Rice: The Life Giver and Earth Killer

Rice. The basic food of more than half the world's population, and it has kept that place for centuries. It’s versatile, it’s filling, and it’s affordable. However, rice is a double edged sword. It emits 1.3% of the world’s global emissions (Ghosh). That may not seem like much, but compare that to the 1.9% of emissions that landfills are accountable for (Ghosh). The way rice is grown currently is problematic, but there are solutions. The practices of alternate wetting and drying and drip irrigation are only two of many possible solutions that are just waiting to be widespread. The United Nations can grab the reins and lead the implementation of these solutions by funding the installation of the technology, spreading knowledge about the problems with the current rice-growing practices and create a safety net to fall on for the poor who depend on rice.

Traditionally, rice is grown in paddy fields, flat land that is submerged in as much as 10 centimeters of water during the growing season. Due to the absence of competing weeds, this practice results in high yields (Beans, 00:02:25-00:02:32). This allows microorganisms called methanogens, thrive in this no-oxygen environment. They multiply quickly, emitting staggering amounts of methane. The way rice is currently farmed has many challenges. How much water rice cultivation requires is only one of those problems. Only 11% of the world's farmland is covered by rice, but more than ⅓ of the world’s irrigation water is used for rice (Beans, 00:02:42, 00:02:47). One method that could save water and kill the methanogens is something called alternate wetting and drying.

Alternate wetting and drying is the practice of alternating dry and wet periods instead of keeping the field flooded for the whole season. The use of water would drop, since the rice would not be constantly submerged in it. The potential mitigation of greenhouse gasses is 73% (Ivanovich, et. al). This practice also decreases the cost of irrigation by 12- 15% (Alam, et. al). However, research shows that when this method of irrigation was applied to rice fields, the yields of the rice dropped 5.4% compared to regular growing methods (Alam, et. al). Although 5.4% seems like a relatively small number, when you take away that 5.4 percent from the 520.4 *million* metric tons of rice consumed annually (Shahbandeh) you get approximately 492.2 million metric tons. This is 28 million metric tons less, which can feed the entire country of Philippines for a year with some rice to spare (*Rice Consumption by Country 2024*).

Drip irrigation is another solution for humanity's problem with rice. Instead of flooding the field in the first place, a network of tubes is woven around the paddy field. There is a small faucet-like hole at the bottom of each tube that drips water at a very slow rate. Thus, this method of irrigation is called drip irrigation (Espino , et. al 1). Its mitigation potential is 78%, slightly more than the alternate wetting and drying method. Despite this, it has a major downside. The current method for rice irrigation only costs $150 per acre (Espino, et. al.). Drip irrigation on the other hand, costs $500-$3,000 USD for above ground irrigation, and $1,000-$4,000 USD for below ground irrigation (Farmer). It needs to have a filtration system, otherwise the system can get clogged or the water will get contaminated and pass pollutants into the water. The system also deteriorates quickly, since it's in direct contact with the sun on a daily basis.

Both of the solutions listed above are valid, but many barriers stand in the way. One example of this problem is the knowledge barrier. Many people have not even heard of the world's problem with rice in the first place, so the number of people who know about the possible solutions are most likely microscopic. Money and the economic flow only make the barrier taller and thicker. Not only does drip irrigation cost more, but alternate wetting and drying decreases the yield of the crop, and would drive rice prices up. It would be devastating for the people starving, who already do not consume enough food on a daily basis. This would likely cause an uproar from the people and the solution of alternate wetting and drying would be rejected.

The United Nations have many resources that could be used to help make the proposed solutions more accepted and favorable. Two of the main areas the UN works on are (1) support sustainable development and climate action and (2) deliver humanitarian aid. Hence, the UN can take proactive action by investing funds into the implementation of drip irrigation and alternate water and drying technologies. Moreover, the UN can help organize and fund education about the climate effects of how rice is currently grown as well as provide support for training to operate the machines that would be used to implement the solutions. As the safety measure the UN can design a subsidy program for the poor that could be invoked or used in case of rice price increases.

Rice feeds over half of the world's population, but the way it is grown wastes ⅓ of the world's irrigation water and emits 1.3% of the world's yearly emissions. The methane that rice emits can cause premature deaths and the water that is wasted on water could be used for other purposes. The use of water and the emissions of methane can be greatly reduced by replacing traditional growing methods with alternate wetting and drying and drip irrigation. The United Nations can speed up the implementation of these methods and facilitate their adoption by funding the implementation of both solutions, funding the education of the problem with current growing practices, and creating a subsidy for the poor in the event that they can no longer afford rice. As an added benefit, these efforts are a step forward to tackling climate change.

Works Cited

University of California Agriculture and Natural Resources Cooperative Extensions UC Davis Department of Agricultural and Resource Economics “Sample Costs to Produce Rice” 2021 https://coststudyfiles.ucdavis.edu/uploads/pub/2021/11/03/2021ricesacramentovalley.pdf

Why is rice so popular?- Carolyn Beans, uploaded by Ted Ed, 11, January, 2024 https://www.youtube.com/watch?v=YiiLg_KbZDM&t=178s

Ghosh, Iman “ A Global Breakdown of Greenhouse Gas Emissions by Sector”, *Visual Capitalist, 6, November, 2020* *https://www.visualcapitalist.com/a-global-breakdown-of-greenhouse-gas-emissions-by-sector*

Farmer, Tara “How much does a drip irrigation system cost to install?”, *Homeguide*, 5, September, 2023, https://homeguide.com/costs/drip-irrigation-system-cost#:~:text=cost%20per%20zone-,%24500%20%E2%80%93%20%244%2C000%20cost%20per%20acre,%244%2C000%20per%20acre%20on%20average.

Alam, Shahe et, al “ Economics of Alternate Wetting and Drying Method of Irrigation: Evidences from Farm Level Study” *ResearchGate,* December 2009, https://www.researchgate.net/publication/265848707_Economics_of_Alternate_Wetting_and_Drying_Method_of_Irrigation_Evidences_from_Farm_Level_Study

Vince, Vince “ Drip Irrigation: The Ultimate Guide for Beginners” *Hills Irrigation,* https://www.hillsirrigation.com.au/drip-irrigation-guide/#:~:text=Not%20necessarily%20beginner%2Dfriendly%20%E2%80%93%20Because,or%20under%20watering%20your%20plants.

“Rice Consumption by Country 2024” *World Population Review,* 2024, https://worldpopulationreview.com/country-rankings/rice-consumption-by-country