

2007 CMDC

Wortmann

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Roots

- **Seminal (seed) roots: radical and lateral seminal roots**
 - Anchor seedlings
 - Minimal uptake
- **Nodal roots**

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Root hairs (Gardner et al., 1985):

- Lateral extensions of root epidermal cells,
- Several millimeters long,
- About 200 per sq. mm,
- Life of about 2 days,
- Less at higher temperatures (Gardner et al., 1985),
- Give very large surface area,
- Account for a large share of nutrient and water uptake.
- Adapted from Rob Nielsen.

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When are yield components determined?

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Rows/ear (girth): V6
Kernel/row: V12-VT
Kernel/ear: R1-3
Kernel wt: R3-5

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Roots and stress mitigation

- Deep roots desired, especially for N and water
- Roots need to be healthy throughout the season

Seasonal nutrient content

Pounds per acre

Days after planting

Source: © Wright, Parker, & Gentry

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Roots and stress mitigation

- **Until 6th to 7th leaf (~25-30 days), mostly lateral with 70% of roots in top 10"**
 - **Minimize root injury during side-dress application or cultivation**
- **7-8 weeks (>V12): roots have reached the center of the row and 4 ft. depth**
- **Nutrient uptake: root hairs and mycorrhiza**
- **Roots and SOM**
- **High root density and immobile nutrients, e.g. within <0.1"; wheat may only exploit 5% of available P**
- **Early damage**
 - **Opportunity for recovery**
 - **Greater risk of later damage**
 - **Branching stimulated**
- **Roots are costly to produce; often 50% of photosynthate: root loss or unnecessary root production = yield loss**

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