

CORN Growth and Development

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Corn Growth Stages

- Vegetative (V)
- Reproductive (R)



How a Corn Plant Develops, Special Report No. 48
Iowa State University

<http://www.agronext.iastate.edu/corn/production/management/growth/>



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Corn Emergence (VE) ... almost

Emergence occurs when the plant pokes through the soil surface.



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VE (Emergence)

The collar of the first leaf is still wrapped tightly around the stalk.
Once the collar opens, the young plant will be at VI

Corn Growth Stages: Vegetative

V3

3 Collars

V6

6 collars

V12

12 collars

V15

15 collars

VT

tassel

Corn Growth Stages

V3

3 Collars

**Nodal roots active.
Growing point below ground**

V6

6 collars

**Growing point above ground.
Tassel and ear development starting.**

V12

12 collars

**Ear size, kernel size and kernel number being
determined.
Limits on water and/or nutrients will reduce yields.**

Corn Growth Stages

V15

15 collars

**Rapid growth, about 10 to 12 days before silking.
Most sensitive to stress.**

VT

tassel

**Last tassel branch is visible but prior to silking.
Complete leaf loss will cause nearly 100% yield loss.**



Corn Growth Stages

Comparing visible collars to actual nodes.

Tassel and ear development start early.

Corn Growth Stages: Reproductive

R1

Silking

R2

Blister

R4

Dough

R5

Dent

R6

Physiological Maturity

Corn Growth Stages

R1 Silking	<p>N and P uptake are rapid.</p> <p>About 50% of total N is taken up after R1.</p> <p>K uptake is nearly complete.</p> <p>Water needed for pollination.</p> <p>Pollination occurs.</p>
R2 Blister	<p>Ear size nearly complete.</p> <p>Silks begin to dry out.</p> <p>A miniature corn plant is being formed in each fertilized kernel.</p>



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R1: Silking.

Silks remained attached to the ovules until after the ovule is pollinated.



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R1 Silking

Corn needs to capture as much light as possible by R1 to maximize yield.

Corn Growth Stages

R4

Dough

Kernels have accumulated $\frac{1}{2}$ of total dry weight.

Five leaves have formed in the kernel.

R5

Dent

Most kernels have dented and are near 55% moisture at start.

Starch layer has formed and progresses down the kernel.

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R5

Corn Growth Stages

R6

Physiological
Maturity

**Blacklayer has formed at bottom of kernel.
Kernel is about 30 to 35% moisture.**



Corn Growing Degree Days

- Each day has a slightly different average temperature.
- Temperature affects corn growth rate.
- GDDs attempt to relate temperature to corn growth rate.
- Corn Growing Degree Day (GDD)
 - Base 50 °F
 - Max 86 °F
 - Min 50 °F
- GDD = Average daily temp minus base temp
 - Average temp with Max of 86 °F and Min of 50 °F
 - Base temp of 50 °F

Calculating Corn GDDs

- GDD
 - Base 50 °F
 - Max 86 °F
 - Min 50 °F
- Example 1:
 - High: 75 Low: 55
 - Average Daily Temp = $(75+55)/2=65$
 - $65 - 50 = 15$ GDDs
 - Example 2:
 - High: 98 Low: 66
 - Average Daily Temp = $(86+66)/2=76$
 - $76 - 50 = 26$ GDDs

Max Temp: 86 used in calculation

Corn Growing Degree Days

Corn Maturity (Days)	GDD
85 to 100	2100 – 2400
101 to 130	2400 – 2800
131 to 145	2900 – 3200

GDD Requirements of a 2700 GDD Hybrid

Growth Stage	GDD
V2	200
V6	475
V12	870
VT	1135
R1	1400
R6	2700

From NCH-40 Growing Season Characteristics and Requirements in the Corn Belt. National Corn Handbook.

Planting Date and GDDs

Hybrid: DKC66-96, 116 day relative maturity
1350 GDDs to mid-pollination; 2820 GDDs to Black Layer

Planting Date (Henderson, KY)	Expected GDD's accumulated by:	
	July 31	Aug 31
April 1	2512	3289
April 15	2335	3112
May 1	2121	2898
May 15	1896	2672
June 1	1548	2325

From University of Kentucky Ag Weather Center: <http://www.wagwx.ca.uky.edu/>
Corn Growing Degree Day calculator: http://www.wagwx.ca.uky.edu/cgi-bin/cropdd_www.pl
Expected GDD's based on 30-year weather data

Planting Date and GDDs

Hybrid: DKC66-96, 116 day relative maturity
1350 GDDs to mid-pollination; 2820 GDDs to Black Layer

Planting Date (Bowling Green, KY)	Expected GDD's accumulated by:	
	July 31	Aug 31
April 1	2411	3150
April 15	2225	2965
May 1	1993	2732
May 15	1797	2536
June 1	1483	2223

From University of Kentucky Ag Weather Center: <http://www.wagwx.ca.uky.edu/>
Corn Growing Degree Day calculator: http://www.wagwx.ca.uky.edu/cgi-bin/cropdd_www.pl
Expected GDD's based on 30-year weather data



Corn Ears: Good and Bad



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