Aerated steam by the ‘Plant Sauna’ eradicates powdery mildew from strawberry transplants

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The ‘Plant Sauna’
- A closed container with even distribution of aerated steam at a set temperature (Fig. 1)
- Originally developed in Norway to disinfect greenhouse equipment
- Adapted to treat strawberry (Fragaria × ananassa) plants against diseases and pests
- Eliminates or significantly reduces important diseases
- Standard treatment with aerated steam developed in Florida: 1-h pre-treatment at 37°C to increase heat tolerance of the plants, then 1 h at 20-25°C (no steam), followed by 4 h at 44°C
- Effects of aerated steam against powdery mildew (Podosphaera aphanis) on strawberry transplants is reported here

Results
- Podosphaera aphanis killed after 2 or 4 h at 40 - 44°C (Fig. 3)
- No viable conidia found following treatments
- New leaves formed after treatments were disease free (Fig. 4)
- In non-inoculated plants, dry weight was slightly reduced at 44°C but not at 40°C

Discussion and future perspectives
- Aerated steam at 40 to 44°C for 2 to 4 h effectively kills strawberry powdery mildew
- Treatments at the highest temperature may reduce growth in plug plants; no negative plant and yield effects found in experiments with cold-stored bare root plants
- Further experiments will include studies with insects (Fig. 5) and mites
- An up-scaling of the treatment capacity of the ‘Plant Sauna’ is currently taking place in The Netherlands (Fig. 6), lead by the companies Marten Barel BV (The Netherlands) and Myhrene AS (Norway)

Materials and Methods
- Strawberry transplants of cv. Korona grown in peat plugs (Fig. 1)
- Most leaves with sporulating lesions of powdery mildew at time of treatment
- Plants kept in aerated steam for 1 h at 37°C, ambient temperature without steam for 1 h and either 2 or 4 h in aerated steam at either 40, 42, or 44°C (Fig. 2)
- Following treatments, plants were kept at 20°C for 3 weeks in closed growth chambers
- Assessed for mycelial growth and spore formation on treated leaves and on new leaves, and various growth characteristics

Fig. 1. An experimental unit of the ‘Plant Sauna’ and treated transplants.

Fig. 2. Temperature scheme for treatments with the ‘Plant Sauna’.

Fig. 3. Dead mycelium of Podosphaera aphanis on a strawberry leaf one day after aerated steam treatment at 44°C for 2 h (left); sporulating mycelium on an untreated control leaf (right).

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Fig. 3. Dead mycelium of Podosphaera aphanis on a strawberry leaf one day after aerated steam treatment at 44°C for 2 h (left); sporulating mycelium on an untreated control leaf (right).

Fig. 4. Incidence (%) of new leaves with powdery mildew after aerated steam treatments for 2 or 4 h at 40, 42, or 44°C, or untreated (control); results from two experiments.

Literature