January 2000 Agdex 576-1

Managing Nitrogen to Protect Water Quality

Nitrogen is a key nutrient for crop production

Nitrogen is an essential nutrient for crop growth. If there is not enough nitrogen for growing plants, it can limit crop production. Soil organic matter, chemical fertilizers and livestock manure are sources of nitrogen for crop production. Excess nitrogen that is not used by growing crops converts to nitrate (NO_3^-) which can be very mobile in soils. Nitrate can leach through the root zone and contaminate shallow groundwater. Areas with coarse or sandy soils are at greater risk for nitrate leaching to ground water. Nitrogen can also be carried in runoff and contaminate surface waters. Nitrogen must be managed properly to increase crop yields and protect water quality.

➥ *Nitrogen from manure and chemical fertilizers can pollute surface and ground water.*

Nitrogen exists in organic and inorganic forms. Inorganic nitrogen like nitrate (NO_3^-) and ammonium (NH_4^+) can be immediately taken up by growing crops. Organic nitrogen must be mineralized or changed into these inorganic forms before it can be used by growing plants.

➥ *Manure is a valuable source of nitrogen on the farm.*

Excess nitrogen in aquatic ecosystems can be harmful. When there is a sufficient supply of phosphorus available in aquatic ecosystems, high concentrations of nitrogen can promote the growth of aquatic plants and algae. When algal blooms die and start to decompose, dissolved oxygen is depleted in the water. The lack of dissolved oxygen can suffocate aquatic organisms like fish resulting in fish-kills. Algal blooms can also affect the aesthetics of a water body producing large algal scums as well as impair recreational uses like swimming and boating. Under certain conditions (pH and temperature), high ammonium levels in surface waters can be toxic to fish.

➥ *Nitrate-Nitrogen levels greater than 10 milligrams per litre are above drinking water quality guidelines for humans; levels greater than 100 milligrams per litre are above livestock watering guidelines.*

High nitrate-nitrogen levels in drinking water can harm human and livestock health. High nitrates levels in drinking water can impair the blood's oxygen carrying capacity in small infants causing 'Blue Baby Syndrome'. Similarly, extremely high nitrates can be toxic to ruminant animals like cattle and sheep.

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How you can help protect Alberta's water resources

Managing nitrogen in the right way will ensure we all have clean drinking water and healthy aquatic systems.

- **Test your soil and manure for nutrient content**. Test your soil and manure for nitrogen, phosphorus and potassium content. Apply enough fertilizers or manure to meet crop nutrient requirements. Ensure that an adequate land base is available for spreading manure at appropriate rates.

➥ *Routinely test your soil and manure for nutrient content.*

- **Reduce the numbers of acres in summer fallow**. Reduce cultivated summer fallowing to prevent soil erosion and reduce the amount of nutrients and sediment transported in runoff to surface waters.

- **Ensure sufficient lagoon and manure storage**. Liquid manure lagoons must be properly sealed with compacted clay or plastic liners to prevent nitrogen leaching to shallow ground water. Manure, if stockpiled, must be contained on compacted soil or concrete pads to prevent leaching to ground water. All runoff from manure stockpiles must be contained to prevent contamination of surface waters.

- **Do not apply manure on land with high risk of runoff**. Applying manure or fertilizers on frozen, snow-covered, saturated or heavily compacted bare soils increases the risk of contaminated runoff reaching surface water.

➥ *Test your ground water well for levels of nitrate, and bacteria every year.*

- **Maintain healthy riparian areas**. Riparian areas are zones of vegetation along-side streams and around water bodies. By feeding livestock away from creeks and controlling their access to riparian areas through rotational grazing, alternate watering sources, and fencing, the risk of manure reaching surface water decreases.

More information

Contact your Alberta Agriculture regional conservation coordinator for more information.