**Supplementary Materials**

Equation 1 describes the model used for simulation experiment where equilibrium “arthropod species” abundances are determined by genetically based phenotypic variation in a “foundation species”, following the methods and notation of Shuster *et al.* (2006). In summary, the model (Eq. 1) produces the mean abundance of a community of “arthropods” on a population of clonal “trees” planted in a common environment. Simulations using this model consisted of the following steps: 1) input a set of tree genotypic values, 2) use tree genotypic values to generate tree individual phenotypic values using a uniform distribution and 3) using a set of randomly assigned arthropod phenotypic values calculate the expected abundance of each arthropod species on each tree. For the final step, the match between tree and arthropod is determined by the difference between tree and arthropod phenotype, and thus, the greater the match between tree and arthropod phenotype the closer the arthropod abundance will be to carrying capacity. Simulation code is available at <https://github.com/MKLau/cg_simulations>.

**Equation 1**.

*Indices*

Foundation tree individual

Arthropod species

*Arthropod Variables*

Arthropod species abundance at equilibrium

Arthropod species carrying capacity

Arthropod trait value

Variation in the arthropod trait values

Mean arthropod trait value

*Tree Variable*

Tree phenotypic trait value,

*Environmental Variable*

Environmental variation influencing arthropods

*Genotypic Effect Variables*

“Genotypic Effect” modulated in the simulation experiment

= Selection Intensity term, parameterized as in Shuster *et al.* 2006

Table of identifications for the arthropod species codes in the genotype-species network (Fig. 2).

|  |  |  |  |
| --- | --- | --- | --- |
| **Node** | **Taxon ID** | **Node** | **Taxon ID** |
| 1 | *Pemphigus betae* | 23 | *Dolichocolon* sp. 1 |
| 2 | Phytaminae | 24 | Diptera 2 |
| 3 | *Anthocoris antevolens* | 25 | *Formica propinqua* |
| 4 | *Araniella* *displicata* | 26 | *Formica* sp. 1 |
| 5 | Asilidae 1 | 27 | *Formica* sp. 2 |
| 6 | Reduviidae 1 | 28 | *Pemphigus populi-globuli* |
| 7 | Reduviidae 2 | 29 | Hymenoptera 1 |
| 8 | Asilidae 2 | 30 | Ichneumonidae 1 |
| 9 | *Boisea triveata* | 31 | *Chrysopa* sp. |
| 10 | Anobiidae | 32 | *Cycloneda* sp. |
| 11 | Encyrtidae | 33 | *Harmonia axyridis* |
| 12 | Braconidae | 34 | *Anacampsis niveopulvella* |
| 13 | *Phaenicia sericata* | 35 | *Gypona* sp. 1 |
| 14 | Cercopidae | 36 | Cicadellidae 1 |
| 15 | *Chaitophorus populicola* | 37 | Cicadellidae 2 |
| 16 | Cleridae | 38 | *Gypona* sp. 2 |
| 17 | Coccinelidae (nymph) | 39 | Cicadellidae 3 |
| 18 | *Argia* sp. | 40 | *Listrus* sp. |
| 19 | *Forficula auricularia* | 41 | Chironomidae |
| 20 | Tortricidae (larva) | 42 | *Aceria parapopuli* |
| 21 | Chrysopidae (egg) | 43 | Muscidae |
| 22 | Diptera 1 | 44 | *Myrmic*asp. |