



SOIL WEED SEEDBANK—ONE SOURCE OF WEED PROBLEMS

The weed seedbank refers to the reserve or cache of viable weed seeds present in the soil. The weed seedbank plays a major role in the persistence of weeds in agricultural production fields.

Its source is both new weed seeds deposited in the current year plus older seeds that remain in the soil and persist from previous years. Actually, the soil weed seedbank also includes the vegetative structures such as rhizomes from which perennial weeds re-propagate. Thus, the weed seedbank is the sum of viable weed seeds and vegetative propagules that are present in the soil.

The maintenance of a viable weed seedbank is ensured by the capability of weeds to produce many seeds per plant plus the ability of those seeds to remain viable over long periods of time.

- A significant number of seeds of annual ryegrass (9 yr), perennial ryegrass (3 yr), barnyardgrass (13 yr), curly dock (>10 yr), and common cocklebur (6 yr) remain viable for several years.
- A single isolated Palmer amaranth plant can produce an estimated 500,000 to 1 million seeds. Even in a normal stand of Palmer amaranth where there are many plants, the number of seed produced by a single plant can still be over 100,000.
- The combination of weed seed longevity and weed plant prolificacy makes diligent weed control in crops a necessity.

Here are a few facts about weed seeds that pertain to the soil weed seedbank.

- The largest contribution to replenishment of the soil weed seedbank is from new seed produced by weed plants growing on the site.

- Weed seed production in a crop production field will be reduced by competition from the crop due to shading, and damage from sublethal doses of herbicides that do not kill weed plants. However, this reduced weed seed production will likely be great enough to maintain or increase the soil weed seedbank.
- Weed seed longevity in soil is a product of dormancy, which is a common attribute of weed seeds. Dormancy is broken by exposure to light, particular soil temperature and moisture conditions, and soil disturbance by tillage which alters the environment of dormant seeds.
- Weed seeds are generally distributed throughout the top 4-6 inches of the soil profile.
- Distribution in the soil profile will generally vary because of soil texture. For example, weed seeds will be in the lower part of the 0-6 in. profile in a sandy soil, with more even distribution in this same depth in a silty loam soil.
- Tillage is the major cause of vertical movement of weed seeds in production fields. Weed seeds will be more concentrated in the top 2 in. of the soil profile in a no-till system, whereas a tillage system that uses a moldboard plow will bury more seeds deeper.
- The soil weed seedbank makes annual weed control necessary in crop production. That is, eliminating weed seed production on a cropping site for several years will reduce the soil weed seedbank, but if weed seed production is not prevented in subsequent years either because of management failures or less than optimum weed control, the weed seedbank quickly replenishes. Thus, producers cannot decrease their diligence toward weed management in any crop production year because the weed seedbank



assures a continuity of weeds that will require management every year.

- Weed plants must be removed before seed set or seed maturity to ensure no production of viable seed to replenish the soil weed seedbank in a production field.
- Invariably, there will be weed escapes that will produce seed that will mature and be available to replenish the soil weed seedbank. Click [here](#) for management options to destroy mature weed seeds during/after crop harvest (harvest weed seed control or HWSC).
- Managing soil weed seedbanks is complex because of the difficulty in preventing weed seed production that will introduce new seed, the longevity and persistence of a small percentage of the seedbank, and the potential of many weed species to produce large amounts of seed.
- Reducing the soil weed seedbank is the first step in weed management. This should be followed by competition from a healthy crop, use and/or rotation of herbicides with different modes of action, and agronomic best management practices such as optimum crop plant populations and narrow rows to assure a complete crop canopy.

The subject matter content of this article may seem elementary, and it is. However, adopting and using annual management strategies to reduce the number of weed seeds that are present in the soil at a crop production site are important initial components of a complete weed management program.

Control of the soil weed seedbank as a component of weed management has become especially important in the current environment of herbicide-resistant (HR) weeds since the seed produced by an HR weed will produce new plants that possess the HR trait.

See the Referenced Items on this resource page for more in-depth information on the summary points above.

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