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Adsorption-based Cooling Systems for Improved Storage of Mango in Sub-Saharan Africa Countries

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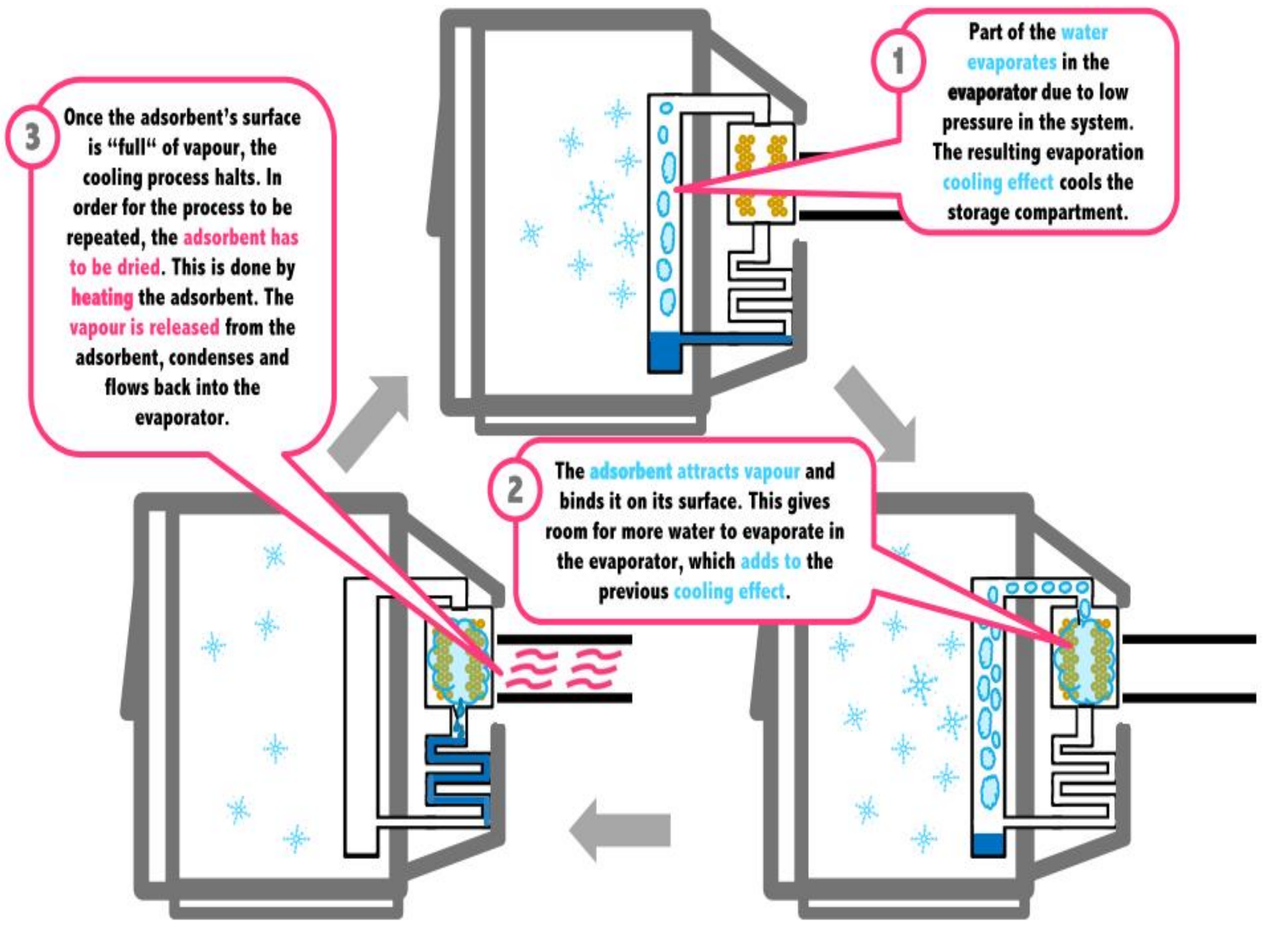
Introduction: Refrigeration is generally recognized as a key tool for successful marketing of perishable products, but such sophisticated cooling systems are unavailable or non-existent for African smallholder farmers due to financial constraints. Therefore, this work was focused on providing solutions to reduce the postharvest losses by implementing cost effective, environmentally friendly and energy saving technologies such as adsorption-based cooling systems for mango storage in Sub-Saharan Africa countries.

Objective: To evaluate the potential of adsorption-based cooling systems for mango storage.

Adsorption based cooling system:

Coolar UG has developed a refrigeration system that cools with heat instead of electricity by utilizing the principle of adsorption. The system evaporates purified water in a low pressure environment and amplifies the evaporation cooling effect via vapour adsorption onto the surface of silica gel.

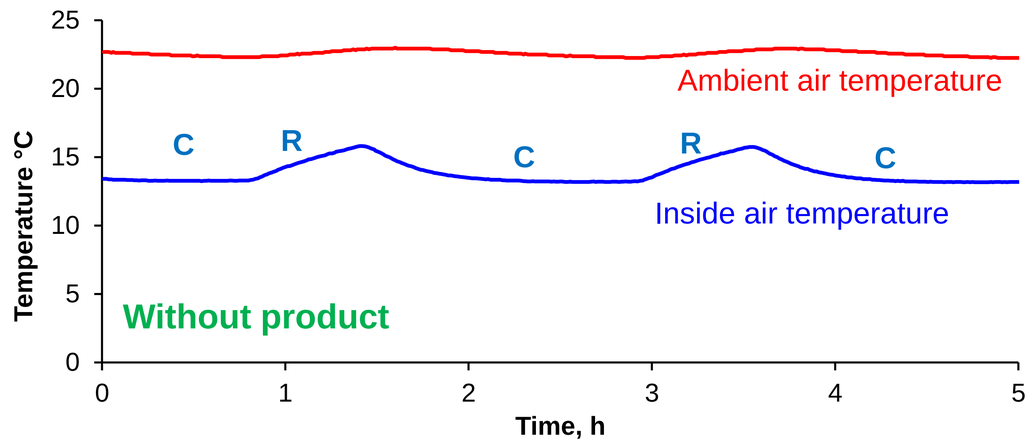


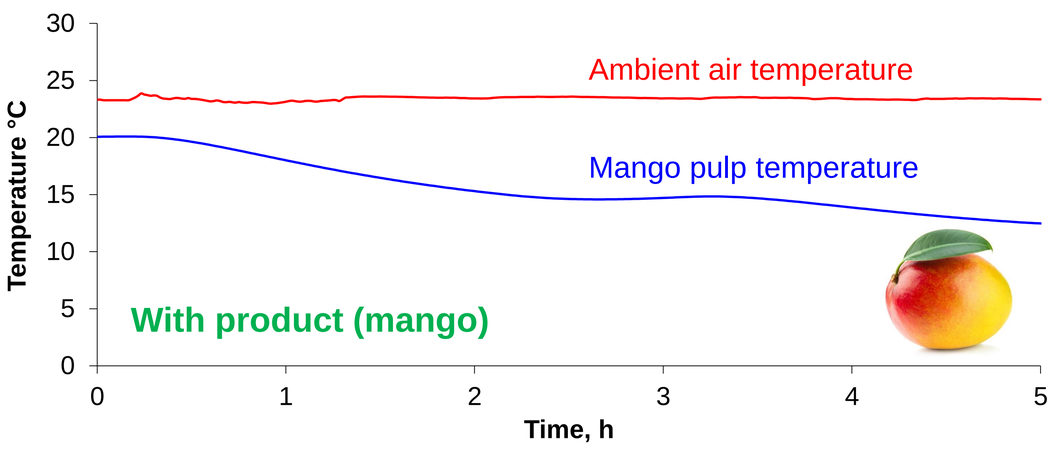
Working principle of Coolar's adsorption-based cooling system

(Source: Coolar UG, Berlin, Germany)

Performance evaluation:

Cooling performance of Coolar prototype (180 L) was tested with and without product. The system was operated with 0.8 kg silica gel, 80 °C hot water and 120/30 minutes of cooling (C) / regeneration (R) cycles for one week. Ripe mango (cv. Shelly) fruits were stored and temperature was monitored over one week storage period.





Highlights:

- The adsorption based prototype was capable of reducing air temperature to 13 °C
- Core temperature of mango decreased from 23 to 13 °C after 5 hours of storage

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