

## SOIL AND PLANT NITROGEN FLUXES

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Measurements made at Swift Current during the periods 1938 to 1944, and 1966 to 1967 indicate a net mineralization of soil nitrogen during the summerfallow period. The average increase in nitrate-nitrogen from June 15 to October 30 has been about 50 lb per acre two feet. However during individual years this has varied from 20 to 96 lb per acre two feet. Superimposed on this general tendency of increased nitrate during the summerfallow period are frequent positive and negative fluxes. The most consistent of these are a negative flux in June and a positive flux in September. Detailed studies of the variations indicate that all of the commonly recognized causes of nitrate fluxes in the soil profile are active including:

1. Leaching
2. Upward flux by mass flow in response to temperature gradients
3. Microbiological fluxes both negative and positive
4. Absorption by plants.

Measurements of soil nitrate fluxes and nitrogen absorption by a developing crop of wheat indicate that the wheat crop is highly dependent on the initial nitrate in the soil during the early stages of development. Depending on the year, contemporary mineralization does not appear to become an important source of plant nitrogen until about mid-July. This corresponds to about the shotblade stage of the crop when tillering is normally completed. Consequently, when mineral nitrogen is below optimum at seeding, applications of fertilizer nitrogen are required to obtain normal crop development.