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Effects of Nitrogen on Soil and Corn Yields

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The Effects of Nitrogen on Soil and Corn Yields

Doug Hughes

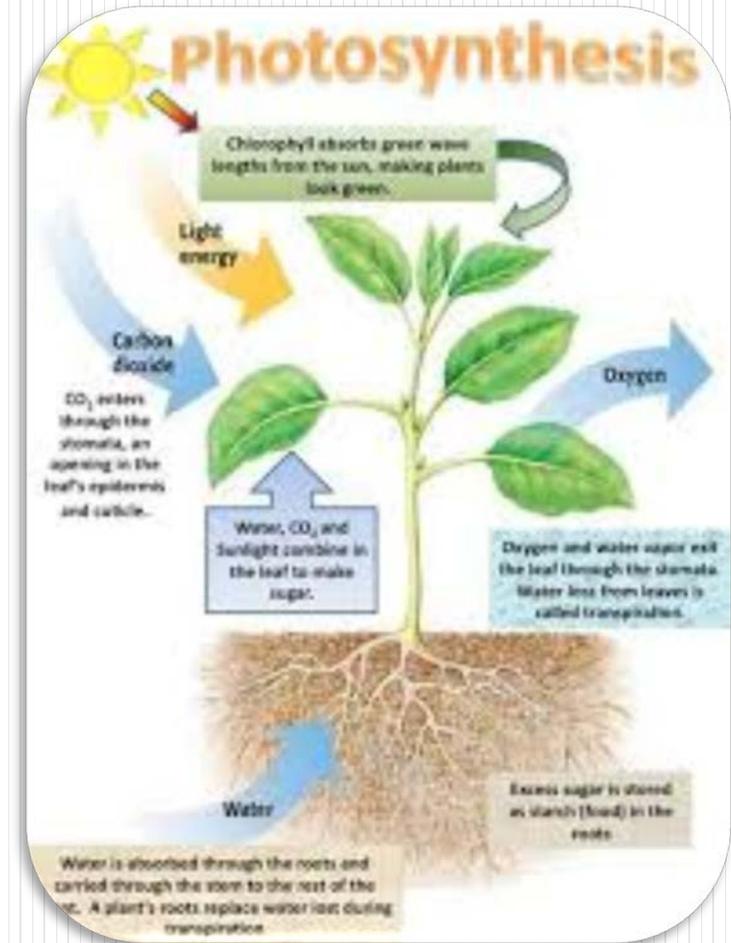


(https://www.google.com/search?q=corn&newwindow=1&source=lnms&tbm=isch&sa=X&sqi=2&ved=0ahUKEwiP08rxrlzTAhVKzIMKHd2PBKIQ_AUIBigB&biw=1239&bih=621#newwindow=1&tbm=isch&q=corn+plants&*&imgrc=_Ql0pK42XaF7OM:~&spf=407)

What effect does nitrogen have on a corn plant?

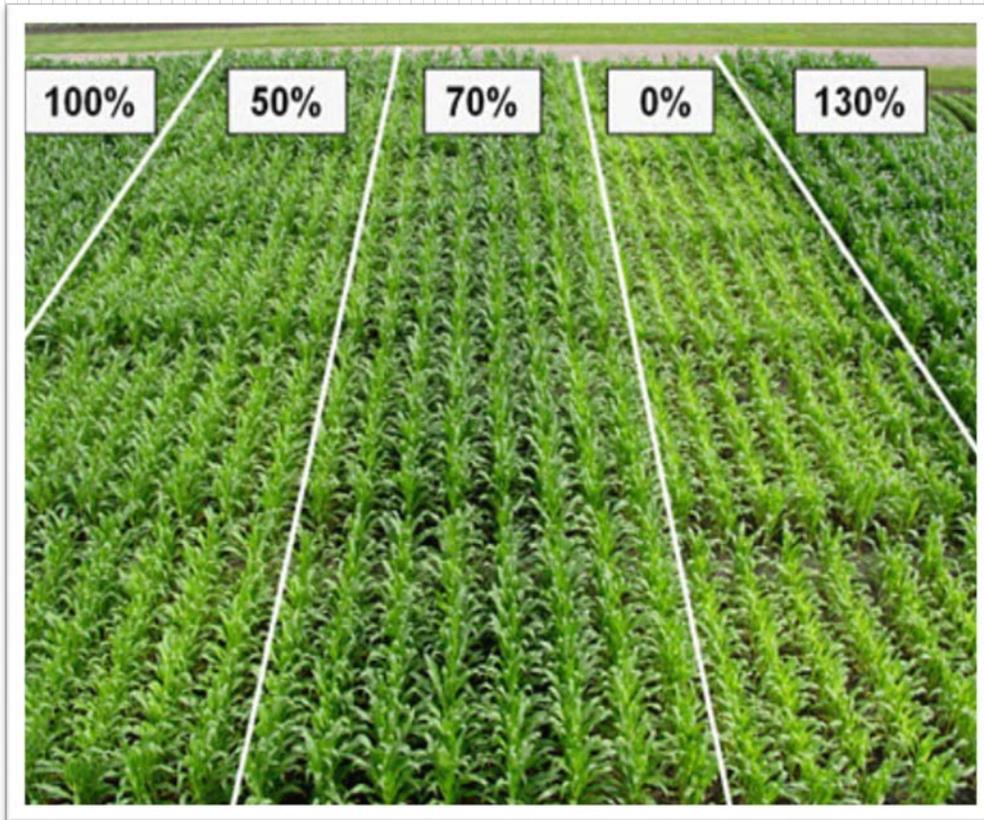
- Has a major role in establishing an optimal photosynthetic capacity
- Plays a major role in maintaining a high rate of photosynthesis during grain filling period
- Maximizes the leaf area index

(Uribelarrea)



("Southern Organics & Supply.")

Side by side comparison pictures



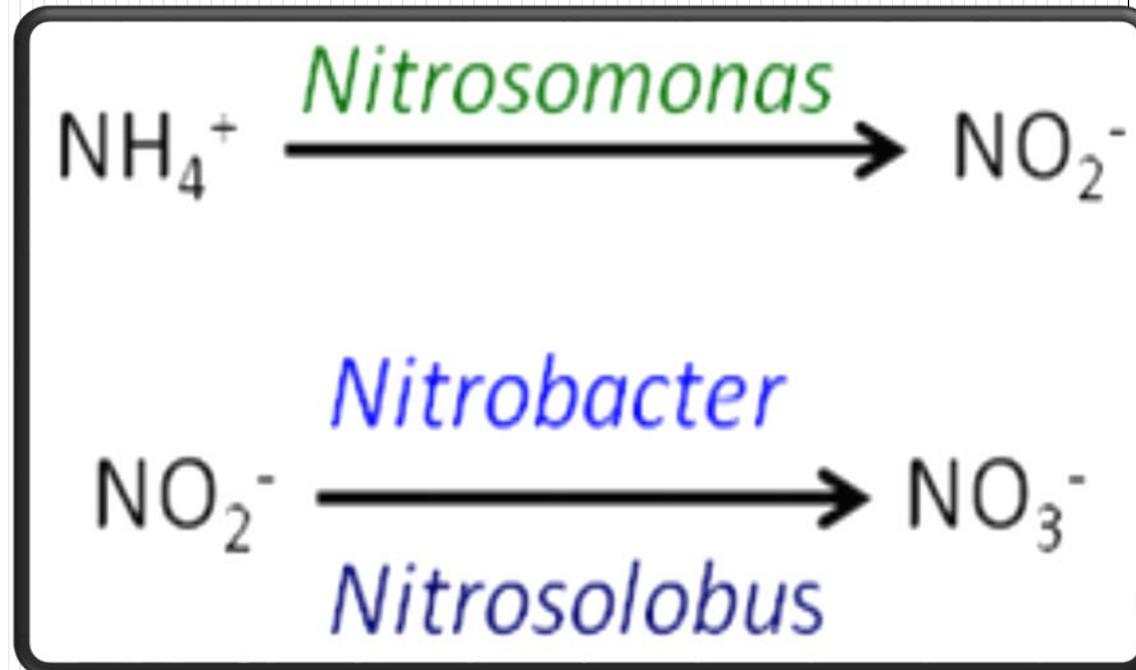
("Determining Optimum Nitrogen Rates for Corn.")

- The 0% had no nitrogen applied and was noticeably smaller and unhealthier looking
- The 50% has a little bit of a yellow tint to it, which means it is not as healthy as possible
- The 130% had the most nitrogen applied to it and it appears to be the most green and healthiest looking plant
- ("Determining Optimum Nitrogen Rates for Corn.")

Ammonia reaction in the soil

- NH_3 converts to NH_4^+ when it enters the soil
- When temperatures reach above 50 °F, the ammonium converts to a nitrate through nitrification
- Since soil also has a negative charge, these N atoms are lost

("Common N Fertilizers & Stabilizers for Corn Production.")

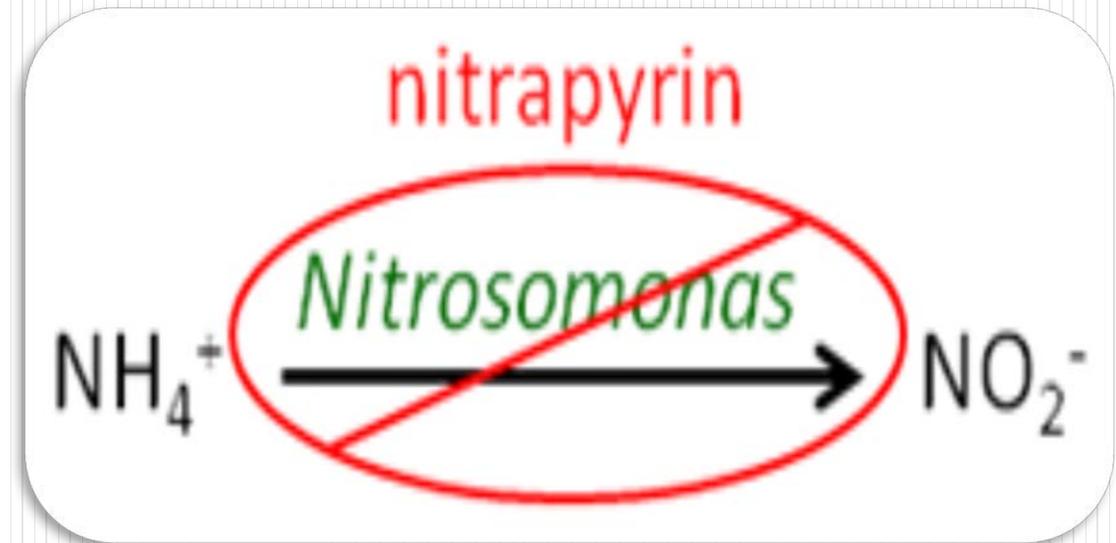


("Common N Fertilizers & Stabilizers for Corn Production.")

How to reduce nitrogen loss

- Nitrapyrin inhibits the growth of *Nitrosomonas* bacteria and keeps N readily available for plant uptake
- Works best in cool temperatures (less than 50°F)
- In warm temperatures can work for 30-40 days
- In products such as N-Serve
- These products are easy for farmers or dealers to add in anhydrous tanks

("Common N Fertilizers & Stabilizers for Corn Production.")



("Common N Fertilizers & Stabilizers for Corn Production.")

Current practices

- Ways to apply nitrogen have changed to help stop nitrogen loss
- These ways include:
 - Before planting
 - Spray down 28% or 32% nitrogen and work into soil
 - Spread urea and work into soil
 - During plant growth
 - Side dressing (application after plant emergence) 28% or 32% nitrogen
 - Side dressing anhydrous ammonia
 - Side dressing using Y-drops

("Custom Application")



28% or 32% nitrogen side dress rig("5.14.15 - Field Activities.")



Y-drop rig (Holland)

Current practices cont.

- Late Fall or early Spring
 - Apply on anhydrous ammonia
 - Strip tillage
- There are many ways that are used to apply nitrogen, these are just the most common

("Custom Application")



("Common N Fertilizers & Stabilizers for Corn Production.")



("Settling On Spring Strip-Till.")

Impact nitrogen rates have

- Excess nitrogen can run off into water supply or damage environment in other ways
- Not enough nitrogen can reduce corn yield
- Being able to apply less nitrogen saves the farmer cost and at the same time helps the environment

(Scharf)



The lighter green indicates nitrogen loss (Scharf)

General study ideas

- Many tests have been performed to find what is the right amount of nitrogen is and there have been:
 - Timing trials, applying nitrogen at different times through out growing season
 - Variable rate trials, applying different rates throughout the field depending on the capability of the soil
 - Different rate trials, having a certain amount of rows with a different amount of nitrogen applied as the next set of rows next to it and comparing yields

(“Custom Applications”)

Nitrogen rate study between two hybrids

- Planted two varieties, a commercial corn (FR1064xLH185) and a high protein corn (FR1064xIHP)
- Different rates of nitrogen were applied to the corn at the same time, between V2(second leaf) and V3(third leaf)
- Grain yield, biomass, and leaf area index were collected
- The purpose of this study was to see what kind of change different nitrogen rates would have on the yield of corn

(Uribelarrea 152)

Results of study

High Yield Commercial Corn

- Yield increased as rate of N increased, had more total yield than high protein corn
- Kernel size and number increased as rate of N increased
- Leaf area index was moderately increased as rate of N increased
- Leaf area index was lower than high protein corn at VT(vegetative tassel) stage across all rates of N

(Uribelarrea 152-158)

Experimental High Protein Corn

- Yield increased more as rate of N increased, less total yield than commercial corn
- Protein level increased as rate of N increased
- Leaf area index increased moderately as rate of N increased
- Leaf area index was higher than commercial corn at VT stage across all N rates

(Uribelarrea 152-158)

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