Granules

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Tips, Updates, and Insights from the Encirca® Services Agronomy Science Team

Selecting the Right Soil Nitrogen Modeling Depth for Encirca® services Nitrogen

Summary

- The Season Chart display and N recs are based on the modeling depth set in Encirca.
- The default modeling depth of 24 inches is appropriate for most Midwestern Corn Belt soils.
- For very well drained soils, (e.g. some loams, sandy loams, etc.) with deep rooting potential, consider using a reporting depth of 36 inches or 48 inches.
- For excessively drained and irrigated sands consider using a modeling depth of 48 to 60 inches.
- Shallow soils, especially with restrictive layers or a shallow water table may benefit from using a 1 foot reporting depth.
- Think about the typical effective rooting depth for the soils in your field in choosing a modelling depth.

Introduction

Corn takes in nitrogen through its roots, but at what depths do those roots extract nitrogen from the soil?

Prior versions of the Encirca services nitrogen model used a default depth of 24 inches for displaying soil nitrogen levels. This was believed to be the typical depth at which nitrogen was being extracted by the corn roots. In some sandier soils, the depth was automatically set to 48 inches with the understanding that more downward movement of nitrates occurred in these soils (especially with irrigation), rooting depth tended to be deeper, and therefore roots would also access nitrogen at these further depths.

A recent change to the Encirca service, allows users to select the soil nitrogen modeling depth field-by-field. This document provides guidance as to which soil nitrogen modeling depth is appropriate for common soils.

Analysis

Locations were selected to represent various soil and weather conditions and run through the Encirca services nitrogen model. These simulations track plant uptake, nitrogen additions (fertilizer and mineralization) and losses (volatilization; denitrification; leaching) within each soil depth layer. The remaining soil N within each 12 inch deep layer is then tracked for each day of the crop year and presented as a percentage of the total soil N in the top 72 inches. The VT/R1 date was used as the reference point since soil N at that point is a key component in the recommendation process.

For these examples, most fields had a spring application of Anhydrous Ammonia, with the exception of irrigated sand fields, which had multiple applications of N throughout the vegetative growth period.

Note: Setting a deeper soil depth range in the Encirca services nitrogen model will likely show more soil nitrogen, and therefore could lower any nitrogen rate recommendation. Users are advised to carefully consider the proper modeling depth for each field when generating nitrogen recommendations. The modeling depth selected is applied to all soils found in the field.

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Example Location & Soil Types with Estimated % Plant Nitrogen Uptake by Depth at VT/R1

Location/Year	Soil Type	% at 12 inches	% at 24 inches	% at 36 inches	% at 48 inches	% at 60 inches	%at 72 inches
Moderate Rooting Depth	**Mod to Well Drained Loams**						
Ames, IA 2014	Clarion loam	31%	59%	82%	95%	99%	100%
Lewis, IA 2015	Marshall silty clay loam	54%	95%	99%	100%	100%	100%
Mason City, IA 2014	Readlyn loam	54%	79%	93%	99%	100%	100%
Urbana, IL 2016	Flanagan silt loam	73%	97%	99%	100%	100%	100%
New Richland, MN 2015	Webster clay loam	42%	87%	98%	100%	100%	100%
Hastings, NE 2015 (irrigated)	Crete silt loam	59%	86%	97%	100%	100%	100%
Deeper Rooting Depth	**Excessively Drained Sands**						
Lincoln Co, NE 2017 (irrigated)	Valentine fine sand, rolling	48%	59%	72%	85%	95%	100%
Merrick Co, NE 2015 (irrigated)	Ipage loamy fine sand	38%	64%	77%	86%	93%	100%
More Shallow Rooting Depth	**Poorly Drained Silt/Clay Loams**						
Humeston, IA 2014 (wet year)	Haig silt loam	71%	96%	100%	100%	100%	100%
Humeston, IA 2017 (dry year)	Haig silt loam	89%	98%	99%	100%	100%	100%
Columbia, MO 2016	Mexico silt loam	80%	99%	100%	100%	100%	100%
Wood Co, OH 2017	Hoytville clay loam	94%	99%	100%	100%	100%	100%

These are example results; your values may vary due to weather and management.

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