TYPES OF PROPAGULES, GDD, & PHENOLOGY

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Types of Propagules

- **Seed** – a small embryonic plant enclosed in a covering that is the product of the ripened plant ovule

Field sandbur

Common groundsel

Seed longevity Depends on….

- Species
- Environmental conditions
  - -moisture, temperature
- Depth of burial
- Soil type
- Level of disturbance
- Dormancy

Beal's seed longevity experiment started in 1879

William Beal

Table 5.12
Results of Beal's Buried Seed Study (Darlington, 1951)

Elapsed time (years)	Species still viable
70	Curly dock (8)[a] Evening primrose (14) Common mullein (72)
50	Black mustard Marshpepper smartweed
40	Ragweed Common purslane Redroot pigweed Virginia pepperweed Broadleaf plantain
30	Foxtail Shepherd's-purse

[a]() = % germination.

120 years: As of 2000, mullein and a mallow still germinate.

Table 1.6 Longevity of Weed Seeds Buried in the Soil[a]

Weed	Years[b]
Quackgrass	1–6
Common milkweed	3
Wild oat	4–7
Shattercane	10
Common cocklebur	16
Foxtail	20
Field bindweed	20+
Johnsongrass	20
Canada thistle	21
Jimsonweed	40
Common lambsquarters	40
Redroot pigweed	40
Velvetleaf	40

[a]Data from Holm et al. (1977), Klingman and Ashton (1982), Martin and Burnside (1980), Salisbury and Ross (1992).
[b]Viability may be anywhere from 1 to 100% at the end of the period. The fact that seeds can survive over these periods is more important than the actual percentages.

Types of Propagules

- **Rhizome** – underground stem that can emit roots from the lower side and leaves from the upper side

Quackgrass

Dallisgrass

Types of Propagules

- **Stolon** – aboveground stem that can develop new plants by rooting at nodes


Ground ivy


Bermudagrass

Warning

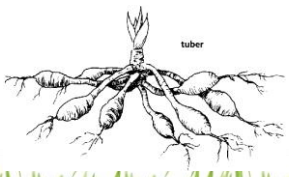
If you till a creeping perennial weed only once, you're just encouraging it!


Hercules and the Hydra

Types of Propagules

- **Tuber** – thickened portions of rhizomes or roots that store carbohydrate for propagation


Yellow nutsedge



Types of Propagules

- **Bulb** – underground organs for carbohydrate storage on which specialized leaves develop


Wild garlic


Star of Bethlehem

Reasons for Weed Invasion

- At the Board

Resumption of Growth

Degree day modeling:

- Measure daily temperatures
- Calculate a base temperature and starting date
- Every day accumulates the number of degrees above the base temperature.

$$GDD = \frac{\text{daily max.} + \text{daily min.}}{2} - \text{base temperature}$$

Example: Smooth crabgrass in Maryland had maximum germination between 140-230 DD.

Terms

- **Degree day** – a quantitative index demonstrated to reflect demand for energy to heat or cool houses and businesses. The base for these calculations is 65 F. A heating degree day accumulates when average max and min temperatures are lower than 65 F and a cooling degree day accumulates when they are higher than 65 F. Thus, a cooling degree day used for energy consumption is the same as the bermudagrass growing degree day.

Terms

- **Growing Degree day** – a quantitative index demonstrated to reflect plant growth based on predetermined biological minimum temperatures for growth of a given species.
  - Corn (50F base, max 86F)
  - Bermudagrass (65F base)
  - Crabgrass germination (55F base)
  - Annual bluegrass seedhead production (50F base)

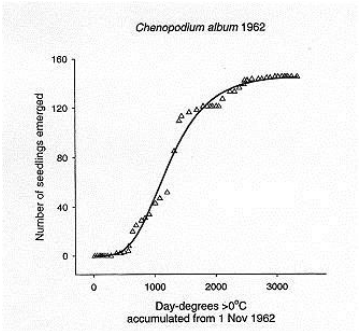
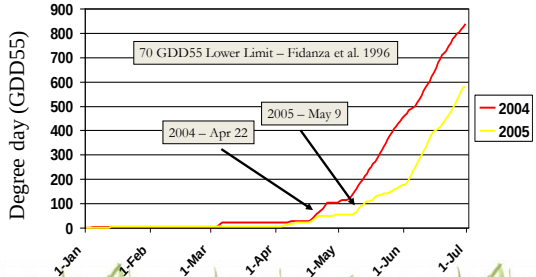
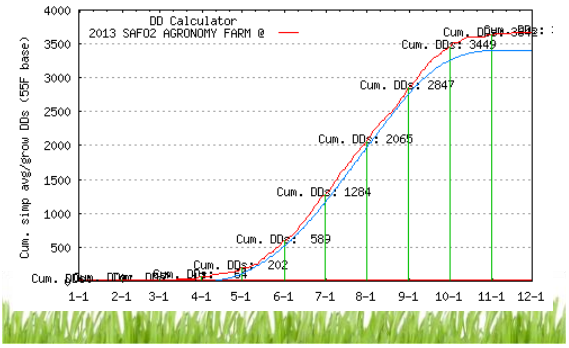


Fig. 1 A simple day-degree model empirically fitted to the observed emergence of *Chenopodium album* L. in 1962 (data from H A Roberts).

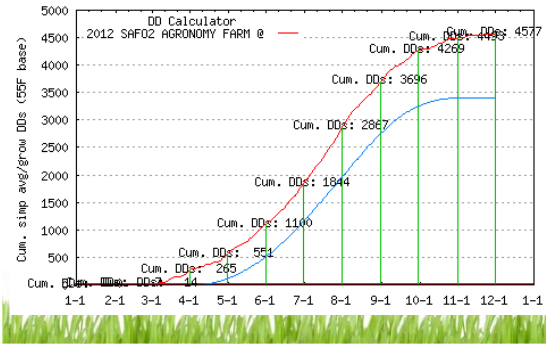
Cumulative Growing Degree Days (base 55F) in Blacksburg, VA in 2004 and 2005



GDD50 Stillwater 2013



GDD50 Stillwater 2012



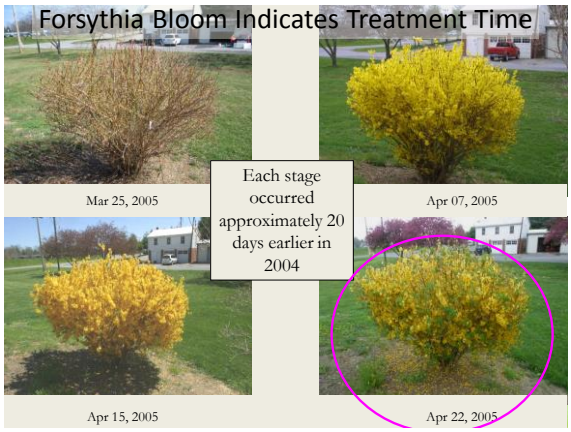
Dogwood, Daffodil, & Forsythia

Dogwood, Daffodil, & Forsythia

Getting late: Dogwood full bloom, Forsythia over half bloom drop and leafing, daffodil mostly wilted blooms.

Time to Treat: Dogwood not full bloom, Forsythia and daffodil full bloom but not bloom drop.

Forsythia Bloom Indicates Treatment Time



Some Degree Day Targets

- Crabgrass Germinates 70 to 140 GDD_{55}
- Bermudagrass Grows >0 GDD_{65}

Application Timing

- Apply preemergence herbicides:
  - Between full forsythia bloom and 50% bloom drop
  - Before GDD_{55} reaches 70 units
  - Before soil temperature reaches sustained 55 F
- If crabgrass has emerged, use a postemergence herbicide with your preemergence herbicide