Seed dormancy is more than just overwintering

Battling weeds can seem like a lifelong chore. One reason for this is the ability of weed seeds to exhibit dormancy. Seed dormancy is a tool weeds use to ensure their continued distribution in time and space. Seed scientists have varying theories on how to classify types, levels, and forms of seed dormancy. A seemingly simple concept of seeds waiting to germinate is actually quite complicated from the molecular to ecological level. Dormancy is not necessarily the absence of seed germination but characteristics of the seed that determines the conditions required for germination.

Primary dormancy encompasses the attributes of the seed which are inherent and genetic to that seed. These characteristics are developed while maturing in the mother plant. Not all seeds exhibit primary dormancy, however, and non-dormant seeds are able to germinate immediately if proper environmental conditions exist. A seed can exhibit pseudodormancy or enforced dormancy in which a non-dormant seed will not germinate because one or more requirement is not fulfilled. Additionally, seed with primary dormancy may become non-dormant and then induce dormancy again which is known as secondary dormancy.

To further complicate the seed dormancy discussion, scientists look at the issue from a molecular level or a “whole-seed” point of view. From a molecular perspective, dormancy types are embryo or seed coat-imposed. Similarities and differences are seen in the ecosystem perspective which divides dormancy into five areas with numerous levels and types in each area. First, physiological dormancy (PD), the most common type of dormancy in this area, typically requires a temperature stratification to break dormancy of the embryo. Second, morphological dormant (MD) seeds have an embryo that is still small and just requires time to grow rather than a dormancy-breaking action. A combination of physiological and morphological dormancies is the third type; morphophysiological dormancy (MPD) involves an underdeveloped embryo and a physiological barrier to germination. Next, seeds which are physically dormant (PY) have one or more water-impermeable layers in the seed coat. Dormancy is broken by natural or artificial formation of a “water gap” in the seed. Finally, combinational dormancy is a mixture of physical dormancy and physiological dormancy in which the seed coat is impermeable and the embryo is dormant.

How do seeds ever survive and germinate with all these different types of dormancy? Again, scientists have studied this topic for decades and new information is always coming to light. It is commonly thought that the plant growth regulators abscisic acid (ABA) and gibberellins (GA) are involved in determining seed dormancy. ABA is produced while the seed is developing and prevents the seed from germinating while GA promotes germination. While these hormones do not interact directly, their relationship is vital to overall seed dormancy.

All of this information is useful when managing weeds. For example, Russian olive seeds are consumed by several bird species, notably European starlings. Germination rates for seeds which passed through the starlings were higher than unconsumed seeds. The physical and chemical scarification of the seed coat is breaking dormancy of the seed and new infestations of Russian olive may be caught early by tracking the European starling.

Seed dormancy influences the amount of time seeds remain viable in the soil, or the seed longevity. Common weeds in the area can have a longevity ranging from one year to 4 decades. Seed longevity is typically shorter in grass species than broadleaf species. The following table shows the general time frame weed seeds will remain viable in the soil. Since weed seeds have varying levels and types of dormancy, effective control typically requires more than one year of attention. Be diligent in weed control and for more information contact your local weed and pest control office or Goshen County Weed and Pest at: (307) 532-3713, gocoweeds@embarqmail.com, or <https://www.facebook.com/gocoweeds>.

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| **Weed**  | **Seed Longevity** |
| Barnyard grass  | 13 years |
| Dalmatian toadflax  | 10 years |
| Dandelion  | 5 years |
| Downy brome (cheatgrass)  | <2 years |
| Canada thistle  | >2 decades |
| Field bindweed  | >50 years |
| Jointed goatgrass  | 3-5 years |
| Kochia | 2 years |
| Lambsquarters  | 4 decades |
| Leafy spurge  | 10 years |
| Marestail | 2 years |
| Musk and Scotch thistle  | 8 years |
| Quackgrass  | 4 years |
| Redroot pigweed | 4 years |
| Russian knapweed  | 8 years |
| Russian thistle  | 1 year |
| Scotch thistle | 8-10 years |
| Wild oats  | 3-6 years |