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# Analyzing Climate Impacts on Insect Pests using Phenology Modelling and GIS Implemented in the ILCYM Software

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**Abstract**

Climate change is expected to exacerbate the already serious challenges to food security and economic development; especially on the African continent where people are already struggling to meet challenges posed by existing climatic variability. Change in temperature caused by climate change is considered the most important abiotic factor affecting the future distribution and abundance of pests. Early predictions of pest risks could help to adapt to climate change by developing and supporting farmers with adequate pest management strategies. The relationship between insect development and temperature is best described by process-based phenology models. The ILCYM software, an open-source computer-aided tool developed by CIP, supports the development of pest phenology models that can be used through simulations for estimating life table parameters (*e.g.*, net reproduction rate). In its GIS component, it estimates three risk indices (establishment (EI), generation (GI) and activity index (AI)) to map and quantify changes on global and regional scales using either actual (WorldClim database) or future temperature data (downscaled data of scenario A1B). Higher spatial (pixel size of 90 m) and temporal resolution (daily data) analysis for capturing insect potential distribution and abundance on small regional scales and variable altitude gradient can also be conducted. In a collaborative effort between CG-Centers (CIP, IITA) and its partners (icipe) the effects of temperature change are assessed on a wide range of insect pests (*e.g.*, cassava mealybug, maize stem borers, potato tuber moths) of important food crops. Preliminary results will be presented; the applied methodology is proposed as a very helpful tool for adaptation planning in integrated pest management.

**Keywords:** Adaptation planning, climate change, food security, insect life cycle modelling, integrated pest management, pest risk assessment

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