

## Nutrient Management

### Nitrogen Fertilization for Continuous and Rotated Corn



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#### Quick points

Based on current N fertilizer and corn prices, recommended N application for corn following soybean is 125 lb N/acre (range 105 to 145 lb N/acre) and for continuous corn is 175 lb N/acre (range 155 to 195 lb N/acre).

For corn following an established alfalfa crop, the N fertilizer requirement is low, most often needing no N to at most 30 lb N/acre.

Second or third year corn in rotation with soybean has a N fertilizer rate need similar to continuous corn.

#### In print

**Concepts and Rationale for Regional Nitrogen Rate Guidelines for Corn**  
ISU Publication PM 2015

#### Nitrogen fertilizer recommendations for corn in Iowa

ISU Publication PM 1714

#### Online

##### ISU Extension Soil Fertility

[extension.agron.iastate.edu/soilfertility](http://extension.agron.iastate.edu/soilfertility)

##### Corn Nitrogen Rate Calculator

Determine N application rates with continuous corn, corn following soybean, and different N and corn prices.

[extension.agron.iastate.edu/soilfertility/nrate.aspx](http://extension.agron.iastate.edu/soilfertility/nrate.aspx)

This is an excerpt from the 2007 Crop Advantage Series Proceedings. For more information on this and other crop production programs offered by ISU Extension visit

[www.extension.iastate.edu/crops](http://www.extension.iastate.edu/crops).

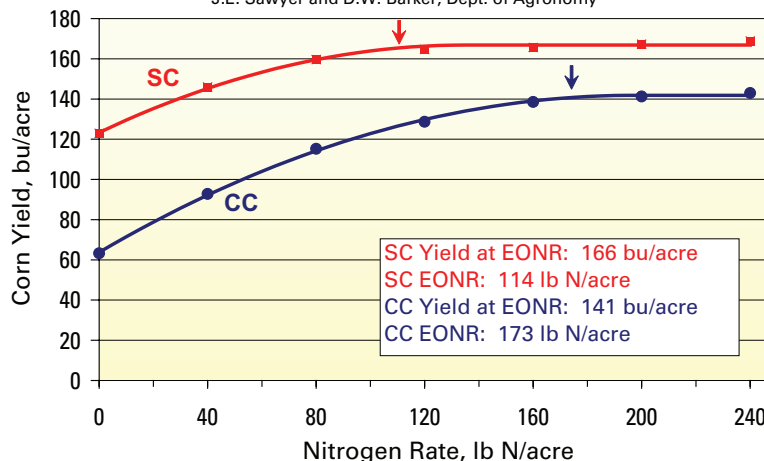
Increasing demand for corn grain to meet ethanol production has spurred interest in growing more continuous corn (CC). Because the common rotation for many years has been corn after soybean (SC), many producers became unfamiliar with practices needed to produce CC. One of those is nitrogen (N) fertilization.

#### Nitrogen application rate

Soybean in rotation with corn results in a soil system that supplies greater crop available N. There are several reasons, but mainly is due to crop residue amount, residue characteristics, and microbial mineralization differences between CC and SC rotations. Results of research in Iowa indicate that the N fertilizer rate requirement is 50 to 60 lb N/acre higher with CC than SC. The emphasis today is not on determining a “soybean credit”, which is really a misnomer, but instead the emphasis is on determining the N rate required for corn in a specific rotation. In recent years there has been a wide fluctuation in both N fertilizer and corn prices. The most economical application rate is influenced by both (i.e., the N:corn price ratio). To aid in determination of N rates for corn, the Corn Nitrogen Rate Calculator web based tool was developed so that different N and corn prices, as well as crop rotation, could be used in choosing a N application rate (see the on-line resources listing for the web site). Research in Iowa has also shown that second (CC<sub>S</sub>) or third year (CC<sub>CS</sub>) corn after soybean has a N fertilizer rate requirement similar to that for CC. Therefore, N rates for CC can be used when fertilizing second or third year corn.

2000 - 2005 (Seven Locations; 32 Site-Years)

J.E. Sawyer and D.W. Barker, Dept. of Agronomy



Corn grain yield response to fertilizer N application with continuous corn (CC) and corn following soybean (SC) at seven ISU research farms (EONR is the economic optimum N rate).

#### Yield

Nitrogen fertilization should be based on expected economic return to the N application rather than trying to achieve maximum production. It is just not possible to pay for the relatively large N rate increase required to grow the last small yield increase from an economic optimum rate to a maximum yield producing rate. Current N and corn prices result in recommended rates that produce yields quite close to maximum production (average 96 to 99% of maximum yield). Unless N prices increase and/or corn prices decline dramatically, recommended rates will not hinder productivity. Using economic derived rates also helps reduce nitrate loss to water systems.