

DAAD RISE Worldwide

Project: Hemp Physiology Modeling

Scientific research question: Hemp is a strain of *Cannabis Sativa* which is grown for industrial use as fiber, fuel, and phytochemicals. Given the ongoing legalization in many states of the US and globally, the hemp crop is receiving renewed attention among farmers, industry, and academia. Particularly in the state of Florida, due to the recent decline in citrus production and tree plantings lost to natural disasters, hemp is seen as a promising high-value crop for farmers and of great importance for the economy. Despite the positive market outlook, multiple studies highlight the current lack of knowledge about hemp production. Understanding different growing systems (e.g., fiber vs. medicinal hemp), as well as how yield and quality parameters (e.g., fiber and CBD content) are influenced by genetics, management and environment is of special importance. Growers are therefore currently facing a complex decision in an uncertain environment, ultimately limiting the potential of the hemp crop as a sustainable source of fiber and resources. In this context, developing a model-based decision support system will be useful to address some of the challenges of hemp growers and other stakeholders.

Experimental approach: Crop simulation models describe the process of crop growth and development as a function of weather, soil, and crop management. Diverse and detailed experiments representing crop growth across various environments are necessary to develop and advance crop models. The University of Florida's Institute for Food and Agricultural Sciences Industrial Hemp project (<https://programs.ifas.ufl.edu/hemp>) is currently pioneering hemp production in Florida via multiple field trials at different locations. More specific trials are planned to analyze and document the physiological response of the hemp crop to specific environments or stresses. Experimental data will be collated into predictive models through mechanistic or statistical approaches.

Possible prospective tasks of the intern: The intern can assist with literature review, experimental setup, data collection in field or greenhouse/growth chamber trials or analyzing modeling approaches on existing datasets. Specific observations of interest for modeling purposes are growth stages, biomass and crop components and environmental parameters such as weather, soil moisture and nutrients. Depending on the research interests and skills, the project can be adapted to suit a course project or bachelor thesis at his home institution.

General information: The prospective intern will be hosted in the Department of Agricultural and Biological Engineering (<https://abe.ufl.edu/>) within the working group of my advisor Gerrit Hoogenboom. The group comprises circa 5 staff and 10-15 students and visiting researchers, working on various aspects of crop and ecosystem modeling for agronomic management, food security and climate change adoption. The department houses the maintenance of the "DSSAT" crop modeling ecosystem, a major international initiative for crop and ecosystem modeling. The University of Florida (UF) is ranked among the top ten public university in the USA with over 50 000 students and 14 000 staff. The campus is in the city of Gainesville, a typical southern college town in North-Central Florida with about 290 000 inhabitants in the metropolitan area. Gainesville is near major cities such as Orlando (2h), Jacksonville (1.5h), Tampa (2h) and Miami (4.5h). Attractions in the surrounding area range from beaches and marshes with rivers and natural springs to typical southern culture, art, and tourist attractions such as Universal Studios and the Kennedy Space Center. As an international student myself, I strive to welcome you to the US and hope that you can experience the Sunshine State in all its diversity.

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