TITLE: ANOTHER CHALLENGE: CROPS, CROPS EVERYWHERE BUT LITTLE FOOD ON THE TABLE - THE POSTHARVEST ENGINEER'S STRUGGLES

ABSTRACT

The paradox of crop abundance coexisting with food insecurity remains one of the most pressing contradictions of modern food systems. Fields in many developing countries including Nigeria, display impressive yields at harvest, yet household tables remain inadequately supplied. The farm to fork continuum exposes critical gap where potential food is lost before it can get to the table. It is within these gaps that the postharvest engineer operates, confronting technical, infrastructural and systemic challenges that determine whether harvest crops become meals or waste. The objective of this lecture is to use the concept of "farm to fork" along the food value chain to interrogate the process of movement of food from the farm to the household table level.

Globally, nearly one-third of all food produced is lost or wasted, with postharvest losses accounting for a significant share in low- and middle-income countries. For perishables like tomatoes, fruits and leafy vegetables, losses can exceed 40% between farmgate and retail points. The food value chain begins at the farm with harvesting and field handling, progressing to transportation, storage, processing, packaging, distribution and ends at the consumer's fork. At each node, biological, mechanical and environmental factors interact to degrade the food. Challenges start immediately with poor harvesting techniques, causing bruised crops, creating entry points for pathogens. Lack of shade and immediate cooling accelerates metabolic activity in fruits and vegetables, reducing shelf life within hours. For grains, delayed drying or improper moisture content leads to mold growth and aflatoxin contamination. Transportation presents the next struggle. Rural feeder roads are often impassable during peak seasons, causing delays. Overloaded trucks without cushioning or temperature control turn produce into pulp. Storage and aggregation hubs are critical check points. Traditional barns and warehouses lack hermetic seals, rodent protection or humidity control. Processing for value addition and shelf life extension is underdeveloped. Cottage scale processors struggle with energy efficiency, food safety compliance and equipment maintenance. In all these aforementioned postharvest processes, there is one form of losses or the other. In order to eliminate or reduce these postharvest losses and get food to the table, the following research efforts were thus undertaken by this postharvest engineer along the following thematic areas:

i. Determination of the engineering properties of some underutilized crops
ii. Using the determined properties to develop some processing machines
iii. Optimization and modelling of the machines
iv. Product development
v. Solar thermal usage food processing and preservation
vi. Storage of perishables
vii. Environmental Engineering and Management

Ultimately, solving the problems that are preventing more food from getting to the household table requires repositioning the postharvest engineer as a system integrator across the farm to fork chain. Interventions must be context specific, energy smart and economically viable for smallholder farmers. Investment in rural infrastructure, cold chain networks and digital monitoring tools are essential. More

importantly, engineering solutions must be paired with policy support, market incentives and farmer education. Only by strengthening every link in the postharvest value chain can abundant harvests translate into food security at the table.