

Weed Flora of Ajmer District

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ABSTRACT: The present study was conducted to investigate the weed flora in Ajmer. The survey was carried out in different crop fields in Ajmer. Many weeds were found. Weeds can be utilized economically. However weeds are not good for crops. They inhibit crop growth. Allelopathy is the process to manage weeds in crop fields. Examples of weeds found in Ajmer were *Phalaris minor* L., *Chenopodium murale* L., *Sonchus oleraceus* L., *Cyanodon dactylon* L. and *Convolvulus arvensis* L. and many more which inhibited crop yield in different areas of Ajmer district.

KEYWORDS: weed, flora, Ajmer, survey, crops, allelopathy, inhibition, yield, growth, fields

I. INTRODUCTION

A **weed** is a plant considered undesirable in a particular situation, "a plant in the wrong place", or a plant growing where it is not wanted.^[1] This introduces the concept of humans and their goals in a particular setting.^[2] The concept of weeds is particularly significant in agriculture, where the aim is growing crops or pastures of a single species, or a mixture of a few desired species. In such environments, other plant species are considered undesirable and therefore a weed. Besides, some weeds have undesirable characteristics making them a plant pest in most human settings.^{[3][4]}

Examples of weeds are plants unwanted in human-controlled settings, such as farm land, orchards, gardens, lawns, parks, residential and industrial areas. Taxonomically though, 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 wanted. In the same way, volunteer plants are regarded as weeds in a subsequent crop. Some plants that are widely regarded as weeds are intentionally grown in gardens and other cultivated settings, in which case they are sometimes called beneficial weeds. The term weed is also applied to any plant that grows or reproduces aggressively, or is invasive outside its native habitat.^[5]

More broadly, the term "weed" is occasionally 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.^[6]

Weed control is important in agriculture. Methods include hand cultivation with hoes, powered cultivation with cultivators, smothering with mulch or soil solarization, lethal wilting with high heat, burning, or chemical attack with herbicides and cultural methods such as crop rotation and fallowing land to reduce the weed population.^[7]

Certain classes of weeds are ruderals with adaptations that advantages them to certain environments. That is to say: disturbed environments, where soil or natural vegetative cover has been damaged or frequently gets damaged, these disturbances give 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.^[8]

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.^[9] Since human agricultural and horticultural 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, gardens, roadsides, and construction sites.^[9] The weedy nature of these species often gives them an advantage over more desirable species because they often grow rapidly 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 found in Ajmer fields.^[10]

Some plants become dominant when introduced into new environments because the animals and plants 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 Ajmer district after it was accidentally introduced, but was reduced to a rare roadside weed within several years after some of its natural enemies were imported. 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".^[11,12] These chemicals may limit the growth of established plants or the germination and growth of seeds and seedlings in Ajmer district of Rajasthan.

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 in Ajmer.

A number of native or non-native plants are unwanted in a specific location for a number of reasons.^[15] An important one is functional: they interfere with food and fiber production in agriculture, wherein they must be controlled to prevent lost or diminished crop yields. Other important reasons are that they interfere with other cosmetic, decorative, or recreational goals, such as in lawns, landscape architecture, playing fields, and golf courses. Similarly, they can be of concern for environmental reasons whereby introduced species out-compete for resources or space with desired endemic plants.^[13,14]

For all these reasons, horticultural (both functional and cosmetic) and environmental, weeds interfere in the fields of Ajmer district:-

- competing with the desired plants for the resources that a plant typically needs, namely, direct sunlight, soil nutrients, water, and (to a lesser extent) space for growth;
- providing hosts and vectors for plant pathogens, giving them greater opportunity to infect and degrade the quality of the desired plants;^[15]
- providing food or shelter for animal pests such as seed-eating birds and Tephritid fruit flies that otherwise could hardly survive seasonal shortages;^[16]
- offering irritation to the skin or digestive tracts of people or animals, either physical irritation via thorns, prickles, or burs, or chemical irritation via natural poisons or irritants in the weed (for example, the poisons found in Nerium species);^[17]
- causing root damage to engineering works such as drains, road surfaces, and foundations,^[18] blocking streams and rivulets.^[19]

In weed ecology some authorities speak of the relationship between "the three Ps": plant, place, perception. These have been very variously defined, but the weed traits listed by H.G. Baker are widely cited.^{[20][21]}

Weeds have long been a concern, perhaps as long as humans have cultivated plants. They are mentioned in various historic texts, such as the Shakespearean Sonnet 69:

To thy fair flower add the rank smell of weeds: / But why thy odour matcheth not thy show, / The soil is this, that thou dost common grow.^[22] and the Bible:^[5] Cursed is the ground because of you; through painful toil you will eat of it all the days of your life. It will produce thorns and thistles for you, and you will eat the plants of the field. By the sweat of your brow you will eat your food until you return to the ground.^[23]

II. DISCUSSION

While the term "weed" generally has a negative connotation, many plants known as weeds can have beneficial properties in ajmer district in Rajasthan. . A number of weeds, such as the dandelion (*Taraxacum*) and lamb's quarter, are edible, and their leaves or roots may be used for food or herbal medicine. Burdock is common over much in Ajmer, and is sometimes used to make soup and medicine by residents and local people. Some weeds attract beneficial insects, which in turn can protect crops from harmful pests. Weeds can also prevent pest insects from finding a crop, because their presence disrupts the incidence of positive cues which pests use to locate their food.^[24,25] Weeds may also act as a "living mulch", providing ground cover that reduces moisture loss and prevents erosion. Weeds may also improve soil fertility; dandelions, for example, bring up nutrients like calcium and nitrogen from deep in the soil with their tap root, and clover hosts nitrogen-fixing bacteria in its roots, fertilizing the soil directly. The dandelion is also one of several species which break up hardpan in overly-cultivated fields of Ajmer, helping crops grow deeper root systems. Some garden flowers originated as weeds in cultivated fields and have been selectively bred for their garden-worthy flowers

or foliage. An example of a crop weed that is grown in gardens is the corncockle, (*Agrostemma githago*) in Ajmer, which is a common weed in fields, but is now sometimes grown as a garden plant by the residents of Ajmer.^[25]

Many weed species have moved out of their natural geographic ranges and spread around the world in tandem with human migrations and commerce. Weed seeds are often collected and transported with crops after the harvesting of grains, so humans are a vector of transport as well as a producer of the disturbed environments to which weed species are well adapted in the fields of Ajmer district, resulting in many weeds having a close association with human activities.^[26]

Some weed species have been classified as noxious weeds by government authorities because, if left unchecked, they often compete with native or crop plants or cause harm to livestock.^[20] They are often foreign species accidentally or imprudently imported in Ajmer where there are few natural controls to limit their population and spread.^[21]

An alternate definition often used by biologists is any species, not just plants, that can quickly adapt to any environment.^[6] Some traits of weedy species are the ability to reproduce quickly, disperse widely, live in a variety of habitats, establish a population in strange places, succeed in disturbed ecosystems and resist eradication once established. Such species often do well in human-dominated environments as other species are not able to adapt. Common examples include the common pigeon, brown rat and the raccoon. Other weedy species have been able to expand their range without actually living in human environments, as human activity has damaged the ecosystems of other species. These include the coyote, the white-tailed deer and the brown headed cowbird seen to grow easily in Ajmer district of Rajasthan.^[6]

In response to the idea that humans may face extinction due to environmental degradation, paleontologist David Jablonsky counters by arguing that humans are a weed species. Like other weedy species, humans are widely dispersed in a wide variety of environments, and are highly unlikely to go extinct no matter how much damage the environment faces.^[6]

The list of weeds found in Ajmer district of Rajasthan in different areas are:-

- Amaranth – ("pigweed") annual with copious long-lasting seeds, also a highly edible and resilient food source
- Bermuda grass – perennial, spreading by runners, rhizomes and seeds.
- Bindweed
- Broadleaf plantain – perennial, spreads by seeds that persist in the soil for many years
- Burdock – biennial
- Common lambsquarters – annual
- Cogongrass - *Imperata cylindrica* - One of the most damaging pest weeds in the world, infesting vast areas in the tropics.^[26]
- Creeping charlie – perennial, fast-spreading plants with long creeping stems
- Dandelion – perennial, wind-spread, fast-growing, and drought-tolerant
- Goldenrod – perennial
- Japanese knotweed
- Kudzu – perennial
- Leafy spurge – perennial, with underground stems
- Milk thistle – annual or biennial
- Poison ivy – perennial
- Ragweed – annual
- Sorrel – annual or perennial
- Striga
- St John's wort – perennial
- Sumac – woody perennial
- Tree of heaven – woody perennial
- Wild carrot – biennial^[22]
- Wood sorrel – perennial
- Yellow nutsedge – perennial
- *Phalaris minor* L.
- *Chenopodium murale* L.
- *Sonchus oleraceus* L. *Cyanodon dactylon* L.
- *Convolvulus arvensis* L.

Many invasive weeds were introduced deliberately in the first place, and may have not been considered nuisances at the time, but rather beneficial.^[26]

III. RESULTS

Weeds are plants that some people view as undesirable in a particular place. Throughout the long human history of horticulture, people have worked to control weeds for many reasons. Weed control is a highly developed field of knowledge. Weed control methods vary according to the growth habit of the weeds in question, as well as the context. For example, different methods of weed control may be used on a food crop versus a fiber crop or a golf course, because there is often more concern about health effects of chemicals used on food crops. Weeds can be categorized by their life habit. They can generally either be grouped as annuals or perennials. An annual weed grows from the seeds dropped in the previous growing season. Perennial weeds regrow from previously established roots, dormant stolons, tubers, rhizomes, as well as the seed^[21,22].

Understanding the habit of weeds is also important for non-chemical methods of weed control, such as plowing, surface scuffling, promotion of more beneficial cover crops, and prevention of seed accumulation in fields. For example, amaranth is an edible plant that is considered a weed by mainstream modern agriculture. It produces copious seeds (up to 1 million per plant) that last many years, and is an early-emergent fast grower. Those seeking to control amaranth quote the mantra "This year's seeds become next year's weeds!".^[19] However, another view of amaranth values the plant as a resilient food source.^[11] Some people have appreciated weeds for their tenacity, their wildness and even the work and connection to nature they provide. As Christopher Lloyd wrote in *The Well-Tempered Garden*:

Many gardeners will agree that hand-weeding is not the terrible drudgery that it is often made out to be. Some people find in it a kind of soothing monotony. It leaves their minds free to develop the plot for their next novel or to perfect the brilliant repartee with which they should have encountered a relative's latest example of unreasonableness.^[16]

It has long been assumed that weeds, in the sense of rapidly-evolving plants taking advantage of human-disturbed environments, evolved in response to the Neolithic agricultural revolution approximately 12,000 years ago. However, researchers have found evidence of "proto-weeds" behaving in similar ways in Ajmer.^[22]

Crop weeds are weeds that grow amongst crops in Ajmer.

Despite the potential for some crop weeds to be used as a food source, many can also prove harmful to crops, both directly and indirectly. Crop weeds can inhibit the growth of crops, contaminate harvested crops and often spread rapidly. They can also host crop pests such as aphids, fungal rots and viruses.^{[1][2]} Cost increases and yield losses occur as a result. Striga, one of the main cereal crop weeds in Ajmer, commonly causes yield losses of 40–100% and accounts for around \$7 billion in losses annually. Many hectares of land in Ajmer are affected by striga.^[3] Barnyard grass has been identified as a culprit in Ajmer fields as rice yield losses and certain species have been known to mimic rice.^{[4][5]} Examples of crop weeds include chickweed, barnyard grass, dandelion, striga and knotweed found in different crop fields of Ajmer^[6]

A **weed of cultivation** is any plant that is well-adapted to environments in which land is cultivated for growing some other plant.

Many such weeds are quite specialised and can only thrive and reproduce where the ground has been broken by plough or spade. They are invariably annual and reproduction is by seed alone, which can in many species lie dormant for years in the soil until brought to the surface during cultivation. They have fast reproduction cycles, usually in one year from seed to seed, though some species can have more than one generation in one season. A few species such as groundsel (*Senecio vulgaris*), shepherd's purse (*Capsella bursa-pastoris*), red deadnettle (*Lamium purpureum*) and chickweed (*Stellaria media*) can survive unharmed through very cold weather and are often able to seed even in winter in many areas of Ajmer.^[23]

IV. CONCLUSIONS

The use of allelopathy emerges as an alternative method for weed management in crops, especially in small vegetable producing properties. Thus, we can identify the allelopathic effects of aqueous extracts of the weeds *Cyperus difformis* L. (small-flowered nutsedge), *Commelina benghalensis* L. (benghal dayflower) and *Galinsoga parviflora* Cav. (gallant soldier) on seed germination and seedling growth of *Lactuca sativa* L. (lettuce) and *Lycopersicon esculentum* L. (tomato). Two experiments were carried out in a completely randomized design with five replications, the first with lettuce seeds and the second with tomato seeds submitted to germination in five concentrations of weeds

aqueous extracts (0, 25, 50, 75 and 100%). All treatments with aqueous extracts of the three species, at different concentrations, caused a reduction in lettuce and tomato root length. ^[24] There was a reduction in most of the evaluated variables, and seed germination of the crops had the lowest influence of the extracts. The weeds benghal dayflower, small-flowered nutsedge and gallant soldier showed allelopathic potential on lettuce and tomato crops in Ajmer. This potential allelopathic effect is directly related to the concentration and type of extract from the plant species. In general, it can be noted that the greatest allelopathic effect occurred with the use of small-flowered nutsedge extract, followed by gallant soldier and dayflower in ajmer alongwith were Phalaris minor L., Chenopodium murale L., Sonchus oleraceus L., Cyanodon dactylon L. and Convolvulus arvensis L. ^[26].

REFERENCES

1. Harlan, J. R., & deWet, J. M. (1965). Some thoughts about weeds. *Economic botany*, 19(1), 16-24.
2. ^ Holzner, W., & Numata, M. (Eds.). (2010). *Biology and ecology of weeds* (Vol. 2). Springer Science & Business Media.
3. ^ Harlan, J. R., & deWet, J. M. (1965). Some thoughts about weeds. *Economic botany*, 19(1), 16-24.
4. ^ Holzner, W., & Numata, M. (Eds.). (2010). *Biology and ecology of weeds* (Vol. 2). Springer Science & Business Media.
5. ^ Janick, Jules (1979). *Horticultural Science* (3rd ed.). San Francisco: W.H. Freeman. p. 308. ISBN 0-7167-1031-5.
6. ^ David Quammen (October 1998), "Planet of Weeds" (PDF), *Harper's Magazine*, retrieved November 15, 2010
7. ^ Blackshaw, R. E., Anderson, R. L., & Lemerle, D. E. I. R. D. R. E. (2007). *Cultural weed management. Non-Chemical Weed Management: Principles, Concepts and Technology*, Wallingford, UK: CAB International, 35-48.
8. ^ Bell, Graham (2005). *The Permaculture Garden*. Chelsea Green Publishing. pp. 63–64. ISBN 9781856230278.
9. ^ Hans Lambers; F Stuart Chapin III; Thijs L. Pons (8 October 2008). *Plant Physiological Ecology*. Springer. pp. 507–. ISBN 978-0-387-78341-3.
10. ^ Saupe, Stephen G. "Plant Foraging: Two Case Studies" (PDF). Retrieved February 15, 2009.
11. ^ Klamath weed, *Hypericum perforatum*. [L.II.<http://faculty.ucr.edu/~legnerref/biotact/ch-66.htm>]
12. ^ Willis, Rick J. (2007). *The History of Allelopathy*. Springer. p. 8. ISBN 978-1-4020-4092-4. Retrieved 2009-08-17.
13. ^ "Callaway.qxd" (PDF). Archived from the original (PDF) on September 10, 2006. Retrieved 2010-03-20.
14. ^ Coupe, Sheena, ed. (1989). *Frontier country: Australia's outback heritage*. Vol. 1. Willoughby: Weldon Russell. p. 298.
15. ^ Muhammad Ashraf; Münir Öztürk; Muhammad Sajid Aqeel Ahmad; Ahmet Aksoy (2 June 2010). *Crop Production for Agricultural Improvement*. Springer. pp. 525–. ISBN 978-94-007-4116-4.
16. ^ Annecke, D. R., Moran, V. C. (1982). *Insects and mites of cultivated plants in South Africa*. London: Butterworths. ISBN 0-409-08398-4.
17. ^ Watt, John Mitchell; Breyer-Brandwijk, Maria Gerdina: *The Medicinal and Poisonous Plants of Southern and Eastern Africa* 2nd ed Pub. E & S Livingstone 1962
18. ^ Roberts, John; Jackson, Nick; Smith, Mark. *Tree Roots in the Built Environment*. 2006. ISBN 978-0117536203
19. ^ Weeds Australia Archived 2011-07-11 at the Wayback Machine Black Willow
20. ^ Baker, H.G. *The Evolution of Weeds*. *Annual Review of Ecology and Systematics*, Vol. 5: 1–24 November 1974 doi:10.1146/annurev.es.05.110174.000245
21. ^ Baker H. G. "Characteristics and modes of origin of weeds". In *The Genetics of Colonizing Species*. H. G. Baker, G. L. Stebbins. eds. New York, Academic Press, 1965, pp. 147-172
22. ^ Pooler, C[harles] Knox, ed. (1918). *The Works of Shakespeare: Sonnets. The Arden Shakespeare* [1st series]. London: Methuen & Company. OCLC 4770201.
23. ^ Genesis 3:17-19 New International Version
24. ^ "Burdock Root". *Chinese Soup Pot*. Retrieved 29 May 2011.
25. ^ Preston, Pearman & Dines. (2002). *New Atlas of the British Flora*. Oxford University Press.
26. ^ Rashid M. Hassan; Robert Scholes; Neville Ash (14 December 2005). *Ecosystems and Human Well-Being: Current State and Trends: Findings of the Condition and Trends Working Group*. Island Press. pp. 570–. ISBN 978-1-55963-228-7.