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"Reconcile land system changes
with planetary health"

Performance of amaranth and african nightshade under varying shade net levels in kilifi, Kenya

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Abstract

Vegetable production in the coastal region of Kenya is increasingly challenged by high ambient temperatures and elevated evaporation rates, resulting in reduced crop yields. Agroforestry systems have the potential to enhance productivity and income generation in such environments; however, identifying shade tolerance in nutritionally dense crops such as vegetables is crucial to maximising their performance and contribution to nutrition security. A study was conducted at Pwani University farm in Kilifi to assess the performance of two indigenous vegetable species, amaranth (Amaranthus dubius Mart. ex Thell.) and black nightshade (Solanum spp.), under four different shading intensities. A randomised complete block design was used, with the shade net levels 0 %, 35 %, 55 %, and 75 % assigned to main plots and vegetable species to subplots, and replicated three times. Data on fresh weight (FW), total biomass (TB), and plant height (PH) were collected from six tagged plants of each crop type at crop maturity. Data were subjected to analysis of variance, followed by Tukey HSD test. For amaranth, shading level had a significant ($p < 0.001$) effect on all three measured variables. Highest values were obtained for the 55 % shading level and lowest values for 0 % shading (mean FW 114 g versus 51 g, TB 252 g versus 81 g, and PH 38 cm versus 19 cm, respectively). In black nightshade, shading level also significantly ($p < 0.001$) influenced all three variables, with the highest and lowest values recorded at 55 % and 0 % shading levels, respectively (mean FW 0.05 g versus 0.02 g, TB 0.08 g versus 0.03 g, and PH 18 cm versus 10 cm). The study showed that both amaranth and black nightshade performed best under the shade levels of 55 %, and using such shade nets could be an important climate-smart adaptation strategy to enhance productivity and resilience of vegetable farms in coastal Kenya. In addition, the two tested vegetables can potentially grow well under tree canopies of similar intermediate shade levels and thus have a potential for integration into vegetable agroforestry systems.

Keywords: Adaptation, agroforestry, climate change, indigenous vegetables, shading

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