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Field experiments: Pear scab on 'Conference'

K. Kots, M. van Driel and C. M. Wenneker[1]

Abstract

In the Netherlands, 75% of commercially grown pears belong to the variety 'Conference'. Controlling pear scab (Venturia pirina) *is becoming more challenging, not only in organic orchards, but also in conventional orchards. We set up field experiments to help us to better understand disease development of pear scab in the orchard. These experiments provide interesting data on leaf, fruit and twig scab. Additionally, they form a basis for the development of a standardized test to determine sensitivity of pear varieties against pear scab.*

Keywords: Pear, scab, *Venturia pirina*, twig scab, conidia

Introduction

The effective control of pear scab (*Venturia pirina*) is essential for both organic as well as conventional cultivation of pears (Trapman *et al.,* 2013). Like apple scab (*Venturia inaequalis*), pear scab can cause damage to leaves and fruits. Additionally, pear scab can cause twig scab, producing lesions on twigs that open and release conidia in early spring (González-Domínguez *et al*., 2017), just as vulnerable green parts appear. It has been recognized that part of the challenge of controlling pear scab is caused by lack of knowledge of the infection biology (Timmermans *et al*., 2010. Gaining more insight can help to optimize pear scab models to more accurately predict sporulation and infection moments. The goal of this study was to set up a system to induce pear scab infections in the field, in order to follow symptom development and quantify sensitivity. These experiments help us to better understand pear scab infection biology and it is a first step for an assay to test vulnerability of (new) pear varieties to pear scab. This short communication contains first results of experiments conducted in 2022 and 2023.

Material and Methods

Experiments were carried out in a conventional pear orchard ('Conference', row distance 3.5 m, plant spacing 1 m, plant year 2009, Randwijk, the Netherlands). No fungicides were applied during the experiment, starting two months prior to the experiment. The conidia used for inoculations were obtained from an organic 'Conference' orchard in Randwijk. The experiments were performed in blocks of four replicates in 2022 and six replicates in 2023. In each replicate (one tree) 4-8 twigs with leaves and 10 fruit clusters were spray-inoculated with10^4 pear scab conidia and covered with a plastic bag for 48 hours. Per replicate, one tree was left uninoculated and one was inoculated with water. Inoculations were performed monthly in May, June, July and August. Fruits, leaves and twigs were assessed for scab symptoms weekly until harvest in early September. Fruits were stored at -0.5˚C until the following spring and then reassessed. Leaves were gathered before leaf fall and monitored in spring for ascospore development and release. Twigs were assessed in spring for twig scab development.

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Results and Discussion

During the 2022 and 2023 experiments, inoculations performed from May until August, all successfully caused pear scab in 'Conference'. There was a large variation in symptom development on leaves and/or fruits, ranging from 12 to 30 days. It is evident that weather conditions, like temperature and precipitation, are important factors in the development of scab symptoms.

Leaf scab

Leaves infected in May, June, July and August (Figure 1) all formed conidia producing lesions. In the 2023 experiment, leaves were also inoculated with conidia in mid-September, but these inoculations did not result in visible lesions before leaf fall. The age of the leaves did not affect the success rate of the infection within the experiments. Additionally, all leaves from the May, June, July and August 2022 experiments released ascospores in spring 2023. It would be interesting to explore the contribution of late leaf infections to primary inoculum in spring.

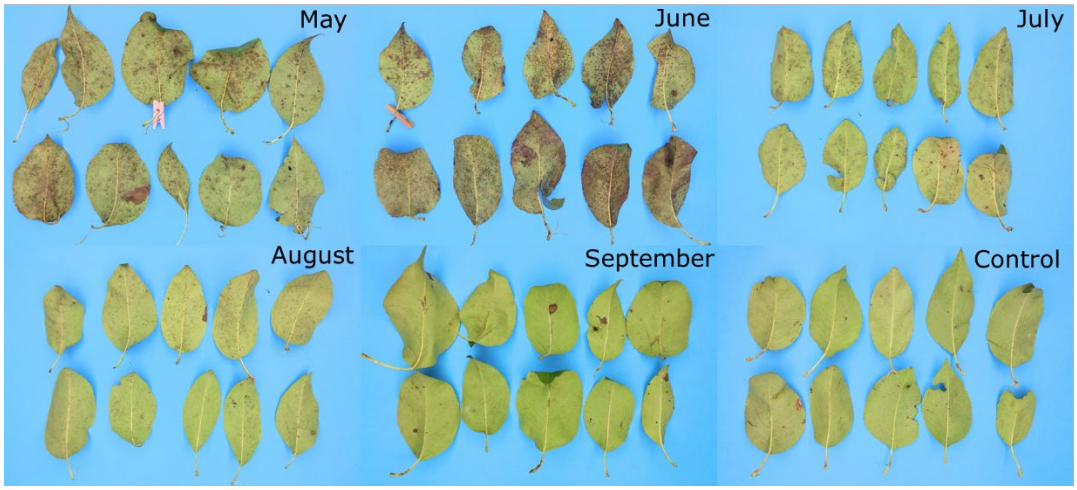

Figure 1: Leaves from the 2023 experiment, harvested at 10% leaf fall.

Fruit scab

Inoculations performed in May, June and July all caused fruit scab. The August inoculations (performed two weeks before harvest in 2022 and 2023) produced no fruit scab. During storage, the number of fruits with scab did not increase (Figure 2). However, we did observe an increase in severity level after six months storage. Previous research reported the susceptibility of fruit being highest early in the season (Van Hemelrijck *et al.*, 2015). Our results suggest later infections can also result in a substantial amount of fruit scab damage.

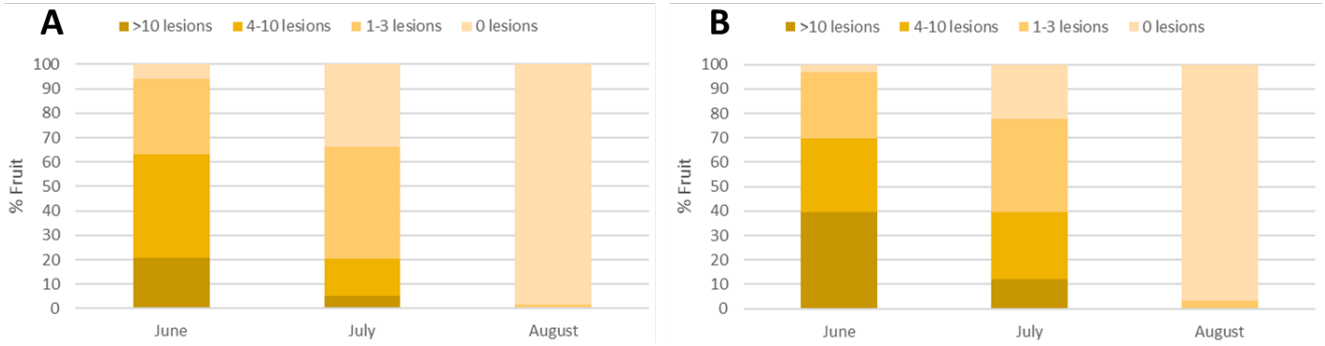

Figure 2: Field experiment 2022: fruit scab. A) Fruit scab after harvest in September. B) Fruit scab after storage in March.

Twig scab

Twig scab could consistently be induced in May and June. At the time of the inoculations, the youngest unfolded leaf was marked and when twig scab developed this was on the internodes directly above or below the marked leaf. In the July experiments twig growth has stopped, and no twig scab developed on these twigs. Furthermore, no twig scab was found on the twigs inoculated in August. The first symptoms of twig scab formed in the May and June experiments could be observed within several weeks after inoculation and conidia could be isolated from these lesions. In September and October, the lesions became more pronounced and appeared blister like (Figure 3). Twig scab lesions from the 2022 experiment opened in January to May 2023. These results show that next to leaf and fruit scab, also twig scab can be induced by artificial inoculations. Additionally, it confirms that twigs are only susceptible to scab for a limited amount of time during the season, but twig scab lesions do form an important source of primary inoculum in spring.

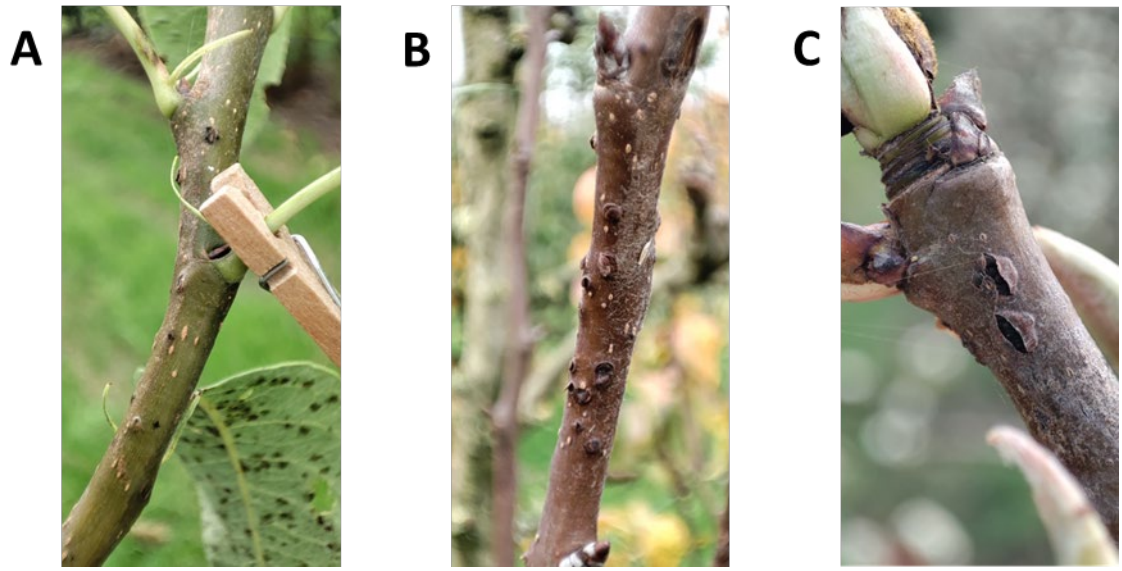

Figure 3: Field experiment 2022: twig scab. June 2022 inoculated twig scab in August 2022 (A), October 2022 (B) and April 2023 (C).

Acknowledgements

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