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Mitigate the Downside Risks of Second-Year Corn

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Summary article available online at:
www.kingcorn.org/news/articles.04/CornCorn-1222.html

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Second-year corn…

- Fear & uncertainty of soy rust has "added fuel to the fire" for some growers who were already considering 2nd-year corn for economic reasons.
  - Economics vary greatly depending on assumptions used in the calculations.
    - Yield drag, crop prices, variable costs, uncertain need for soy fungicide or insecticide.

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Short-run vs. Long-haul…

- Single-year comparison may indeed favor 2nd-year corn over rotation soy.
  - Especially if applications of soy fungicides or insecticides are anticipated.
- Long-run comparison favors corn/soy when corn/corn return is less than the average of corn/soy and soy/corn returns.
  - Work w/ own crop budgets if possible…

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Illinois crop budgeting tool…

- Computes budget for per-acre returns for up to 4 different crops.
  - Requires you already know per acre costs.
- Download (free registration) from Univ. of Illinois "farmdoc" Web page that lists numerous such spreadsheet tools.
  - Look under "Farm Management" section.

www.farmdoc.uiuc.edu/fasttools/index.html

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Record-keeping tools…

- "WinMax" software from Purdue
  - **www.agry.purdue.edu/max** (free)
- "Farm Trac" software from Farm Works
  - **www.farmworks.com** (not free)
- Numerous other software programs
  - Google™ "agricultural software directory"

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Agronomically…

- We cannot support 2nd-yr corn because…
  - Yields of corn/corn are at least 6 to 10% less than corn/soy.
    - Worse if risks are not managed wisely.
  - Higher risk of some diseases & insects.
  - Higher nitrogen fertilizer requirement.
  - Alters time management issues…
    - e.g., sidedressing, timely harvest

But, if you're gonna do it…

- Then consider how to mitigate the downside risks of corn following corn.
  - Fertility, especially nitrogen.
  - Stand establishment issues.
  - Diseases & insects.
  - Hybrid selection & availability.
  - Harvest timing issues.

Fertility issues…

- Higher N requirement (~ 50 more lbs N/ac)
  - Cost & availability may be issues.
- If sidedressing N, more days will be required to cover more corn acres.
- Short-term P & K issues not serious.
  - Over time, corn/corn will remove more soil P than corn/soy.

High nitrogen fertilizer costs…

- Should encourage growers to critically evaluate their nitrogen fertility program.
  - Nitrogen application rates.
  - Nitrogen use efficiency (NUE).
    - Application timing & placement, soils, climate, farming logistics.
  - N source (product).
    - Cost, availability, NUE, farming logistics.

Nitrogen application rates…

- Traditionally, linked to field productivity.
  - Yield goals based on historical yields.
    - Five-year running average probably okay.
  - Corn following soybean:
    - Aim for about 1 lb of N per bushel *
  - Corn following corn or wheat:
    - Aim for about 1.2 lbs per bushel.

*** Assumes a 30 lb N credit for previous crop soybean. A 50 lb N credit would lower rate to ~ 0.9 lb N per bu.**

Bottom line on N rates

- Use realistic yield goals (not record yields).
- Credit all the N you can from nitrogen in starter fertilizer, weed 'n feed herbicide appl'ns, spring plowdown ammoniated phosphates, manure appl'ns.
- Given high N prices, consider shaving rates up to 10% if cash flow or N supply is tight.
  - Esp. if using higher priced urea or UAN.

More N management advice

- If cash flow or N supply is limited,
  - Apply some N to all corn fields, rather than full rate on some and skimping on others.
    - Because, greatest yield response comes from first N lbs applied, less from last lbs.
- Concentrate on achieving better **nitrogen use efficiency**…

Nitrogen use efficiency…

- Some of the fertilizer nitrogen we apply to a field is lost to the environment …
  - In other words, not all of the nitrogen applied to a field is used by the crop.
- Nitrogen use efficiency (NUE) is the balance between that used by plants vs. that lost to the environment.

NUE is influenced by…

- The efficiency of the "photosynthetic factory" (i.e, the plant).
  - Minimal stress = Maximum "factory" efficiency
  - 2004 record yields were classic example of high yields at high NUE.
- The occurrence & severity of nitrogen loss within the nitrogen cycle.
  - Volatilization, leaching, denitrification

Stand establishment issues

- Greater residues of corn/corn often delay soil warmup & drying in spring; can also create havoc w/ planter if no-till.
  - Target better-drained fields for corn/corn.
  - Tillage, if practical, to manage residue.
  - Row cleaners or similar no-till planter gadgets
  - Avoid planting excessively early.
  - Response to starter more likely.

Success w/ starter fertilizer…

- Depends on your ability to maximize…
  - Probability of getting a response and…
  - Potential size of the response if it occurs.
- Your goal should be to achieve the biggest bang for the fertilizer dollar.

Starter fert. decisions…

High soil test P & K + warm seedbed.

- Probability of yield response to starter is low and…
- Size of expected response is low, so …
- Little yield risk if you decide to forego the use of starter.

Starter fert. decisions…

High soil test P & K, but cold, "crappy" conditions for germination and seedling growth.

- Probability of yield response to starter P & K is low, but…
- Probability of yield response to starter N is high, so…

Minimum of 20 lbs N optimizes the probability and size of a starter response.

- Use starter N and aim for no less than 20 lbs N per acre.

Starter fert. decisions…

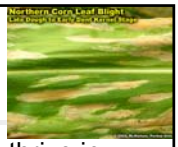
Low soil test P + cold, "crappy" conditions for germination and seedling growth.

- Probability of yield response to starter P and N is high, so…
- Apply N + P starter mix, but still aim for no less than 20 lbs starter N per acre.

But, recognize that 10-34-0 is not cheap…

- $279/ton (Jan '05) = $1.40/lb N = $28/ac for 20 lbs N

Disease risks



- Some seedling blight diseases thrive in cool, wet soils early in the season.
  - Avoid excessively early planting in poorly drained soils.
- Some corn diseases survive on non-decomposed corn plant residues.
  - Especially northern corn leaf blight, gray leaf spot, Diplodia ear rot.

Image Source: RLNielsen, © Purdue Univ.

Northern corn leaf blight

- Conducive conditions:
  - Susceptible hybrids
  - Continuous corn
  - Disease inoculum
    - Old corn residue
  - Wet, cloudy weather
  - Temperatures ranging from 65 – 80 F
- Reasons for recent prevalence uncertain.

Image Source: RLNielsen, © Purdue Univ.

Gray leaf spot

- Conducive conditions:
  - Susceptible hybrids
  - Continuous corn
  - Disease inoculum
    - Old corn residue
  - High humidity
  - Extended periods of leaf wetness
  - Temperatures ranging from 70 – 85 F

Image Source: RLNielsen, © Purdue Univ.

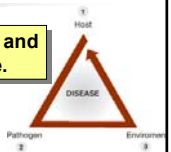
Diplodia ear rots

- Reasons for recent prevalence uncertain.
- Infection occurs at ear shank, through base of the husk leaves, or on silks.
- Conducive conditions:
  - Susceptible hybrids
  - Disease inoculum
  - Cool, wet weather during late whorl through early grain fill

Image Source: RLNielsen, © Purdue Univ.

Break the disease triangle…

Growers can most easily impact the "host" and "environment" sides of the disease triangle.



- Avoid corn following corn.
- Avoid excessively early planting.
- Avoid high residue tillage practices.
  - Especially corn/corn + no-till
- Avoid susceptible hybrids.
  - Work closely w/ seed reps

Image Source: http://www.soybeanrustinfo.com/details/details.asp

Insect issues…

- Primary insect to consider in short-term corn after corn is corn rootworm.
  - Consider judicious use of soil insecticide, SAI, or transgenic Bt hybrids.
- Corn borer likely not worse in 2nd-yr corn, but pressure could elevate in lengthier continuous corn systems.

Image Source: RLNielsen, © Purdue Univ.

CRW control options…

- Most consistent control:
  - Granular insecticides.
  - Bt-RW hybrids (transgenics).
    - Though, some questions
- Less consistent control:
  - Liquid insecticides.
  - High rate SAI.

Image Source: RLNielsen, © Purdue Univ.

These differences are most pronounced where rootworm pressure is severe (high populations).

Seed-Applied Insecticides (SAI)

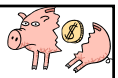
- Newer insecticide class: Neonicotinoids
  - Poncho™, Cruiser ™, Gaucho™
  - Systemic to roots & new leaves
- Targeted towards…
  - Secondary soil insects (low rate formulations)
  - Corn rootworm (high rate formulations)
- Pre-applied to seed by seed company.
  - Sometimes must be requested w/ seed order.
  - ~ $4 – $6 per acre (low rate formulations)
  - ~ $18 – 20 per acre (high rate formulations)

SAI efficacy on secondary insects?

- Purdue Entomology opinion on efficacy of low rate SAI…
  - Seedcorn maggot ~ Excellent
  - Wireworm ~ Good
  - White grub ~ Fair
  - Black cutworm ~ Fair

Source of Ratings: J. Obermeyer, L. Bledsoe (Purdue Entomology)
Wireworm Image Source: www.ipm.uiuc.edu/fieldcrops/insects/wireworm/index.html
SCM Image Source: http://www.uky.edu/Agriculture/Entomology/entfacts/fldcrops/ef120.htm

A form of "crop insurance"…



- Because WW & SCM do not consistently occur at damaging levels, SAI should be considered "crop insurance" with "insurance premiums" of ~ $4 - $6/ac.
  - Seek the biggest "bang" for this input with:
    - Early planting (high risk cool, wet soils).
    - Fields with known history or high risk of wireworm or seedcorn maggots.

Wireworms: Grassy weed areas, grass sod
Seedcorn maggot: Decaying vegetation, manures

Hybrid selection

- Greater emphasis on hybrid traits important to corn/corn systems:
  - Seedling vigor
  - Disease tolerance
  - Stalk & root strength
  - Overall plant, stalk, and root health
  - Overall stress tolerance

Image Source: RLNielsen, © Purdue Univ.

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Choosing hybrids wisely…

- No such thing as a perfect hybrid or else there wouldn't be so many hybrids for sale in the marketplace.
  - Choosing hybrids wisely is not easy.
  - Choosing hybrids wisely requires a lot of effort on your part.

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Bottom line?

- There is no single method that is easy or perfect for selecting corn hybrids that will perform consistently well in your farming operation.
- Choosing hybrids wisely requires a lot of searching for yield data and a lot of homework "massaging" the data to make sense out of it.

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Dumb hybrid decision-making

- Simply because it's cheap.
- Simply because it's new.
- Simply because it's biotech.
- Simply because it's the one the company has the most bags of in the warehouse.
- Simply because it's genetically different from the other one you bought.
- Simply because you trust the seed rep.

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Harvest timing issues…

- More corn acres translates to a longer corn harvest season.
  - Some corn fields will remain standing (or not) later into the fall than usual.
  - Scout fields beginning late August for stalk rot development or simply weak stalks.
    - Prioritize harvest of high risk fields if necessary.

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In summary…

- Consider how to mitigate the downside risks of corn following corn.
  - Fertility, especially nitrogen.
  - Stand establishment issues.
  - Diseases & insects.
  - Hybrid selection & availability.
  - Harvest timing issues.

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