

## Appendix 1.

A graphical manual of Azteca Chess movement and capture rules.

This appendix reproduces images of the Azteca chess manual, which describe rounds, movements and capture rules. The full manual is available on line at <http://www.ecosur.mx/academico/wp-content/uploads/sites/8/2016/11/AZTECA-CHESS-RULES-ONLINE.pdf>; further enquires can be made to the authors. ([luis.garciabarrios@gmail.com](mailto:luis.garciabarrios@gmail.com)).

These images were also published previously as figures 2 and 3 in:

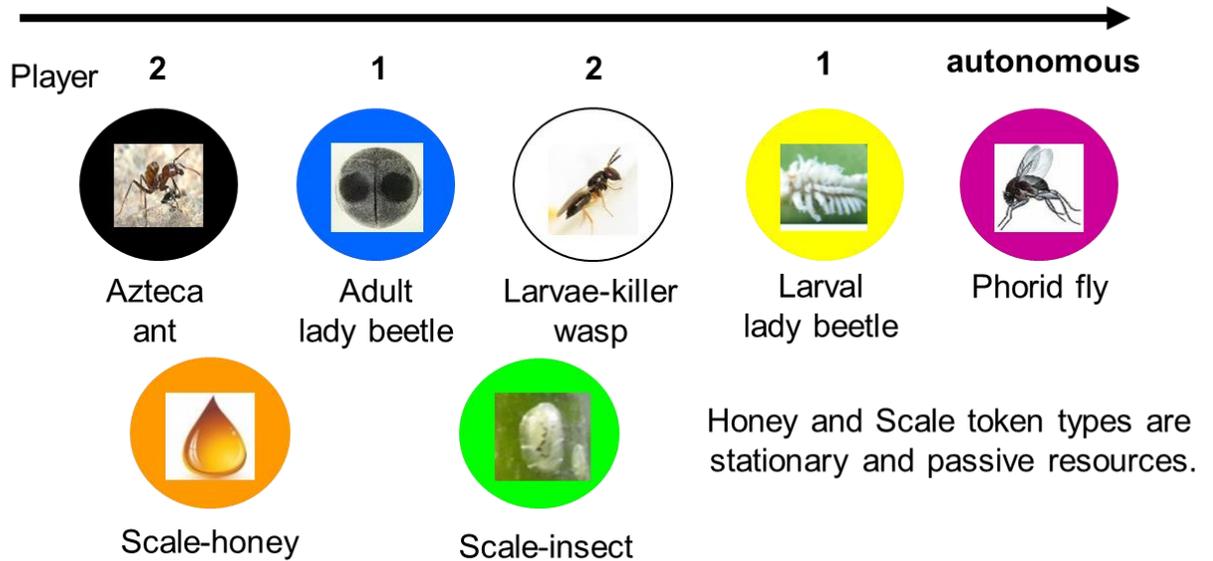
García-Barrios L., I.Perfecto and J.Vandermeer. 2016. Azteca Chess: Gamifying a Complex Ecological Process of Autonomous Pest Control in Shade Coffee. *Agriculture, Ecosystems and Environment* 232: 190-198

For a brief explanation of other general features and objectives of the game see the methodology section of this paper and, for a detailed description, see the results section of García-Barrios et al. 2016.

Appendix 1. Figure 1. (a) Azteca Chess Board-Game with initial display of tokens. Pink circles are exclusively for the phorid fly to move clockwise at the end of each round. (b) A generic species in a given cell can move to any of the white cells in this diagram. (c) A generic species in a given cell can affect species or consume resources in any of the white cells in this diagram. (d) Tokens and order of moves in a round. The phorid fly is moved systematically and this can be done by any of the two players.



## (d) Tokens and order of moves in a round



The Azteca Chess hexagonal-cell board stylizes a transversal section of a coffee bush. It exposes the initial spatial display of coffee-scale insects, adult beetles, beetle larvae, larvae-killer wasps, ants and one phorid fly. Honey-dew drops can eventually be traded for additional ants. Neither the two fungi nor the scale-killer wasp are included explicitly in the game. It is a turn-based two-player strategic game. One player decides the moves of the adult and larval beetles; the other those of the ants and wasps. The fly moves autonomously to a new pink cell of the board on each round. Scale insects and honeydew do not move; they are passive tokens to be consumed by the beetles and ants respectively. Player-one's goal is to have its beetle tokens capture/consume all six scale insects on the board; she strives to drive the dynamics towards the scale extinction attractor (no rust control). Player-two's goal is to have ant and wasp tokens capture all beetles on the board before they can eat all the scale insects; she strives to attract the dynamics towards a persistent scale colony (potential rust control). Whichever player meets her goal first wins. If both players meet their goals in the same round, the game ends in a draw (all locally extinct; no potential rust control). A draw can also be declared by agreement among players based on time limit (commonly 30 min.) or if more rounds mean an endless pursuit with no winner (i.e. a threshold between attractors).

Appendix 1. Figure 2. On its turn, an organism-token can choose to capture another token according to the following rules. In the last two rules, capture is not optional but obligatory.

## How tokens capture and affect other

	=		<p>If an adult lady beetle captures a contiguous SCALE, it oviposits and the young larvae eats the scale while the adult flies away. Thus, the adult token is flipped as a LARVA in the scale's cell.</p>
	=		<p>If a larval beetle captures a contiguous SCALE, it eats it and grows to adult. For this purpose the larva token is flipped to set itself as an adult in the scale's cell.</p>
	=		<p>If AZTECAANT eats contiguous HONEY, the Ant remains on the board, and produces another ANT in the cell where the honey is. The HONEY token is removed from the board.</p>
	=		<p>If WASP eats contiguous LADYBEETLE LARVA, the WASP remains on the board, and produces another WASP in the LARVA's cell. The LARVA token is removed from the board.</p>
	=		<p>If ADULT LADYBEETLE becomes contiguous to ANT, the ANT – on its turn- MAY chase her off of the board; ANT remains in its current cell, and the ADULT LADYBEETLE token is removed from the board.</p>
	=		<p>If on its turn any ANT has a WASP contiguous to it MUST use its turn to chase out of the board. Thus, the ant gets distracted from other</p>
	=		<p>At the end of a round, the FLY eats one of any contiguous AZTECAS. Then it moves clockwise to the next pink cell before the next round. In this level of the game, the FLY does not reproduce when it eats ANT.</p>