Cassava green mite, *Mononychellus* tanajoa (Bondar)

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The cassava green mite, *Mononychellus tanajoa* (Bondar) (Acari: Tetranichidae), originating in Neotropics, became a serious pest of cassava soon after its accidental introduction into Africa in early 1970s. It quickly spread across the cassava belt in Africa causing average cassava yield losses of about 35%. To date *M. tanajoa* has not spread beyond Africa. The pest is highly specific to cassava and has the typical tetranychid mite life cycle. We developed process-based phenology model for *M. tanajoa,* using ILCYM software developed by CIP, generated from data collected under five constant temperatures (16, 21, 26, 31, and 36°C), with relative humidity of ~75% and L12:D12 photoperiod. This phenology model was validated with similar data generated under three sets of fluctuating temperatures (long dry seaons, long rainy season and short rainy season). In turn, we used ILCYM to map *M. tanajoa* distribution and abundance under current and future climate scenarios using 2000 and 2050 WorldClim database. Outputs from this study show that *M. tanajoa* did not develop at 16°C and temperatures ranging between 21 to 36°C were highly suitable for its development and reproduction. The output of current distributions compare well with published literature which shows that the tropics are highly favorable for this species and that it can potentially be found where cassava is grown. *M. tanajoa* is presently widely distributed throughout tropical and subtropical areas of Latin and Central America and in sub-Saharan Africa. It is still absent in tropical areas of Asia and the Pacific where conditions are highly suitable for its establishment. Warming climate is predicted to have small effects on the distribution of *M. tanajoa*, but abundance is likely to decline in large areas of Western Africa with higher abundance in the southern latitudes and highland areas. The most effective adaptation against this species is monitoring and surveillance where it is not present, and the introduction and conservation of predatory mites along with the use of hairy cassava varieties are best bet for risk avoidance at farm level.

Fruit pests

Tephritid fruit fly, *Bactrocera invadens* Drew, Tsura & White

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The Sri Lanka fruit fly, *Bactrocera invadens* Drew, Tsuruta & White (Diptera: Tephritidae), 2005 is a devastating highly polyphagous pest of fruits and vegetables (42 known hosts) in tropical Africa, where it was introduced in is presently found in at least 24 countries. In this study, we determined development, survival and reproduction of *B. invadens* on a carrot-based diet at six constant temperatures (15, 20, 25, 30, 33 and 35°C), with a relative humidity of ~75% and a L12:D12 photoperiod. We used these data in ILCYM to develop a temperature-based phenology model. We then used ILCYM for risk analysis of this pest under current and future climates using the three risk indices establishment, generation and activity. We modeled the phenology of this species quite successfully despite the long life cycle of this species at low temperature (~ 1 year). Our data is the only complete such data set over such range of temperatures. Mapping current distribution showed that this species can establish (as it has) widely in a range of tropical and subtropical conditions (but most successful at not more than 12 degrees north and south of the equator). There will be a reduction in both the distribution and abundance of this species in the tropics by the year 2050 but the indices of distribution and abundance remain high enough to indicate that this species will remain a serious threat to fruit production in tropical areas of the world. Risk reduction adaptations are quarantine and surveillance in areas predicted to be suitable for establishment of *B. invadens*, the implementation of already tested control options such as biological control with parasitoids (e.g., *F. arisanus*), use of mass trapping (male annihilation) and bait sprays with effective commercial baits (GF-120).