

## **Diversified Weed Management Strategies**

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Despite having more weed management knowledge than ever before, we have tended to narrow the weed management techniques actually practiced. Wild oat is here employed as an infamous “model weed” to show how we might plan management strategies for problem weeds. We learn, not surprisingly, that the best strategy for wild oat and other difficult weeds involves diversity of cropping systems and weed management techniques.

Herbicides are generally over-used. The almost complete succession of herbicidal wild oat control over cultural control has reduced wild oat densities to tolerable levels. But, the rather indiscriminant or over-use of herbicides has led to some concerns. The major ecological concern for farmers is the threat of widespread resistance to wild oat herbicides. Ironically, the most efficacious herbicides tend to select for resistant weed populations most rapidly. In the three western Canadian Prairie Provinces, over half of “high risk” fields surveyed had wild oat resistant to Group 1 herbicides. The same survey indicated that a few wild oat populations were resistant to all herbicides registered for wild oat control in wheat. Selection for herbicide resistance only ceases when herbicides are not used.

Diversified or Integrated weed management does not preclude herbicide use, it includes their judicious use along with other agronomic methods that help crops compete with weeds and reduce weed seed production. Before herbicides were widely available, farmers employed cultural measures to manage weed populations. These methods are still valid and provide insights for successful weed management systems today. Cultural practices such as seeding competitive cultivars, using higher than normal seeding rates, altering normal crop seeding dates, planting crops for silage or green feed to restrict viable weed seed production, and crop rotation still have much value. In the future, we may also benefit from current research on seed destruction techniques (rolling, cracking, radiation, etc.) on combines, whole-plant harvesting and removal of weed seeds from the field, and genetic triggers for destroying seed viability (“terminator genes”).

Diversified weed management systems require that the question of why weeds are there be answered first. For example, what is the life cycle of your most dominant weed? If your most dominant weed is downy brome (winter-annual), then diversified weed management for that species will include fewer winter-crops in the rotation. If your most dominant weed is wild oat – you are dealing with a summer annual growth cycle. Your rotation system can then be designed to disadvantage a summer annual growth habit. It is no secret that wild oat thrives on the Prairies because we have over-emphasized summer annual crops. Even with our formidable herbicide tools, if we continue to plant summer annual crops over and over again we are only providing assistance to weeds of a similar growth habit. Although we have substantially increased species diversity in recent rotations (more and more legumes), we have not increased crop life cycle or growth habit diversity.