

The Importance of Herbicides for Grain Crops in Canada

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Canada ranks sixth in the world in wheat production with 27 million tonnes per year. (Canadian farmers also produce 22 million tonnes of other grain crops such as barley, corn, oats and rye.) Canada is the world's second largest exporter of wheat with 70% of its production exported annually. The herbicide era began in the 1940s with the introduction of 2,4-D, a phenoxy herbicide that was adopted very rapidly to control many annual broadleaved weeds. In 1949 and 1962 in Canada, 2,4-D was used on 3.2 and >10 million hectares respectively [1]. 2,4-D is credited with raising grain yields on treated acres in Canada by 10% by controlling broadleaf weeds [2].



Weeds in wheat fields

With the use of 2,4-D, there was a shift to an increasing problem with wild oat for which there was no effective control until 1961 when triallate became available. The widespread use of triallate and other wild oat herbicides coincided with the beginning of an upward trend in wheat yields (Figure 1). Canadian researchers have concluded that the main factor underlying the increase in wheat yield was improved weed control with herbicides [3]. This control resulted not only in reduced competition from weeds, but also in better seedbed moisture because fewer cultivations were needed. Because of the ability to control weeds with chemicals, it was possible to seed shallowly into a moist seedbed immediately after one cultivation since numerous spring cultivations with a resultant loss of soil moisture were no longer necessary [3].

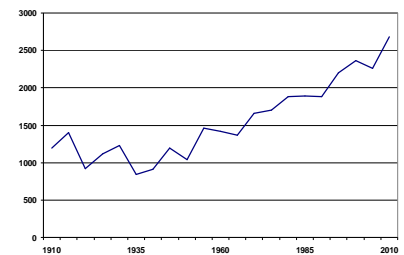


Figure 1: Canadian Wheat Yield, 1910 - 2010 (Kg/Ha)

Crop production on the Canadian prairies is limited mainly by lack of water. Taking land out of crop production for a year (fallowing) to conserve water has been practiced for many years. The 1970s marked the introduction of glyphosate; this herbicide transformed grain production in western Canada as it facilitated the widespread adoption of minimum-till and zero-till farming systems [1]. These have reduced fuel and labor costs and have significantly increased soil and water conservation in the semi-arid prairies [1]. Each tillage pass that is eliminated saves an estimated 5.9 liters/hectare of diesel. The increased cost of diesel fuel and reduced price of glyphosate in Canada in the 1980s-90s spurred the adoption of no-till (Figure 2). Direct seeding (conservation tillage) practices are now the norm; 70-80% of the land is direct seeded in western Canada. Greater moisture conservation has facilitated a 70% reduction in fallow [4]. Herbicides have made these changes possible.

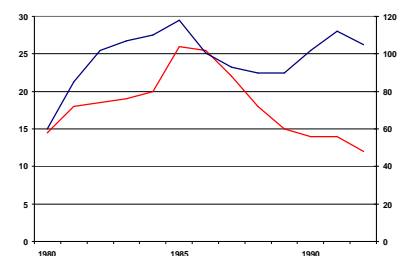


Figure 2: Glyphosate Price (red, left axis) and Fuel Index (blue, right axis, 1985=100)

Research has shown that organic grain producers in Canada have yields that are 23 - 27% lower than conventional farms with competition from weeds being a cause of the lower yield [5]. Surveys of organic grain farmers in Canada show that 100% use tillage to control weeds and 67% practice fallowing [6].

References

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