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Knowledge acquisition in farmer field schools: Agroforestry knowledge co-creation processes in Kilifi county, Kenya

QUINTER AOKO¹, ANNIE ONG'AYO², JAMES CHEGE³, ROSE KIGATHI⁴, ELISHA OTIENO GOGO⁵,
KATJA KEHLENBECK⁶, SILKE STÖBER⁷

¹*Pwani University, Community Development, Kenya*

²*Pwani University, Community Development, Kenya*

³*Pwani University, Community Development,*

⁴*Pwani University, Dept. of Biological Sciences, Kenya*

⁵*Pwani University, Crop Sciences, Kenya*

⁶*Humboldt Universität zu Berlin, Center for Rural Development (SLE), Germany*

⁷*Humboldt-Universität zu Berlin, Centre for Rural Development (SLE), Germany*

Abstract

Farmer Field Schools (FFS) are widely promoted as a participatory approach for enhancing agricultural knowledge among smallholder farming communities. However, the processes through which knowledge is acquired remain insufficiently documented. This study examined how an agroforestry project (AfriNutriForest) supports agroforestry knowledge acquisition within FFS groups in Kilifi County, Kenya. Knowledge acquisition among farmers occurred through Agro-Ecosystem Analysis (AESA) sheets, experiential learning, field observation, farmer-to-farmer exchange visits, and interaction with subject matter specialists. FFS participants tested growing amaranth under fruit trees compared to full sun, and using drip or traditional irrigation across four sites during October 2025 to April 2026. Data was collected through structured observation checklists, focus group discussions, and participatory matrix scoring and thematic analysis. The recorded activity time across 20 Farmer Field School sessions totalled 2,939 minutes, with each session lasting 90 to 270 minutes. Farmers spent 25 % of their time acquiring knowledge through hands-on practical activities (743 minutes), followed by 24 % in farmer-to-farmer discussions (700 minutes), facilitator questions (15 %), facilitator explanation (13 %), decision-making (12 %), and joint analysis (10 %). This shows that 49 % of knowledge acquisition time was practice-based and interactive. Farmers at each site collectively defined four criteria in a matrix scoring exercise, centred on water use efficiency, harvest quantity and quality, plant growth and vigour, time savings, input costs, and natural soil fertility from tree leaf litter. Under-tree drip irrigation ranked highest at three of the four sites: Mtwapa (55/160), Takaungu (66/160), and Malindi (75/160), driven by advantages in water conservation under shade, reduced labour time, better plant quality, and soil fertility. At Mavueni, open-field drip ranked highest (53/160) due to better harvest quality and drainage constraints under trees. Across all four sites, under-tree drip irrigation received the highest average score (59/160), while open-field traditional irrigation scored the lowest (25/160). In conclusion, farmers actively learned through structured observation and peer discussion, demonstrating that FFS can function as sites of knowledge co-creation. Strengthening FFS requires a clear

feedback structure to capture farmer observations, translate them into experimental adjustments, and integrate farmer insights with scientific testing across continuous learning cycles.

Keywords: Agro-Ecosystem Analysis sheet, experiential learning, facilitation dynamics, farmer-to-farmer exchange, tree-crop integration