



Effects of Silicon Fertilisers on Cucumber

Wageningen UR Greenhouse Horticulture: Chris Blok, Jantineke Hofland-Zijlstra, Aat van Winkel;
Elkem Solar AS: Karl-Jan Erstad, Anne Erstad; Jiffy/Tref: Cees van der Burg

Objective

Silicon fertiliser Solarite was added to peat slabs and assessed for:

1. Cucumber fruit yield in kg/m².
2. Silicon release into the nutrient solution.
3. Performance compared to crystalline silicon.
4. Suppression of natural occurring mildew.

Conclusions

1. A 5-10% lower yield due to silicon was acceptable as mildew resistant varieties still yield minus 10-20%.
2. Release is 1.0-2.0 mmol.L⁻¹, after 40 days <0.5 mmol.L⁻¹.
3. Micro crystalline silicon the levels were over four times lower.
4. Naturally occurring mildew was suppressed from 25% to 5%.

Results: Silicon Silicon release into the nutrient solution by Solarite is close to the maximum of 2.0 mmol.L⁻¹. This level can be maintained for 40 days and then drops below 0.5 mmol.L⁻¹. With dolomite and micro crystalline silicon or just dolomite the level is four times lower.

Results: Mildew Incidence of powdery mildew was lower for Solarite treated slabs. The initial incidence of mildew occurred four weeks later when Solarite was applied than when no silicon was added. Results with dolomite + micro crystalline silicon and just dolomite were intermediate.

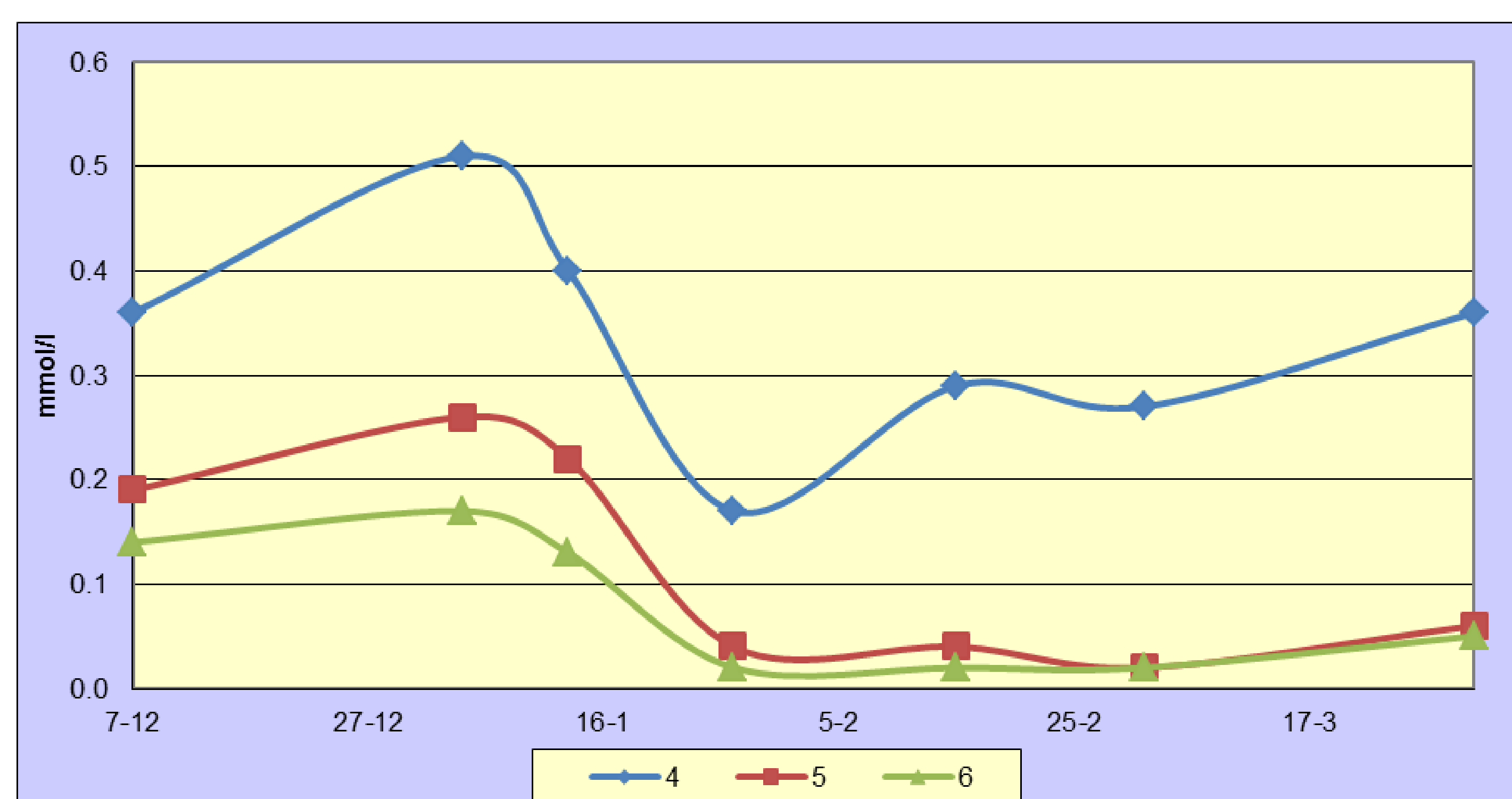


Figure 1. Silicon in mmol/l in the 1:1.5 extract. 1 (black) = reference rockwool, 4 (blue) = Solarite, 5 (red) = Dolomite + microsilica and 6 (green) = Dolomite.

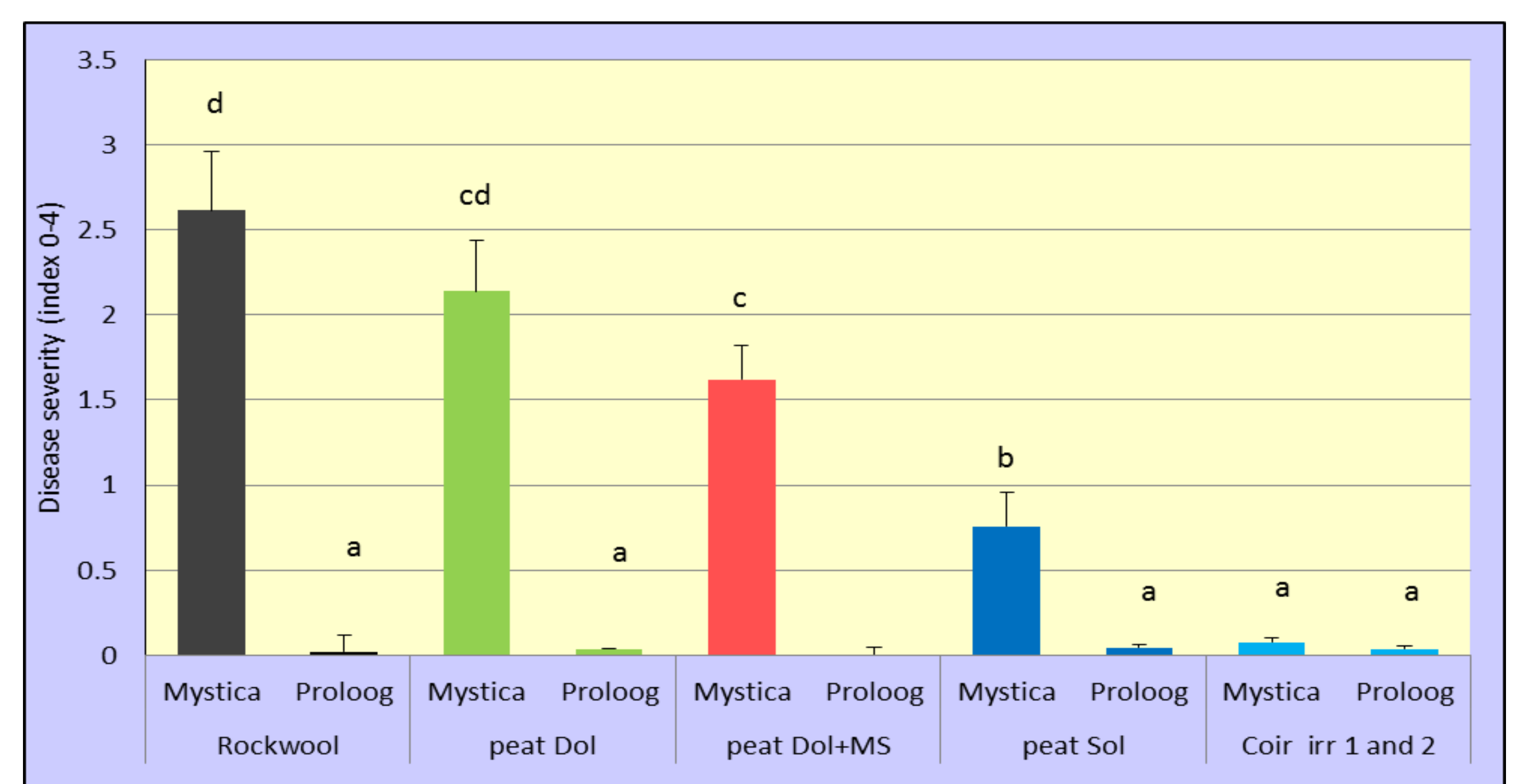


Figure 2. Powdery mildew severity for 1 (black) = reference rockwool, 4 (blue) = Solarite, 5 (red) = Dolomite + microsilica, 6 (green) = Dolomite. Mystica (susceptible) Proloog (resistant).

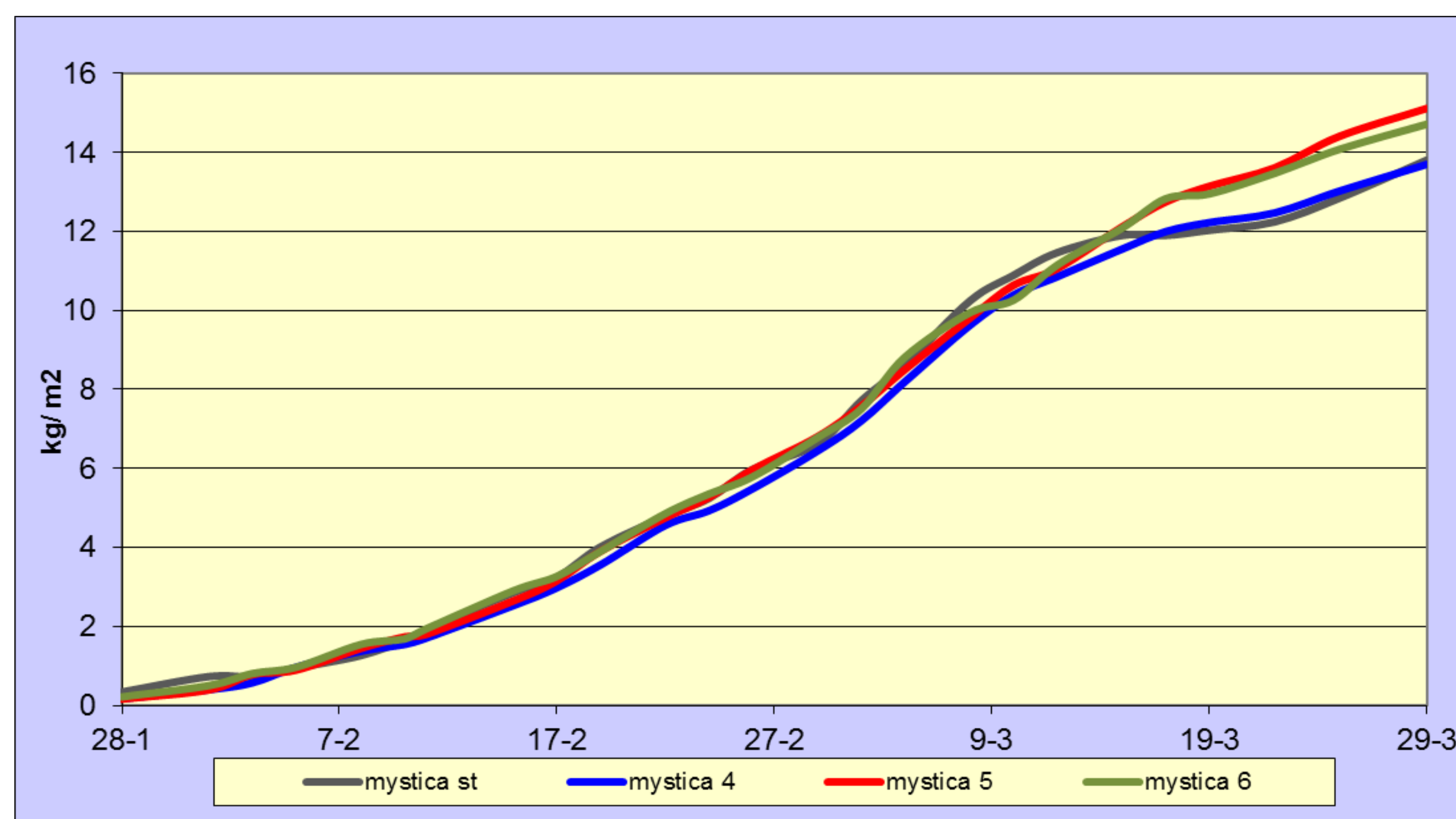


Figure 3. Yield in kg/m² for mildew susceptible variety Mystica. 1 (black) = reference rockwool, 4 (blue) = Solarite, 5 (red) = Dolomite + microsilica and 6 (green) = Dolomite.



Figure 4. Healthy (left) and mildew affected plants (right).

Results: Production Production with Solarite added was minus 5-10%. Mildew resistant variety Proloog yielded minus 10-20% compared to mildew susceptible variety Mystica.

Background

ELKEM Norway produces a silicon rich material, Solarite, which consists of very fine particles, is readily soluble and can neutralize acidity. Silicon can protect plants against fungi such as mildew in crops as rose and cucumber. Mildew resistant cucumber varieties are available but produce markedly less fruit weight.

Methods

Jiffy Norway/Holland delivered Solarite treated peat slabs. Grodan Rockwool was used as reference. A mildew susceptible and a mildew resistant cucumber variety were grown (Mystica and Proloog). Mildew severity was defined as 0 = 0%, 1 = 1-5%, 2 = 5-25%, 3 = 26-49%, 4 = > 50% of the mature leaf area covered by fungus.

