Types of Propagules

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

  *Figures: Field sandbur and 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

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

Types of Propagules

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

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

**Warning**
If you till a creeping perennial weed only once, you’re just encouraging it!

Types of Propagules

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

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.

- **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)

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

GDD<sub>50</sub> Stillwater 2013

GDD<sub>50</sub> Stillwater 2012
Dogwood, Daffodil, & Forsythia

Ideal Time to Treat

Dogwood, Daffodil, & Forsythia

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

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

Forsythia Bloom Indicates Treatment Time

Mar 25, 2005
Apr 07, 2005
Apr 15, 2005
Apr 22, 2005

Each stage occurred approximately 20 days earlier in 2004

Some Degree Day Targets

- Crabgrass Germinates 70 to 140 GDD$_{55}$
- Bermudagrass Grows >0 GDD$_{55}$

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