University of Idaho Extension

Field Studies of Nitrogen Mineralization in Sugar Beets in Elmore and Owyhee Counties

Polyethylene Porous ineralization Bag

Using Watermark Sensor

The Situation

In Elmore and Owyhee Counties there is a strong need to understand early nitrogen tie-up and nitrogen dynamics in relation to nitrogen mineralization, yield and quality because of rotation and cropping systems.

Our Response

Nitrogen mineralization was determined by the buried-bag method at the grower's field. In the buried-bag method, nitrogen mineralization is estimated under field conditions by incubating soil samples in a semi-permeable polyethylene bag. Nitrogen mineralization is determined by subtracting ammonium and nitrate values of the soil samples in bags retrieved during the growing season from initial values after converting to pounds of nitrogen per acre. I cooperated with OSU and ARS scientists in using combined data for growers' graining at the local, state and regional Far West conference.

Part of this applied research has been published as organic matter dynamics and nitrogen mineralization by the Royal Society of Chemistry and the Idaho Academy of Science.

Program Outcomes

Growers were actively involved in evaluating and applying the method in their cultural practices. By adjusting C/N ratio, we prevented early nitrogen tie-up and influenced the mineralization process early to increase the sugar level and reduce conductivity.

Nitrogen mineralization rates in different fields varied from 46.1 pounds to 215 pounds per acre. As an average, the growers saved 62 pounds of nitrogen per acre. The results have implications for crop production. Growers gained knowledge on kinetic parameters of nitrogen mineralization related to straw and compost amendment. The findings have helped growers to achieve higher profits while enhancing surface and groundwater quality.

Table 1. Nitrogen Mineralization Studies in Elmore County, 2004.

Nitrogen Mineralization (lb/A)

Location	Depth (in)	Initial N (lb/A)	May	June	July	August	September
Glenns Ferry	0-12	183.6	-5.2	6.4	42.8	43.2	134.8
	12-24	184.4	-10.0	4.0	28.8	7.6	54.8
	Total	368.0	-15.2	10.4	71.6	50.8	189.6
Grandview	0-12	320	-2.4	50.8	175.2	90.8	-300.8
	12-24	116	6.8	24.4	44.4	48.0	64.8
	Total	436	4.4	75.2	219.6	138.8	-235.2

2005 Nitrogen Mineralization in Sugarbeets

Site	Depth	Initial N Level	June	July	Aug	Sept	Oct	Soil N Supply
Pounds of N Per Acre								
G.V.	0-12	98.42	174.0	185.4	241.30	217.4	256.50	354.92
	12-24	78.66	98.8	100.7	118.18	150.9	119.32	197.98
Total		177.08	272.8	286.1	359.48	368.3	375.82	552.90

ELMORE COUNTY, IDAHO 1889

For More Information

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