

Latest advances in agronomy

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COMMENTARY

A weed is a plant considered undesirable in a particular situation, "a plant in the wrong place". Examples commonly are plants unwanted in human-controlled settings, such as farm fields, gardens, lawns, and parks. Taxonomically, the term "weed" has no botanical significance, because a plant that is a weed in one context is not a weed when growing in a situation where it is in fact wanted, and where one species of plant is a valuable crop plant, another species in the same genus might be a serious weed, such as a wild bramble growing among cultivated loganberries. In the same way, volunteer crops (plants) are regarded as weeds in a subsequent crop. Many plants that people widely regard as weeds also are intentionally grown in gardens and other cultivated settings, in which case they are sometimes called beneficial weeds. The term weed also is applied to any plant that grows or reproduces aggressively, or is invasive outside its native habitat. More broadly "weed" occasionally is applied pejoratively to species outside the plant kingdom, species that can survive in diverse environments and reproduce quickly; in this sense it has even been applied to humans.

Certain classes of weeds share adaptations to ruderal environments. That is to say: disturbed environments where soil or natural vegetative cover has been damaged or frequently gets damaged, disturbances that give the weeds advantages over desirable crops, pastures, or ornamental plants. The nature of the habitat and its disturbances will affect or even determine which types of weed communities become dominant.

Examples of such ruderal or pioneer species include plants that are adapted to naturally occurring disturbed environments such as dunes and other windswept areas with shifting soils, alluvial flood plains, river banks and deltas, and areas that are burned repeatedly. Since human agricultural practices often mimic these natural environments where weedy species have evolved, some weeds are effectively preadapted to grow and proliferate

in human-disturbed areas such as agricultural fields, lawns, roadsides, and construction sites. The weedy nature of these species often gives them an advantage over more desirable crop species because they often grow quickly and reproduce quickly, they commonly have seeds that persist in the soil seed bank for many years, or they may have short lifespans with multiple generations in the same growing season. In contrast, perennial weeds often have underground stems that spread under the soil surface or, like ground ivy (*Glechoma hederacea*), have creeping stems that root and spread out over the ground.

Some plants become dominant when introduced into new environments because the animals in their original environment, that compete with them or feed on them are absent; in what is sometimes called the "natural enemies hypothesis", plants freed from these specialist consumers may become dominant. An example is Klamath weed, that threatened millions of hectares of prime grain and grazing land in North America after it was accidentally introduced, but was reduced to a rare roadside weed within several years after some of its natural enemies were imported during World War II. In locations where predation and mutually competitive relationships are absent, weeds have increased resources available for growth and reproduction. The weediness of some species that are introduced into new environments may be caused by their production of allelopathic chemicals which indigenous plants are not yet adapted to, a scenario sometimes called the "novel weapons hypothesis". These chemicals may limit the growth of established plants or the germination and growth of seeds and seedlings.

Another of the ways in which the ecological role of a plant can make it a weed even if it is in itself inoffensive, is if it harbours a pest that is dependent on it for survival; for example, *Berberis* species are intermediate hosts for stem rust fungi, so that they promote serious damage to wheat crops when growing near the fields.

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