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

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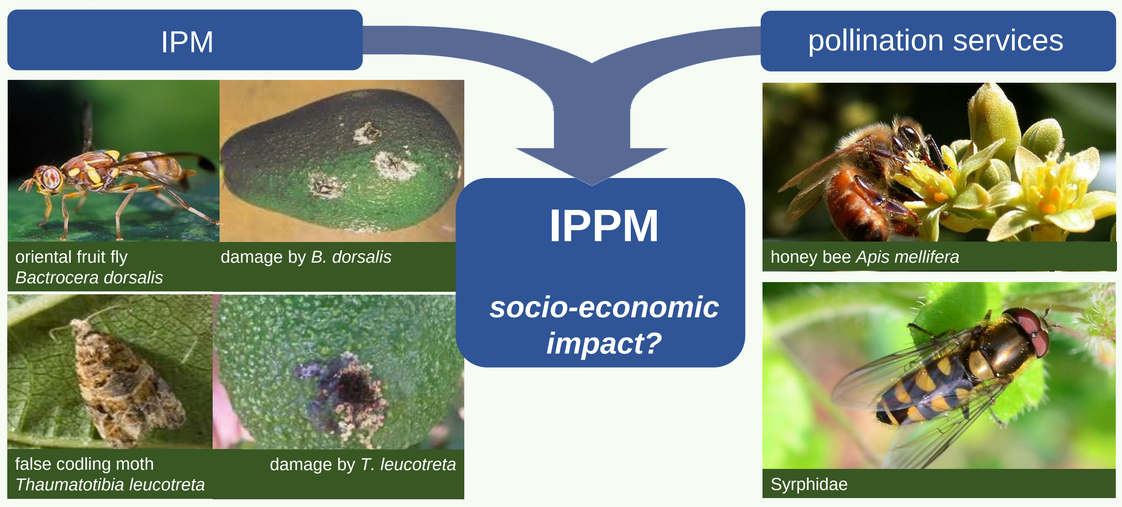
INTRODUCTION

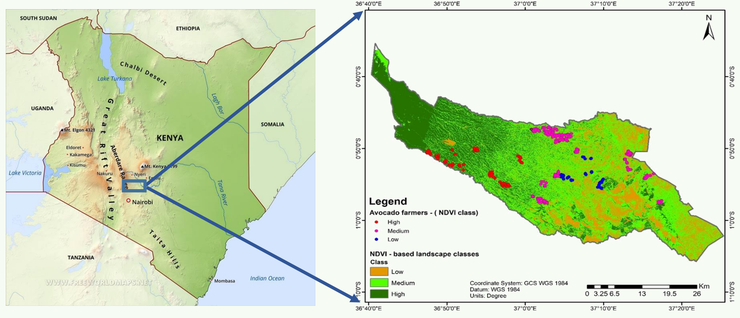
- Avocado is an important fruit crop in Kenya, grown by smallholder farmers for nutrition and income.
- The oriental fruit fly *Bactrocera dorsalis* and the false codling moth *Thaumatotibia leucotreta* are major pests, controlled by harmful synthetic pesticides.
- Avocado is highly pollination-dependent. Use of synthetic pesticides also reduces non-target organisms like pollinators.
- Integrated pest and pollinator management (IPPM) integrates integrated pest management (IPM) with pollination and other ecosystem services.



OBJECTIVE

To assess the impact of IPPM among smallholder avocado growers in Kenya.

METHODS



study area: 410 farmers across 3 vegetation classes in Muranga County, Kenya

baseline: February 2019 (2018 season), using pre-tested structured closed-ended questionnaires

interventions: control, IPM, PS, IPPM

	IPM✕	IPM+
beehives✕	**control**	**IPM**
beehives+	**pollination service (PS)**	**IPPM**

training: in IPM, PS, IPM+PS (IPPM)

endline: July 2021 (2020 season)

analysis: difference-in-difference (DiD) and multinomial logistic regression models

RESULTS

- IPM farmers improved their attitude towards avocado pests, pollinators and IPPM compared to farmers using conventional methods.
- IPPM farmers improved their practices against pests compared to farmers using conventional methods.
- IPM and PS farmers did not improve the proportion of income from avocado, but IPPM farmers did.
- IPM, PS and IPPM farmers who received training and had good knowledge of these technologies were more likely to demand or adopt these technologies.

P < 0.1
P < 0.05
P < 0.01

DiD model estimates of impact of IPM, PS and IPPM on selected outcomes.

	Knowledge score (%)	Attitude score (%)	Practice score (%)	Number of avocado trees	Perceived avocado losses due to pests (%)	Expenditure on pesticides (KShs)	Annual income from avocado (%)
Follow-up	40.75	6.25	42.27	10.25	0.60	43.46	6.19
IPM	14.72	9.59	4.58	7.89	4.21	23.13	5.77
IPM × follow-up	-2.03	5.44	-0.95	6.31	-1.77	12.13	-6.37
PS	13.00	13.52	6.77	20.12	3.55	32.63	8.36
PS × follow-up	4.05	0.87	-1.82	0.30	-0.27	-108.54	-2.57
IPPM	16.54	13.24	6.81	13.32	3.70	48.13	4.93
IPPM × follow-up	0.01	3.19	5.68	12.58	2.11	96.07	9.64
Gender (household head)	2.51	5.60	4.33	12.95	1.12	109.54	1.25
Age (household head)	-0.03	-0.19	0.01	-0.01	0.04	-3.42	0.13
Household size	0.34	-0.27	0.40	-0.94	0.28	12.96	-0.59
Participation in non-agricultural businesses	-2.06	-1.97	-0.09	-3.78	2.78	-35.69	-2.93
Total land cultivated	1.55	1.14	2.84	24.99	-1.04	66.22	0.42
Total land under avocado	-1.29	0.54	-1.22	3.00	1.19	7.95	-0.53
Avocado farming experience	0.03	0.02	-0.01	-0.33	-0.00	0.82	0.06
Distance to the nearest output market	-0.01	-0.02	-0.01	-0.03	-0.01	-0.16	-0.05
Received any training in the last 2 years	10.08	7.67	9.17	2.87	-1.08	68.20	8.01

Multinomial logit model showing average marginal effects (AME) on factors associated with the use of IPM, PS and IPPM.

	IPM	PS	IPPM
Gender of household head	0.012	0.068	0.039
Age of household head	0.001	0.001	-0.005
Household size in adult equivalent	-0.021	-0.022	0.025
Participation in non-agricultural business	-0.003	-0.001	0.018
Total land cultivated (hectares)	-0.035	-0.002	0.104
Total land under avocado (hectares)	0.044	0.013	-0.000
Avocado farming experience (years)	-0.001	-0.006	0.006
Distance to the nearest output market	-0.001	-0.001	0.001
Received any training in the last two years	0.136	-0.049	0.057
Knowledge of IPPM	-0.116	0.077*	0.100

CONCLUSION

- Training of farmers can be used as a strategy to upscale IPPM or their component technologies.
- this study recommends the integration of IPM with PS, and the promotion of IPPM, to achieve greater impact on productivity of smallholder avocado production systems and farmer livelihoods in sub-Saharan Africa.

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