

# ICR PARTNERSHIPS

## Institute of Cannabis Research Receives \$230,000 for Cannabis Research from South Korea



The Institute of Cannabis Research (ICR) will receive a total of \$150,000 over the next four years (2022 – 2025) to develop and optimize a cannabinoid extraction method for therapeutic studies. The award is a part of the national grant that the Chuncheon Bioindustry Foundation (CBF) submitted to the Ministry of Science and Information and Communications Technology (MSIT) in South Korea. The CBF will receive a total of \$13M.

The Chuncheon Bioindustry Foundation is an institute that supports and develops the bio-industry for Chuncheon City and Gangwon Province in South Korea. In February 2019, ICR signed an MOU with CBF to facilitate collaboration on research topics of mutual interest and benefit. As a result of the continued collaboration, the ICR research team, led by

Dr. Sanghyuck Park, participated in the CBF national grant proposal entitled ‘Developing R&D Infrastructure for the Industrial Uses of Hemp and its Derivatives in South Korea’ along with three university/research institutes and seven industrial partners. In May 14, 2021, the CBF research grant proposal was selected as one of only three awardees among nine provinces’ applications. CBF will lead the five year project through partnerships with Kangwon University and Nongshim Co., Ltd., for the development of new hemp varieties, and with Korea Institute of Science and Technology (KIST), Kangwon University, and HuonsNatural Co., Ltd., for exploring cannabinoid therapeutic potentials, as well as with K-medichem Co., Ltd. and HuonsNatural Co., Ltd., for the industrialization of hemp products and derivatives.

Although the uses of Cannabis and its byproducts in South Korea have been strictly regulated, this government support will allow CBF to cultivate hemp and conduct R&D for industrial and medicinal applications. Gangwon province anticipates Chuncheon City to be a leader of hemp bio-industry in South Korea, serving as a growth engine to boost the local economy as well as nation. As a part of the national project, ICR will engage in the hemp breeding program and infrastructure development processes required for cannabinoid production.

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# ICR GOVERNING BOARD



## Introducing Dr. Malik Hasan, Governing Board Member

With a rich background in the field of medicine, education, and research; Dr. Malik Hasan conceived the idea of the Institute of Cannabis Research (ICR) and founded it in 2016. Dr. Hasan presented the idea of a research body to be housed at Colorado State University–Pueblo and presented the idea to CSU System President Dr. Tony Frank, and then CSU–P President, Lesley Di Mare. To further ensure its viability, Dr. Hasan successfully lobbied the Colorado Legislative body to make the ICR a permanent Colorado institute under law at CSU–P.

The Pakistani native, Dr. Hasan graduated from King Edward Medical College in Lahore, Pakistan at the age of 20/21, making him one of the youngest medical school graduates in the world. His interest in neurology led him to the prestigious Institute of Neurology based at the Hospital for Neurological Diseases at Queen's Square, London. In his four-year tenure, Dr. Hasan became the senior registrar of neurology and at the age of twenty-four, sat successfully for examination for membership of the Royal College of Physicians of London and Edinburgh. Dr. Hasan returned to Pakistan to become Assistant Professor at King Edward Medical College. He later was named the healthcare advisor to Pakistan and given cabinet rank by the Governor of West Pakistan, now Pakistan. In that role, Hasan served as health care advisor overseeing health care in West Pakistan, and his work was instrumental in establishing greater healthcare for millions of Pakistani citizens.

### Dr. Malik Hasan

Dr. Hasan emigrated from Pakistan to the United States and became Assistant Professor at Rush University in Chicago. He created a modern EEG lab and was named head of the lab. Additionally, he created a modern neuro-physiology lab, and was named co-director of the CT Scan Lab. Understanding the technological advances in neurology, Dr. Hasan secured one of the first CT scan machines in the United States and later led the CT Scan Department at Rush University.

Seeking further opportunities to provide services to under-served communities, Dr. Hasan came to Pueblo, CO and set his mark by creating dedicated neurological units, and neuro-intensive care units at both local hospitals. The establishment of these units was so unique, it would be fourteen years before Harvard Medical Systems created similar units. Dr. Hasan also introduced the first full-body CT scanner to the State of Colorado. Dr. Hasan redefined neurological healthcare in Southeastern Colorado with his tireless work ethic and desire to serve as many communities and patients as possible. While a practicing physician, Dr. Hasan began to see the difficulties of patient care within the current insurance practices and began to envision a new system. Dr. Hasan created the HMO/Health Insurance Companies Qual-Med and later Foundation Health as a bold new approach to providing quality health care at reasonable prices. Under his leadership, the company grew to be Fortune 100/200 Corporations in the United States and eventually were listed as the fourth largest HMO/health insurance companies in the United States. In 2001, President George W. Bush, asked Dr. Hasan to serve as a primary healthcare advisor and in 2008, President Elect Barack Obama created a healthcare commission and asked Dr. Hasan to serve. Dr. Hasan, and the committee's work, would be the basis for the future Affordable Care Act. (Con't on next page)

Continuing to understand the power of technology within the healthcare industry, Dr. Hasan crafted a new technology company – Health-Trio, where Dr. Hasan personally holds over 800 patent claims issued by the United States Patent Office, all connected to software, medical records, physician and patient portals, and other healthcare technology.

Dr. Hasan has served on several national boards, committees, and commissions related to best practices, healthcare business and technology, innovative treatments, and is the recipient of countless awards and accolades for his cutting-edge technology and problem-solving capabilities. Twice he was the featured keynote speaker at the Harvard Healthcare Conference, recipient of a Smithsonian Award, and was invited by Pope Benedict to speak at a Vatican conference on stem-cell research. Beyond the healthcare field, Dr. Hasan's interests led to him being named to the UN Commission on Human Rights, the Presidential Commission of Arts, and designated as a Public Diplomat for the United States.

Today, Dr. Malik Hasan continues to advocate for advanced medical research, premium healthcare at an affordable cost for all citizens, and his true passion of healing and caring for others.



## Journal of Cannabis Research

The Journal of Cannabis Research (JCR) is the official publication of the Institute of Cannabis Research. It is the only broadly multidisciplinary journal of cannabis research, encompassing not only clinical and scientific research, but also research into social, business, economic, legal, environmental, and ethical impacts of cannabis use and the changing legal status of cannabis. To learn more about the aims and scope of the journal as well as submission guidelines, please visit: [Journal of Cannabis Research](#)  
Please see two recent articles here:

- [Industrial hemp seed: from the field to value-added food ingredients](#)
- [The supply-side effects of cannabis legalization](#)

The Institute of Cannabis Research is accepting donations to support future cannabis research. You, our friends, colleagues and supporters, have the ability to help us continue with cutting edge research by donating to the ICR Research Fund. Please consider contributing to this important research to enhance our understanding of the applications and impacts of cannabis. All donations contributed are tax deductible. Please consider a year-end donation or feel free to contact the Foundation Office to learn of donations through wills, trusts, and etc.

[Donate Here](#)

# ICR RESEARCH



Our funded FY23 Research Studies have been announced. Funded projects focus on topics related to cannabis research, including biology, chemistry, physiology, and agronomy; medical and clinical research; and public health and harm reduction/societal impacts. These projects have an anticipated start date of October 1st. Please find the link to all of the FY23 awardees here:

<https://www.csupueblo.edu/institute-of-cannabis-research/research/research-studies/index.html>

## Introducing Dr. Punya Nachappa, PhD, Associate Professor, Entomology, Department of Agricultural Biology, Colorado State University

### Examining the adaptive roles of plant defensive chemistry on pest resistance in *Cannabis sativa*

Understanding how plants respond to insect herbivores can provide new insights into plant-insect chemical communication and coevolution and facilitate new approaches to crop protection. Cannabis is known for the presence of cannabinoids, which include  $\Delta^9$ -tetrahydrocannabinol (THC) and cannabidiol (CBD) and more than 100 related secondary metabolites. In addition to cannabinoids, *C. sativa* also possesses a range of defense mechanisms (namely terpenes and phenolic compounds) that are conserved across dicots and well described in other model plant species. To date, no study has analyzed the degree to which cannabinoids confer pest resistance relative to other defensive traits in *C. sativa*. Hence, the goal of our project is to understand how variation in secondary metabolites in *C. sativa* affects key hemp pests by using and developing novel genetic tools and technology. Outcomes of this research will not only advance basic research in the field of plant-insect coevolution but also has practical applications for breeding for pest resistance in hemp.



Dr. Punya Nachappa, PhD



# UPCOMING WEBINARS



**Institute of Cannabis Research**  
at Colorado State University Pueblo

**Cannabis  
Research  
Webinar  
Series**



**Jefferson**  
Thomas Jefferson University

**Lambert Center for  
the Study of Medicinal  
Cannabis & Hemp**

**September Webinar:** The ICR and Lambert Center are pleased to host Dr. Hollis Karoly for the webinar on September 8th at 1:00PM MST Title: "Exploring the Effects of Oral Cannabidiol on Blood Alcohol Level and Intoxication: Results from a Human Laboratory Study" [Register Here:](#)

Dr. Hollis Karoly is an Assistant Professor at Colorado State University, Fort Collins, Colorado specializing in Clinical Psychology and Neuroscience with a specialization in addictive disorders. Her research aims to characterize neural, molecular and behavioral mechanisms underlying the etiology of alcohol use disorders, in an effort to inform treatment development. More specifically, Dr. Karoly is interested in how functional impairments along the microbiota-gut-brain-axis (MGBA; which refers to bidirectional interactions between gut microbes, endocrine, autonomic, enteric, immune and central nervous systems) may promote alcohol use behavior and serve as potential treatment targets. In recent years, her work has increasingly emphasized the role of the endogenous cannabinoid system - which is distributed heavily throughout the brain and gut - in the context of alcohol use disorders. Thus, Dr. Karoly is conducting several studies measuring the impact of phytocannabinoids (primarily cannabidiol [CBD] and tetrahydrocannabinol [THC]) on behavioral phenotypes related to alcohol use disorder (alcohol consumption, craving, intoxication) and on biomarkers across the MGBA (brain structure and function, peripheral inflammation, intestinal permeability, gut microbial composition). To this end, Dr. Karoly combines behavioral measures, molecular biology methods, neuroimaging and high throughput 16S ribosomal RNA gene sequencing to explore the impact of alcohol and cannabis on the MGBA and behavior. Because this work involves acute administration of various cannabis products, Dr. Karoly's research also makes use of a Mobile Drug Administration Laboratory which adheres to federal guidelines restricting cannabis administration in academic research.



**Dr. Hollis Karoly**

**October Webinar:** The ICR and Lambert Center are pleased to host Dr. Claude Cyr for the webinar on October 13th at 1:00PM MST [Registration Link forthcoming and can be found here:](#)  
**Title: TBA**



**Dr. Claude Cyr**

Dr. Cyr has been practicing family medicine in Quebec since 1996. He is a Faculty Lecturer in the Department of Family Medicine at McGill University and participated as an Associate Researcher for the Quebec Cannabis Registry, the world's first research database on the use of cannabis for medical purposes.

He completed his Family Medicine Residency at Laval University in Quebec city. His major clinical interests are in pain management, geriatrics, mental health, and the use of cannabinoid-based medicines in palliative and cancer care. He is the founder of Doctors for Responsible Access, an association of medical cannabis practitioners whose mission was to support responsible access to cannabis in light of legalization in Canada. His focus is on the conception and dissemination of judicious educational tools for Health Care Providers interested in the use of cannabinoid-based medicines. He is a recognized cannabis educator and government advisor and is actively involved in supporting the role of pharmacists in having a primary role as medical cannabis providers in Quebec. He is a member of the Society of Cannabis Clinicians, the Canadian Consortium for the Investigations of Cannabinoids, and a member of Drug-Free Kids Canada's advisory council.

# UPCOMING WEBINARS



## CANNABIS CULTIVATION Webinar Series



**September Webinar:** The ICR Hemp Farmers Association is pleased to host Dr. Clint Shock on Wednesday, September 21, at 11:00AM MST [Register Here](#)  
**Title:** "Cost competitive hemp production for cannabinoids"

Clinton C. Shock, PhD in Plant Physiology, University of California, Davis; Professor Emeritus Oregon State University; Certified Professional Horticulturalist Clint has enthusiasm for plants and seeks to use science and education to solve horticultural, environmental, economic, and social problems. His research has developed economically viable options that are voluntarily implemented by growers. As Director of an Oregon State University experiment station from 1984 to 2018 he headed cooperative efforts to improve growers' yields and profitability while simultaneously correcting environmental problems. His work resulted in drip irrigation technology options for onion growers and improved groundwater quality in the Treasure Valley of Oregon and Idaho. Clint has studied the water use requirements of many crops and crop yield and quality responses to carefully managed irrigation. He has supported professionally several watershed councils since their inception. These councils have designed, funded, and implemented over a hundred diverse watershed restoration projects. Clint has envisioned and generated win-win solutions to problems such as credit and market access for poor growers in the Brazil, revegetation in the Amazon, "sugar end" of potato in the Pacific Northwest of the US, and groundwater contamination and irrigation induced erosion in the Treasure Valley. In China Clint helps drip irrigation research. Currently Clint is conducting horticultural research and breeding on medicinal crops.



**Dr. Clint Shock**

**November Webinar:** The ICR Hemp Farmers Association is pleased to host Dr. Lawrence Smart on Wednesday, November 2, at 11:00AM MST [Registration forthcoming and will be located Here](#)  
**Title:** "Shedding light on the genetic control of flowering time in hemp"



**Dr. Lawrence Smart**

Larry Smart is Professor of Plant Breeding and Genetics in the Horticulture Section of the School of Integrative Plant Science at Cornell University and is based at Cornell AgriTech in Geneva. He is a plant geneticist and breeder who uses genomic tools to understand the biology of key traits and to breed improved cultivars of hemp for grain, fiber, and cannabinoids; shrub willow for bioenergy and carbon sequestration; and hop for craft breweries in New York.

His research focuses on hybrid vigor, sex determination, and disease resistance. He earned a BS in Biology from Cornell University, PhD in Genetics from Michigan State University, and was an NSF post-doctoral fellow at UC Davis.



## A Deeper Look at Hemp – Scanning electron microscopy images presented by Dr. Eunsoo Kim, Visiting Scientist

- (a) This SEM micrograph shows cotyledon cells of hemp seed containing numerous large protein bodies (P) and smaller oil bodies (O). The protein bodies are oval or spherical in form, with diameters ranging from 1.8 to 5.0  $\mu\text{m}$ .
- (b) The TEM micrograph shows a protein body including an electron-dense globoid. The oil bodies measuring from 0.2 to 2.5  $\mu\text{m}$  in diameter surround the protein body. The protein bodies of hemp seeds are vacuoles filled with storage proteins.
- (c) This light micrograph demonstrates palisade cells of cotyledon. Numerous protein bodies are easily stained with basic fuchsin and methylene blue.
- (d) The isolated oil bodies of cotyledon cells are visibly stained with Sudan III.

