Fertility Management for Strip-tillage

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DEFINING STRIP-TILLAGE

LESS THAN FULL-WIDTH TILLAGE OF VARYING INTENSITY WITH THE ROW DIRECTION

- **ROW OR RESIDUE CLEARING**
  - Remove residue
  - Finger coulters, brushes, sweeps

- **STRIP-TILLAGE (SHALLOW)**
  - Move residue, seedbed prep., Row fertilizer
  - Fluted coulters, discs

- **STRIP-TILLAGE (DEEP)**
  - Disrupt compaction, deep place fertilizer
  - Knives
  - Some with coulters to move residue or create mini-ridges
THE SITUATION

- No-till can be a tough sell because of the “slow growth syndrome”
- High residue corn production systems are needed for erodible land
- Strip-tillage offers a compromise, but there are considerations
- Fertility management more like no-till than chisel
RESEARCH SUGGESTS BENEFITS COMPARED TO NO-TILL

- Dryer and warmer soil (Wolkowski, 2000)
- Earlier planting (Vyn et. Al., 1998)
- More consistent seed depth (Swan et al., 1995)
- Better stands (Kaspar and Erbach, 1998)
- Faster early season growth (Wolkowski, 2000)
- Yield response (Vetsch and Randall, 2000)
- Net return (Yiridoe et. Al., 2000)
TILLAGE EFFECTS ON CROP RESIDUE

First year corn after soybean, Arlington, Wis.
SOIL TEMPERATURE AFFECTED BY TILLAGE AND CROP RESIDUE

Effect on crop residue, Arlington, Wis.

Effect on in-row soil temperature, Arlington, Wis.

Wolkowski, 2000
Soil tests identify the “central tendency” or assess spatial variability of soil test in a field.

Soil test stratification develops due to acidification from N fertilizer, surface nutrient applications, and decomposition from residue.

Samples need to be taken to a correct, consistent depth.
Arlington tillage x herbicide study. No-till, chisel, moldboard for 20+ years.
- Continuous corn
- Recommended NPK fertilization, no lime
### Effect of Sampling Depth Soil pH and Soil Test K

<table>
<thead>
<tr>
<th>Depth</th>
<th>Soil pH</th>
<th>Soil Test K</th>
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<tbody>
<tr>
<td></td>
<td>MB</td>
<td>CH</td>
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<tr>
<td>in</td>
<td>in</td>
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<td>0-8</td>
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*Arlington, Wis.  Tillage in place 20 years*
Stratification likely similar to no-till

Avoid current or recent rows if fertilizer is banded

Maintain consistent depth

Wisconsin suggests 10 cores, 6-7 in./sample for each 5 acres
Wisconsin long-term research shows response to row-placed fertilizer in no-till

Cool, wet soils with compacted surface layer

Don't overlook K – use a complete fertilizer

Surface or deep-banded may be acceptable alternatives
INTERACTIVE EFFECT OF TILLAGE
AND BANDED FERTILIZER

Wolkowski, 2000
ARLINGTON STRIP-TILLAGE PROJECT

- Tillage/rotation study since 1997
  - Plano silt loam soil
  - Strip-till added in 2000
  - Cont. corn, Soybean/corn, Corn/soybean
  - PK fertilizer: None, broadcast, deep, and row-placed at crop removal rate
  - Summarize 2001 - 2004, strip-till only
<table>
<thead>
<tr>
<th>Year</th>
<th>pH</th>
<th>Soil test P (ppm)</th>
<th>Soil test K (ppm)</th>
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EARLY SEASON P UPTAKE IN STRIP-TILL

Soybean/Corn Rotation
EARLY SEASON K UPTAKE IN STRIP-TILL

Soybean/Corn Rotation

K UPTAKE (mg/plant)

- None
- BDCT
- 2x2
- DEEP
CORN GRAIN YIELD AS AFFECTED BY FERTILIZER PLACEMENT IN STRIP-TILL

Four Year Avg. (2001 - 2004)
## EFFECT OF ROTATION, TILLAGE, AND FERTILIZER ON CORN K CONCENTRATION 45 DAP

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*Arlington, Wis.*
Little research that addresses the need for N at planting.

Other than application expense, splitting application is acceptable.

UW recommendations will use the MRTN approach for selecting N rate for continuous corn and corn after soybean.

Follow standard N management advice:
- Avoid fall N applications
- Surface urea or UAN subject to volatilization loss
- Side-dress on sands and loamy sands
- Preplant → sidedress acceptable on silt loams
- Take credit for nutrients in manure/forage legumes
**GUIDELINES FOR DETERMINING WHICH PART OF THE MRTN RANGE TO USE**

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<th>Situation</th>
<th>Low</th>
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<th>High</th>
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<tr>
<td>No-till production</td>
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<td>Following small grain</td>
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<tr>
<td>Cool, wet soils</td>
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<tr>
<td>Heavy manure history</td>
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<td>Known N credits</td>
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CHOP STALKS AND STAY BETWEEN ROWS IN CORN RESIDUE

OTHER CONSIDERATIONS: STRIP-TILLAGE IN CORN RESIDUE IS POSSIBLE
OTHER CONSIDERATIONS: SPRING STRIP-TILLAGE CAN PRODUCE A CLODDY SOIL CONDITION

RIDGE PROPERTIES AFFECTED BY CROP
OTHER CONSIDERATIONS: EROSION STILL POSSIBLE WHEN STRIP-TILLAGE IS UP AND DOWN SLOPE

MAINTAIN TILLAGE ON THE CONTOUR
SUMMARY

- Strip tillage offers a residue management compromise between no-till and full-width systems.
- The creation of a residue-free strip offers warmer and drier conditions at planting.
- Be aware of stratification when soil sampling.
- K may become limiting in these systems, so use a complete fertilizer.
- Use the MRTN approach to N fertilization. Increase N rate up to 30 lb N/a in long-term continuous corn.
- Avoid surface application of urea-containing fertilizer.