



Sound Horticulture

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Medical Marijuana Grower Considerations

OVERVIEW:

Marijuana has been grown for many centuries for both its medicinal and physical properties. Most of the cultivation has been as a field crop, in temperate climates. The rapid increase in breeding for stronger medical characteristics and the resultant shift towards cultivation in protected environments has led to serious pest issues due to the nature of cultivation in protected crops and the lack of selection of protected crop traits.

“Protected crops”, from a pest point of view, is an oxymoron. Indoor crops face much higher and devastating pest pressure primarily because the most protected thing in a protected crop is the pest. Unless great pains have been taken to mimic natural, optimal conditions for the plant (moisture exposure, humidity, shading, light tolerance, rest period, and who knows what), the plants are stressed. Stressed plants attract and nurture spider mites. Overly fed plants produce softer than optimal new growth, which is essential for the sucking pests such as aphid and whitefly.

The practice of manipulation of humidity to prevent molds causes plant stress. The practice of using numerous fans to physically strengthen the stems is even more stressful, as the high volumes of moving air remove the “humidity envelope” that all plants create for themselves. This is a very difficult crop to protect, as the conditions that are favored by the growers (and the pests) are almost the opposite to the conditions needed of the biological controls.

PRIOR TO PLANTING:

Before you plant, a thorough cleaning with detergent is your number one preventative action and highly recommended. Take care to remove all old plant material, obvious fungal residue, and any non-essential apparatus in the greenhouse or growth chamber. Wash any previously used tools and clothing to ensure no cross-contamination between crops.

Stressed plants are much more susceptible to fungal pathogens and insect pests. The climate must be appropriate for the growing conditions. Due diligence is needed to ensure that air circulation is efficient and regulated; otherwise, the “humidity

umbrella” that the plant normally forms by transpiration can be adversely affected. Pests such as the two-spotted spider mite will thrive on dry plants. It is also important to note that Powdery Mildew and similar plant pests require rapid changes of humidity to induce sporulation. If the humidity can be held within 10% of the target, and any target of humidity, sporulation will not occur, and the mold will not spread.

A good preventative strategy is to place a few pots of bush beans throughout the house or room before planting the crop. The beans will attract any pests that were missed in the initial clean up. If the previous crop had a history of spider mites, apply *Stratiolaelaps scimitus* to the floor, where the legs touch it, where support posts enter it, and any plumbing or electrical entry points, as well as the perimeter wall. Spider mites take a rest away from the crop even when not diapausing and look for protected areas such as these.

GETTING STARTED:

When you have started planting and the pots are first watered, a soil mite such as *Stratiolaelaps scimitus* or *Gaeolaelaps gillesspiei* should be applied to the soil surface at a rate of 25 mites per square foot. They can be broadcast over the spaced out pots or trays. These soil mites will control fungus gnat larvae in the root zone, leading to a faster growth rate and healthier plants. Both mites also feed on pupating thrip larvae, helping thrip management by breaking the reproductive cycle. *Stratiolaelaps scimitus* also controls root aphids, weevils, and pathogenic nematodes.

For air-rooting systems, there are not a lot of predators or pests that have adapted to this style of propagation. We recommend that this area has at least some *Dalotia coriaria* (Rove Beetle) present at all times. This flexible beetle is an excellent flyer, tolerates virtually aquatic situations, and is always hungry. It tends to stay in the structure, and resides in the drain system, so only periodic applications are needed to maintain a presence.

As soon as true leaves are present, you must apply *Neoseiulus fallacis* at a rate of 2 mites per square foot. *N. fallacis* is a spider mite generalist, also capable of controlling Broad Mite and other eriophyid (microscopic) mites. If you have a history of Broad Mite, you should double the rate of *fallacis*, and make sure that the *fallacis* is in place as soon as possible. Once the plant begins to grow the flower head, and stickiness begins, all of the predatory mites will avoid those areas.

Yellow sticky traps should be applied at least 1 trap for every 500 square feet. Care must be taken to ensure that the height of the traps does not exceed the height of the plants. Traps higher than the plants will not trap a representative sample of thrips.

SPIDER MITE CONTROL:

In a dry environment, spider mites are the most common and serious pest. Spider mites hate high humidity. (We actually manage our spider mite culture on bean plants just by misting them). If you are not battling botrytis or similar molds, try misting the affected areas on a regular schedule for a few days.

Prevention of spider mites is possible by applying *Neoseiulus fallacis* at a rate of 2 mites per square foot. This generalist mite predator evenly establishes itself throughout the crop, preventing spider mite establishment under normal conditions. Hot spot outbreaks should be treated with *Phytoseiulus persimilis* at a rate of 1 mite per 100 spider mites for control within 1 week. *Fallacis* and *persimilis* are compatible and do not interfere with each other. *Fallacis* does not do well on spider mite webbing while *persimilis* thrives on it. But, it must be noted that stickiness repels both of these mites.

Stethorus punctillum is a tiny black beetle that thrives in low humidity situations. If you are unable to manage the climate effectively and the conditions for spider mite are extreme, *Stethorus* could save the crop. They should be applied at a rate of 0.1 per square foot in extreme cases, or in moderate cases, at a rate of 0.01 per foot. These beetles find spider mites by smell and quickly move to new infestations, leaving behind their eggs and larvae to finish the job. The stickiness of the flower head will not deter these beetles.

Another strategy to control spider mites is to plant bush bean plants amongst the crop. In some crops, such as tomato, this is a very effective strategy for pulling spider mites off the crop. Bean plants are also easy to monitor, as they show spider mite damage within hours. If the beans are moderately successful, apply *persimilis* to them to create a “banking” system, generating more *persimilis* that will move into the crop. If the beans are highly successful at attracting the spider mites, carefully remove them along with the spider mites and plant some more beans.

APHID CONTROL:

Aphids are attracted to soft new plant growth. Aphids themselves seldom cause permanent damage, but their excrement “honeydew” can lead to sooty mold. Honeydew in turn, attracts ants. If you have aphids, you must eliminate any ants first. Ants “farm” aphids, so they can feed on the honeydew. They will protect the aphids from predation and sometimes actively move aphids around to “greener pastures” within your crop.

Once the ants are gone, aphids can easily be controlled with *Aphidoletes aphidimyza* at a rate of 0.01 per square foot, weekly, until the aphids are eliminated. If you have a history of aphids, continue at this rate weekly for the duration of the crop. Root aphids are insidious and can be difficult to diagnose and observe. The soil mite *Stratiolaelaps* controls root aphids and weevils, but only in the first and second instar larvae, so, using these mites to control an existing problem will take a long

time. Applying *Stratiolaelaps* when the plants are first rooted is the only effective way to manage root aphids.

THRIPS CONTROL:

Thrips cause damage that is similar to spider mites. Thrips tend to scrape the leaf surface while spider mites pierce the leaf tissue and extract the chlorophyll. Thrips are tiny pests, capable of limited flight. They are attracted to yellow and blue sticky traps, which when used in large enough numbers, can become effective management tools. You can increase the trapping rate by a factor of 10 by attaching a cotton ball to the sticky trap and adding a few drops of vanilla or almond extract to the cotton ball. Beans are also very attractive to Thrips, allowing both early detection and possibly a better target.

There are only a few available biological controls to combat thrips. The predatory mite *Neoseiulus cucumeris* is the best choice. These mites attack the first and second instar larvae. If enough *cucumeris* are present they are extremely effective. *Cucumeris* sense the thrip emerging from the leaf, wait for the thrip to stick its head out, and bite it off. The presence of *Stratiolaelaps scimitus* or *Gaeolaelaps gillespiei* in the soil will effectively reduce the cycling of the thrips, by a factor of up to 80%.

When Thrips get overwhelming, soapy baths on the floor with vanilla, or almond or peppermint, can have an amazing trapping effect.

WHITEFLY CONTROL:

Whitefly is not a common pest in marijuana crops but because pests tend to adapt, it is important to be on the watch for them. Whitefly is a close relative to the aphid; both of them suck. Both pests rapidly create excessive honeydew that leads to sooty mold. If any whitefly is seen on the yellow sticky cards, begin applying the parasitic wasp *Encarsia formosa* at a rate of 0.02 per square foot, weekly. Beans are also very attractive to Whitefly, so, this is another reason to use beans.

SUMMARY:

- Always start your plants with an application of soil mites for fungus gnat and root aphid control
- Always start the plants with the predatory mite *fallacis* for mite prevention
- Localized spider mite outbreaks can be treated with *persimilis*
- Severe spider mite outbreaks in poor climates can be dealt with using the beetle, *Stethorus*
- Bush beans can be used to monitor and trap most damaging insects
- Thrips can be controlled with *cucumeris* and sticky traps that have been treated with vanilla or almond extract.
- Rooting areas should have some *Dalotia* present at all times

Content Courtesy of Applied Bio-nomics Ltd.