UDC: 632.93:633.1 DOI: https://doi.org/10.53040/ppap2026.10

ADVANCING ECOLOGICAL PLANT PROTECTION USING INDIGENOUS BOTANICAL BIOPESTICIDES

AZEEZ Awal Agboola, https://orcid.org/0009-0003-3091-812X

Department of Forestry and Wildlife, Faculty of Agriculture, Zamfara State University (ZAMSUT), Talata Mafara, Zamfara State, Nigeria
Corresponding e-mail: civilmatters.ng@gmail.com

Purpose: This research assessed the effectiveness of indigenous botanical biopesticides as environmentally sound alternatives to conventional insecticides for protecting vegetable and field crops. The study investigated whether locally available plant extracts could reduce insect pest populations, conserve natural enemies, improve crop productivity and contribute to sustainable plant protection strategies under tropical production systems.

Materials and Methods: Field experiments were conducted for two consecutive seasons using a randomized complete block design. Aqueous extracts of neem, Tephrosia vogelii and garlic were applied individually and in combination and compared with a synthetic insecticide and untreated

control. Pest abundance, crop injury, beneficial arthropod diversity, marketable yield and economic returns were recorded periodically. Data were analysed using analysis of variance to determine treatment differences.

Results: Botanical treatments significantly reduced infestations of major chewing and sucking insect pests while maintaining higher populations of pollinators and predatory insects than conventional pesticide plots. Combined botanical formulations produced the greatest suppression of pest populations, reduced foliar damage, increased marketable yield and improved benefit-cost ratio. Lower chemical inputs also reduced environmental risks and enhanced ecological stability within the production system.

Conclusions: Indigenous botanical biopesticides provide an effective, affordable and sustainable approach to modern plant protection. Their integration into integrated pest management programmes can strengthen biodiversity conservation, reduce pesticide dependence and enhance resilient agricultural production in line with current achievements and future perspectives in plant protection.

Keywords: Botanical biopesticides; Integrated pest management; Crop protection; Biodiversity; Sustainability

Acknowledgments: The author sincerely acknowledges the Department of Forestry and Wildlife, Faculty of Agriculture, Zamfara State University (ZAMSUT), Talata Mafara, for academic support and appreciates colleagues who contributed valuable technical assistance during the study.