

# Current Impacts of Outdoor Growth of Cannabis in Colorado

Fact Sheet No. 0.308

Crop Series | Production

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## Biological concerns

Cannabis supports a diverse fauna of insects and other arthropods, both harmful and beneficial. There are also numerous pathogens that could impact plantings, depending on many cultural and environmental factors. The specific list of insects and pathogens associated with cultivation of Cannabis at any given site is not well known, due in part to the clandestine nature of production in the past. One scientific survey conducted on an established marijuana garden in Mississippi found more than 300 species of insects associated with the garden. A large proportion of these species were predaceous on other arthropods and not plant feeders. Of the insect species collected that were using the plants as a food source, the majority (43 species) were sap feeders, 15 were leaf chewers, nine utilized pollen and one was a possible root feeder (Lago & Stanford, 1989).

Much of the current pest biology and management information available from written and on-line sources was written by individuals with no training in entomology or plant pathology. This has led to a Cannabis pest management information base that is incomplete, unreliable, and/or simply incorrect. Many potential pests of Cannabis are host specific, meaning they feed exclusively on Cannabis and botanically related plants.

Cannabis is placed in its own botanical family, the Cannibaceae. The only other member of this family that grows in Colorado is hops, *Humulus lupulus*. There are currently about 150 acres of hops planted in Colorado, with about 100 acres of that total on the west slope, with

that acreage increasing annually. Hops is the plant species that faces the greatest potential crossover threat from any of the Cannabis specialist insects. Conversely, Cannabis is the plant species that faces the greatest crossover threat from any of the hops specialist insects.

Two specialist insects are potential pests of outdoor grown Cannabis in Colorado. These are the hops aphid (*Phorodon humuli*) and hemp russet mite (*Aculops macularis*). There are probably other specialists that feed on Cannabis in Colorado, but their presence has not been reliably confirmed. Of these two species, the hops aphid has been long established, with collections recorded in the early part of the 20th century (Palmer, 1952). The hemp russet mite is widely established in indoor Cannabis production across the state (Whitney Cranshaw, personal communication) and has the potential to move to outdoor production. The hemp borer (*Grapholita de-lineana*) is frequently mentioned as a pest of Cannabis production on internet sites. It is present in the US as far west as Minnesota (Miller, 1981), but its presence has never been confirmed in Colorado (Todd Gilligan, personal communication).

Several generalist insects will feed on Cannabis when it is grown outdoors. These generalists tend to be ubiquitous and would be present on any crop grown on a site. These insects include several species of

Lygus bugs, stink bugs, grasshoppers, and thrips. Two spotted spider mite (*Tetranychus urticae*), is a common pest of Cannabis grown in indoor situations, and it is ubiquitous throughout lower elevations in Colorado. There is no reason not to expect occasional problems with this spider mite in outdoor production situations.

Outdoor grown Cannabis plants will attract many species of beneficial insects and natural enemies. Many types of generalist predators can be expected to prey on aphids, spider mites, rust mites and others



## Background information, and definition of hemp and cannabis

- Amendment 64, section 16 (d) to the Colorado Constitution defines Industrial hemp (a distinct variety of *Cannabis sativa* L.) as a plant of the genus *Cannabis* and any part of that plant, whether growing or not, containing a Delta-9 tetrahydrocannabinol (THC) concentration of no more than 0.3% on a dry weight basis. Under Colorado State law any Cannabis with a percentage of THC above 0.3% is considered marijuana (<https://www.colorado.gov/pacific/agplants/difference-between-hemp-andmarijuana>).
- Other items that help differentiate between hemp and marijuana include production differences (growth form, plant height, cultivation methods, planting density, proposed end use, plant sex, etc.).

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insects that are attracted to the crop. Lady bird beetles, minute pirate bugs, predatory thrips, damsel bugs, and many other types of predators will be attracted. These are all very broadly distributed and would be found on most crops or other vegetation grown on any plot of land.

Reliable surveys of insects in outdoor grown Cannabis are almost non-existent because of the past legal status, clandestine growing sites, and insect identification by individuals who are not trained in entomology. Hemp production has been illegal nationally, and reliable surveys in the crop do not exist. The pest fauna will surely differ from that found in recreational/medicinal plants because of physical, biochemical and cultural differences in the plants and the way they are grown. One relatively disregarded issue regards insect use of Cannabis pollen. Cannabis is wind pollinated, but pollen is a nutritious, protein rich food source for many insects and a variety of insects, including honey and other native bees utilize it as a resource (Stringer, 1992).

There is a lot of speculation on internet sites regarding impacts of Cannabis pollen on honey bees and honey quality, but little science on bee usage in field grown plants. Terrab et al. (2005) found that Cannabis sativa pollen was an important component of the floral resources collected by honey bees in the Central Rif Region of northern Morocco. Paris et al. 1975 did an analysis of two strains on Cannabis sativa pollen and found that it was rich in cannabinoids and particularly active THC and THCA, the latter being able to be transformed into physiologically active THC. Climactic factors and particularly temperature played an important role, since the THC content at 24° degrees C/16hr was 30 times as great as at 22 degrees C/16hr.

Currently, Cannabis pollen has been reported to be an allergen by the public, however, no research was found that supported or denied any claims of it being more of an issue for some people than other plantpollens, in fact, the study concluded that "As expected with most plant aeroallergens, Cannabis polleninhalation has been noted to cause symptoms of allergic rhinitis, conjunctivitis, and asthma" (Ocampo and Rans, 2015).

Additionally, there is no publicized university research, at the time of this report, on agricultural impacts on marijuana. Several states do have uni-

versities that are looking at the growth potential related to hemp (variety trials mainly). Some examples of medical research follow:

-University of California's Center for Medicinal Cannabis Research (CMCR). Focus is on scientific studies to assess the safety and efficacy of cannabis and cannabis compounds for treating medical conditions.

-University of Mississippi National Center for Natural Products Research. Studies Harmful and Beneficial Effects.

-University of Washington Marijuana Research Center, are studying a variety of aspects of marijuana, including prevention and treatment of abuse, its effect on the brain, and the epidemiology of marijuana use and problems.

### Additional agricultural concerns associated with outdoor cannabis production

Water use requirement information is very difficult to ascertain on cannabis production in an outdoor setting. However, a variety of sources were examined and the following information presented is the best

- known information available.
- Water use requirements
  - o Hemp: 12-15 inches per year
  - o Marijuana: 25-35 inches per year
  - o Traditional Crops:
    - Corn 20-25 inches per year
    - Alfalfa 30-40 inches per year
    - Tomato 15-25 inches per year
    - Peach 30-40 inches per year
    - Hops 20-30 inches per year
  - Nutrient requirements (N, P, K)
    - o Hemp: 120 lbs/ac N, 90 lbs/ac P, 140 lbs/ac K
    - o Marijuana: Variable during different growth stages, no reliable information available.
    - o Traditional Crops:
      - Corn 100-150 lbs/ac N, 40-80 lbs/ac P, 40-120 lbs/ac K
      - Alfalfa 20-30 lbs/ac N, 100-150 lbs/ac P, 100-150 lbs/ac K
      - Tomato 90-130 lbs/ac N, 60-100 lbs/ac P, 140 to 215 lbs/ac K
      - Peach 30-150 lbs/ac N, 30-80 lbs/ac P, 50-150 lbs/ac K
      - Hops 100-150 lbs/ac N, 40-60 lbs/ac P, 80-150 lbs/ac K

## Future research priorities for outdoor cannabis production

The general conclusion that can be reached from the currently available knowledge is that outdoor grown Cannabis poses no unique threat to surrounding crops due to emigration of insects, mites or plant pathogens. The actual amount of undesired biological migration from a given Cannabis production field will be more a product of farm and crop management than as a result of crop species.

Research that needs to be conducted before the impacts of outdoor grown Cannabis can be fully evaluated include:

-Surveys of the insects associated with small scale and large scale Cannabis and hemp production.

This should include different genetic types and be done over as large of geographic range as possible and pests that attack the crop.

-Plant pathogens associated with Cannabis production, conducted over a variety of environments and production regimes.

-Beneficial and other insects that utilize the plant environment, but do not attack the plant directly

-Pollen production from a range of Cannabis growing systems, including female only clones, female selected from seeded crops, seed production plants, and hemp production blocks.

-Insects, bees, and other organisms that utilize Cannabis pollen.

-Differences in arthropod utilization of field grown hemp and outdoor grown Cannabis for medicinal or recreational consumption.

Chemical use for pests (pesticides, herbicides, etc.) is another area of limited information. Currently there are no pesticides registered by the U.S. Environmental Protection Agency (EPA), making any application of pesticides illegal. However, CDA currently has a "Marijuana Pesticides List" but they "do not recommend the use of any pesticide on marijuana, or any other food crop for which the pesticide has not been specifically tested, registered and labeled to ensure its safe use with the respect to workers and consumers." The current list was last updated in May and is found on the Colorado Department of Agriculture website. This site also has a list of selected examples of materials that cannot be used due to CDA criteria. However, none of the chemicals on the use list can legally be used under the EPA language.

Another consideration that has impacted the public are related to nuisance odor complaints (currently focused on indoor grow operation smells). At this time, the State of Colorado utilized local city authority to deal with odor complaints. The City of Denver has information on their website, and suggests that there has to be a finding that the odor is a public nuisance in order for action to be taken. There is no law about the amount of odor that would constitute a violation, other case law does exist in the state related to smells from various instances, most of which have been dealt with mainly by the cleanup of the foul odor.

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