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## Effect of integrated pest and pollinator management (IPPM) training on knowledge, perceptions and livelihoods of avocado farmers in Kenya

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### Abstract

Use of synthetic pesticides reduces not only pests but also non-target organisms like pollinators, leading to a reduction in the productivity of pollination-dependent crops such as avocado (*Persea americana*). Integrated pest management (IPM) is implemented in the crop, which needs to be compatible with pollination and other ecosystem services through the novel concept of integrated pest and pollinator management (IPPM). In this study, we investigated the impact of IPPM training on farmers’ knowledge, attitude and management of avocado pests; size of avocado orchards; avocado losses due to insect pests; expenditure on pesticides; and income. We compared the outcome variables among farmers using IPPM against those using each of the components in isolation (IPM or pollination services (PS) through beehive supplementation), and a control group that used conventional pest management practices without beehive supplementation, with a total of 410 farmers. We utilised two rounds of panel data obtained from a randomly selected sample of avocado farmers from Murang’a County, Kenya and employed difference-in-difference (DiD) and multinomial logistic regression models. We found that users of IPM registered a significant improvement in their attitude towards avocado pests, pollinators and IPPM packages compared to farmers using conventional methods. Also, farmers using IPPM witnessed a substantial improvement in their practices against pests compared to those using conventional methods. The use of IPM and PS in isolation did not impact the proportion of income from avocado, but farmers who used IPPM registered a significant increase in the proportion of household annual income from avocado. Our findings on factors associated with the demand for IPM, PS and IPPM technologies indicate that farmers who received training and had good knowledge of these technologies were more likely to demand or adopt these technologies, implying that training of farmers can be used as a strategy to upscale IPPM or their component technologies. Based on these findings, this study recommends the integration of IPM with PS, and the promotion of IPPM, to achieve a greater impact on productivity of smallholder avocado production systems and farmer livelihoods in sub-Saharan Africa.

**Keywords:** Avocado, integrated pest and pollinator management, Kenya