

Section: Crop and Livestock Production

Introduction

Crop and Livestock Production are practices undertaken by African farmers in a bid to alleviate food insecurity, not only for themselves and their families, but also for their countries. On-farm productivity of the various commodities faces numerous challenges in the context of the African smallholder farmer. However, opportunities for increased productivity are available, and this section seeks to highlight some of the challenges being faced and suggests solutions that can be scaled-up for any country in Africa seeking improved crop and livestock production.

In crop production, novel traditional “orphan” crops present reliable alternatives for countries in sub-Saharan Africa (SSA), aside from the popular staples widely produced. For instance, finger millet in Kenya is a strategic famine crop that has potential for enhancing production, utilization, and marketing in Africa as presented in “*Opportunities for Enhancing Production, Utilization and Marketing of Finger Millet in Africa.*” Research interests in millet production are growing and there is need to upscale efforts in bio-fortification of adapted varieties leading to higher rates of utilization and adoption.

Root crops are important sources of calories and micronutrients for millions of resource-poor farmers in tropical regions. Among them is cassava, which can be utilized as an input in both food and non-food industrial applications. The crop has potential as an income generator and food security crop for the farmers who cultivate it. The authors of “*Opportunities to Commercialize Cassava Production for Poverty Alleviation and Improved Food Security in Tanzania*” bring to light the challenges of post-harvest deterioration, lack of suitable cultivars, poor processing techniques and enabling policies, as major constraints to its production. Nonetheless, there are opportunities for its commercial production, strategically presented for adoption herein.

Livestock production is a vital occupation in rural Africa. Millions of nomadic communities in the arid and semi-arid regions of Africa are highly dependent on livestock for their livelihoods. Diverse indigenous breeds adapted to native environments prove to be more resilient in survival, and longevity, but are unfortunately low in production and productivity. Animal breeding conventionally poses numerous challenges; yet, with the advent of biotechnology, emerging new strategies to circumvent these challenges continue to present themselves. Combining successful conventional breeding techniques with emerging technologies like Marker Assisted Selection (MAS) provide an opportunity to study the genetic diversity present in indigenous breeds and how this can be utilized for improved livestock production and productivity. Insights are presented in “*A Review on Challenges to Genetic Improvement of Indigenous Livestock for Improved Food Production in Nigeria*” revealing the challenges and abundant potential of biotechnology in finding solutions to existing production gaps.

On the other hand, one of the chief constraints to agricultural productivity in the African context is the prevalence of pests and diseases. Resource-constrained smallholder farmers, unable to acquire chemicals to combat pests and diseases, are in turn unable to generate income from their produce due to poor quality and quantity of their yields. A study on *“Pathogen Variability and New Sources of Resistance to Angular Leaf Spot among Bean Landraces in Uganda”* demonstrates both the need for understanding the pathogen variability, and dynamics, in present populations and offers tactics to speedier breeding for resistant varieties. This would empower the smallholder farmers to earn more from their trade in agriculture.

Genetically modified (GM) crops with high yields and resilient traits continue to offer a solution to the imminent problem of food insecurity due to the low productivity experienced in most African countries that rely on agriculture. On a continent where population growth continues to spike, land under agricultural cultivation is not expected to increase. Hence productivity in yields per hectare must be doubled, if not tripled, in order to keep up with feeding the growing population. Biotechnology has the potential to contribute immensely to improved productivity. *“Potential Uses, Perceptions, and Policy Issues of Genetically Modified Crops in Africa: A Case Study of Kenya”* is a review that demonstrates how Kenya has made incremental progress through building institutional capacities and developing some GM technologies because of enabling national policies. Unfortunately, the lack of proper sensitization to these technologies, anti-GM propaganda, and ineffective implementation of policies has resulted in low adoption of technology in this country.

Finally, the value of involving farmers in variety and germplasm selection in plant breeding is underlined in *“Understanding Farmer Needs and Unlocking Local Genetic Resources for Potato Improvement: A Case Study in Ethiopia.”* Modern plant breeding aims at developing market-led varieties, utilized by the farmers themselves, hence the significance of working with farmers to develop technologies that would benefit them as the producers of the food ensuring a food secure Africa. Farmers in Ethiopia were involved in the selection process among various local potato varieties, for traits that they considered most important. Gender, agro-ecological zones, growing seasons, and market access were all factors that caused variation among preference criteria. Local varieties have been preferred to exotic clones, because they have other desirable attributes making them well-suited for alternative uses. Hence, there is a need to approach breeding holistically and work with all stakeholders to ensure its success.