

SEED-MEDIATED GENE FLOW IN CANOLA. Linda M. Hall, Robert H. Gulden and Hugh J. Beckie, Research Scientist/Adjunct Professor, Alberta Agriculture and Food, University of Alberta, Edmonton, AB, T6G 2P5; Assistant Professor, Department of Plant Science, University of Manitoba, Winnipeg, MB, R3T 2N2; and Research Scientist, Agriculture and Agri-Food Canada, Saskatoon, SK, S7N 0X2.

Canola or oilseed rape (*Brassica napus* L.) is a relatively newly domesticated oilseed crop grown in Canada and in temperate regions around the world. Canola resistant to glyphosate, glufosinate or imidazolinone (IM) herbicides was introduced in Canada in 1996 and has been widely adopted, occupying 45, 42 and 10% of canola acres, respectively. Herbicide-resistant canola is planted on 97% of acres but seed sources are not necessarily pure. In a study of admixture in certified canola seed, the permitted threshold of 0.25% was frequently exceeded. Harvest loss in canola due to pod shatter prior to and during harvest averaged 5.9% of the seed yield, or approximately 3,000 viable seeds m⁻², however, harvest losses ranged from 9 to 56 times the normal seeding rate of canola. Canola can develop secondary seed dormancy that varies with genotype, and is induced most effectively by low water potential in combination with warm temperatures. Fall tillage promotes the persistence of high dormancy genotypes. While the majority of canola volunteers are recruited in the year following dispersal, seed banks can persist for 3 to 4 years. Seed bank deletion occurs by predation, pathogenesis and desiccation, in addition to germination in spring and fall. High densities of seed can germinate pre-seeding and within a crop. Canola can be a competitive weed within cropping systems, and weed surveys have ranked it as the 14th most abundant weed in the 2000's, occurring in 11% of fields surveyed. Volunteer control options exist for all herbicide-resistant biotypes. However, with naive herbicide rotations, resistant canola can be difficult to control - for example if glyphosate is used alone pre-seeding on glyphosate-resistant canola, or if ALS inhibitors are used alone in-crop to control IM resistant canola. Seed losses along transport corridors have led to feral herbicide-resistant populations along roadsides and rail lines in Canada and Japan. These populations may persist and spread, and contribute to gene flow. Seed-mediated gene flow is a significant temporal and spatial factor in the spread of herbicide-resistant genes locally and internationally.