

2005 Solution Days

Yield

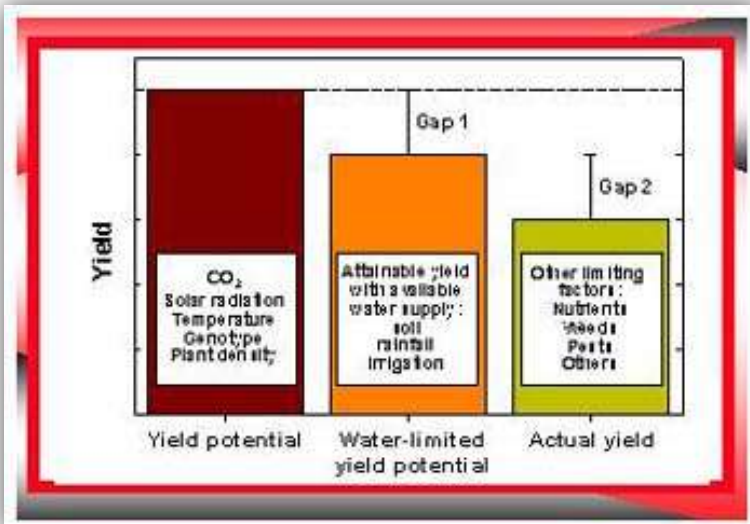
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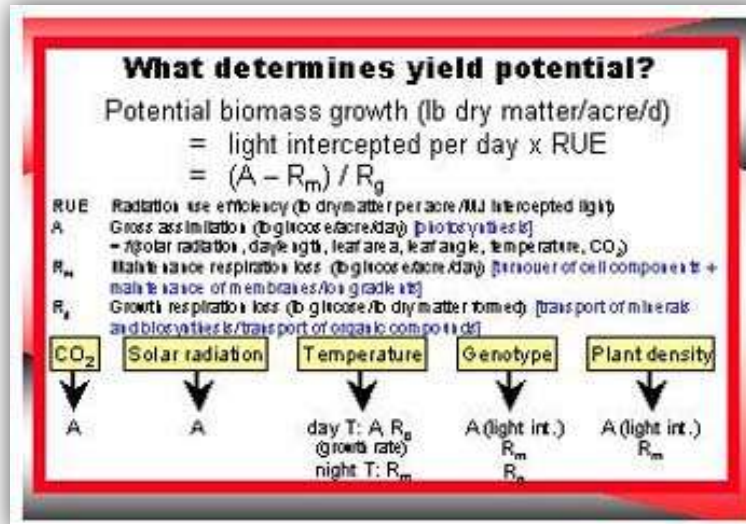
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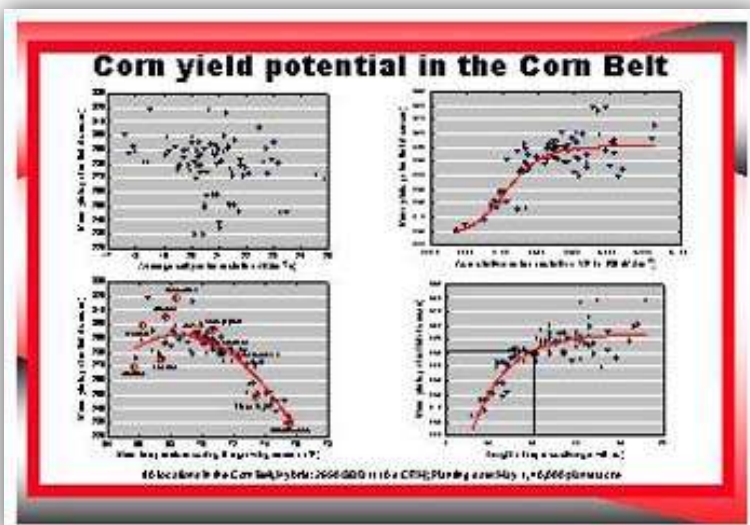
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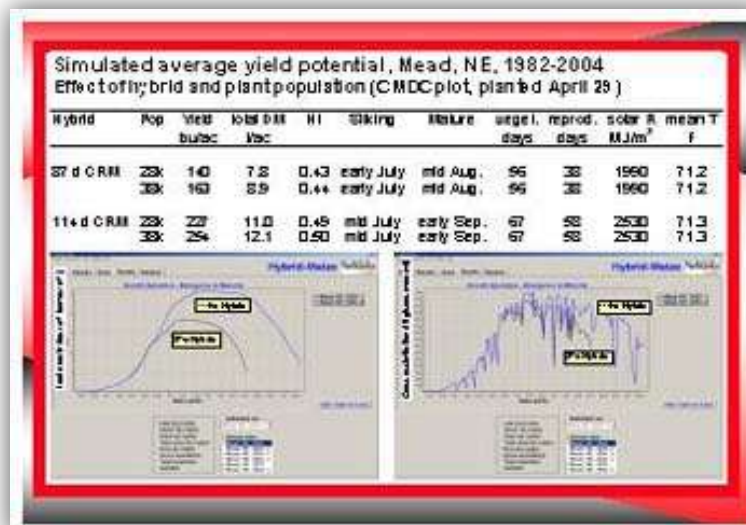
05cmdc-dobermann001



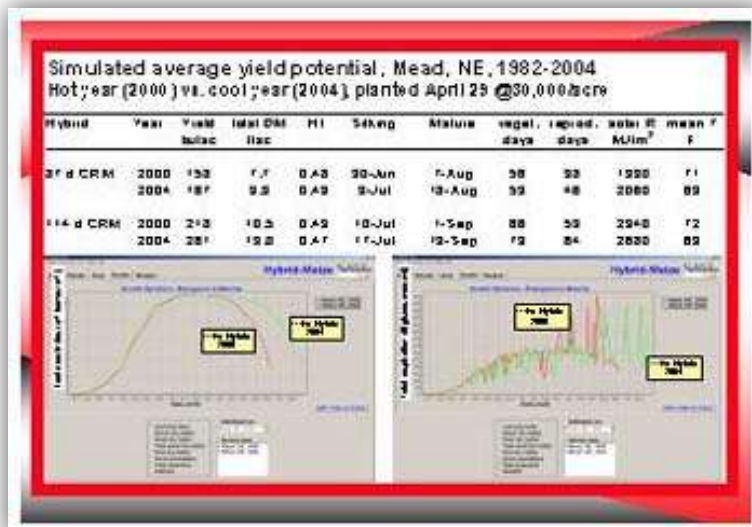
05cmdc-dobermann002



05cmdc-dobermann003



05cmdc-dobermann004



05cmdc-dobermann005

What is grain yield?

Grain yield = Total plant biomass x harvest index
 $HI = \text{grain DM} / (\text{grain DM} + \text{stover DM})$

Grain yield = ears/acre x kernels/ear x kernel weight

ears/acre: seed drop, emergence VE
 # ears/foot/plant VS

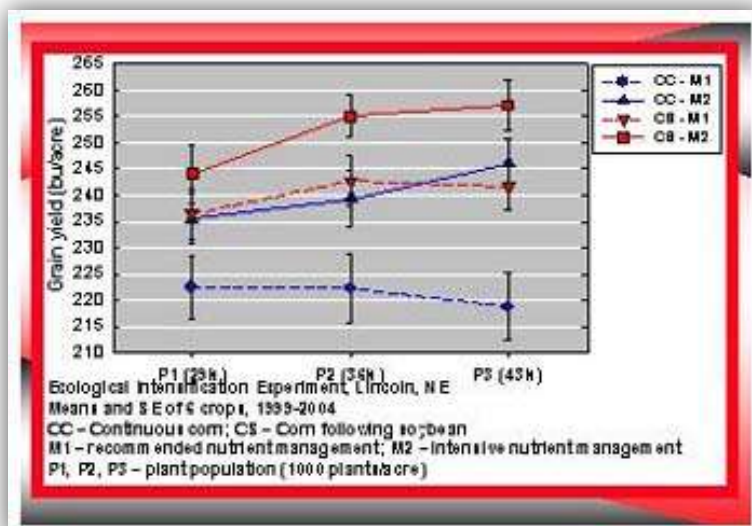
kernel/ear: #rows/ear; VS-V6
 #kernels/row; V12 to 1 wk after silking R2-R6

kernel weight: genetics x daily resource supply x grain filling duration

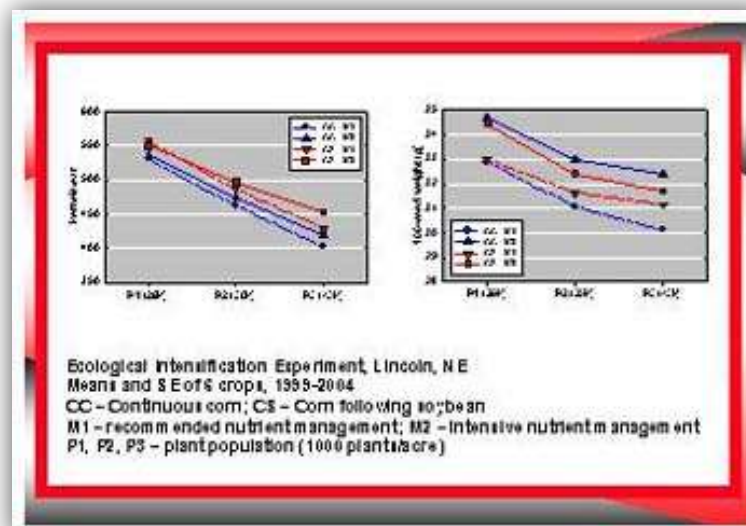
All are affected by:

- Hybrid characteristics
- Climate (solar radiation, min T, max T)
- Plant population
- Water supply
- Nutrient supply

05cmdc-dobermann006



05cmdc-dobermann007



05cmdc-dobermann008

Crop Management to Reach the Genetic Yield Potential of Hybrid Corn

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Protocol

- Identify Recovery Rate of Corn Under Stress
 - Shade During Grain Fill
 - 6 Days
 - 12 Days
 - 18 Days
- Planting Dates vs Solar Radiation
 - 4 Hybrids – 1365, 1375, 1380, 1450 HU/Mid Silk
 - 3 Planting Dates – April 27, May 5, May 12

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Solar Radiation Review

- Stress.....Lack of Photosynthesis
- Cloudy Days
 - decrease photosynthesis (manufacture of food)
 - taking sugars away from the stalk to promote grain fill
- Heat Units vs Solar Radiation
- Diseases
- Planting Dates

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Stress At Pollination



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Stress At Grain Fill



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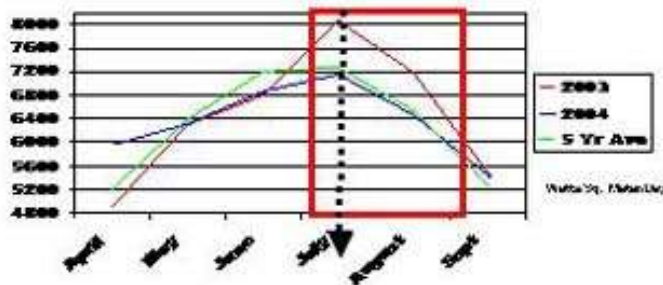
Diseases



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Solar Info

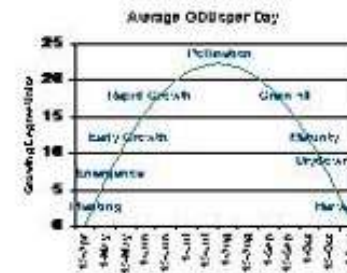
Grand Island, NE



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30 Year Ave. GDU's

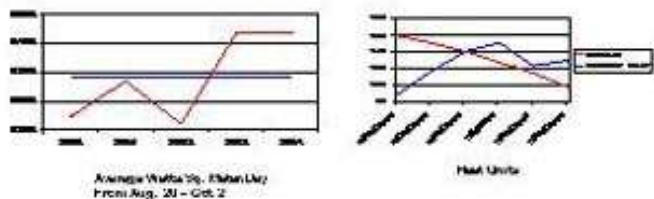
- ✓ GDU accumulation varies during growing season
- ✓ Peak daily average at pollination & just after
- ✓ Growing season or year effects
- ✓ Some are cooler, others warmer



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What Happened In 2004?

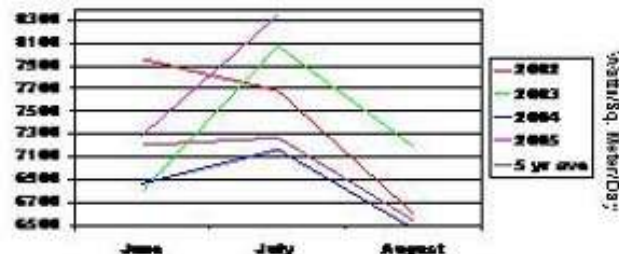
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Where Are We Today?

Grand Island, NE



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Understand What To Do

- Hybrid A – 112 Days – 1375 GDU's - Mid Silk
– **Planting Date – April 17-24**
- Hybrid B – 112 Days – 1340 GDU's – Mid Silk
– **Planting Date – April 24-30**

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The Take Away

- Understand the difference between days to maturity and heat units to mid silk and then to black layer
- Using heat units to mid silk; adjust planting dates to hit the highest average amount of solar radiation during grain fill
- Take what nature gives you and then turn it into your advantage

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Crop Management to Reach the Genetic Yield Potential of Hybrid Corn

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Crop Management to Reach the Genetic Yield Potential of Hybrid Corn

- Genetic yield potential is the yield of a well adapted hybrid when soil and crop management eliminate all stresses due to abiotic (water, nutrients) and biotic (weeds, insects, disease) factors
- When pests are controlled, it depends mostly on:
 - solar radiation and temperature
 - optimization of hybrid maturity and plant density
 - Adequate and timely N supply
- Profit maximization typically occurs at 85-90% of genetic yield potential
- Requires sites with reasonable soil quality (no hard pan or barrier to root penetration, good soil structure, lack of toxicities—salinity, alkalinity, acidity)

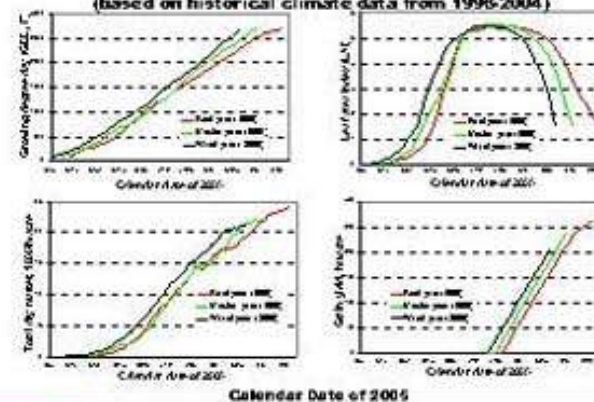
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Hybrid Maturity x Density x N Fertilizer Management Demonstration Plots

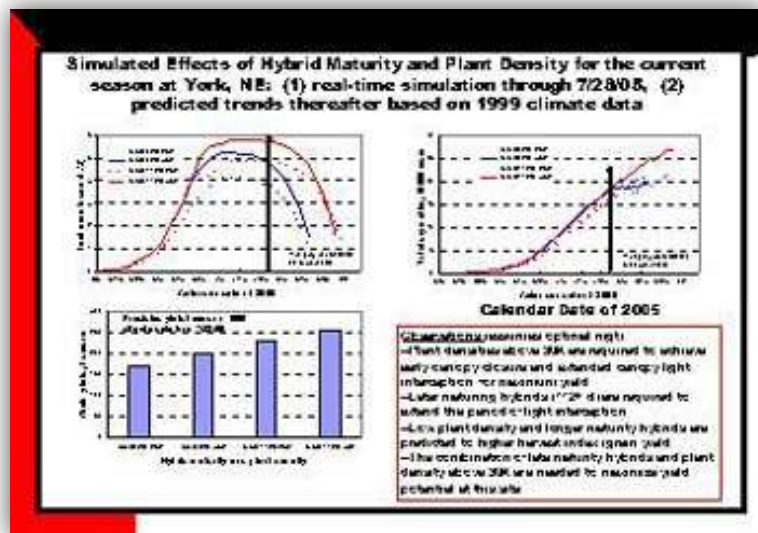
- Short (92d) vs later maturity (112d) hybrids
- 28k vs 38k seed drop
- Two N management treatments
 - One dose: 200 lb N/ac before planting
 - Gradual supply (50 lb N/ac in four splits): before planting, 5/23, 6/13, and 7/4
- General field management
 - Planted on April 27
 - One section no-till, another tilled and disced
 - Ammonium nitrate N source
 - Optimal irrigation and pest control

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Simulated Range in Grain Yield and Yield Determinants at York, NE (based on historical climate data from 1998-2004)



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Other considerations in selecting hybrid maturity and plant density

- Dangerous to have all fields planted to same maturity hybrid, or all fields reaching silking at the same time, due to devastating yield loss from freak events
 - Straight line wind storms, hail, hot & dry winds at pollination, short-term flooding events, etc
- While later maturing hybrids may give highest yield
 - Dry-down requirements to harvestable maturity
 - Risk of frost and yield stability of later maturing hybrids?
- Marginal cost-benefit of higher plant density needs to be considered and consistency of the response
 - Diminishing return at densities above 35-37k
 - Greatest response in higher yielding, more favorable years

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Take home messages

- Achieving genetic yield potential depends on maximizing light interception in *time* (especially length of grain filling period) and *space* (early canopy closure; stay-green during grainfilling)
- Substantial year-to-year variation in yield potential due to climate (temperature, solar radiation)
 - 2004 was the "perfect" growing season
- Optimizing planting date, plant density, hybrid maturity, and N management are key factors
- Use of Hybrid-Maize simulation model and test strips provide efficient means to identify optimal combinations for a given field site

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