Climate changes, phenology and trophic interactions through cities

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Résumé

The rise in temperature caused by climate changes induces changes in the phenology of organisms. These changes in phenology vary from one species to another and can lead to desynchronization between interacting organisms. Synchronization represents a high selection pressure for arboreal phytophagous and their deciduous host trees. If phytophages hatch too early, they may find no available leaves at all. If they hatch too late, the leaves may already have developed defenses. Both decreases phytophages fitness and abundance. City centers tend to be on average warmer than peripheries. So, cities can be used to study the effect of climate changes as time for space substitution. Across decades, such urban heat may select for phenological adaptation in populations of phytophages. On the other hand, trees vary strongly in their budburst even under the same thermal regime, reflecting genetic determination. The interactive effect of rise in temperature and genetic-variation in host tree phenology on hatching of phytophages remain unknown. The relative or interactive effects of urban heat and genetic variation in host-tree phenology on hatching of phytophages remain unknown: is hatching of phytophages accelerated by early bud-bursting of host trees or by urban heat? Do urban environments prevent herbivores from responding to the bud-bursting of their host trees? In this context, we want to understand how climate change will affect synchronization between arboreal phytophagous and pedunculate oak using survey along temperature gradients. We hypothesize that the phenology of phytophagous is selected by (1) average temperature and/or (2) on the phenology of the tree they are on. If phenology of phytophagous is not selected by average temperature, we should observe (3) desynchronization between phytophagous and host tree with the increase of temperature. To respond to these questions, we monitored the budburst of 24 oaks in the field. For these 24 oaks, we also monitored the budburst of branches in a common garden, as well as the hatching of the caterpillars present on them. We also follow the temperature experienced by tree and caterpillars in the field and in the common garden.

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Mots-Clés: Climate changes, biodiversity, trophic interactions, urban, phenology