

# Sustainability in Canada and Europe: An Assessment after 25 Years of GM Crop Production

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Canadian agriculture has embraced innovative technologies and products. Canadian farmers rapidly adopted genetically modified crops following their approvals in the late 1990s. Twenty-five years later, genetically modified (GM) canola and corn adoption accounts for virtually all production, while GM soybean adoption is >80%.<sup>1</sup> The reduced tillage and chemical use position Canadian prairie farmers among the most sustainable farmers on the planet.<sup>2,3</sup>

The European Union (EU) has adopted an approach that is the total opposite to that of Canada, implementing a regulatory system that restricts and bans innovative agricultural products and technologies. The EU's precaution-based approach has resulted in only one GM crop being approved this century,<sup>4</sup> while Canada has approved 107 using a science-based regulatory framework.<sup>5,6</sup> Agricultural production in the EU remains relatively unchanged despite several decades of transformative agricultural innovation.

## ■ CANADA'S AGRICULTURAL SUSTAINABILITY TRANSFORMATION

The key priority for superior crop yields is efficient weed control. Weeds produce greater seed amounts and use water and nutrient resources that are then not available for crops. Poor weed control is a leading cause of lower crop yields. When GM, herbicide tolerant crops were commercialized in the mid-1990s, farmers rapidly adopted them as this technology greatly improved weed control. Widespread adoption of GM crops

has driven significant sustainability advances in prairie agriculture.

Over the past 25 years, removing tillage as the leading form of weed control has additionally resulted in soil moving from being a net emitter of carbon to sequestering carbon.<sup>2</sup> Saskatchewan soils annually sequester 0.4 metric tons of carbon per hectare. Ninety percent of farmers indicated that the efficient weed control provided from the use of glyphosate allowed them to have continuous efficient weed control and keep tillage out of their land management practices.<sup>2</sup> Some crop fields in Saskatchewan have been zero tillage for 20 years or even longer, greatly reducing soil erosion and increasing moisture conservation.

Herbicides play a key role in weed control strategies. Previous herbicides had environmental impacts that were greater than the impacts of those presently used. Farm level data on in-crop herbicide use from 2016 to 2019 indicate that the environmental impact of these herbicides is 65% lower than the impact of those used from 1991 to 1994.<sup>3</sup> This lower environmental impact also benefits biodiversity, as agricultural chemicals now have a weaker biodiversity impact than in previous decades, as the use of more benign herbicides at lower rates results in lower herbicide residues being transferred into the watershed.

Saskatchewan farm level data on fertilizer use indicate a 102% increase in the total volume of fertilizers applied between 1991–1994 and 2016–2019. Forty percent of this increase is due to the addition of 7 million crop acres that are no longer summerfallow. Yields have increased by 28% between these two periods. When nitrogen use efficiency is examined, farmers are far more efficient as while total fertilizer use increased by 102%, nitrogen use increased by only 29%. Farmers are producing more food per acre per pound of fertilizer applied than was previously the case.<sup>7</sup>

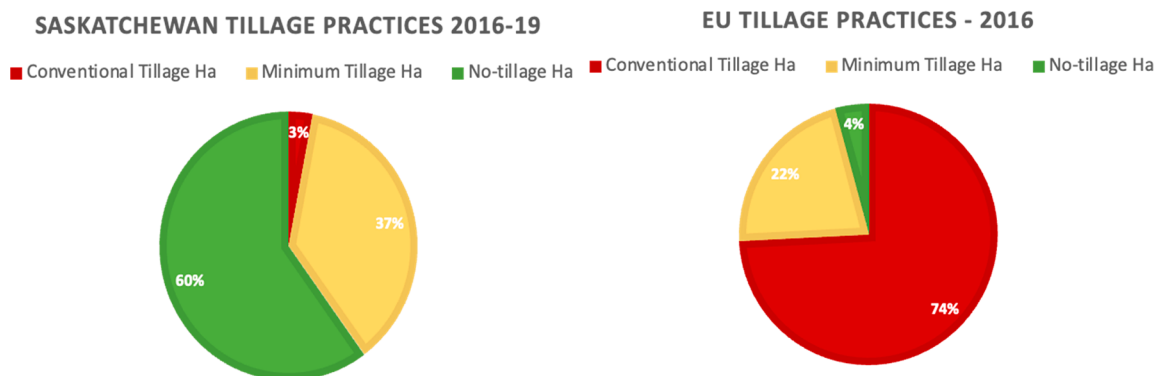
## ■ EUROPE'S SUSTAINABILITY AVERSION

European farmers have been predominantly prevented from adopting innovations enjoyed by Canadian farmers, being forced to rely on older crop production methods. Tillage is still

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**Figure 1.** Tillage rates in Canada and the EU. Sources: ref 2 for Canada and ref 8 for the EU.

the leading form of weed control throughout Europe (Figure 1). The failure to adopt GM crops in most of Europe results in the annual release of 33 million tons of GHG emissions, making agricultural GHG emissions 7.5% higher than if GM crops had been adopted at rates similar to those in Canada.<sup>9</sup> While GM corn is grown in Spain and Portugal, farmers in the rest of Europe are denied access to this sustainable innovation. The EU's failure to adopt higher-yielding GM crops has resulted in minimal productivity increases, as between 1995 and 2019, FAO data show the agricultural production index for the 27 countries of the EU increased by only 7% while agricultural production in the United States increased by 38%.<sup>10</sup>

The EU's current agriculture policy framework, the Farm to Fork Strategy (F2F), calls for a 20% reduction in the use of fertilizer, a 50% reduction in the use of pesticides, a 50% reduction in the environmental impact of pesticides, and a tripling of organic production.<sup>11</sup> Implementation of the F2F will result in lower food production: −26% for cereals, −27% for oilseeds, −10% for fruits and vegetables, −14% for beef, and −9% for dairy.<sup>12</sup> The EU is abandoning commitments to achieve the United Nations' top three Sustainable Development Goals: zero poverty, zero hunger, and improved health.

## ■ BENEFITS FROM EMBRACING INNOVATION

Because of the ban on innovative technologies and products, European farmers are foregoing benefits experienced by Canadian farmers. Canada's science-based regulatory framework has assessed the risks of innovative products, determining them to be no riskier than existing products. This has aptly proven to be the correct decision given the evidence of reduced environmental and biodiversity impacts. Canadian farmers have greatly improved the sustainability of food production due to innovations and by ensuring that economic sustainability is the priority for decision making.

Adopting a precautionary-based regulatory approach means that Europe has prevented commercialization of vital products and technologies that are driving improved sustainability and threatens to remove many products and technologies that will further increase food production's impact on the environment, not lessen it. Current policies and political practices are ensuring that Europe is actually ensuring that food production will be less sustainable than it has been in the past or compared with production in other innovation-embracing countries.

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### Notes

The author declares no competing financial interest.

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