

Soil FACTSHEET



Ministry of
Agriculture

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Nitrogen Fertilization as Related to Soil pH

Nitrogen Losses Increase at Higher pH Values

Urea is an excellent source of nitrogen for plants when it is drilled into the soil. However, urea-N losses may be quite high when surface applied, particularly on soils that have a relatively high pH. The losses are caused by the volatilization of ammonia at high pH levels. Even on acidic soils, the pH adjacent to urea particles will increase when urea is converted to ammonia by urease (a soil enzyme). Losses can be minimized by irrigating soil as soon as possible after urea is applied so that no particles are left on the soil surface.

Surface application of either ammonium nitrate (34-0-0) or ammonium sulphate (21-0-0) will have lower losses.

Ammonium Decreases Soil pH Values

Any of the ammonium-containing nitrogen fertilizers can acidify soils, when fertilization and irrigation rates are above crop requirements. Acidification occurs from the conversion of ammonium (NH_4^+) to nitrate (NO_3^-), which releases acidifying hydrogen ions (H^+), as well as the leaching of particular nutrients called 'base cations' from the soil.

The acidification rate depends on the physical and chemical properties of the soil (its buffering capacity) as well as the rate of water percolation and the amount of fertilizer applied in excess of that utilized by plants.

The preferred sources of nitrogen fertilizer for use on acid soils in order of their decreasing effect on soil pH are as follows:

1. calcium nitrate
2. ammonium nitrate (34-0-0)
3. urea (46-0-0)
4. anhydrous ammonia (82-0-0)
5. a mixture of urea and ammonium sulphate (34-0-0-11);
6. monoammonium phosphate (MAP, 11-53-0)
7. ammonium sulphate (21-0-0).

Ammonium sulphate should be used when soils contain low levels of plant sulphur. This fertilizer contains sulphate-sulphur, which is the only form of sulphur that is directly available to plants. Calcium nitrate is not a commonly used fertilizer in British Columbia.

FOR FURTHER INFORMATION CONTACT

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