

# 10<sup>th</sup> Mid Atlantic Dairy Grazing Conference

## Keys to Good Corn Silage Yields



**2014 Mid Atlantic Dairy Grazing Conference  
Keys to Good Corn Silage Yields**

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**Happy Corn Plants=Happy Milk Cows**






**Factors important to Happy Corn**


- Irrigation
- Fertility
- Hybrid
- Fungicides
- Plant and Populations




**First steps to a Happy Cow**


- Planting: soil temp 55+ @ 2" ( 10 day forecast)
- Plant 1.5-2" deep
- Check your planter
  - 13ft. 9" = 38" rows
  - 14ft. 6" = 36" rows
  - 17ft. 5" = 30" rows
- 24 – 28 days after emergence best time for weed control
- V6 = growing point out of the ground
- V6-V7 = N down (just above your boots) 37 - 45 days
  - Very important time
- Tassel emergence 65-69 days
  - Stink bugs
  - Fungicide spray ???






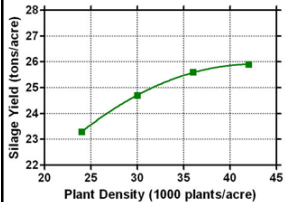
**Plant Populations**

- Silage yield increased with population density and was greatest at the highest density tested;
- Silage fiber content increased with increased plant density;
- Digestible fiber and whole plant digestibility decreased.
- Net energy and TDN were reduced with increased plant density;
- Estimated milk/acre and beef/acre increased with greater plant density.



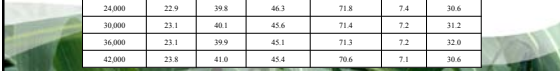


**Increasing Plant Populations**



- NDF ↑
- NDFD ↓
- Starch- likely optimized to grain yields

Plant/acre	ADF	NDF	Dig fib	WPDg	CP	Starch
18,000	22.6	39.8	46.5	72.0	7.2	30.7
24,000	22.9	39.8	46.3	71.8	7.4	30.6
30,000	23.1	40.1	45.6	71.4	7.2	31.2
36,000	23.1	39.9	45.1	71.3	7.2	32.0
42,000	23.8	41.0	45.4	70.6	7.1	30.6

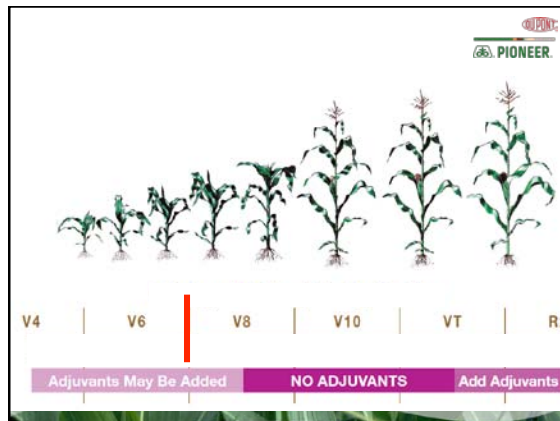


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### Decision to Employ Foliar Fungicides Can Be Based on Scouting Fields

- Important with early season applications prior to fifth leaf collar stage
  - If disease is observed, one can mix fungicide with post-emergence herbicide that saves one application expense
- Later during plant growth, if over 15% of leaf area is infected at R1 stage, plant ability to deposit starch post-pollination will decline significantly

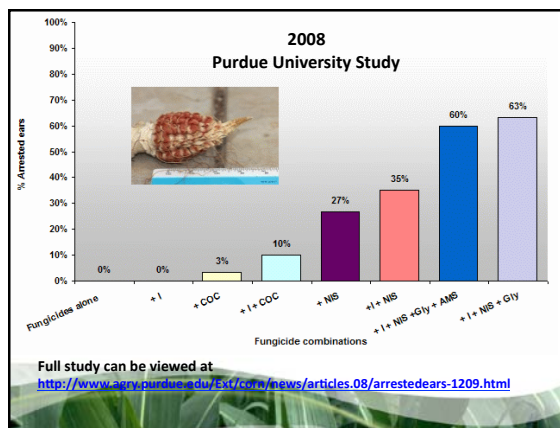


### Arrested Ear Development



•Pre-tassel applications of fungicides plus surfactants

•Additives such as non-ionic surfactants and crop oil concentrate contribute strongly to the potential for damage



### Corn Silage Foliar Fungicide Studies are Limited

- Any grain study showing increased bu/acre yield response means harvesting as corn silage will result in higher tonnage and starch yields
- Fungicides will not reduce those mycotoxin producing molds that include:
  - Fusarium ear rot which produces fumonisin
  - Aspergillus ear rot which produces aflatoxin
- Fungicides do not impact the fermentation process.

### Odds Of Selecting The Right Hybrid

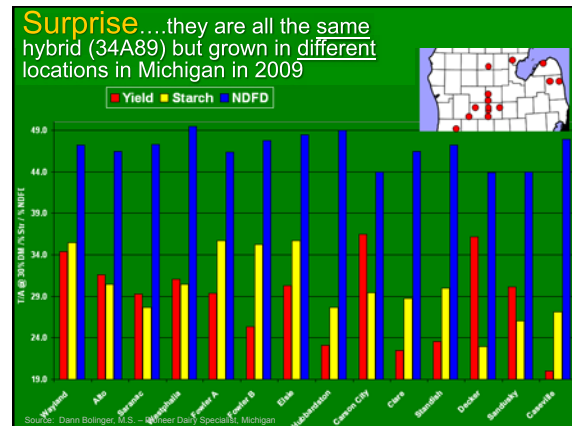
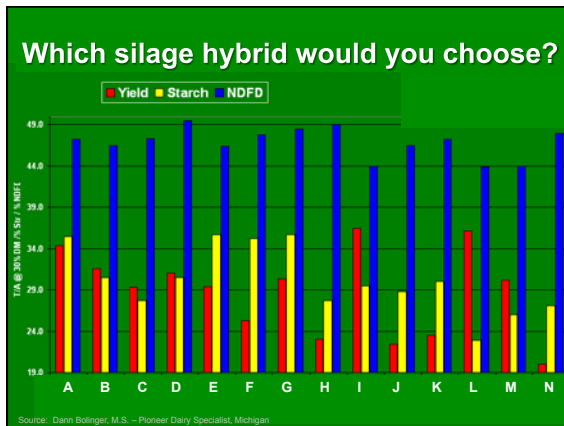
Number of Environments	Measured Silage Yield Difference		
	2.0 T/A	1.0 T/A	0.5 T/A
1	60%	52%	51%
10	90%	75%	65%
30	95%	90%	75%
200	98%	95%	93%

A Minimum of 20 Paired Comparison Locations are Needed to Make a Valid Silage Hybrid Selection

	That increase with least Significant Difference - JS	# of locations Required
Yield - Tons/Acre	2	18
Neutral Detergent Fiber - %	2	37
In-Vitro Digestibility - %	2	22
Grain Yield - Bushels/Acre	5	33 to 40

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**THE INFLUENCE OF GENETICS VS. GROWING ENVIRONMENT ON SILAGE HYBRID YIELD, STARCH CONTENT AND FIBER DIGESTIBILITY**

PIONEER

**Starch Influencers**

- Yield is roughly 50% grain
- % Starch is ratio of grain to fodder
  - Early vegetative growth w/ mid to late season grain fill
- Maturity @ harvest
  - Prior to black layer, starch is still being produced
  - Hybrids within a plot should be reasonably close in maturity
    - look at harvest moisture as an indicator

**NDFD Influencers**

- Greatest during vegetative growth (pre-tassel)
- Early moisture stress = improved NDFD
  - Moisture availability
    - More water typically lower NDFD
    - Less water typically higher NDFD
- Heat Units
  - More heat, less NDFD
  - Less heat, more NDFD

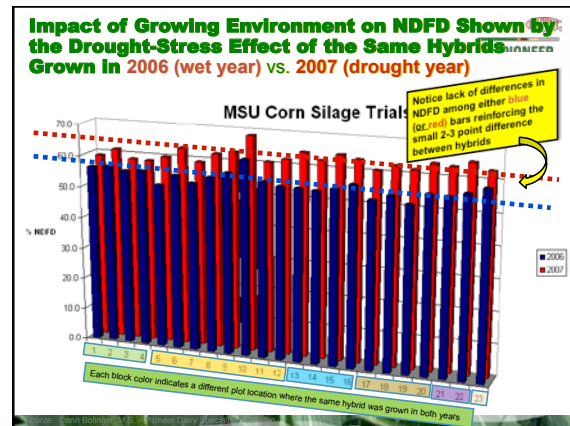
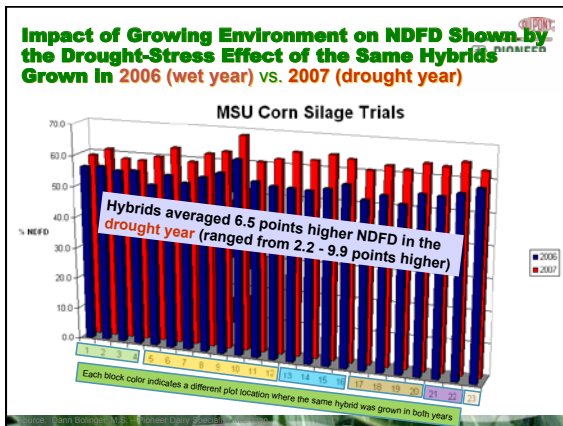
**The huge range in NDFD that nutritionists see in individual farm corn silage samples is primarily the result of non-genetic factors like:**

- >growing conditions
- >harvest timing
- >chop height
- >fermentation quality
- >feed-out management

Lets take a look at another Michigan example of growing condition extremes (2006 vs. 2007) impacting NDFD

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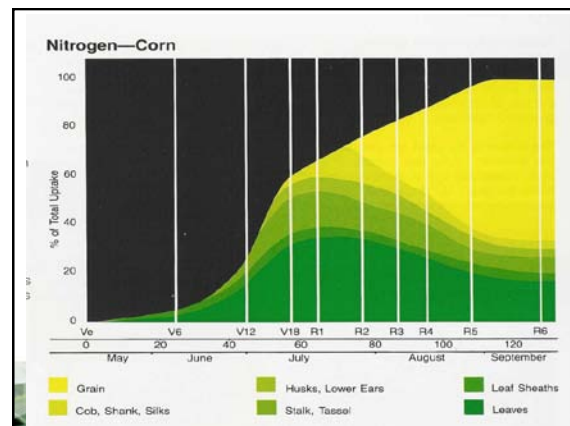
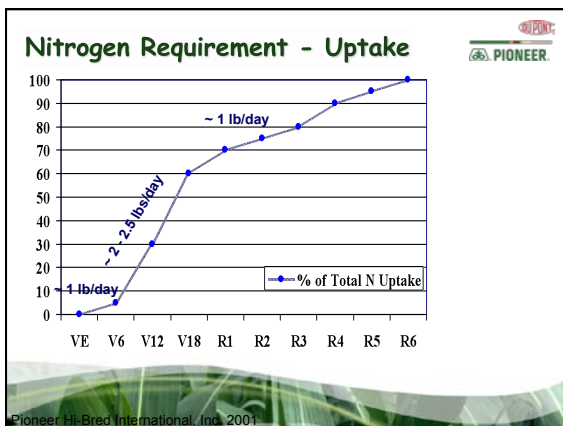
### Nitrogen Requirement

- 1.2 to 1.3 lbs N per bushel of grain or up to 8 to 9Lbs N per 35% ton.
- Can get by with 0.9 lb N / Bushel if managed well

Placement, timing, N source, environment, N credits

Grain per acre	Grain per ton of silage
80 bushels	5.0 bushels
117 bushels	6.0 bushels
124 bushels	6.2 bushels
131 bushels	6.9 bushels
152 bushels	7.5 bushels
160 bushels	8.1 bushels
180 bushels	12.0 bushels

Pioneer Hi-Bred International, Inc. 2001







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**N- Injection Schedule for Pivot**

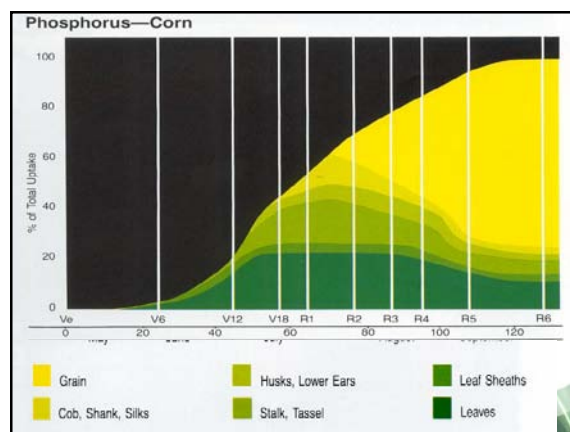
- Pre Plant 25%
- V6- 22%
- V12- 22%
- V16-18- 22%
- R1- 9%


**Other Items Necessary for Optimum Corn Production**

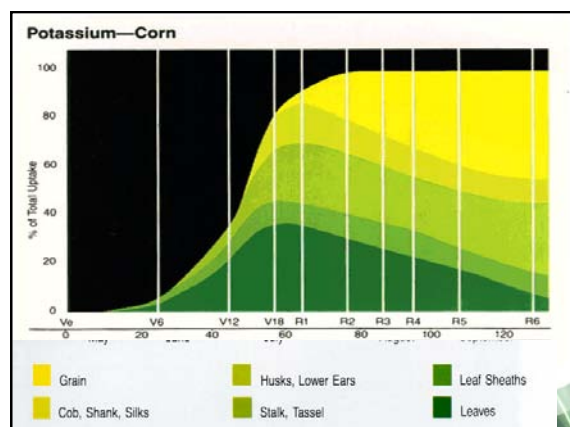
- Rotate
- pH 6.0 - 6.5
- Phosphorus: Critical Level by soil test
- Potassium: 50 to 75% on N Rate
- Sulfur: Leachable like N, 40 to 60Lbs
- Micronutrients (Zn if pH >6.5)

Pioneer Hi-Bred International, Inc. 2001



**Phosphorus**

- Usually not limiting in a manure system
- Can be limited by cool wet springs.
- Potential for Phosphorus enhancing products to add value
- Silage harvest removes 3X the P205 as grain harvest



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### Potassium timing

- Should be applied at planting
- Split applications on Sandy soils
- Most taken up by Tassel.
- Equal uptake as N.
- Silage removes 10X the K20 as grain harvest

	1 <sup>st</sup> 25 days	2 <sup>nd</sup> 25 days	3 <sup>rd</sup> 25 days	4 <sup>th</sup> 25 days	Last 25 days	Total lbs. Uptake
N	8	35	31	20	6	240
P205	7	29	39	27	8	110
K20	9	44	31	14	2	240

### Sulfur

- General yellowing
- Interveinal chlorosis
- Not easily translocated, so symptoms appear in the upper, younger leaves
- N/S ratio < 15:1
- Most common nutrient deficiency early



### Adequate Irrigation

- Delivers water at the right time
  - By Crop growth stages
- Delivers the right amount of water
  - Water sensor technology
- Delivers the water to the right place
  - Pivot uniformity

### Delivering at the Right Time

- Begin watering early
- Don't Starve a baby for milk



### The First Irrigation Mistake

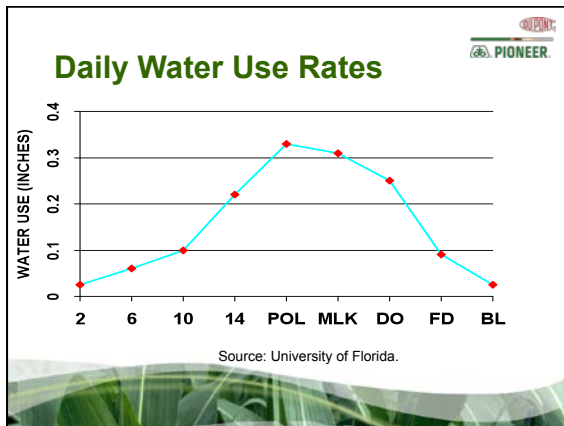


### Delivering at the Right Time Four Critical Yield Stages

- Kernel row number (V9-V12)
- Ear size potential (V12-V17)
- Fulfilling the ear size potential (V17-R2)
- Grainfill (R3-BL)

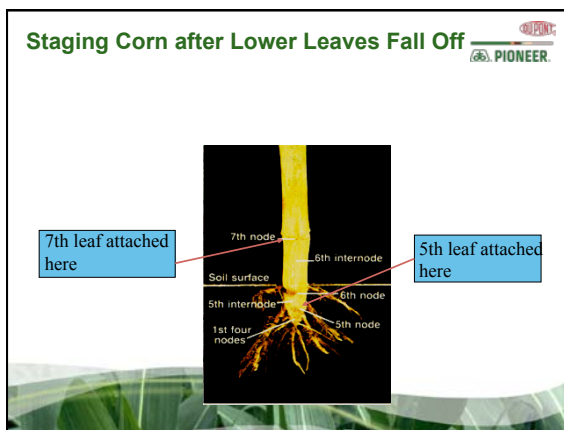
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### Estimated Water Use of Corn during Various Stages of Growth

Days After Planting	Growth Stage	Inches per Day	Total Water Use (inches)
0-20	seedling	.06	1.2
20-30	5"-10"	.09	.9
30-40	10"-20"	.15	1.5
40-50	20"-50"	.20	2.0
50-60	50"-80"	.21	2.1
60-70	80"-silking	.25	2.5
70-100	silking-grainfill	.33	10.0
100-110	grainfill	.25	2.5
110-120	maturity	.23	2.3
<b>0-120</b>			<b>25.0</b>



### Leaf Stages- Row number

- V8-10 Row Number Formation
- Corn approx 30 inches tall
- Stress at this time can reduce row numbers on the ear.
- Water needs approaching 1.75 inches per week
- Just because the amount of water needed is less does not mean it is less important to irrigate at this time

### Leaf Stages- Ear size

- V12-V15 Ear length determined
- Stress at this time will reduce ear length.
- Water needs of slightly over 2.0 inches per week
- Corn 4 to 5 feet tall

### Leaf Stages – Fulfilling Ear Size

- V15 - VT - R2
- Most critical time for water-largest yield reductions from water stress - 2 weeks before and 2 weeks after silk
- Brace roots begin
- Corn 6-9 feet tall
- Water needs = 2.2 inches per week



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### VT –Tassel Stage

- Tassels emerge – silks 2-3 days later
- Pollen shed 10-14 days later
- Tassel emergence and silking is the heart of the critical stage of water usage



### R-1 Silking

- Silks at the butt end of ear elongate first and tip end last
- Most critical stage for H<sub>2</sub>O stress
- Nutrient uptake
  - N - 60-70% complete
  - P - 55%
  - K - 90%
- Root mass reaches maximum size
- Water needs are approaching 2.5 inches per week



### Kernel Pollination and Abortion

- Miss nick Vs Kernel Abortion
- 18 days following silking is critical for water



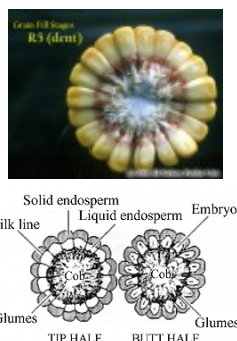
### R-5 Dent Stage – Completing Grainfill

- At first dent there are approximately 24 days to black layer and the milk line is barely visible
- Grain - 55% moisture
- 75% of DM grain weight has accumulated
- Water need declines to 1.75 inches per week

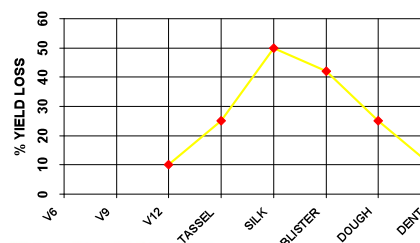


### Assessing Milk Line

- Full dent - 1/3 milk line
  - 2.5 inches of water to finish
  - 17 to 21 days to black layer
- Full dent - 1/2 milk line
  - 1.5 inches of water to finish
  - 90% of final DM weight is completed
  - Begin silage harvest
  - 10 to 14 days to black layer



### Percent Yield Reduction After 4 Days of Wilting





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### Available Water Holding Capacity of Different Soil Textures

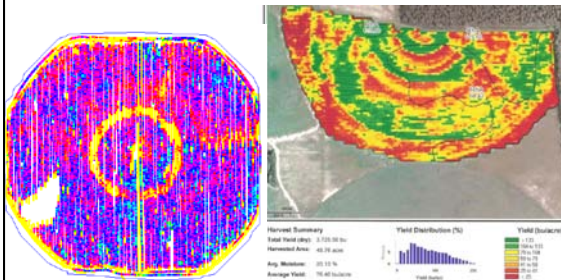
Soil Texture	Inches per Foot
Coarse sand	0.5
Very fine sand	1.2
Very fine sandy loam	1.9
Silt loam	2.1
Silty loam	2.6
Clay	2.8

### How Much Water Should You Apply Per Irrigation?

1. Dependent upon the selected level of soil water depletion
  2. Dependent upon rooting depth of crop
  3. Dependent upon soil texture
- Apply water as rapidly as possible without getting runoff

### Delivering to the Right Place

- Pivot Uniformity
- Dry areas cost you yield and inputs.
- Use Regulators



### The Second Most Common Irrigation Mistake is Shutting the Water off at First Dent



### Possible Yield Lost if Irrigation is Stopped at First Dent

- 20-25% yield may be lost!
- At first dent, Half milk line is still two weeks away!
- 20% of starch accumulation left to go

Stage of fill at time of death	Yield Loss from Death of:	
	Leaves Only	Whole Plant
Soft dough	35%	55%
Full Dent	27%	41%
Milk Line 1/2 down kernel	06%	12%

Classic Purdue University Study

### Like Cows, Happy Corn will perform better for your farm!

- Most Problems with Corn have to do with two things
- Water
- Nitrogen

### • Questions?

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