Institute of Cannabis Research
COLORADO STATE UNIVERSITY PUEBLO

Annual Report

2025

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LETTER FROM

The Chair of the Governing Board

As Chair of the Governing Board of the Institute of Cannabis Research (ICR), I'm excited to share highlights from what has been a truly transformative year. From groundbreaking research to new educational programs and deeper community engagement, we've made meaningful progress—and I'm proud to walk you through what we've accomplished together.

Research That's Making a Difference

This year, our funding of research efforts really paid off. The ICR has supported many new peer-reviewed publications and helped our researchers secure more than $9 million in additional funding. Despite a tough budget year, we successfully preserved our core funding. Originally facing a $950,000 cut from the state budget, we worked with state legislators to reduce that to $725,000. To this end, the ICR has funded three new innovative grant proposals this next year, covering topics including use of cannabis for chronic spine pain, cannabis-impaired driving, and cannabidiol metabolites. We have also updated our RFA cycle for next year with streamlined review processes/timelines and enhanced conflict-of-interest protocols.

Building the Next Generation of Cannabis Experts

We're thrilled to announce the launch of the ICR Certificate of Foundational Studies in Cannabis, a 16-credit program starting in fall 2025 through CSU Pueblo's Extended Studies. This program covers everything from cannabis regulation to health effects and contamination, and it's designed to prepare students for real-world engagement with the industry.

Growing Support for Our Mission

Our first-ever fundraising dinner in February 2025 was a big step forward. We welcomed 148 attendees and the evening featured inspiring talks from Governor Jared Polis, Ed Perlmutter, and Joel Stanley, and we honored Paige Figi with our inaugural ICR Award of Excellence.

Connecting Through Conferences

We're gearing up for the 9th annual Cannabis Research Conference 2025, happening October 6–8 in Portland, Oregon. This conference is a premier event for advancing cannabis science, covering areas like medicine, textiles, food, and more. It brings together leading researchers, innovators, and industry representatives.

What's Next

Looking forward, we're focused on launching our new certificate program, funding impactful research, expanding our donor base, and building partnerships with public agencies, Colorado legislators, and academic institutions. Our marketing team has been hard at work improving our website, launching researcher blogs, and reaching out with podcasts and media outlets. We're also creating helpful resources for new cannabis researchers and building stronger connections with regulatory agencies and donors.

The future is bright, and we're ready to keep pushing forward.

Warm regards,

Dr. Jon Reuter

Chair, Governing Board

Institute of Cannabis Research

CALLS TO ACTION

For Researchers

- Explore new funding opportunities and join a growing network of cannabis researchers.
- Visit the ICR website for RFA announcements and conference updates.
- Engage with our certificate program and contribute to cannabis science.

For Legislators and Policymakers

- See how ICR delivers measurable impact for Colorado's public health and economy.
- Review our Annual Report and ROI documents to understand our value.
- Partner with us to support evidence-based cannabis policy and innovation.

For Community and Industry Partners

- Discover how ICR is building a healthier, more informed Colorado.
- Support our mission through donations, partnerships, and event participation.
- Join us at CRC 2025 and explore our educational and research initiatives.

Dr. Malik Hasan

Dr. Melissa Reynolds

Dr. Cinnamon Bidwell

Dr. John Harloe

Ms. Elyse Contreras

Dr. Gail Mackin

Mr. Sherard Rogers

Mr. Scott McWhorter

Dr. Joanna Zeiger

Dr. Jon Reuter

Mr. Mike Hennesy

ABOUT THE Governing Board

The ICR has a state appointed Governing Board that plays a critical role in the operation of the Institute. The Board is comprised of four ex officio members including Dr. Jon Reuter (representing the President of the University of Colorado System), Dr. Gail Mackin (representing the Chancellor of the Colorado State University System), Ms. Elyse Contreras (representing the Executive Director of the Colorado Department of Public Health and Environment), and Mr. Scott McWhorter (representing the Executive Director of the Colorado Department of Higher Education). The members representing cannabis-related industries include Mr. Sherard Rogers, Dr. Malik Hasan, and Dr. John Harloe, JD, and Mr. Mike Hennesy. There are three Board Members associated with cannabis-related research that include Dr. L. Cinnamon Bidwell, Dr. Joanna Zeiger, and Dr. Melissa Reynolds. In addition to serving important roles supporting the operation of the ICR, the Board brings a wealth of diverse experience and knowledge that directly relates to cannabis research.

Highlights

FROM THE BOARD

Joanna Zeiger

"Serving on the ICR Board has been one of the most meaningful ways I've been able to give back to both the state and the research community I care about deeply. As a researcher focused on the impact of medical cannabis on chronic illness and mental health, I've seen firsthand how much we still need rigorous, responsible science to guide policy, support patients, and improve public health. Being part of the ICR Board allows me to help shape how cannabis research can best serve Coloradans.

For the past five years, I've also served on the planning committee for the annual Cannabis Research Conference (CRC), which continues to grow as a national hub for education, collaboration, and evidence-based dialogue. The conference is one of the many ways the ICR fulfills its commitment to widely disseminate information. One of the ICR's greatest strengths is its mandate to fund research through a competitive, merit-based process and sharing findings with scientists, policymakers, healthcare providers, and the broader public.

I volunteer my time because I believe research should be inclusive, accessible, and grounded in real-world needs. The ICR makes that possible and I'm proud to be part of it."

Mike Hennesy

"As Vice President of Innovation at Wana Brands, I lead scientific research and product development initiatives for one of the nation's largest cannabis edibles companies. Serving on the Board of the Institute of Cannabis Research has been a rewarding experience for me. As someone who has spent the past decade immersed in cannabis science and product innovation, I believe strongly in the importance of grounding this rapidly evolving industry in rigorous, transparent research. The ICR plays a unique and vital role in Colorado and nationally by funding independent studies, convening thought leaders, and supporting the next generation of researchers. This past year, I was especially encouraged by the launch of the ICR Certificate in Foundational Studies in Cannabis. This program expands access to quality cannabis education and will help build a pipeline of informed professionals ready to shape the future of the cannabis sector. From the Journal of Cannabis Research to the annual Cannabis Research Conference, the ICR continues to foster meaningful dialogue across disciplines. I volunteer my time because I believe that evidence-based cannabis policy and product development can only happen when organizations like the ICR lead the way with integrity and curiosity."

LETTER FROM THE DIRECTOR

Dr. Chad Kinney

It never ceases to amaze me how fast each year goes by.

Over the past few weeks, I've been reflecting on the Institute of Cannabis Research (ICR) in Fiscal Year 2025 and considering the theme for this letter. While many topics come to mind, I'll focus on two: 1) the nature of research, and 2) the outcomes of the cannabis research ICR supported this past year.

Regarding the nature of research: One of the most common questions we receive is whether research projects supported through the ICR are "pro- or anti-cannabis." This framing, in my view, is misguided. Research is not about advocacy—it's about inquiry and commonly intended to improve the human condition. While studies often examine potential cannabis-related concerns or benefits, they are driven by hypotheses intended to generate reliable knowledge and inform decisions across society. As the ICR matures, its scientific contributions have grown significantly in both substance and influence. Not only have ICR-funded researchers generated valuable findings, but they've also secured major external funding, drawn in a new generation of scholars, and expanded ICR's impact through our conference, journal, and webinars.

On outcomes: ICR-supported researchers are asking complex questions. While science often demands patience, we're now reaching a stage where long-term projects are yielding concrete findings. For instance, studies have shown that preoperative cannabis use can affect postoperative pain management, cannabidiol (CBD) use during pregnancy may have unintended effects on offspring, and ICR researchers—alongside global partners—have produced the most complete Cannabis sativa reference genome (99.6%). These outcomes are substantial, yet nuanced, and often require careful interpretation to grasp their full implications.

Looking ahead, the ICR—recognized globally as a leader in cannabis research—has a unique opportunity to deepen its role in clinical research. Many pressing questions from consumers, regulators, and policymakers require studies involving human participants. However, such research is resource-intensive and highly regulated. Despite its underrepresentation in current literature, the ICR is well-positioned to help fill this critical gap. Doing so, however, will require greater support at a time when resources for research are increasingly strained.

To meet this need, the ICR launched new advancement efforts and partnerships this year, starting with our first annual Dinner for the Advancement of Cannabis Science, which drew over 150 leading stakeholders from across the country. With strong community support, the ICR's research can further empower consumers, clinicians, and policymakers to make informed decisions about cannabis as it intersects with so many different aspects of our great society.

I encourage readers to explore this annual report for more detail on the impactful, hard-earned cannabis research results and outreach activities supported through the ICR.

With Gratitude,

Chad A. Kinney, Ph.D.

FISCAL YEAR 2025

Budget

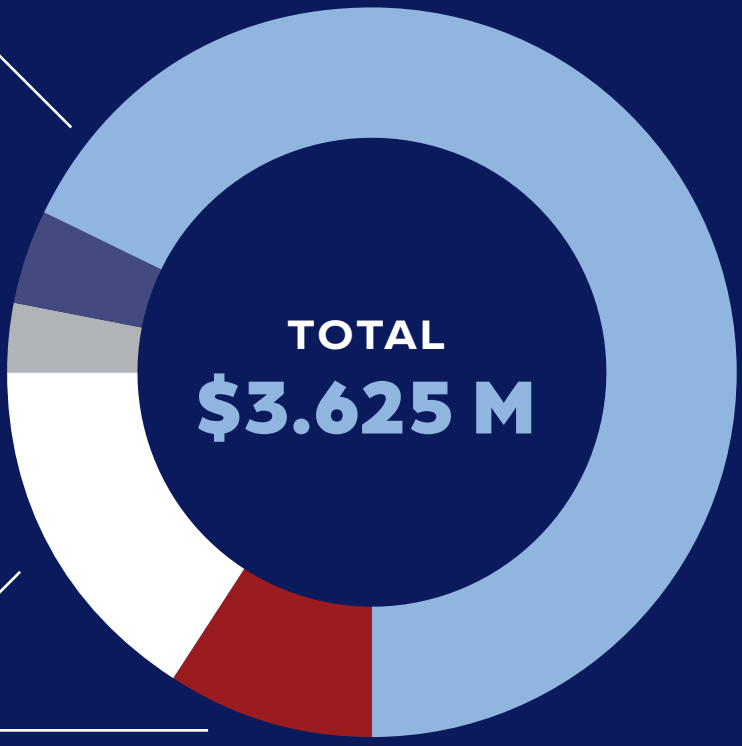
68% CANNABIS RESEARCH
$2,439,000
(Research conducted at institutions throughout Colorado)

4% OUTREACH
$151,000
(e.g. Conference and Journal of Cannabis Research)

3% OPERATIONS
$118,000
(e.g. Software and Marketing & Communication)

16% PERSONNEL
$588,000

9% INDIRECTS
$329,000



The budget for the Institute aligns with its mission and priorities. At the forefront is the direct investment in cannabis research. This work is conducted by talented researchers throughout the state of Colorado primarily at institutions of higher education. In addition to supporting meaningful cannabis research the ICR is called to support the dissemination of cannabis research, which it does through three key mechanisms: the annual Cannabis Research Conference, sponsoring the Journal of Cannabis Research (the top cannabis research journal on the globe), and two monthly webinar series open to the public. Combined the budget categories of Research and Outreach, which captures dissemination activities, makes up more than 70% of expenditures during FY 2025. The majority of the remaining resources are investments in the ICR's staff who carry out the mission of the ICR and operational costs in executing the work of the Institute. The resources from the State of Colorado are further leveraged for a greater impact on cannabis science through volunteers such as the members of ICR's Governing Board that volunteer their time in support of the mission of the ICR; volunteers from around the country that invest time to assist with planning and program development for the annual conference; and through a growing number of private and public partnerships.

MEET THE ICR Staff

Dr. Chad Kinney

DIRECTOR

Dr. Kinney joined Colorado State University Pueblo in 2007 as a member of the Chemistry Department. In addition to serving as the Director of the ICR, Dr. Kinney has also served as the Chair of the Chemistry Department and served a year as interim Provost for the campus. Dr. Kinney's research interests include environmental chemistry related to pharmaceuticals and personal care products as environmental contaminants as well as cannabinoid chemistry and analytical techniques associated with cannabinoids. As Director of the ICR, Dr. Kinney works with a talented staff, a dedicated Governing Board, and researchers from around Colorado to ensure that the Institute meets the role and mission that the state has charged the ICR with.

Dr. John Williamson

ASSOCIATE DIRECTOR OF ICR RESEARCH DEVELOPMENT

Dr. Williamson began working with the ICR in 2019 and currently serves as the Associate Director of the ICR's strategic development team, advising on research partnerships, collaborations, and external funding opportunities. After 25 years, Dr. Williamson retired as a tenured professor of medicinal chemistry at the University of Mississippi, then accepted a position as a branch chief of basic and mechanistic research at the National Institutes of Health, and has also served as a research consultant for a variety of governmental agencies, private industry, the media, and many prestigious universities across the country. His duties at the ICR include coordination of the research webinars, serving on the conference planning committee, the outreach team, and the ICR grants program.

Dr. Sanghyuck Park

ASSOCIATE DIRECTOR OF RESEARCH

Dr. Sanghyuck Park is a plant molecular biologist specializing in cannabis physiology and genetics, with a focus on how cannabis interacts with environmental stresses. Since joining the Institute of Cannabis Research (ICR) in 2017, he has published 36 peer-reviewed articles and delivered over 50 conference presentations. He is passionate about education, actively mentoring CSU Pueblo students and leading the ICR Cannabis Plant Science and Cultivation webinar series. Dr. Park currently serves as Associate Director of Research at the ICR, where he leads interdisciplinary projects and fosters international cannabis research collaborations.

Dr. Jeff Smith

STRATEGIC PARTNERSHIP AND OUTREACH SPECIALIST

Professor Smith is an accomplished neuroscientist with research expertise focused on learning and memory and neurodegenerative diseases. This includes multiple publications in cannabis-related research. Professor Smith is an experienced leader on the CSU Pueblo campus as Director of the Cannabis Biology and Chemistry Degree Program, former Director of the graduate program in the Biology Department, and former Chair of the Biology Department.He was also part of the team that created the vision which led to the establishment of the ICR in 2016, as well as helped provide early leadership of the ICR as a member of the Institute's Steering Committee and served as the Interim Director of the institute for fiscal year 2022/2023.

Ms. Julie Powell

OPERATIONS ASSISTANT

Ms. Julie Powell joined CSU Pueblo in 2023 and is new to the ICR. She received BA's in Anthropology and Global Studies from the University of North Carolina at Chapel Hill and completed her Master of Education in Student Development and Leadership in Higher Education at Angelo State University. She has over a decade of experience in education to include counseling and teaching in K-12 as well as grant-funded program management and work-based learning in higher education. Julie has joined the team to support the overall operation and mission of the ICR.

Mr. DuShunte Carmon

FORMER GRANTS MANAGER AND PROGRAM OFFICER

DuShunte D. Carmon received BA's in both Sociology and Behavioral Science from San Jose State University, a MS Degree in Sociology/Criminal Justice from Clark Atlanta University, and a Paralegal Certification from Emory University. Mr. Carmon has taught courses at Morehouse College, Clark Atlanta University, University of Memphis, and Voorhees College. Mr. Carmon was a Field Researcher and Data Analyst for Morehouse College in collaboration with the Department of Highway Safety, Seat Belt Study in 2001, as well as being a Research Associate for Morehouse College. Mr. Carmon has previously served as the Grants Manager, responsible for managing research relationships with institutions and investigators supported through the ICR.

Ms. Wendy Fairchild

FORMER PROJECT ASSISTANT

Ms. Fairchild worked for the ICR as the Office Manager for six years and was promoted to the Project Assistant for the department last year. Ms. Fairchild worked with many offices on campus and oversaw administrative needs of the staff and governing board and assisted with organizing the annual cannabis conference and with maintaining the ICR webpage. Ms. Fairchild created, published, and distributed all in-house ICR outreach materials including the bi-monthly e-newsletter, annual reports, webinar ads, email blasts, news items, and managed the ICR's social media content.

Dr. Ingrid Carolina Corredor Perilla

VISITING RESEARCH SCHOLAR / POSTDOCTORAL RESEARCH ASSOCIATE

Carolina Corredor is a microbiologist with a PhD in Agroecology from the National University of Colombia. She has over six years of experience teaching agricultural microbiology, biology, and the role of microbes in the cannabis industry. As a postdoctoral researcher at the ICR, Dr. Corredor is preparing manuscripts on the biotic and abiotic factors that affect cannabis cultivation. She also mentors bachelor's students on projects in aged seed biology, physiology, and seed germination quality.

Dr. Eun-Soo Kim

VISITING RESEARCH SCHOLAR

Dr. Kim joined the ICR as a visiting scholar in 2019 conducting a glandular trichome project. His background is in plant cell biology and development. Dr. Kim previously served as a professor of biology department at Konkuk University in South Korea. He has been focusing on education and research of Cannabis for over 30 years. Currently, Dr. Kim has taken part in the USDA project as a SME to develop the courses of CBC Program. He will teach the new courses of the CBC Program in the fall semester of 2025.

Dr. Byeong-Ryeol Ryu

VISITING RESEARCH SCHOLAR

Dr. Byeong-Ryeol Ryu is a plant molecular biologist from Kangwon National University, South Korea, with research expertise in cannabis stress physiology and molecular genetics. During his tenure as a visiting scholar at the Institute of Cannabis Research (ICR), he contributed to collaborative efforts focused on hemp variety development and comparative genomics. His work integrates biochemical and molecular approaches to investigate stress responses in cannabis and develop strategies for their mitigation.

SUMMER 2025

New Research Projects

Effects of Cognitive Decline, Age and Tolerance on Cannabis-impaired Driving in Older Adults: Observational Study

Carolyn DiGuiseppi, MD, PhD, MPH
Professor of Epidemiology,
Colorado School of Public Health,
University of Colorado Anschutz Medical Campus

Many adults ages 65 and older who regularly use cannabis have driven under its influence. Yet there is little research to understand how cannabis affects driving in this age group. Conditions that may affect older adults, such as aging brain or slowing metabolism – might worsen cannabis' effects on driving. The effects of cannabis in older adults might also vary depending on whether they use it daily or less often. We aim to learn how inhaled cannabis affects driving performance in older adults. We will investigate how age, underlying brain function, and frequency of use influence cannabis' effects on driving. Our ultimate goal is to support driving safety among older adults.

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Samuel Gockel, Ph.D
Assistant Professor
of Organic Chemistry,
Colorado State University Pueblo

Diversity-Oriented Chemical Synthesis of CBD Metabolites: Enabling Translational Research

Hemp has historical, cultural, and medicinal significance, but modern research has been restricted by regulations. Only recently has cannabidiol (CBD), a major hemp cannabinoid, become widely available in the U.S. Despite being marketed for conditions like pain and anxiety, CBD lacks FDA approval and remains under-studied. Its extensive metabolism in the human body produces over 140 known metabolites, yet only two have been sufficiently synthesized. Evidence suggests these metabolites may drive CBD's effects, raising therapeutic questions.

READ MORE

Safety and Efficacy of Oral Cannabis in Chronic Spine Pain

Emily Lindley, Ph.D
Assistant Professor of Orthopedics;
Director of the Colorado Cannabis
Research Consortium, University of
Colorado Anschutz Medical Campus

Back and neck (spine) pain are common and disabling conditions that affect 70% to 85% of people at some point in their life. Patients with spine pain are often prescribed opioids, which are only moderately effective for managing chronic pain and are associated with the risk of overdose and misuse/abuse. However, there are few, if any, non-opioid pain medications that are more effective for managing chronic spine pain. Thus, patients and healthcare providers are seeking safe, effective alternatives to opioids for treating chronic spine pain. One such proposed alternative is medical cannabis. Although limited, clinical studies have indicated that cannabinoids may be effective for reducing chronic pain. However, there have been no high-quality clinical trials of cannabis for the treatment of chronic spine pain.

READ MORE

2024 - 2027

Active Research Projects

1

READ MORE

Edible Roulette or a Sure Bet? Evaluating Testing Standards and Consistency in Colorado's Edible Products

L. Cinnamon Bidwell, Ph.D
Institute of Cognitive Science Faculty; Assistant Professor, University of Colorado Boulder

Duncan Mackie, Ph.D
Director of Pharmacology & Experimental Therapeutics

2

Defining Offspring Cardiovascular Consequences of Cannabidiol (CBD) Consumption During Pregnancy

READ MORE

Emily Bates, Ph.D
Associate Professor of Pediatrics, Developmental Biology, University of Colorado Anschutz Medical Campus

3

READ MORE

Examining the Effects of Pesticide Treatments on Pest Populations, Cannabinoid Concentrations and Pesticide Residues in *Cannabis sativa*

Punya Nachappa, Ph.D
Associate Professor of Entomology; Department of Agricultural Biology, Colorado State University

Nirit Bernstein
Professor, Agricultural Research Institute, Volcani Center, Israel

4

Cannabis Use and Neuropsychological Functioning Among Emerging and Older Adults

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Rachel Thayer, Ph.D
Assistant Professor of Neuropsychology, University of Colorado Colorado Springs

5

Cannabinoids as a Treatment for Irritable Bowel Syndrome Symptoms

READ MORE

Melissa Reynolds, Ph.D
Professor of Chemistry, Colorado State University

2023 - 2026

Active Research Projects

1

Endocannabinoids in Children with Autism Spectrum Disorder and Changes with Cannabidiol (CBD) Treatment (2023)

READ MORE

Nicole Tartaglia, MD
Professor Pediatrics Developmental Pediatrics, University of Colorado Anschutz Medical Campus

2

Investigation of Polycyclic Aromatic Hydrocarbons Resulting from Vaped or Dabbed Cannabis/Cannabis-derived Products with Known Adverse Health Effects

READ MORE

Alison Bauer, Ph.D
Associate Professor Department of Environmental and Occupational Health, University of Colorado Anschutz Medical Campus

3

Developing Predictive Models to Distinguish Alcohol Use, Cannabis Use and Co-use: An Exploration of Electroenceph-alography (EEG) Metrics and Traditional Intoxication Measures

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4

Increasing the Analytical Testing Capability of Cannabinoids and Concomitant Phytomolecules in Cannabis-derived Plant Matrices

READ MORE

William Baurerle, Ph.D
Professor Department of Horticulture and Landscape Architecture, Colorado State University

5

Identifying the Neuronal Cell-types Responsible for the Rewarding and Aversive Properties of THC

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David Root, Ph.D
Assistant Professor Department of Psychology and Neuroscience, University of Colorado Boulder

Hollis Karoly, Ph.D
Assistant Professor Department of Psychology, Colorado State University

Patti Davies, Ph.D
Professor Department of Occupational Therapy, Colorado State University

Research Projects

WRAPPING UP IN 2025

Examining the Adaptive Roles of Plant Defensive Chemistry on Pest Resistance in *Cannabis sativa*

Punya Nachappa, Ph.D
Associate Professor of Entomology; Department of Agricultural Biology, Colorado State University

SUMMARY

This study investigates the role of cannabinoids, including cannabidiol (CBD) and cannabidivarinic acid (CBDVA) in Cannabis sativa for aphid defense. Aphids represent a major pest of Cannabis sativa. To assess CBD and CBDVA's impact on aphids, researchers compared aphid populations on high- and low-cannabinoid hemp genotypes and conducted aphid feeding assay with artificial diet fortified with CBD or CBDVA in the lab.

READ MORE

KEY OUTCOMES

- Results showed significantly lower aphid populations on high-CBDVA genotypes,
- Aphid productivity was reduced on high-cannabinoid plants, which have higher trichome density, suggesting a potential physical and chemical defense mechanism.
- Feeding access with elevated CBDVA in the artificial diets reduced aphid survival and productivity.
- Interestingly, feeding assays showed CBD supplementation increased aphid fecundity, suggesting complex interactions but elevated phytohormones indicating a strong plant defense response.
- The findings highlight CBDVA's insecticidal properties and its potential as an environmentally sustainable biopesticide for organic farming.
- Future research is needed to evaluate CBDVA's extraction feasibility, stability, and effects on non-target organisms, offering a promising alternative to synthetic pesticides and a new revenue stream for hemp growers.

Potential Health Effects of Heavy Metals in Cannabis Flower, Concentrates, Vape Devices and Vape Emissions

Mike Van Dyke, Ph.D
Associate Professor, Center for Health, Work, and Environment, Colorado School of Public Health, University of Colorado Anschutz Medical Campus

Kathy James, Ph.D
Associate Professor; Climate & Human Health Doctoral Program Director, University of Colorado Anschutz Medical Campus

SUMMARY

This study investigated heavy metal metalloid content in cannabis samples from Colorado. Analysis included the commonly regulated arsenic, cadmium, lead, and mercury, along with 17 additional metals and metalloids. Samples underwent elemental analysis using inductively coupled plasma-mass spectrometry. A total of 60 flower samples were tested, including samples from indoor (n=20) and outdoor (n=20) growing facilities as well as failed regulatory samples (n=20).

KEY OUTCOMES

- Most samples had concentrations of metals and metalloids below the limit of detection.
- Indoor-grown flowers had lower barium, lithium, and selenium levels compared to outdoor-grown flowers.
- Samples that failed state regulatory testing for metals and metalloids also had higher levels of chromium.
- Approximately 17% of samples had elevated concentrations of copper (Cu) and manganese (Mn) that were above the upper limit of quantitation.

READ MORE

Examination of the Bi-directional Interactions Between Phytocannabinoids and a Human-associated Gut Microbiota

Jessica Prenni, Ph.D
Associate Professor, Department of Horticulture and Landscape Architecture, Colorado State University

Tiffany Weir, Ph.D
Professor, Food Science and Human Nutrition, Colorado State University

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Cannabinoids and Traumatic Brain Injury: A Randomized, Placebo Controlled Trial

Kent Hutchison, Ph.D
Institute of Cognitive Science Affiliated Faculty & Professor, University of Colorado Boulder

READ MORE

Research Projects

WRAPPING UP IN 2025

L. Cinnamon Bidwell, Ph.D

Institute of Cognitive Science Faculty; Assistant Professor, University of Colorado Boulder

Duncan Mackie, Ph.D

Director of Pharmacology & Experimental Therapeutics, MedPharm Holdings

Isolation and Pharmacological Evaluation of Phytocannabinoids for Alzheimer's Disease

SUMMARY

Alzheimer's disease is a leading cause of dementia and death, impacting tens of thousands in Colorado of families and placing a growing burden on caregivers and the healthcare system. Current treatments are limited, and new therapies that target the root causes of neurodegeneration are needed. Our goal is to determine how cannabis-derived compounds might help reduce inflammation in the brain—a key factor in Alzheimer's disease and other neurodegenerative conditions. using researchers-built biosensors to monitor interactions between cannabinoids and the CB1/CB2 receptors—endogenous cannabinoid receptors known to regulate inflammation.

KEY OUTCOMES

- Isolated and purified several rare cannabinoids and terpenes from DEA-approved cannabis for use in brain inflammation models.
- Developed high-tech biosensors to track how phytocannabinoids interact with endocannabinoid G-protein coupled receptors, CB1R and CB2R.
- Established advanced human cell models of Alzheimer's and Parkinson's-related brain inflammation using microglia, neurons, and astrocytes.
- This initial work is identifying cannabis compounds that can shift immune responses from harmful (M1) to healing (M2) states in lab models.

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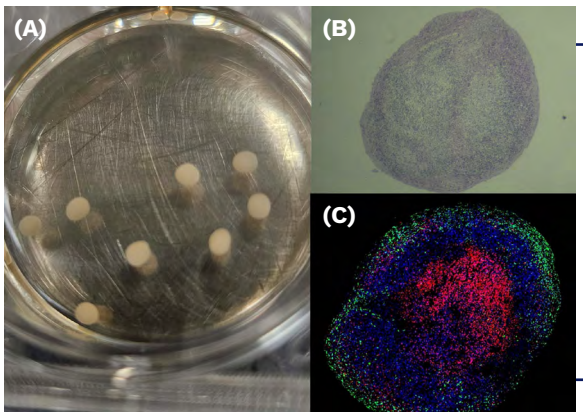

(A) Stem cell derived mid-brain organoids used to model different disease states such as Parkinson's and Alzheimer's.

(B) Hematoxylin and eosin staining, a technique in for visualizing tissue sections under a microscope.

(C) Fluorescent staining, a valuable tool for visualizing neurons and identifying cell death in biological samples.

Christopher Lowry, PhD

Associate Professor, Integrative Physiology,
University of Colorado Boulder

Preventative and Treatment Effects of Broad-spectrum Cannabidiol (CBD) in a Rat Model of Comorbid Autism and Epilepsy: A Mechanistic Study

SUMMARY

This project utilized a rat model of Autism Spectrum Disorder (ASD) to investigate potential protective effects of cannabidiol (CBD) on ASD symptoms in this model. The prevalence of ASD has increased dramatically in the last 25 years and currently affects 1 in 36 children in the United States. While the cause of ASD is not well understood, it is suspected that stress-dependent neurological immuno-inflammation and environmental chemicals present in mothers during gestation could be involved. Because CBD is thought to have anti-inflammatory properties in neuro-immune cells, it was hypothesized that it might provide a benefit in ASD by reducing neuro-inflammation.

KEY OUTCOMES

- The key finding was that offspring had reduced ASD symptoms when their mothers had received Cannabidiol (CBD) during pregnancy.
- It is possible that CBD's anti-inflammatory effects may protect fetal brain development.
- Future research will be needed to determine exact mechanisms about how CBD exerted these effects and whether or not it directly targeted the neuro-inflammatory response.
- None of the control rats developed epilepsy, while 30% of stressed rats did.
- Prenatal CBD reduced the incidence of epilepsy slightly in stressed (23%) and non-stressed rats (13%). Statistical analysis showed a significant effect of stress on seizures but no significant effect of CBD.
- Prenatal CBD had limited protective effects against stressed-induced epilepsy supporting the need for further research.

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Additionally, because ASD is associated with a higher incidence of epilepsy, the brain activity of rats was monitored for 7 months using electrophysiology as a way to study stress-dependent epileptogenesis as a cofactor in ASD.

The Pink Pepper Project

A BREAKTHROUGH IN CANNABIS GENETICS

Figure 1. Pink Pepper is identified by its vibrant purple coloration and developed through an extensive breeding program that integrates 26 genetically diverse Cannabis sativa L. varieties.

Pink Pepper represents a major scientific and commercial advancement in cannabis research. This novel CBD-rich (12% CBD) cannabis variety, characterized by its striking purple coloration (Fig. 1), was developed through a collaborative effort between the Institute of Cannabis Research and Kangwon National University. What sets Pink Pepper apart is its fully sequenced genome, which has been officially registered as a reference genome for Cannabis sativa L. with the National Center for Biotechnology Information (NCBI). This milestone serves as a comprehensive genetic roadmap for cannabis, providing critical insights into the genetic regulation of key agronomic traits, such as phytocannabinoids biosynthesis, disease resistance, and environmental adaptability. In genetic research, the reference genome enables precise gene identification, functional analysis, and molecular breeding strategies. For the commercial sector, it accelerates the development of high-performing cultivars, ensuring consistent cannabinoid profiles, improved yield, and enhanced resilience to environmental stressors.

Dr. Park, alongside research team from KNU, has successfully assembled the Pink Pepper genome with an unprecedented 99.8% BUSCO (Benchmarking Universal Single-Copy Orthologs) score. This achievement makes Pink Pepper the most accurate hemp genome assembly in the world and a foundational resource for future cannabis genetic studies. The genome registration has garnered international attention and has already begun to drive groundbreaking research and commercial interest in hemp breeding, medicinal applications, and sustainable cultivation practices. This scientific accomplishment strengthens Colorado's position as a global leader in cannabis research while also ensuring that the highest-quality cannabis genetics remain accessible to researchers and breeders worldwide.

READ MORE

Byeong-Ryeol Ryu

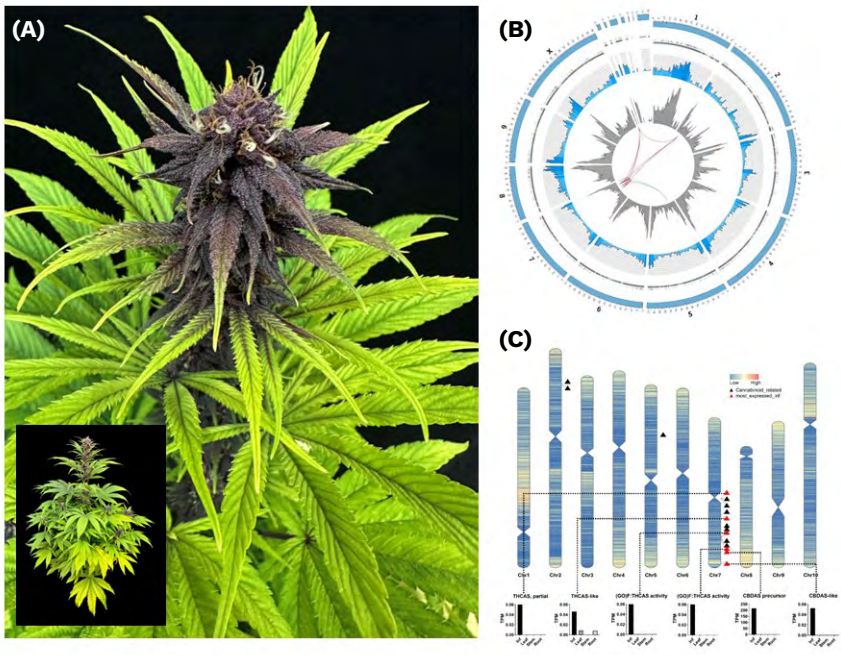
VISITING RESEARCH SCHOLAR FROM KANGWON NATIONAL UNIVERSITY IN SOUTH KOREA

I joined the ICR with the aim of broadening my research spectrum through international collaboration and pursuing world-class studies.

The Cannabis Genome Project, a joint effort between ICR and Kangwon National University in Korea, has been successfully completed. The precision of this genome data has been recognized, leading to its selection as a reference genome by NCBI. This serves as a positive example of the research potential and synergistic collaboration between our two institutions for researchers worldwide.

Furthermore, I am conducting in-depth research focused on enhancing Cannabis' environmental resilience. Climate change and shifts in cultivation environments significantly impact plant growth and secondary metabolite production, which are crucial for maintaining stable yields and effective compound content in Cannabis. To address this, I am investigating the mechanisms by which Cannabis responds to and adapts to various abiotic stress conditions, such as drought, high temperatures, and low temperatures, through transcriptome-based studies.

This research aims to comprehensively analyze genes that are activated or suppressed under stress, with the goal of identifying key genes contributing to Cannabis stress alleviation and environmental resistance. By discovering these genes and elucidating their functions, we will lay the groundwork for crucial guidelines to develop environmentally resilient cultivars that can stably produce high-quality Cannabis even in harsh conditions and in the face of future climate change. Ultimately, this research is expected to enhance the stability of Cannabis cultivation, contribute to the sustainable development of the global Cannabis industry, and create new value in the agricultural sector.



ICR-KNU (Kangwon National University) Collaborative Cannabis Genome Project Recorded as Reference Genome

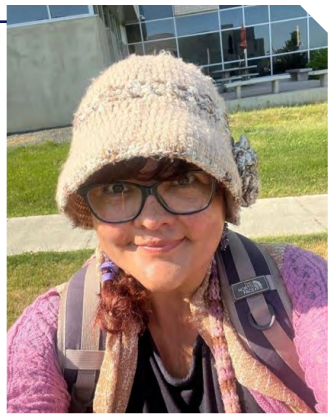
(A) The Pink Pepper variety, a model plant for this genome project is the first medicinal hemp cultivar bred and registered in Korea through collaboration with ICR.

(B) The complete Cannabis genome map, based on the Pink Pepper plant, spans approximately **770 Mbp.** It's completeness has been verified with a BUSCO score of up to **99.6%.**

(C) Centromere predications and cannabinoid-related genes have been annotated on the genome map, along with a total of **30,459 functionally annotated genes.**

Ingrid Carolina Corredor Perilla, Ph.D

VISITING RESEARCH SCHOLAR



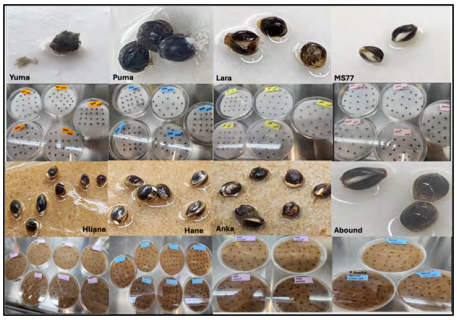
I had the privilege of conducting my research at the Institute of Cannabis Research at CSU Pueblo, an institution recognized for its groundbreaking contributions to cannabis science. The supportive and collaborative environment there inspired me to explore how cultivation parameters, genetics, and environmental conditions collectively influence plant fitness, growth, and secondary metabolism. During my time at the Institute, I developed research projects examining the effects of biotic (microbiome and beneficial microorganisms) and abiotic factors (extreme relative humidity ranges) on cannabis growth and cannabinoid production, as well as how seed age and storage quality impact agricultural performance and industrial applications.

As a visiting research scholar and postdoctoral researcher, I arrived in the United States as a doctoral candidate in Agroecology from the National University of Colombia to complete most of my doctoral research at the ICR. During my stay, I wrote my thesis and completed my dissertation, which I successfully defended at the end of 2024. I am sincerely grateful for the opportunities provided by this institution under the mentorship of Dr. Park and the Director, Dr. Kinney, to earn my PhD and grow as a scientist.

Looking ahead, I am eager to pursue postdoctoral positions or research roles that allow me to apply my expertise in cannabis science, seed biology, plant physiology, plant-microbial interactions, and responses to environmental stress. My experience in designing experiments, analyzing biochemical and agronomic traits, and mentoring undergraduate students has prepared me to contribute to multidisciplinary teams focused on advancing sustainable cultivation practices, crop improvement, and innovation in plant-based industries.

Ingrid Carolina Corredor-Perilla, Noah Reid, and Haley Kamon

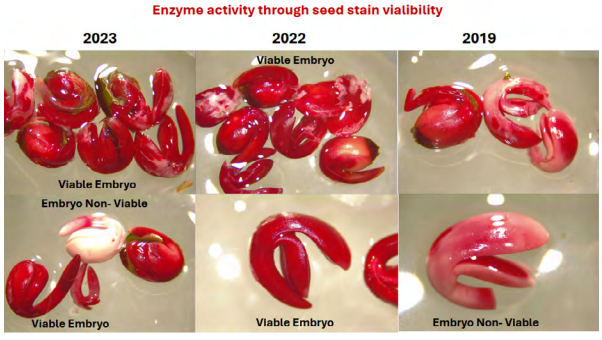
Assessment of Hemp Cultivar Viability for Agricultural Production on the Pine Ridge Reservation



This study evaluated eight hemp varieties stored for over five years at Makoce Agricultural Development to assess seed quality. Overall, germination rates were very low (19%), with some varieties failing to sprout entirely. Roots remained short in all samples. These findings indicate that long-term storage significantly reduces seed viability, emphasizing the importance of proper handling to ensure successful hemp cultivation.

Evaluation of Viability and Quality in Aged Cherry Wine Hemp Seeds

Ingrid Carolina Corredor-Perilla, Chaylen Richards, Byeong-Ryeol Ryu



This study assessed the viability Cherry Wine hemp seeds stored since 2019, 2022, and 2023. Seeds stored for more than five years showed significantly lower germination rates (11%) and shorter roots, with a marked decline in antioxidant and nutritional properties. Older seeds also demonstrated reduced enzyme activity and lower phenol levels. These results show that long-term storage can impair seed quality and highlight the importance of proper handling to preserve hemp seed health and productivity.

Symbiotic Strategies for Soil Remediation: Zinc Uptake in *Cannabis sativa* via *Arbuscular Mycorrhizal* Fungi

STUDENT RESEARCHERS:
McKenna Flanigan and Stanley Eaton

McKenna Flanigan and Stanley Eaton

Dehydrogenase Activity as a Marker for Seed Aging in *Cannabis sativa L.*

STUDENT RESEARCHERS:
Chaylen Richards, Haley Kamon, Noah Reid, Ingrid Carolina Corredor-Perilla, Byeong Ryeol Ryu

Noah Reid and Haley Kamon

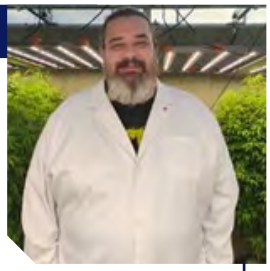
Evaluating the Effects of Sonication on Germination and Early Growth in Industrial Hemp *(Cannabis sativa L.)*

STUDENT RESEARCHER:
Eamonn Miller

Image of a Cherry Wine seed taken after sonication showing testa through an opening in the pericarp.

Future Researchers / Innovators

Brandon Blanchard



COLORADO STATE UNIVERSITY PUEBLO

"In my time working with Dr. Smith and Dr. Park and everyone at the ICR I have gained experience and knowledge in many forms, from cell culturing and imaging to science writing and data analysis, have been hugely rewarding and beneficial in my further pursuit of my PhD after I finish my Cannabis Biology and Chemistry 3+2 master's degree."

Cameron Carpizo

UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

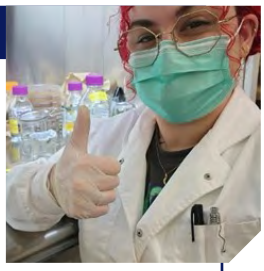
"Since being involved with Dr. Stewart and Dr. Gleisner in cannabis research projects, I have since graduated from the Nurse Practitioner program at the University of Colorado and plan to go on for my doctorate degree next year in hopes to pursue more research based projects in the future".

Luiza Rosa

UNIVERSITY OF COLORADO BOULDER

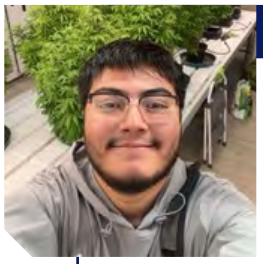
"Receiving the Emerging Scientist Award was a big step in my development as a researcher. With the financial support, I dedicated time to focus on research, including taking a graduate-level course on the neurobiology of addiction, which deepened my understanding of the mechanisms underlying cannabis use. I also submitted my first first-author paper for publication and had the opportunity to present findings at an international conference. These experiences helped me grow in both skill and confidence, and I've learned so much from collaborating with others in the field who had diverse areas of expertise."

Haley Kamon



COLORADO STATE UNIVERSITY PUEBLO

"Participating in research at the ICR has been an incredible opportunity to apply scientific knowledge in lab and greenhouse settings while learning directly from scholars in the field. This experience has supported my academic growth in both cannabis biology and plant science, which are areas I'm deeply passionate about. My research continues to be fueled by a love for plants that I proudly nurture, both at the university and at home."



Kianu Flores

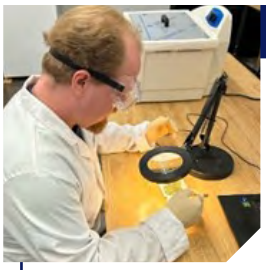
COLORADO STATE UNIVERSITY PUEBLO

"Research with Dr. Park has been an amazing opportunity. It has opened many doors and has provided many opportunities to pursue and push my passion! In just my first year I was able to work hands on with Cannabis and Tobacco Hornworms (Manduca sexta) to explore the impact of CBGA on the development, mortality rate, and activity of the hornworms revealing evidence that supports the many benefits for the evolution of cannabinoids in cannabis. From attending research conferences, hands-on lab experience, and being surrounded by amazing people all united under one passion, research with Dr. Park has been the best opportunity for me and my career."

Stanley Eaton

COLORADO STATE UNIVERSITY PUEBLO

"Working with the Institute of Cannabis Research has been one of the most hands-on and fulfilling parts of my experience at CSU Pueblo. Through my research, I've learned what real-world science looks like—balancing greenhouse work, root inspections, data collection, and poster presentations—all while diving deep into the intersection of cannabis science and environmental toxicology. My current study focuses on how the arbuscular mycorrhizal fungus Rhizophagus aggregatus can enhance the phytoremediation ability of industrial hemp (Cannabis sativa Verda Bio 4.21) when exposed to zinc-contaminated soil. By examining root development, plant response, and zinc uptake, I'm exploring how symbiotic microbial relationships can help make soil cleanup efforts more sustainable and biologically driven. The support and collaboration I've experienced through ICR has not only helped me grow as a researcher, but they've also made this work something I genuinely look forward to. It's been exciting, challenging, and honestly a reminder that I want to keep pursuing this kind of science in the future."

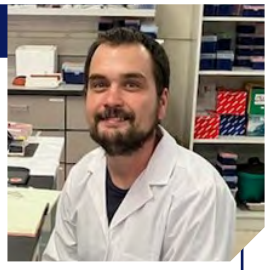


Eamonn Miller

COLORADO STATE UNIVERSITY PUEBLO

"Working with Dr. Park and the Institute of Cannabis Research has been an enriching and enlightening experience. Working as part of the ICR has given me invaluable hands-on experience working with hemp in a research environment. My experience doing research with the ICR has also had considerable crossover with the materials being taught in my courses, increasing my depth of understanding on topics such as cellular biology, botany, chemistry, and bioinformatics. Working with Dr. Park has also given me the opportunity to practice giving research presentations, and to participate in research conferences."

Jacob MacWilliams



COLORADO STATE UNIVERSITY

"I joined Dr. Punya Nachappa's lab in 2021 and have contributed to two projects funded by the Institute of Cannabis Research: *Examining the Adaptive Roles of Plant Defensive Chemistry on Pest Resistance in Cannabis sativa* and *Examining the Effects of Pesticide Treatments on Pest Populations, Chemical Residues, and Cannabinoid Concentrations in Cannabis sativa.* Working on these projects has been instrumental in my professional development, allowing me to deepen my scientific knowledge and technical skills such as manuscript and grant writing while also growing as a mentor to undergraduate and graduate students. Additionally, I have expanded my experience beyond the laboratory by participating in and helping organize the annual Cannabis Research Conference, including serving on the Executive Planning Committee in 2024."

Jeremy Taylor

UNIVERSITY OF COLORADO BOULDER

"The Institute of Cannabis Research at Colorado State University Pueblo gave me the opportunity to engage in research examining the role that inflammatory microglia and the endocannabinoid system have in epileptic and behavioral development. I believe we've made important progress on these processes and I've grown more and more interested in how the endocannabinoid system within the brain is mediating neuronal and microglial interactions for the purposes of shaping neural connections, excitability, and communication. This award helped me improve in a multitude of ways as a future scientist. Everything from learning new wet lab techniques, imaging and data analysis, and improvements in my scientific communication skills can be attributed to the award and my co-mentors, Dr. Barth and Dr. Lowry."

Noah Reid

COLORADO STATE UNIVERSITY PUEBLO

"Being a part of the ICR at CSUP has allowed me to make connections with fellow students I thought I would never have made, the wide diversity of students and sense community is what makes me show up every day. Working on research in association with the Makoce tribe gives me a sense of pride, knowing that my work will directly affect the outcome of the Macoke's hemp agriculture initiative."

Partnerships

New Partnerships

Makoce Agriculture Development

The ICR has launched a new partnership with Makoce Agriculture Development to conduct a Life Cycle Assessment of four grain hemp varieties—Vega, Anka, Indigo, and Rak—across two field sites in Nebraska. This partnership offers the unique opportunity to participate in field research in partnership with other institutions (nonprofit and academic), at the same time as supporting the agricultural initiatives for the benefit of indigenous peoples in the region. Beginning in May 2025, this comprehensive study will assess agronomic performance, environmental sustainability, and post-harvest value potential of hemp grown for seed, fiber, and fuel. Data will be collected on plant physiology, biomass yield, soil health, grain nutrition, and fiber quality. The project aims to identify high-performing cultivars suited for regional agriculture while supporting Indigenous-led agricultural innovation and bioeconomic development.

National Interdisciplinary Cannabis Symposium

The ICR has been fortunate to partner with the Global Hemp Innovation Center as co-hosts of the Cannabis Research Conference (CRC) for the past five years. Looking forward towards continued development and growth of the Conference series, the Institute is pleased to share that CRC will be holding joint meetings with the National Interdisciplinary Cannabis Symposium (NICS) beginning in 2026. NICS is an interdisciplinary symposium which includes judges, law enforcement, academia, attorneys etc. along with cannabis industry associations and focuses on cannabis legislation/regulation and American jurisprudence, which will complement the program of the CRC. NICS is holding their annual meeting for 2025 in Denver 9/19-9/21 and one of their Keynote presenters is Chad Kinney, Executive Director of ICR. The CRC Executive Committee and NICS are currently collaborating and identifying the dates and the location for the joint meeting for fall 2026, which promises to be the most comprehensive interdisciplinary conference in the nation.

Continuing Partnerships

Chuncheon Bioindustry Foundation (CBF)

Our longstanding collaboration with the Chuncheon Bio-Industry Foundation (CBF) is now entering its fifth and final year under the current agreement. Since signing the MOU with CBF, the ICR has received approximately $170,000 in research support from CBF, leading to multiple research avenues and outcomes. We are now actively exploring ways to extend this partnership by pursuing several new national grant opportunities. The sustained cooperation has significantly advanced shared research goals and fostered innovation in hemp biotechnology and commercialization.

Washington State University Center for Cannabis Policy, Research and Outreach

As the Cannabis Research Conference (CRC) has grown in reputation, scope, and national draw the co-hosts, the Institute of Cannabis Research and the Global Hemp Innovation Center, have been fortunate to collaborate with several organizations, centers and institutes across the country. A key example of such a collaboration is the longstanding partnership with the Center for Cannabis Policy, Research and Outreach (CCPRO) at Washington State University. The CCPRO has been a significant sponsor of the CRC going on three years and equally as important Dr. David Gang, the Center's Co-Director, has served on the Conference Program Planning Committee for the past three years as well. CCPRO's participation and partnership on the Conference has helped make the CRC a premier forum for researchers to share and discuss the latest advancements in cannabis research.

Cannabis Research Conference (CRC)

CRC 2024 Recap

The Cannabis Research Conference (CRC) is heading towards its 9th edition in October 2025. What started as the ICR Conference in 2017 with a decidedly Colorado cannabis research emphasis has matured into the CRC, which has gained national prominence as one of, if not the most, robust cannabis research programs drawing presenters and attendees from across the United States, North America, and overseas. The CRC 2024 was held on the Colorado State University campus and included more than 125 presentations, attendees from 32 states and 6 countries. The planning committee included 23 individuals from 16 institutions and organizations from across the U.S. and even two international members. The keynote speakers at CRC 2024 are among some of the most prominent cannabis/cannabinoid researchers on the globe: Dr. Lumir Ondrej Hanus who spent the last 30 years of his career at Hebrew University, Jerusalem, Israel delivered the Mechoulam Lecture, Dr. Todd Michael a prominent plant geneticist from the Salk Institute, La Jolla, CA delivered the Opening Plenary Address, and Dr. Nerit Bernstein who is a senior research scientist at the Volcani Center, Ministry of Agriculture, Israel who has several decades of research experience with cannabis, delivered the Diversity in Cannabis Research Keynote Address.

Looking Ahead to CRC 2025

The CRC series has truly become one of the premiere conferences for wide ranging cannabis research, which is built on the integrity of the high-quality scientific research program embodied in the presentations, collaborative discourse of cannabis research and future directions, and the ever-growing number of conference partners. In addition to the ICR and co-host Global Hemp Innovation Center at Oregon State University, the 2025 CRC meeting will boast more than 15 conference partners and a variety of sponsors. The 2025 conference program committee, made up of 20 cannabis researchers from around the country, has reviewed and accepted a record number of presentations (> 180). Dr. Aron Lichtman a renowned professor in the department of Pharmacology at Virginia Commonwealth University, will deliver the 2025 Mechoulam Lecture with a presentation on a constellation of research investigating positive allosteric modulators of the CB1 reseptor as well as inhibitors of biosynthesis or degradation of the endocannabinoid 2-arachidonoylglycerol (2-AG) in mouse models of chronic pain, cannabimimetic sides effects, and dependence, and lead a discussion on the translational implications of preclinical research. Dr. Punya Nachappa, the 2025 Opening Plenary Presenter, a professor in the Department of Agricultural Biology at Colorado State University, will present her latest work focusing on the interactions between plants and insect vectors to manage plant pests and diseases in hemp.

Outreach & Impacts

OF THE ICR, 2024-2025

Social Media

OVER **36,000** VIEWS

14,000 INTERACTIONS

800 NET FOLLOWS

OVER **200** HOURS OF WATCH TIME

Webinars

RESEARCH WEBINAR

OVER **700** ATTENDEES

NEARLY **200** ASYNCHRONOUS VIEWS

PLANT WEBINAR

OVER **400** ATTENDEES

NEARLY **100** ASYNCHRONOUS VIEWS

ICR Bimonthly Newsletter

OVER **11,000** VIEWS

OVER **600** NEW SUBSCRIBERS

OVER **5,000** CONTACTS

SUBSCRIBE HERE

Cannabis Research Webinar Series

The Cannabis Research Webinar Series, which continues to be a collaboration between the ICR and the Lambert Center at Thomas Jefferson University, is looking forward to celebrating its 5-year anniversary in October and beginning another year of bringing expert voices to the national and international communities. Over the past year we have welcomed even more world leaders in cannabis research, including researchers like Dr. Sarah D. Lichenstein from Yale, Dr. David Gorelick from the University of Maryland, Dr. Devan Kansagara from the Oregon Health and Science University, Dr. Rachel Tomko from the Medical Center of South Carolina, to name a few.

Cannabis Plant Science and Cultivation Webinar Series

The Cannabis Plant Science and Cultivation Webinar Series, co-chaired by Dr. Sanghyuck Park of the Institute of Cannabis Research (ICR) and Dr. Nirit Bernstein of the Volcani Institute in Israel, has been a central platform for ICR's educational and scientific outreach since its launch in February 2022. Entering its 2025 season, the series has featured 27 international experts covering topics such as cultivation practices, pest and microbial management, extraction technologies, analytical chemistry, and molecular biology, all aimed at deepening understanding of cannabis plant physiology and chemistry. The webinars have attracted a diverse global audience establishing the series as a trusted resource for advancing cannabis science and best practices. ICR continues to expand the initiative by seeking expert speakers to explore emerging areas in cannabis research.

Dinner for the Advancement of Cannabis Science

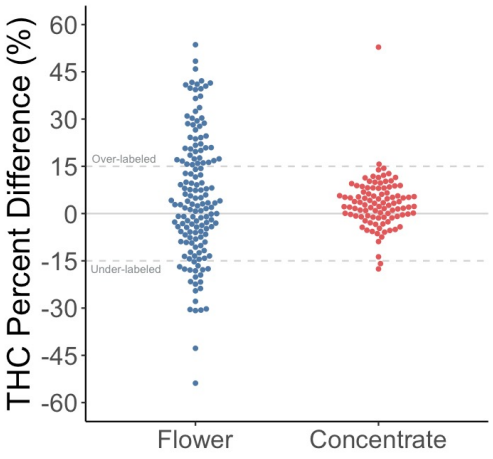
The Colorado Legislature had the foresight to emphasize the ability for the ICR and its Governing Board to accept gifts and donations to be used in support of the mission of the Institute. In February 2025 the ICR hosted the First Annual Dinner for the Advancement of Cannabis Science as a significant first step towards developing a donor base in support of high-quality, unbiased cannabis research. Dr. John Harloe, ICR Governing Board Member, provided outstanding leadership in the effort to plan and execute this event, which was attended by 150 people representing cannabis researchers, regulators, industry members, philanthropists, and families impacted by cannabis research. A highlight of the event was the recognition of Paige Figi for her tireless advocacy for patient access to cannabis therapeutics, which is inspired by her daughter Charlotte's battle with Dravet syndrome. Her advocacy has resulted in transformative changes in cannabis legislation impacting countless individuals and families. The ICR is looking forward to another successful event in 2026.

Institute of Cannabis Research

IN THE NEWS

In 2024-2025, the Institute of Cannabis Research (ICR) and research projects supported through the Institute received notable media coverage. Prominent outlets such as Cannabis & Tech Today, Cannabis Science and Technology, Fox News, GreenState, and Westword highlighted ICR's work. Two research studies, in particular, captured widespread attention and were prominently featured across multiple platforms. This media presence reflects growing public and professional interest in the ICR's contributions to cannabis science.

FEATURED STUDIES



Boulder Label Study

- CU Boulder
- Fox News
- Daily Camera

Each point represents an individual flower or concentrate product. Points positioned farther from the zero baseline (solid gray line) indicate a greater discrepancy between the product's labeled attributes and the values measured in the study.

Pink Pepper

- Cannabis & Tech Today
- Westword
- GreenState
- Cannabis Science and Technology

David A. Gorelick
MD, Ph.D, DLFAPA, FASAM
Editor-in-Chief

JOURNAL OF Cannabis Research

The Journal of Cannabis Research (JCR) began accepting manuscripts in September, 2018. This 7th year of publication continues the journal's solid growth and international scope. We received 190 manuscripts from 57 different countries in the past year (all data through May 31, 2025). Thus far, 49 of those manuscripts from 22 different countries have been accepted for publication. These papers reflect the broad interdisciplinary scope of the journal, encompassing all aspects of preclinical and clinical cannabis, cannabinoid, and endocannabinoid science, as well as cannabis agriculture, economics, regulation, and history.

JCR is international in scope. Our distinguished editorial board of 71 cannabis experts hails from 9 countries on five continents.

JCR is the only international, multi-disciplinary, open-access journal in the cannabis field. Anyone in the world can find our articles on our web site or on PubMed and read them without paying a fee. This makes our articles readily accessible to those in low-income countries or without access to an academic library. In this past year, articles in JCR (from any publication year) received 428,322 total views by 384,091 unique readers in 210 countries and territories, with an average of 1519 views per article.

Articles published in FY 2025 received wide news and social media attention. Articles were mentioned 1209 times (917 social media, 284 news sites [e.g., CNN, New York Times, Times of India], and 5 Wikipedia entries), with an average of 35 mentions per article. JCR was the second most likely scientific journal to be cited in news stories about cannabis, trailing only the Journal of the American Medical Association. The enhanced visibility and international reach of articles published in JCR is an advantage to authors when deciding on where to submit their manuscripts for publication.

JCR is included in 3 major online indexing services, PubMed, Web of Science, and Scopus used by researchers, and has an impact factor of 4.1 in 2024 and 4.3 in 2025 as calculated by Clarivate (the industry standard). The impact factor is a measure of the number of citations of articles in the journal and reflects the journal's influence in the research community. JCR is a member of two respected international societies: Committee on Publication Ethics and International Society of Addiction Journal Editors. Our manuscript acceptance rate of 28% this year and 3100 article citations after almost 7 years of publication are similar or better than comparable, more established journals in our field.

2024-2025 JCR DATA

Manuscript Submissions

174

manuscripts were submitted for review

Readership Statistics

467,000

article views in total, with the top 5 articles accounting for 103,000 views and an average of 1,606 views per article

CUMULATIVE JCR DATA

Authorship Overview

71

authors have contributed to 28 publications across 8 Colorado institutions

Citation Metrics

230

total citations for publications from Colorado institutions

Research Publications

from ICR Supported Projects 2024–2025

Neuroscience & Mental Health

Cannabidiol for Autism-related Irritability

International Journal of Clinical Trials

Investigates CBD's potential in managing aggression in children with ASD.

READ STUDY

Cannabis Science & Plant Research

Decarboxylation Rates in Cherry Wine Cultivar

Scientific Reports

READ STUDY

Cannabidivarinic Acid & Aphid Defense

Journal of Cannabis Research

READ STUDY

Female cannabis inflorescence and stalked glandular trichomes. **(A)** Cannabis inflorescence with a cluster of calyxes and bracts (arrows) containing numerous glandular trichomes. **(B, C)** Snapshots demonstrating the isolation of the secretory cavity contents by glass microcapillary. An intact glandular head and an approaching glass microcapillary are visible **(B).** Collapsed glandular head and collected secretory cavity contents in the tip of a glass microcapillary **(C).**

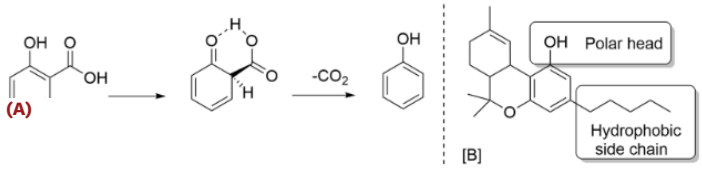
Genomics & Chemistry

Thermo-Chemical Kinetics of Cannabinoid Acids
Journal of Cannabis Research
READ STUDY

Haploid Genome Assembly of 'Pink Pepper'
Scientific Data
READ STUDY

Electrophilic Fluorination of Cannabinol (CBN)
Organic and Biomolecular Chemistry
READ STUDY

Fluorinated Ethers of Cannabinol (CBN)
Chemistry
READ STUDY



(A) Decarboxylation through β-keto acid mechanism in 2-hydroxybenzoic acid

(B) Structure of Δ9-THC cannabinoid

Patent Application: Fluorinated Cannabinoid Compositions and Methods Thereof
PATENT NUMBER: WO 2025/096782 A1

Clinical Applications

CBD for Chronic Prostatitis and Pelvic Pain
World Journal of Men's Health
READ STUDY

Accuracy of Labeled THC Potency
Scientific Reports
READ STUDY

Industrial & Regulatory Insights

Hemp Fiber Applications & EU Regulations
Journal of Natural Fibers
READ STUDY

2024-2025

Total Publications

11

Collaborating Authors

OVER

60

RESEARCHERS

Impact Areas

- Neuroscience
- Plant Biology
- Chemistry
- Clinical Trials
- Genomics
- Industrial Hemp

Featured Publications

Chromosome-level Haploid Assembly of *Cannabis sativa L.* cv. Pink Pepper

Published in Nature Scientific Data

Byeong-Ryeol Ryu, Gyeong-Ju Gim, Ye-Rim Shin, Min-Ji Kang, Min-Jun Kim, Tae-Hyung Kwon, Young-Seok Lim, Sang-Hyuck Park & Jung-Dae Lim

In this study, researchers created a highly detailed genome map of a CBD-rich cannabis strain called “Pink Pepper.” They used a combination of three advanced DNA sequencing technologies—PacBio, Oxford Nanopore, and Illumina—to get both long and accurate reads, which allowed them to build one of the most complete cannabis genomes to date. The assembled genome spans 770 million base pairs and includes over 30,000 protein-coding genes, many of which are involved in producing cannabinoids like CBD. Compared to past cannabis genome projects, this one showed fewer gaps, better organization into full chromosomes, and the highest quality scores based on standard genetic completeness tests (BUSCO). The research also revealed that about 77% of the genome consists of repeating sequences, which are common in cannabis and other plant species. Overall, this genome assembly offers a valuable tool for future studies in cannabis breeding, medical research, and understanding how the plant produces important compounds like cannabinoids and terpenes.

Assessing the adaptive role of cannabidivarinic acid (CBDVA) in aphid defense in *Cannabis sativa*

Published in Journal of Cannabis Research

Jacob MacWilliams, Venkatesh Padimi, Olivia Carter, Korey Brownstein, Zachary Stansell, Tyler Gordon & Punya Nachappa

A recent study explored the role of a minor cannabinoid called cannabidivarinic acid (CBDVA) in helping Cannabis sativa defend itself against aphid pests. Researchers found that hemp plants with higher levels of CBDVA had significantly fewer cannabis aphids compared to low-CBDVA varieties. These plants also had more trichomes—hair-like structures known to physically deter insects. Lab tests showed that adding CBDVA to artificial diets reduced both survival and reproduction in cannabis aphids and green peach aphids, suggesting a direct toxic effect. Interestingly, even low concentrations of CBDVA harmed green peach aphids, which are not typically adapted to hemp. The findings suggest CBDVA could be developed as a natural pesticide, especially useful in organic farming or for crops where chemical pesticide use is limited.

COLORADO STATE UNIVERSITY PUEBLO

Institute of Cannabis Research

ADVANCING CANNABIS SCIENCE

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