

The Fate of Applied Nitrogen Under Field Conditions

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Ammonium nitrate, doubly-labelled with N¹⁵, was applied with and without 2 ton straw/acre, at rates of 50 and 100 lb N/acre on Bradwell soil (light texture) and at 100 lb N/acre on Sutherland soil (heavy texture). In an extra treatment, straw labelled with N¹⁵ was applied to Bradwell soil at 2 ton/acre without fertilizer N. The treatments were applied in the field, inside 12 inch diameter steel cylinders imbedded in the soil to a depth of 36 inches. Two wheat crops were grown. The disposition of the fertilizer N was determined with regard to plant uptake (grain, straw and roots) and depth distribution of residual forms (organic- or mineral-N).

Analytical work is still in progress, but some of the results so far obtained are of interest. To summarize these:

1. Uptake of fertilizer N was greater on Sutherland than on Bradwell, probably due to more favourable moisture conditions.
2. Straw depressed fertilizer N uptake on Bradwell in the first year at both levels of fertilizer. Yield was not affected.
3. Uptake of straw N was relatively small (11.2 percent of N was recovered in plant material in the two crops).
4. Significant quantities of fertilizer N were immobilized (Table I). The presence of 2 ton straw/acre increased immobilization by approximately 14 lb N/acre.

Table I. Fertilizer N remaining in 0-3 inch soil after varying periods of time.

Treatment	Sampling Date					
	August 1967		May 1968		August 1968	
	Organ- ic	Min- eral	Organ- ic	Min- eral	Organ- ic	Min- eral
lb N/acre						
Bradwell						
100*	14.6	3.9	13.7	0.7	12.4	0.3
100 + S ⁺	24.1	3.2	22.9	0.7	18.9	0.4
50	9.9	1.2	8.0	0.3	7.2	0.1
50 + S	15.1	0.8	14.6	0.4	12.3	0.1
Sutherland						
100	10.5	4.1	6.9	1.4	7.8	0.2
100 + S	17.5	6.8	12.3	1.5	13.7	0.3

*1b/acre of NH₄NO₃-N

+straw at 2 ton/acre

5. Immobilized N was partially released, declining by 20-30 percent in the second year (Table I). This release was highest in the straw treated plots.
6. The incomplete N balance shows recovery of 49-77 percent. However, as further results become available, these figures will increase.
7. The enrichment of fertilizer N (6.1 atom percent excess) was sufficiently high for both plant and soil analysis. The enrichment of N in labelled straw (0.14 atom percent excess) allowed plant uptake only to be determined.