

II. Research Proposal

The regulations require the completion of a research proposal before your research license application can be considered. If you completed a Pre-Application and Pre-Application Research Proposal and want to certify your Pre-Application Research Proposal for use as your research proposal on this research license application, you must complete all provisions of the research license application and submit a copy of your Pre-Application Research Proposal. As the Primary Applicant, you will be given the opportunity to certify your request in the Acknowledgment Section below. **To be able to certify your Pre-Application Research Proposal, the Primary Applicant must be the same individual that completed the Pre-Application and Pre-Application Research Proposal.**

Your research proposal must explain the research you plan to conduct on behalf of the Kansas Department of Agriculture. Your research proposal will play an important role in the evaluation of your research license application and approval to participate in the Program.

Below are possible research topics that may be useful areas of study. Once you have determined the area of your research, explain in detail, on the following pages, the specific subject your research will cover.

- Agronomic research and analysis of soils, growing conditions or water usage required to successfully grow industrial hemp.
- Research on types of industrial hemp seed that are best suited to be grown in Kansas, including seed availability, creation of hybrid seed types, in-the-ground variety trials and seed production.
- Agronomic research and analysis of the most efficient types of equipment and techniques for seeding, tillage or harvest.
- Agronomic research and analysis of the most effective, economical and environmentally beneficial pest control or fertilization products or methods.
- Analysis of the management techniques and/or environmental factors that impact the delta-9 tetrahydrocannabinol (THC) concentration in industrial hemp.
- A study on the feasibility of attracting federal and private funding for industrial hemp research.
- Analysis of the economic feasibility of developing markets for the various types of industrial hemp that can be grown in Kansas.
- Research and analysis of the most efficient types of equipment and techniques for transporting industrial hemp plants, plant parts, grain or seeds.
- Analysis of the estimated value-added benefits, including environmental benefits, that Kansas businesses would reap by having an industrial hemp market of Kansas-grown industrial hemp varieties.
- Research and analysis of the most efficient types of equipment and techniques for processing industrial hemp plants, plant parts or grain.
- Analysis of the economic feasibility of developing markets for varieties of industrial hemp seed in and beyond Kansas.
- Research into the development of national and international markets for Kansas-grown industrial hemp and industrial hemp products.
- Analysis of the most efficient and economical methods for distributing and transporting Kansas-grown industrial hemp and industrial hemp products.
- Other types of research into the economic development, cultivation, market analysis, manufacturing, distribution and transportation of industrial hemp and industrial hemp products.

Research Proposal Instructions:

- **Complete the following sections**, either by utilizing the fillable form or by providing your answers on a separate page(s). *Handwritten submissions are strongly discouraged.*
- **If answering on a separate document**, please label each section (A-F).
- **Be concise:** Your research proposal should be as concise as possible; **not to exceed 2 pages total.**
- **For more information on how to write a research proposal**, please see the Technical Bulletin on How to Conduct Research on Your Farm or Ranch by visiting <https://www.sare.org/Learning-Center/Bulletins/How-to-Conduct-Research-on-Your-Farm-or-Ranch>.

SECTION A: Identify your research question and objective, including a statement of the type of research to be conducted and its purpose.

Research questions:

What is the best way to identify and quantify cannabidiol (CBD) and tetrahydrocannabinol (THC) in industrial hemp.

Which hemp variates and under what growing conditions and systems are best for Kansas.

How handling, storing and transportation conditions effect the quality of hemp.

We would like to develop and validate analytical methods, with the use of LC-MS system, that can be used to identify and quantify the cannabidiol (CBD) and tetrahydrocannabinol (THC).

With this tool we will be able to identify hemp varieties that are best suited for different growing conditions and growing systems in Kansas. Additionally we are interested to researching how the different handling, storing and transportation conditions effect the quality of industrial hemp regarding the concentrations of CBD and THC.

SECTION B: Identify your experimental design.

A method will be developed using available literature and industry experts. The developed method will be validated for the analytical performance characteristics: accuracy, precision, specificity, detection limit, quantitation limit, linearity and range.

We are going to evaluate the concentrations CBD and THC for different varieties that are growing in different gowing conditions and in different production systems. The plans will be grown from licensed growers and research collaborators which would utilize a randomize complete block design with 4 replications for their trials.

Different temperature and humidity conditions would be applied during transportation and storage in order to identify the best conditions in regards the quality of hemp in regards of the CBD and THC content. Every combination of temperature and humidity will be replicated at list 4 times.

SECTION C: Explain what will be measured and what data will be collected.

To validate the method we are going to use proper standards and we are going to collect data that provide evidence of accuracy, reliability repeatability of the method for the LC equipment that we are using.

We are going to measure the total content of CBD and THC as well as the individual compounds for the different varieties that are growing in different growing conditions and different systems in order to identify the ones that are best suited for Kansas.

During storage and transportation we are going to monitor temperature and relative humidity in order to identify the optimum conditions to maintain hemp quality regarding the CBD and THC content.

SECTION D: Explain how the project will be implemented, including location and size of your anticipated research areas (in acres or square feet), duration of your research operations and variety of industrial hemp that will be used in your research.

This project will be conducted at the K-State Olathe campus at the postharvest physiology lab, 773 square feet. The plants will be grown from licensed collaborators in different geographical areas in the state of Kansas. We are planning to analyze samples from approved varieties (please see the attached variety list) that will be subject to different treatments as described in section B. This project will span one growing season.

SECTION E: Explain how research data will be collected, recorded and analyzed.

Data will be collected and recorded by K-State employees who are named on the license. Analysis of Variance (ANOVA) will be conducted with a standard statistical software package (JMP).

SECTION F: Explain how the data will be interpreted and how conclusions will be drawn, including anticipated results.

We are going to use the results of statistical analysis of the validation data to evaluate the validation characteristics against predetermined acceptance criteria. Data will be interpreted using standard means separation procedures in JMP that will be used to rank varieties according the content of CBD, THC. Conclusions will be drawn based on statistical analysis of the data. We anticipate finding significant differences among the varieties, the production methods and systems in Kansas. We also expect that the different storing and transportation conditions (temperature and relative humidity) will have an effect on CBD:THC relationship.

2019 Kansas Industrial Hemp Research Program

Research Report (Grower, Distributor, Processor and State Education Institutions)

Please review K.A.R. 4-34-20 (Reports) before completing and submitting the required document.

K.A.R. 4-34-20(h-i). Research Report

(h)...Each primary licensee shall prepare and submit a research report to the department no later than November 30 each year. Each research report shall include the following, at a minimum:

- (1) A summary of the research conducted;
- (2) a description of the methods and materials used in conducting the research;
- (3) the results of the research; and
- (4) an analysis of the results.

(i) All research conducted and all reports submitted to the department as part of the pilot program shall become the property of the department, and no compensation shall be due from the department to any licensee. (Authorized by and implementing K.S.A. 2018 Supp. 2-3902; effective Feb. 8, 2019.)

Research Report Instructions:

- Complete the following sections, either by utilizing the fillable form or by providing your answers on a separate page(s). Handwritten submissions are strongly discouraged.
- If answering on a separate document, label each section (A-F).

Please reference the 2019 Kansas Industrial Hemp Research Program's Rules and Regulations found here: agriculture.ks.gov/industrialhemp.

After completion of the **Research Report** form (page 2), attach relevant documentation to support the report if necessary and remit the report by email to kda.industrialhemp@ks.gov or by mail to Industrial Hemp Research Program 1320 Research Park Drive Manhattan, KS 66502 no later than November 30, 2019.



1320 Research Park Drive
Manhattan, KS 66502
kda.industrialhemp@ks.gov

2019 Industrial Hemp Research Program Research Report

Primary Licensee: _____



License Number: _____

Date: _____

SECTION A: Restate your research question and objective; please indicate if the research question or objective changed. Why did you choose to study this research question and objective?

SECTION B: Restate your experimental design. Did it change over the course of your research?

SECTION C: Explain how the project was implemented, including location and size of your licensed research areas (in acres or square feet), duration and applicable activities (germplasm acquisition, handling, planting, distributing, planting, harvesting, drying, and processing) of your research operations and variety(s) of industrial hemp used in your research.

SECTION D: What data was collected? How was the data measured? Provide the collected data.

SECTION E: What were the results of the research? Were the results what you anticipated? Explain.

SECTION F: Interpret the results as it relates to the research question and objective. Draw conclusions upon your analysis.