Abiotic vs. Biotic Issues in Hemp Fields

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**Take home message:**
Understanding and managing both abiotic and biotic issues is crucial for successful hemp cultivation. Regular monitoring, proper soil management, and timely intervention are key strategies for optimizing yields.

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**Plant biotic disease:** A change in the structure or function of a plant caused by living organisms including fungi, bacteria, viruses, and nematodes. They can be transmitted by insects.

**Abiotic disorder:** Caused by non-living things including nutrient deficiencies, weather, and water stress.

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Abiotic disorders are caused by non-living factors:

- **Soil pH Imbalance:** Hemp thrives in a slightly acidic to neutral soil pH. A sub-optimal pH can cause leaf chlorosis and necrosis that can mimic nutrient deficiencies or disease.
- **Water Stress:** Hemp requires well-drained soil but also consistent moisture levels for optimal growth. Wilting, leaf curling, and lodging are signs of water stress (Figure 1).
- **Temperature Extremes:** Frost or heatwaves can negatively impact hemp’s physiological processes. Leaf curling and scorching are common symptoms associated with high heat.
- **Nutrient Deficiencies or Excess:** Imbalances in essential nutrients such as nitrogen, phosphorus, zinc and potassium can lead to nutrient deficiencies (Figure 3A). Chlorosis of entire leaves and discoloration along leaf veins are common.
- **Wind and Physical Damage:** Strong winds can physically damage hemp plants, leading to breakage or uprooting. Leaves may have holes and stems could snap.

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**Figure 1.** Abiotic issues typically have a pattern of injury where more than one plant is affected. Here, the hemp is lodging as a result of standing water in the field.
Abiotic Cues

- **Distribution:** There is often a pattern of injury in the field for abiotic issues. Symptoms caused by a pathogen (biotic disorder) tend to have an irregular distribution. Regular scouting and recordkeeping are important.
- **Age:** Abiotic issues will typically affect one age of plant tissue. New growth on the plant should appear normal, assuming that the abiotic factor is corrected.
- **Timing:** Abiotic issues arise quickly, while biotic issues build up gradually. Monitor environmental conditions, such as temperature, humidity, and sunlight.
- **Other crops:** Nearby crops will have the same symptoms as the affected hemp. Biotic diseases are typically hemp-specific.

Biotic Cues

- Insect-damage will manifest as eggs, webbing, cast skins, frass, and the presence of the pest itself.
- There is often a “sign” of the pathogen, including spores, mycelium, and overwintering structures.
- Check for pathogen signs when an issue is observed. It is important to look at all plant parts (flowers, leaves, stems and roots).
- Viruses can manifest as leaf curling, spotting, and stunted growth.

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