UF/IFAS Industrial Hemp Pilot Project: Invasion Risk

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Goals

A primary goal of the Industrial Hemp Pilot Project is to better understand the invasion risk of hemp in Florida, and to develop best management practices (BMPs) for hemp transportation, plantings, and harvesting to mitigate invasion risk.

Background

Invasions of non-native plant species are a significant ecological and economic problem for the state of Florida. More than 1400 non-native plant species occur in the state but only 11% of species have escaped cultivation and 6% have invaded natural areas. Although only a small fraction of non-native species are problematic, invasions in natural areas cause severe economic and environmental damage. Invasive species have significant impacts on the state's agriculture, tourism, and recreation industries, and more than $45 million is spent per year to manage plant invasions in Florida's natural areas.

Hemp is a problematic invasive species and a weed of agriculture globally and throughout much of the Midwest US. A recent evaluation by the UF/IFAS Assessment of Non-native Plants in Florida's Natural Areas found that hemp is a 'high invasion risk' for Florida, primarily because of its biological characteristics and because it has escaped and colonized natural areas in other states and countries. Historically, when hemp has escaped cultivation in Europe, Asia, and the Midwest United States, it has established in agricultural and in highly disturbed areas.

We seek to better understand the ecology, biology, and invasion risk of hemp with a focus on the questions:

- Where and when might hemp become invasive?
- Does invasion risk vary among cultivars?
- How long are seeds viable in the soil?
- What are the major hemp seed dispersal pathways?
- What management practices will best mitigate invasion risk?

Fig 1. Young hemp plant established in a high-disturbance plot along the forest edge at the Bivens Arm Research Site, Gainesville.

Research Plan

To predict scenarios where hemp poses the greatest invasion risk, and to help develop BMPs, we are conducting multiple research projects, including:

1. **Establishment experiment.** A field experiment based on "what if" scenarios where we introduce hemp under realistic conditions that might be expected if seeds were left in an agricultural field, lost during transport, or dispersed to a natural area. Currently, we are testing different numbers of seeds introduced, levels of disturbance, field and forest habitats susceptible to disturbance, and different cultivars. Initial results suggest that high numbers of seeds introduced into open disturbed habitats present the greatest risk of invasion.

2. **Seed persistence experiment.** A field experiment where seeds of hemp cultivars are planted at different time intervals to determine how cultivar identity and timing of introductions influence persistence of seeds in the soil. The experiment will be conducted for up to a year or more to evaluate the duration of seed dormancy and viability.

3. **Seed biology.** Lab and growth chamber experiments to better understand how seed viability changes based on seed size, submergence, planting depth, and other factors. These experiments will help us better understand how variability in seed characteristics and early seedling growth might influence invasion risk.

Fig 2. Hemp seeds emerging under high disturbance conditions in the (a) forest and in the (b) open field. *Cannabis sativa* is adapted for high light environments and in forest where there is little light available seedlings become spindly and lighter in colour.