



Jun 27th, 3:40 PM - 5:00 PM

Resilience in eastern and southern Africa's farming systems

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Wilkus, Erin Lynn; DeVoil, Peter; Marenya, Paswel P.; Snapp, Sieg; Dixon, John; and Rodriguez, Daniel, "Resilience in eastern and southern Africa's farming systems" (2018). *International Congress on Environmental Modelling and Software*. 138.

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Resilience in eastern and southern Africa's farming systems

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Abstract:

Sustainable intensification of agriculture can support multiple resilience-related, Sustainable Development Goals (SDGs), including the end of poverty and hunger under climate stress. Sustainable intensification practices (SIPs; e.g., crop residue retention, no till, use of fertilizers, improved varieties, and crop rotations with legumes) have been promoted with these aims in mind. The objective of the study is to identify drivers of resilience and the influence of alternative SIPs for three types of stress seasons (dry, normal and wet) among socioeconomically diverse households, from five eastern and southern African countries. Two resilience attributes – precariousness (i.e. the likelihood of food insecurity), and resistance (i.e. yield variance) – were derived from data on households' primary food sources (crop production, livestock production and food purchases). Socio-economic and biophysical modelling approaches (APSIM, www.apsim.info) were used to assess food security outcomes and quantify the impact of alternative SIPs on resilience measures based on time-bound panel survey data from 2010, 2013 and 2015 and long-term climate records. Food security was disproportionately low among households that experienced dry growing conditions, cultivated less land and had more household members. APSIM modelling showed that SIPs increased cereal and legume yields, and yield variability under these conditions, thereby increasing the likelihood of food security but decreasing resistance for vulnerable households. Although SIPs were especially effective at increasing food security for at-risk communities, SIP adoption was especially low among these households. Efforts to identify and address barriers and trade-offs associated with the adoption of different SIPs has potential to substantially improve food security resilience for at-risk communities.

Keywords: APSIM; Equity, Model, Simulation, Sustainable Intensification Practices