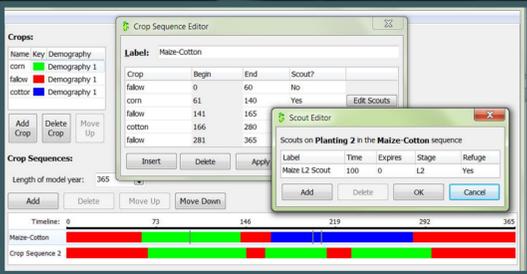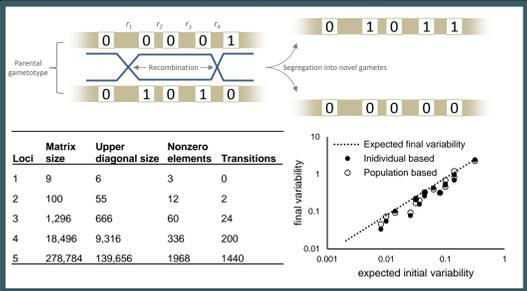# Next Release: phenology, agricultural trends, and more genes

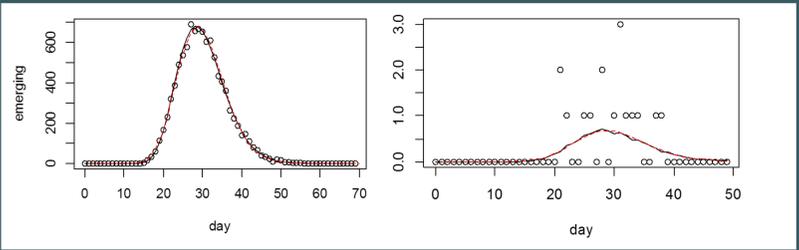Nicholas A. Friedenberg and William Root, Applied Biomathematics

The new Calendar interface allows users to define time-valued patterns of planting within years. Continuous, year-round population dynamics can be modeled using a full year, or a partial-year model with diapause can be specified. Field scouting can be set up to trigger threshold actions such as spraying or crop rotation. The interaction of planting dates and pest life history determine which life stages are present.

Phenology is driven by a distributed delay model and translated into stochastic development and survival. The algorithm accommodates sex- and genotype-specific developmental delays and can accurately reproduce expected adult emergence distributions even for very small populations.


A new algorithm efficiently projects linkage disequilibrium by taking advantage of the symmetry and sparseness of the gametotype recombination matrix. Meanwhile, interaction between selection and the stochastic demographic model accurately produces expected levels of genetic drift.

Preliminary testing suggests an upper limit of 9-12 loci.

Demographic and evolutionary dynamics play out in a spatially explicit landscape made up of one or more crop types, refuge designs, and rotation strategies. The landscape specification accommodates temporal trends such as the increasing adoption of a new trait, swings in market-driven choice of crop, or shifts to earlier planting calendars.
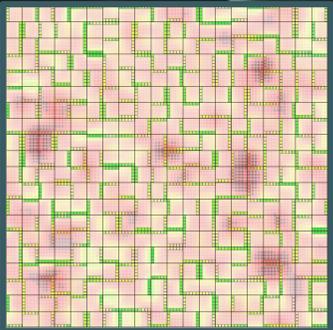
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