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# Will Global Warming Affect the Distribution and Abundance of the Sweetpotato Butterfly *Acraea acerata* Hew. in Africa?

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**Abstract**

In tropical Africa, the sweetpotato butterfly *Acraea acerata*, is a major endemic pest of sweetpotato (*Ipomoea batatas* (L.) Lam). Outbreaks of *A. acerata* are reported by farmers in Uganda to be more frequent than in the past 10 years. We therefore hypothesise that global warming may be responsible for this increased risk of outbreaks and abundance (damage potential). We used the Insect Life Cycle Modelling (ILCYM) software to develop temperature-based phenology models and applied three risk indices (establishment-, generation, and activity index) in a geographic information system (GIS) to map potential establishment, abundance and spread on global, regional and national scales. For current temperature conditions (year 2000) interpolated WorldClim data were used and for future climates (year 2050) downscaled data of the SRES-A1B scenario were applied.

The establishment risk index (ERI) values predicted by the model under the current climatic conditions compare well to the current distribution of *A. acerata* (ERI=1.0) in Africa. For most of Africa, the simulated number of 8–12 generations the pest may develop per year under climatic conditions of the year 2000 are in the range of those reported in literature. Under the 2050 scenario, tropical countries outside of the natural range of the current pest occurrence and distribution especially in South America (Colombia, and Venezuela), the Caribbean, and South-East Asia will have potentially more favourable conditions for *A. acerata* establishment. It is further predicted that the pest will have a reduced risk of establishment in some regions of West African countries by the year 2050 while East and Central African countries will be potentially more affected. Further, an increase by 1–5 generations per year is predicted for most countries where sweetpotato is cultivated. An increase in the number of generations implies an increase in pest abundance resulting into higher pest infestations and crop losses.

Our analysis predicts that higher temperatures (maximum of 30° C) due to global warming will contribute to increase *A. acerata* outbreaks and abundance in Africa. It is therefore vital to inform policy makers about these potential changes and risks to prevent invasions and establish adaptation plans for effective pest management.

**Keywords:** Adaptation planning, climate change, GIS, *Ipomoea batatas*, pest risk assessment, phenology modelling

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