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Investigating Clay Pot Coolers for Food Storage in Developing Nations

A major obstacle to food storage in the developing world is keeping food fresh for longer than a few days. A huge portion of harvested produce ultimately goes to waste in developing nations, purely due to lack of access to cooled storage systems. The lack of household refrigeration in rural regions of Mali often forces women to walk long distances to markets to purchase fresh produce, restricts access to nutritious vegetables, and causes significant food loss due to spoilage. For the past several years, MIT D-Lab has been collaborating with the World Vegetable Center and Institut d'Economie Rurale (IER) to develop and disseminate more effective evaporative cooling systems. Evaporative cooling systems, such as clay pot coolers, are less expensive than traditional refrigeration units, and well suited for the hot and arid regions of Central and Northern Mali.

Clay pot cooling systems are the focus of this project, with the goal of finding configurations that are accessible, water-efficient, and effective at preserving produce. In a clay pot cooling system, one pot is placed inside of another pot or dish, and the gap is filled with sand. Water is then poured into this sand gap, and its evaporation cools the produce inside. When constructing a clay pot cooler, a user may have access to a variety of pots of differing sizes and materials. The efficacy of various configurations has not been systematically studied, so establishing guidance or recommendations on clay pot cooler designs will further improve the appeal of the systems.

To help understand the impact of the clay pot cooler design on performance and usability, trials of different pot configurations are currently in progress. Temperature and humidity data is collected from the trial systems with electronic probes, and the change in weight due to water evaporation is measured with load cells. Data from the first complete trial has demonstrated clear differences between the systems. For example, certain systems keep their contents cool for over a week but create a smaller initial cooling effect than other systems. Other systems are difficult to construct and maintain, or to procure the materials for, which is why the goal of this project is primarily to establish references for effective systems, rather than find one “ideal” efficient system.

Since they do not consume electricity to cool produce, clay pot coolers will not place any additional strain on electricity grids as demand for energy increases in Mali. This will help tackle UN Sustainable Development Goal 7- Affordable and Clean Energy, by reducing a major future burden on the electricity grid. This project also addresses UN Sustainable Development Goal 2- Zero Hunger, by increasing access to fresh produce in developing nations. Fresh produce is not just healthier, it also is viable for longer, so clay pot cooler systems would dramatically reduce the extremely high food waste present in nations that suffer from lack of effective storage.