EFFECTS OF PRECEDING FIVE-YEAR DIVERSIFIED CROP ROTATION ON THE AGRONOMIC PERFORMANCE OF SUNFLOWER (*Helianthus annuus* L.) IN THE FOREST SAVANNA TRANSITORY LOCATION

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ABSTRACT

Crop rotation and diversity are critical for improving soil fertility, enhancing crop resilience, and stabilizing crop yields. Therefore, this study investigated the agronomic performance of sunflower (*Helianthus annuus* L.) grown after 5-years crop rotation which involved five cropping systems: continuous cropping without fertilizer (CS1), continuous cropping with organic fertilizer (CS2), crop rotation with organic fertilizer (CS3), crop rotation without organic fertilizer (CS4), and conventional cropping (CS5), using sesame (*Sesamum indicum* L.), soybean (*Glycine max* (L.) Merrill), cotton (*Gossypium hirsutum* L.), and sunflower as component crops. The study was carried out during the late cropping season of 2023 and 2024 at the Organic Research Farm of the Institute of Food Security, Environmental Resources and Agricultural Research (IFSERAR), Federal University of Agriculture, Abeokuta. The cropping system treatments were laid out in a randomized complete block design in three replicates. Data collected on phenology, growth, grain yield, yield attributes, oil content, and oil yield of sunflower were subjected to analysis of variance with means of significant treatments separated using the least significant difference method at 5 % level of probability. The results revealed that CS2 significantly ($p \leq 0.05$) reduced number of days to flowering of sunflower by two days when sown after all the component crops in 2023 and soybean only in 2024. Plant height at flowering was significantly ($p \leq 0.05$) affected by cropping system when sunflower was sown after all the component crops in both years, except soybean in 2023 with the sunflower under CS5 as the tallest (199.3 cm). Dry matter accumulation was significantly ($p \leq 0.05$) influenced by cropping system at 5, 6 and 7 weeks after sowing with sunflower sown under CS2 accumulating higher dry matter content than the dry matter of plants under CS1 in both years. Preceding crops had no significant effect on grain yield and yield attributes of sunflower in both years. Cropping

system significantly ($p \leq 0.05$) influenced head diameter, head weight, seed weight, number of seeds per head, and grain yield in both years. Sunflower sown under CS2 recorded higher values for these traits in 2024. The higher grain yields recorded under CS5 (573.6 kg/ha) in 2023 and CS2 (1,376.0 kg/ha) in 2024 were higher than the control in 2023 (215.3 kg/ha) and 2024 (564.0 kg/ha). Sunflower under CS2 and CS3 recorded higher oil content and oil yield than sunflower under CS1 in both years, except oil yield in 2023. In 2024, sunflower under CS3 recorded the highest oil content (42.3%) which was higher than the oil content of sunflower under CS1 (37.6%) and CS4 (37.1%). The soybean in the rotation enriched soil nitrogen from 0.1 to 0.6 % total N post-planting in 2023 compared to other component crops. The study concluded that organic sunflower could be cultivated by prospective sunflower growers under CS2 and CS3 for higher productivity in the forest-savanna zone.