summer annual crops. They compete very effectively with obligate summer annual weeds (such as wild oat and green foxtail), but support a habitat that favours winter annual weeds (e.g., Downy (*Bromus tectorum* L.) and Japanese *(B. japonicus* L.) brome grass). Warmer winters in the future will also enable weeds such as cleavers, volunteer canola, chickweed and others that

Table 1: *Top 10 residual weeds (post- in-crop weed control) based on relative abundance among all crops in 2005 in western Canada*[1].

Rank	Species
1	Green Foxtail (*Setaria viridis* L.)
2	Wild Oat (*Avena fatua* L.)
3	Wild Buckwheat (*Convolvulus arvensis* L.)
4	Canada Thistle (*Cirsium arvense* L.)
5	Lambsquarters (*Chenopodium album* L.)
6	Chickweed (*Stellaria media* L.)
7	Stinkweed (*Thlaspi arvense* L.)
8	Redroot pigweed (*Amaranthus retroflexus* L.)
9	Cleavers (*Galium aparine* L., *G. spurium* L.)
10	Kochia (*Kochia scoparia* L.)

are currently predominantly summer annuals in the cooler regions of the Prairies to assume a winter annual growth habit. During the particularly mild winter of 2005-2006, for example, volunteer canola assumed a winter annual life cycle in Manitoba (Figure 1).

How does this matter?

Managing winter annual weeds presents challenges as fall-applied herbicides can be less active and in the spring, cold-hardened winter annual weeds may be more difficult to control and can quickly grow out of stage where herbicide efficacy is reduced substantially[5]. Timing and methods of weed management are critical in driving the structure of the weed community[2,3,4].

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The increasing temperatures and longer growing seasons associated with climate change are expected to result in range expansion of many crops and weeds to higher latitudes. Using kochia (*Kochia scoparia* L.) as an example, several models predicted a substantial northward range expansion for this species over the coming century, particularly in the western Prairies where the range for kochia is expected to reach up to or beyond the northern edge of the prairie provinces[6,7]. In kochia, reduced control due to herbicide-resistance is expected to enhance the rate of expansion northward as climate permits.

Northward expansion is also expected for many other weeds including some that currently are not present in western Canada. Northward movement of waterhemp

Figure 1: *Volunteer canola behaving as a winter annual in Manitoba.*
(credit: A. Lawson, May 30, 2006)

(*Amaranthus rudis* L.) along the Red River basin is soon expected to reach the eastern Canadian prairies while glyphosate-resistant Palmer amaranth (*A. palmeri* L.), which currently is a serious challenge to crop production in the southern U.S., has recently been introduced inadvertently to the north-central states where it appears to be thriving. Soybean and corn production is increasing in the eastern Prairies and is expanding westward and these cropping systems are associated with a different residual weed community than wheat systems[3,4].

What is being done?

Future changes to the type and species of predominant crops grown in western Canada will result in changes in the predominant weeds in these cropping systems. In addition, northward range expansion will result in the introduction of new weeds many of which are already resistant to one or more herbicides. Both are expected to contribute to changes in the weed spectrum and present new challenges to weed management in the future. Using an integrated weed management approach that includes a diverse set of management tools and is less reliant on herbicides alone will be required to effectively manage weeds in the future. The addition of new crops with different life cycles and management requirements can contribute to the diversity in weed management tools so long as more traditional crops are not abandoned in these rotations.