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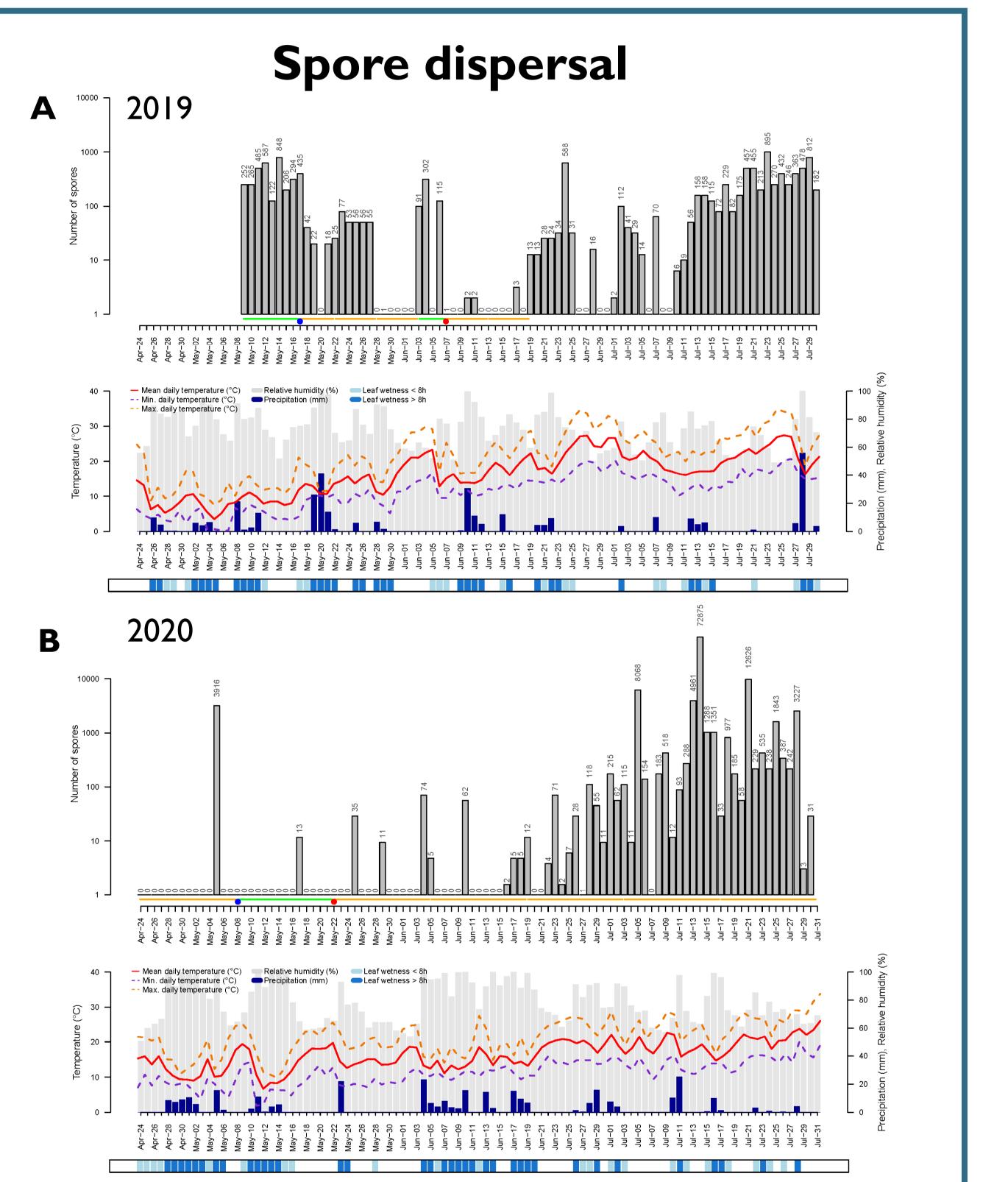
Spore dispersal and early infections of *Diplocarpon* coronariae causing apple blotch

Introduction

Apple blotch is a major disease of apple in Asia and recently emerged in Europe and the USA. It is caused by the fungus *Diplocarpon coronariae* (formerly: Marssonina coronaria; teleomorph: Diplocarpon mali) and leads to severe defoliation of apple trees in late summer resulting in reduced yield and fruit quality. Data on spore dispersal, time point of first infections and disease dynamics in Europe is still lacking but crucial to improve control methods.

Methods

- Spore dispersal was monitored using spore traps (Fig. 2A) and a new qPCR method to quantify daily spore numbers (Fig. I)
- Infection periods were assessed using bait plants (Fig. 2B, C) replaced at weekly intervals
- Disease development was monitored by assessing AB incidence (Fig. 4) and severity (Fig. 5)



Disease development



Fig. 3: Apple blotch symptoms on leaves.

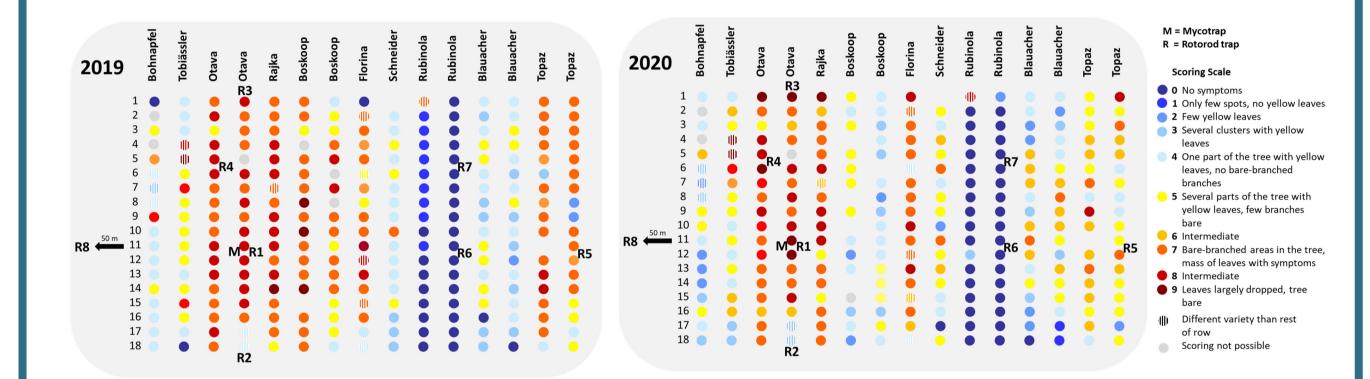


Fig. 4: Apple blotch (AB) disease incidence in the orchard in Rickenback in 2019 and 2020. Scoring from 1 to 9.

Fig. I: Diplocarpon coronariae (Dc) spore dispersal in 2019 (A) and 2020 (B) in an apple orchard in Rickenbach (Switzerland). The green and the yellow lines indicate periods when bait plants exposed in the orchard developed apple blotch symptoms (yellow) or not (green). Blue circles= first leaves with ambiguous AB symptoms tested positive for Dc. Red circles= first unambiguous AB symptoms in the orchard.



Fig. 2:A) Mycotrap spore trap used for spore sampling. B) Bait plants. C) Symptom on bait plant.

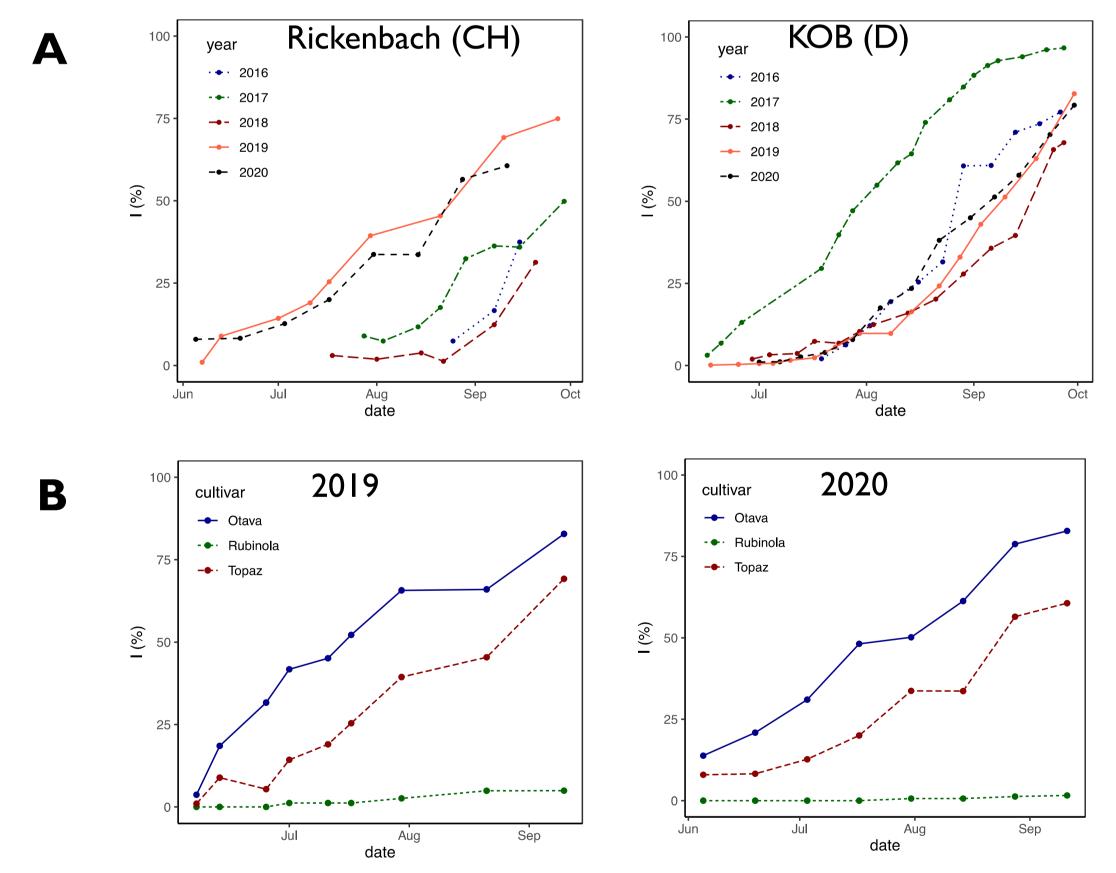


Fig. 5: Apple blotch (AB) disease severity is the percent severity according to the McKinney Index (I) (McKinney 1923). A) AB development in two apple orchards: Rickenbach, Switzerland and Competence Center of Fruit Crops at the Lake of Constance (KOB), Ravensburg, Germany. B) AB development on 'Topaz', 'Rubinola', and 'Otava' in the Rickenbach orchard in 2019 and 2020.

Results

- Spores were found as early as end of March
- First infected leaves were detected beginning of May
- The disease development varies according to the cultivar and the weather conditions during the season

Conclusions

- Few spores might be released in March, but primary infections start in late April or early May, depending on the weather conditions
- The results can help improve disease forecast models for AB and direct disease prevention in the field

References

Boutry, C., Bohr, A., Buchleither, S., Ludwig, M., Oberhaensli, T., Tamm, L., Schaerer, H. J., Flury, P., 2023. Monitoring Spore Dispersal and Early Infections of *Diplocarpon coronariae* Causing Apple Blotch Using Spore Traps and a New qPCR Method. Phytopathology. 113(3): 470-483.

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