

From the Director's Desk ...

Spring semester at Mississippi State University started last month. From experiencing both snow and ice a few weeks ago to 70+ degree weather this week, frozen pipes, no running water, businesses closed, and roads impassable, life is progressing along nicely. Research continues on the many funded projects from various sponsors from USDA-ARS to USGS. Spring semester graduation is scheduled for April 29 & 30 for the Starkville campus and May 3 in Meridian. Please stay vigilant until the curve is flattened.

In this issue, MWRRI features one of our USGS 104b funded research projects. Gurbir Singh, Assistant Research Professor who is stationed at the water center located in Stoneville, MS. His background and research areas are quite extensive.



The decision was made not to hold an in-person 2021 MWRC this year. While this event furthers the sharing of your research in Mississippi, it allows for networking and an avenue for students, researchers, and agency personnel to share common goals and ideas. We're hoping to be able to see everyone in 2022. As details become more definite, please keep watching for newsletters, listserv emails, the institute website, as well as Twitter.

If anyone would like to share how their agency research projects are progressing during the COVID-19, please email your information to Jessie Schmidt for sharing, jessie.schmidt@msstate.edu.

All of us at MWRRI hope you and your family continue to remain safe and healthy during this COVID-19 pandemic.

Jason

Jason Krutz, Ph.D.

From the desk of Dr. Barrett ...

As I write this letter to you, we are seeing the sun and spring like weather for the first time this year. We are also seeing our Covid-19 vaccinations go up while our Covid-19 positive test numbers gradually decrease. We do seem to be moving in a positive trend on these fronts.

But, the winter storm of mid-February exacerbated the operations of water systems across Mississippi. Freezing pipes, busting pipes, brown water or no water are the topics that are coming across for many. It often times takes events like these to make us aware of our vulnerable assets within our drinking water systems. We do not need to let these asset issues go unaddressed. Now is the time to address these issues so the next natural event/disaster may not have such a negative impact on our drinking water supplies. Mississippi is home to just under 1,200 community water systems that are owned and operated as public utilities and as public utilities, the board has the legal authority to set rates at a level to support the current and future needs of the water system. Our Mississippi public water system boards need our support as customers and professionals to get drinking water rates in line to improve and/or maintain a quality drinking water supply for all Mississippi residents.

On a programmatic front, we are very busy at the Institute. The WIIN Grant for Testing for Lead in Schools and Childcare Centers started its first round of sampling in February. It is great to get out and visit with childcare centers and provide this high level of information and assistance. The Mississippi Well Owner Network program is ramping up to hold four or five sample collection and workshop days this Spring and Summer. Please be on the look out for more information on these programs.

From all of us here at MWRRI, if we can ever be a resource for assistance or information, please do not hesitate to reach out. We are here for the water needs of Mississippi.

Thanks so much,



Gurbir Singh, PhD
Assistant Research Professor
Plant & Soil Sciences Delta Research
& Extension Center
Mississippi State University
Stoneville, MS



Tell us a bit about your background and education

I joined Mississippi State University in 2019 as an Assistant Professor. I am located at the National Center for Alluvial Aquifer Research (NCAAR), Delta Research and Extension Center (DREC), Stoneville MS.

I grew up with row crops (rice, sugarcane, wheat, and corn) at our family farm in Punjab, India. I learned basic management of crops, planning annual budgets, and sales of crop produce while working on our family farm.

I earned an undergraduate degree in Agriculture (Honors) with a major in soil sciences from Punjab Agricultural University, Ludhiana India. I moved to the US in 2011 for pursuing my master's degree. My master's degree is in Soil, Environmental and Atmospheric Sciences from the University of Missouri, Columbia, USA, and my Ph.D. degree is in Agricultural Sciences from the Southern Illinois University, Carbondale, USA.

After completing my master's degree, I worked at the University of Missouri in 2013 as a Research Technician and trained several graduate students with data collection and analysis. I worked as a Research fellow at Punjab Agricultural University in 2014 and managed a multi-state research project on long-term fertilizer experiments to study its impact on crop productivity, sustainability, and soil quality. After completing my Ph.D. in 2018, I joined Southern Illinois University as a research associate and then, as an Adjunct Assistant Professor. During these positions I planned, coordinated, and assisted with several research projects focused on cropping systems, water quality and quantity, and nutrient management. Before joining Mississippi State University, I was a Post-doctoral research associate at Lee Greenley Jr. Memorial Research Center, Novelty, MO with the University of Missouri. At University of Missouri, I worked on multiple projects related to tile drainage, nutrient management, and water quality.

What is your current position?

I am an Agronomist in NCAAR and I work on agricultural water and nutrient management. I have expertise in Agronomy, Soil Science, and Water quality research. I am conducting field and laboratory research focused on soil health, water quantity and quality, conservation tillage, cover crops, nutrient management, and GIS modeling in multiple cropping systems. In the NCAAR research team, my responsibilities include conducting field research to solve water problems for our MS producers, advise and mentor graduate students, and transfer of science-based knowledge generated from my research to producers of our state.

How does water resources research fit into your future plans?

Water resource research is an integral part of my research. To meet sustainable agriculture production goals, resource conservation is critical. There is big competition for water resources among different sectors in our society including both urban and agricultural sectors. In Agriculture, irrigation water is the most important input for achieving high yield/productivity goals, however at the same time it is the most overexploited resource in irrigated agriculture production systems. My future research will be focused on answering the question that how we can efficiently manage water resources by conserving them for future generations and at the same time providing food to the growing population.

What are your research interests?

During my career of 10 years in research, I have been a PI and Co-PI on several grants from USDA-NIFA, USDA-NRCS, USDA-EPA, USGS, Agronomic Science Foundation, Illinois- Nutrient Research and Education Council, producer commodity boards, and industry. My irrigation water application research is focused on evaluating irrigation systems including, furrow irrigation, sprinkler irrigation, and subsurface irrigation. I am also working on crop rotations by including cover crops in the rotational cycle and understanding how we can develop a cash crop-cover crop system which benefits growers and at the same time conserves soil-water resource. In Mississippi Delta tillage is an integral part of row crop production. Farmers need tillage to make beds for facilitating surface drainage and use furrows for irrigating when crop water demand is high. My research on conservation tillage systems is established around this approach that how we can develop alternate tillage methods that address drainage and irrigation issues for delta farmers. My research interests are in vadose zone water quality - nutrient leaching, uptake, and cycling. Irrigation water management practices influence nutrient cycling and soil water quality. Fertilizer and irrigation water management go hand in hand for optimizing crop production and reducing environmental losses. My research interests are related to updating soil fertility recommendations based on the optimum irrigation requirements for row crops.



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What does MWRRI provide in research and mentoring?

MWRRI supported our research on evaluating the effects of irrigation systems on crop water and nutrient use efficiencies and net returns through the USGS 104b grant. In this project, a doctoral student is comparing irrigation systems (dryland, sprinkler, and furrow) along with row spacing patterns under corn and soybean crops. Through this supportive grant, we have collaborated with several researchers including economists, irrigation engineers, soil scientists, hydrologists, and extension specialists from Mississippi State University and USDA-ARS. The dedicated funding to a doctoral student through this grant has helped the student in pursuing his PhD degree and the travel money provided through the USGS 104g grant has helped in enhancing the scientific perspective of thinking through attending annual conferences and meetings.

If you're working with students – what is your teaching method and goals for them?

Part of my job at Mississippi State University is mentoring and advising graduate students. I have three graduate students working under me for masters and Ph.D. degrees. My advice to students is that they should develop critical thinking for the applied research. Students need to understand that evidence-based learning is important for a successful career. I try to integrate a multidisciplinary approach in my teaching so that student thinking is developed in a way that while solving a water-related issue they are not creating issues for other disciplines. Teaching is an essential aspect of my intellectual life and focused on student learning and promoting student success. Teaching, along with research allows me to continue to grow, personally and intellectually, as I am challenged by colleagues and students who defend their ideas.

Selected Publications

1. **Singh G.**, Kaur, G., Williard, K.W., and Schoonover, J.E. 2021. Cover crops and Tillage Effects on Carbon-Nitrogen Pools: A Lysimeter Study. *Vadose Zone Journal*. <https://doi.org/10.1002/vzj2.20110>.
2. **Singh., G.**, and Nelson, K. 2021. Long-term drainage, sub-irrigation, and tile spacing effects on corn production. *Field Crop Research*. <https://doi.org/10.1016/j.fcr.2020.108032>.
3. **Singh, G.**, Kaur, G., Williard, K.W., Schoonover, J.E., and Bararpour, T. 2020. Cover crops and landscape positions impact infiltration and anion leaching in a corn-soybean rotation. *Journal of Mississippi Academy of Sciences*; 65 (3), 346-357.
4. Nash, P., **Singh, G.**, and Nelson, K. 2020. Nutrient loss from floodplain soil with controlled subsurface drainage under forage production. *Journal of Environmental Quality* <https://doi.org/10.1002/jeq2.20072>.



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5. Adler, R.L., **Singh, G.**, Nelson, K.A., Weirich, J., Motavalli, P.P., and Miles, R.J. 2020. Cover crop impact on crop production and nutrient loss in a no-till terrace topography. *Journal of Soil and Water Conservation*. <https://doi.org/10.2489/jswc.75.2.153>.
6. **Singh, G.**, Williard, K.W., Schoonover, J.E., Nelson, K., and Kaur, G. 2019. Cover crops and landscape position effects on nitrogen dynamics in plant-soil-water pools. *Water*; <https://doi.org/10.3390/w11030513>
7. **Singh, G.**, Mejía N.M.M., Williard, K.W., Schoonover, J.E., and Groninger J. 2019. Watershed vulnerability to invasive N₂-fixing autumn-olive and consequences for stream nitrogen concentrations. *Journal of Environmental Quality*; <https://doi:10.2134/jeq2018.09.0343>
8. **Singh, G.**, Williard, K.W., and Schoonover, J.E. (2018). Cover crops and tillage influence on nitrogen dynamics in plant-soil-water pools. *Soil Science Society of America Journal*; <https://doi.org/10.2136/sssaj2018.03.0111>.
9. **Singh, G.**, Williard, K.W., and Schoonover, J.E. (2018). Cover crops for managing stream water quantity and improving stream water quality of non-tile drained paired watersheds. *Water* 10(4):521-540; <https://doi.org/10.3390/w10040521>.
10. **Singh, G.**, Schoonover, J.E., Williard, K.W., Sweet, A., and Stewart J. (2018). Giant cane: a vegetative buffer for improving soil and surface water quality. *Journal of Environmental Quality*; <https://doi.org/10.2134/jeq2017.11.0452>.



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Upcoming Events

- Georgia Water Resources Conference – March 22-23, 2021 (will be virtual)
<https://rivercenter.uga.edu/georgia-water-resources-conference/>
- MWRRI Advisory Board meeting (virtual) – March 31, 2021
- UCOWR/NIWR Annual Water Resources Conference will be held virtually June 8-10. Use this link for conference updates, registration, and agenda.
<https://ucowr.org/conference/>

Do you have a publication that you would like to share? Consider distribution through the MWRRI newsletter. Contact Jessie Schmidt for information.

Do you have an upcoming event that all those interested in water-related issues and agriculture would find interesting? Considering adding it to the newsletter and/or listserv. Also available is the MWRRI Twitter account - @MS_WRRI.

About the Mississippi Water Resources Research Institute (MWRRI)

The institute exists as both a federal and a state research unit. Established in 1964, the MWRRI is one of 54 institutes (one in each state, The District of Columbia, Guam, Puerto Rico, and the Virgin Islands) that form a national network to solve water problems of state, regional, or national significance. In 1983, the Mississippi legislature formally designated the MWRRI as a state research institute. Federal funds designated for the institute are used to consult with state water officials to develop coordinated research, technology transfer and training programs that apply academic expertise to water and related land-use problems. These various activities are funded through an annual grant from the United States Geological Survey (USGS). Mississippi state appropriations provide additional funds for cost share. The institute also assists state agencies in the development of a state water management plan, maintaining a technology transfer program, and serves as a liaison between Mississippi and federal funding agencies.

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