

Maintaining Soil Fertility in Manitoba



Balancing nutrient exports with nutrient inputs is an important part of maintaining our soils' productivity and sustainability



Source #1: Livestock Manure & Compost

Manitoba's diverse livestock industry includes dairy, poultry, pork, beef, etc. Although large consumers of grains and hay, the majority of the nutrients are excreted in manure. Manure can be collected in solid form (with straw) or liquid form (diluted with water) and returned to the soil, closing the nutrient cycle. Some manure is also converted to compost to reduce volume and stabilize nutrients forms.

Source #2: Synthetic Fertilizers

Because nutrients are removed from soil in harvested grain or hays, farmers replenish soil reserves using organic and inorganic synthetic fertilizers. Fertilizers are used when access to livestock manure or compost is unavailable and is generally applied to cropland each year to match the nutrient requirements of the crop.



Source #3: Soil

The soil itself acts as a major source of nutrients for crops! Soils store and release nutrients in mineral and organic forms. Plants access these nutrients as they convert to available forms through mineralization by microbes or chemical reactions.



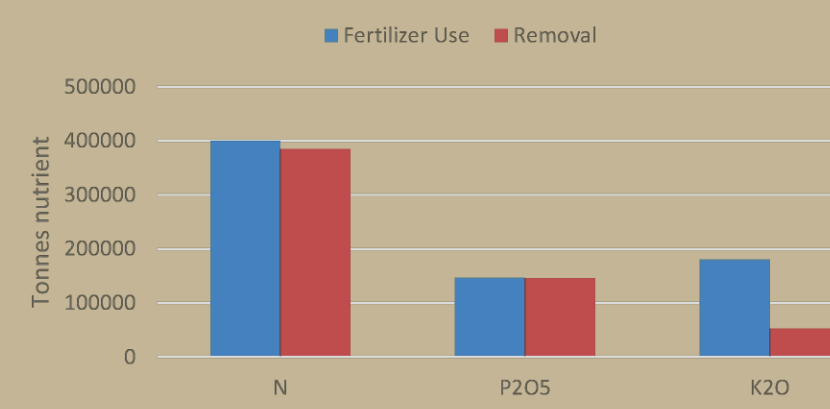
Loss #1: Exported Grain



Photo credit: Manitoba Pulse & Soybean Growers

Harvested grain represents a significant loss of nutrients from cropland, as most of Manitoba's commodities, such as canola, wheat and soybeans, are destined for export markets. Synthetic fertilizers are applied to replenish the soil, but application rates are generally lower than removal rates because our soils are inherently fertile.

Annual Fertilizer Usage and Crop Nutrient Removal (averaged 2012-16)



Loss #2: Urban & Municipal Waste



Photo credit: Larissa Stevenson

Food consumed in Manitoba is grown locally or imported from around the world. Nutrients produced by urban populations is generally regarded as waste and is seldom recycled to cropland. Some centres have begun to recognize the value of these nutrients and adopted new technologies to recover nutrients. For example, yard and kitchen waste is collected and converted to compost. Struvite, a pelleted form of phosphorus, is also being extracted at a waste water treatment facility and used as a commercial fertilizer.

Loss #3: Environment

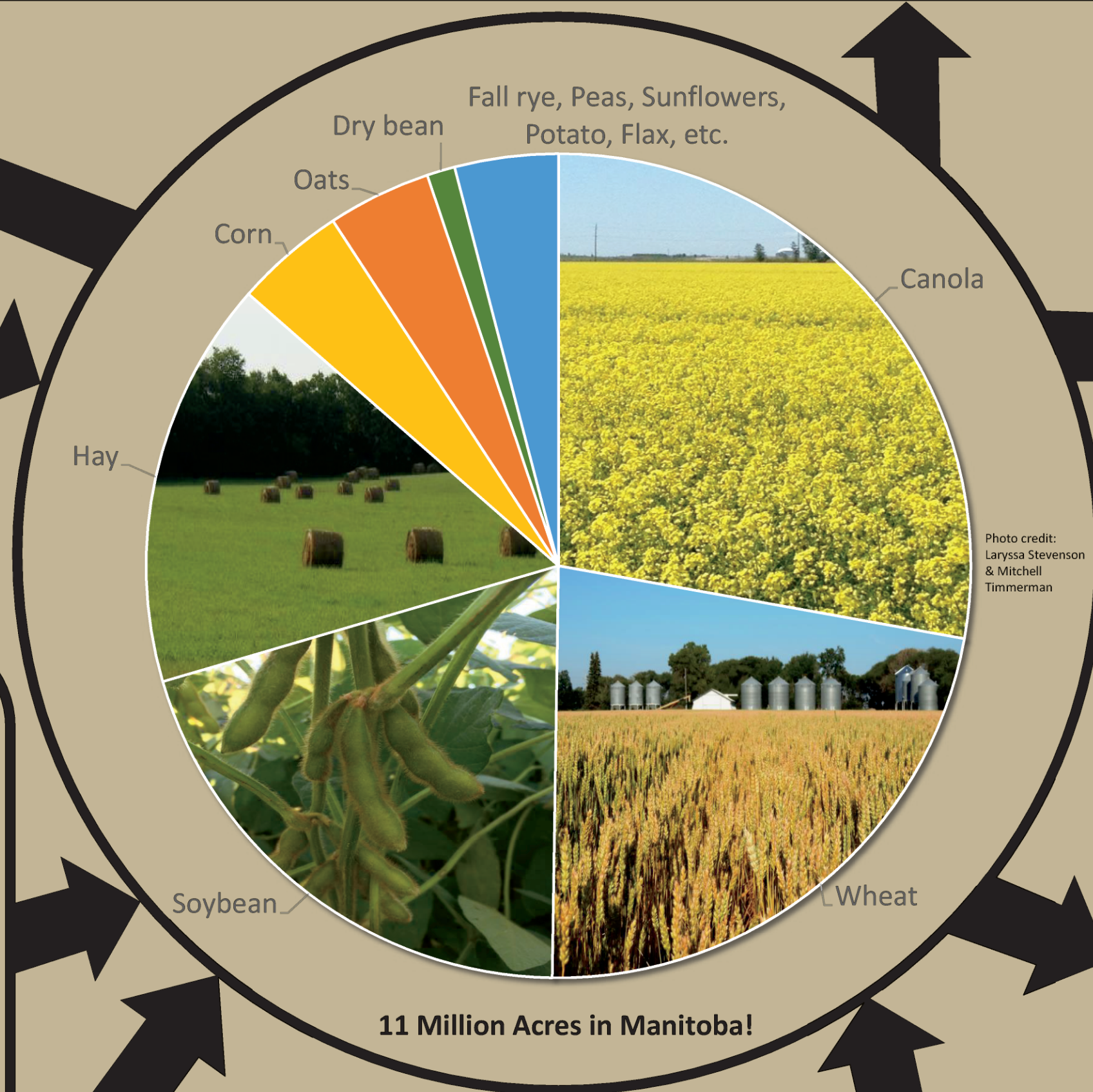


Photo credit: Kevin Baron

Nutrients can be lost naturally from soil to the environment by:

- Leaching.** Nutrients dissolved in water move through the soil profile into groundwater.
- Volatilization.** Nutrients react with other molecules in the soil or air and convert to gaseous form.
- Runoff.** Nutrients dissolved in water or adhered to soil particles are carried into surface water bodies with overland water flow.
- Denitrification.** Under waterlogged conditions, soil nitrogen may convert to and be lost to the atmosphere as N₂ or N₂O.

Farmers minimize environmental loss by adhering to strict manure application guidelines and applying fertilizer using the 4R nutrient management strategies (right source, right placement, right timing, and right rate).



Source #4: Legumes

Manitoba farmers grow various legumes in their crop rotation like perennial forages (e.g. alfalfa) and pulse crops (e.g. peas). Legumes form symbiotic relationships with rhizobium bacteria in the soil capable of converting atmospheric nitrogen to plant available nitrogen, eliminating the need to apply nitrogen fertilizer. Legumes also leave some of that nitrogen behind in soil for subsequent crops.

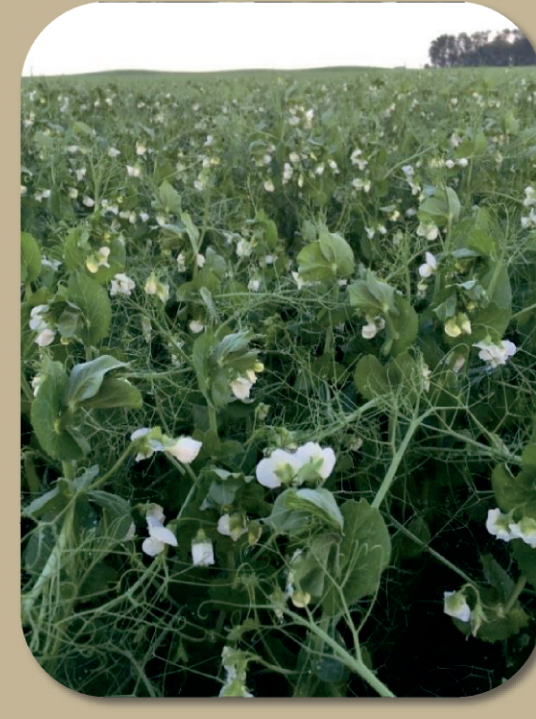


Photo credit: Manitoba Pulse & Soybean Growers



2018



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