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# Farmers' perception of low-cost biochar technology as a nature-based solution for improving soil health in southwest Nigeria

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**Abstract**

The acceptance of organic food and general concern about the environmental impact of synthetic agrochemical use have prompted the search for an affordable and environmentally friendly approach to protecting our soils. Globally, biochar technology has been positioned to affect soil repellent and quality. However, its adoption in Nigeria is dependent on farmers' awareness and perception. Thus, this study examines how farmers perceive low-cost biochar technology as a nature-based solution for improving soil health in South-West Nigeria. A multistage sampling technique was employed to select 300 crop farmers across Ekiti, Ogun, and Oyo States. Data were collected using a structured questionnaire and analysed using descriptive statistics, a binary logit regression model, and Likert scale analysis. Descriptive results revealed variation in adoption, with Ogun State recording the highest adoption rate (45.0 %), followed by Oyo State (39.0 %), while Ekiti State had the lowest adoption level (23.75 %). Logit regression results showed that the variables "educational years, awareness of biochar technology, and cooperative membership positively and significantly influenced adoption. Results indicated that biochar application in cropping systems improves soil structure (4.12), nutrient availability (4.02), and reduces water percolation (3.97), thereby reducing vulnerability to drought stress. Findings also suggest that biochar aids the growth of soil microbes (3.86), thus contributing to increase on-farm biodiversity. Despite these advantages, adoption was constrained by limited awareness (4.23), high labour demand (4.09), competition between biochar use and household energy demands (4.05), and climate change–induced variability in biomass availability (3.96). The study emphasises the possibility of low-cost biochar as a climate-smart and scalable intervention for sustainable agriculture. For broader adoption among crop producers, this study recommends policy support, capacity building, and the promotion of targeted extension services that will help farmers to integrate this technology into their cropping systems.

**Keywords:** Biochar, farmers' perception, nature-based solutions, soil health, south-west Nigeria, sustainable agriculture

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