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# Historical phenological responses in apple to contrasting warming contexts may clarify future crucial responses in Europe

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is enhanced by thinning yet decreases with intense pruning. When aiming to maximize short and long term revenues, optimal practices consist in decrease fruit load by leaving ca. 5 fruits per meter, while pruning intensity can vary between 0 to 60% with higher values favoring long, rather than short term, revenues.

T4 - 09

**HISTORICAL PHENOLOGICAL RESPONSES IN APPLE TO CONTRASTING WARMING CONTEXTS MAY CLARIFY FUTURE CRUCIAL RESPONSES IN EUROPE**

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Phenological responses to warming in temperate fruit trees have rarely been investigated in contrasting warming contexts. This framework is appropriate for highlighting varying responses that would combine chill accumulation declines and heat accumulation increases. A comprehensive overview of historical responses might clarify crucial future responses in the warmest European regions. To examine this issue, a dataset was constituted in apple from flowering dates collected for main BBCH stages in contrasting temperate regions of Western Europe and in different mild regions (Northern Morocco, Southern Brazil). Multiple change-point models were applied to series of flowering date, flowering duration and temperature, aiming to statistically analyse both flowering responses and temperature changes. Modelling of flowering date was used to understand the determinisms of warming responses. In addition, regional differences in dormancy dynamic were characterized by forcing tests. Statistical analysis provided an overview of flowering date responses at global scale, highlighting flowering advances, mainly in Europe and Morocco, but also stationary flowering date series in Brazilian and French Mediterranean regions. Modelling analysis supported the notion that flowering advances are due to heat accumulation increases, explained by marked warming during ecodormancy. Later dormancy releases due to chill declines were also supported in Europe and may explain, in long term, stationary flowering dates in the French Mediterranean region. While the flowering duration series were stationary whatever the region, the flowering duration was far longer in Moroccan and Brazilian regions compared to European. This was linked to contrasting differences in dormancy dynamic observed between these mild and temperate regions. Dormancy release was inadequate in mild due to poor chill accumulation, leading to extended flowering durations. Since later dormancy releases would already have significant impacts on flowering date in Europe, new crucial warming responses, such as extended flowering durations, could be experienced especially in Mediterranean regions in near future.

T4 - 10

**MODELLING FRUIT PLANT-PEST INTERACTIONS, THEIR CONTROL BY CULTIVATION PRACTICES AND THEIR LINK TO FRUIT QUALITY**

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Plant-pest interactions are extensively investigated at the molecular level but much less at organ or whole plant levels with a modelling approach. At these levels, in the case of cultivated plants, models are useful tools not only to understand the processes at play but also to study their control by cultivation practices. We present a general framework of fruit plant-pest interactions and we use two case studies, peach-brown rot and peach-green aphid, to demonstrate the interest of diverse models to address contrasted pathosystems.