The role of silicon nutrient in reducing the levels of strawberry powdery mildew and two-spotted spider mite

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Introduction

Strawberry Powdery mildew, *Podosphaera aphanis*, is a major fungal disease affecting strawberry production worldwide and can result in great yield losses. Work at UH has shown that the use of a silicon nutrient 'Sirius' (OrionFT) can significantly reduce disease severity. The work reported here assessed the use of silicon as a nutrient applied via the fertigation tubes in contributing to delayed epidemic build-up and reduced number of two-spotted spider mite in field trials. The Brix (°Bx) results from the leaf petioles suggested that silicon could also affect the plant sugar level.

Aims

To investigate the use of silicon as a nutrient in contributing to delayed epidemic build-up and reduced pest as well as its effect on the sugar level of the plant.

Mycelium on leaves

Mycelium under x10 microscope

Mycelium on fruits

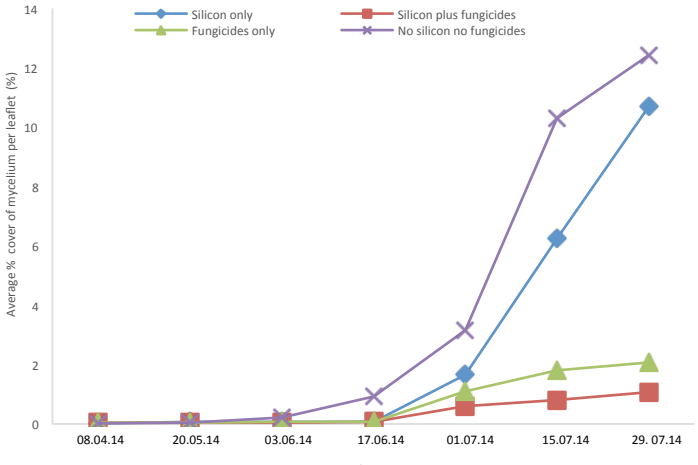

Fig. 1 Average % mycelium coverage per leaflet from 0.017% Silicon only, 0.017% Silicon plus fungicides, fungicides only and no silicon no fungicides treatments between 08.04.14 and 29.07.14.

Fig. 2 Average % mycelium coverage per leaf from treatments: No silicon no fungicides, fungicides only, 0.017% silicon applied once a week, 0.017% silicon applied once a week plus fungicides, double dosage of 0.017% silicon applied once a week and double dosage of 0.017% silicon applied once a week plus fungicides between 21.04.15 and 28.07.15

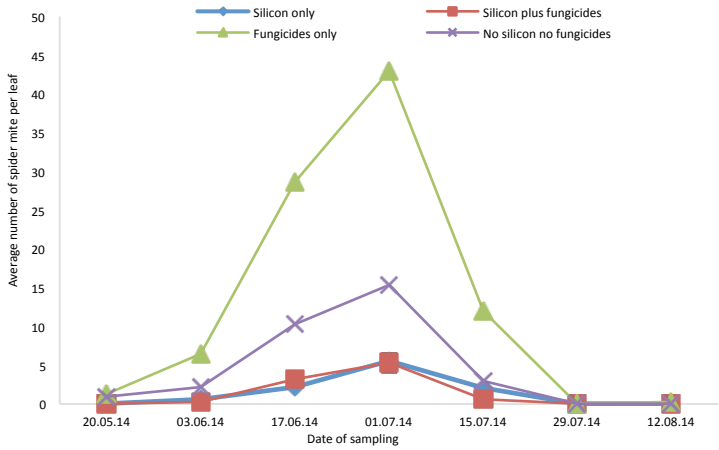

Fig. 3 Comparison of average number of spider mite per leaf between silicon only, silicon plus fungicides, fungicides only and no silicon no fungicides from 20.05.2014 to 12.08.2014.

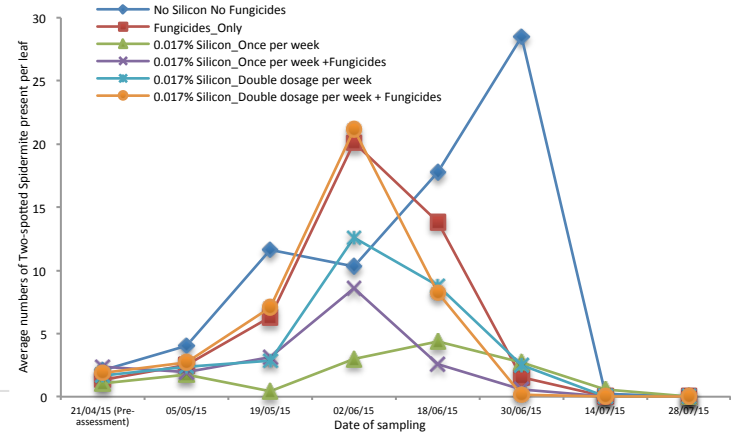

Fig. 4 Average numbers of Two-spotted spidermite present per leaf from treatments: No silicon no fungicides, fungicides only, 0.017% silicon applied once a week, 0.017% silicon applied once a week plus fungicides, double dosage of 0.017% silicon applied once a week and double dosage of 0.017% silicon applied once a week plus fungicides between 21.04.15 and 28.07.15

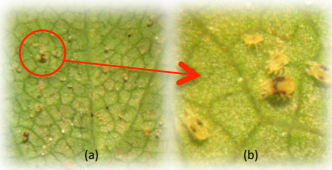

Fig.5 Two-spotted spidermites from non-silicon treatment under x10 microscope (a) and x50 microscope (b).

Materials and Methods

In the 2014 trial, Sirius was applied twice a week at a concentration of 0.017% in the fertigation tubes. Four treatments were undertaken. 75 leaf samples were taken per treatment fortnightly.

In the 2015 trial, Sirius was applied as a single or double dosage once a week at a concentration of 0.017% in the fertigation tubes in two commercial polythene tunnels. Six treatments were undertaken. 75 leaf samples were taken per treatment fortnightly.

Results

In the 2014 trial, 0.017% Silicon plus fungicide treatment had the lowest disease level; 0.017% Silicon alone treatment showed a better level of disease reduction than control (Fig 1). Silicon single dosage with and without fungicides treatments showed lower level of two-spotted spidermites infection (Fig 3).

In the 2015 trial, 0.017% Silicon in single dosage plus fungicide treatment had both the lowest disease level and the lowerst number of two-spotted spidermites (Fig 5). 0.017% Silicon single dosage only also showed better control on both mildew and pest level than control.

Discussion and Future work

The results indicated that silicon nutrient in the fertigation can improve fungicide action if used with commercial fungicides therefore result in better disease reduction. It could also contribute to the reduction of two-spotted spidermite infection on strawberry leaves. Silicon may also help to raise the plant sugar level, which would be important to strawberry growers. The questions lay ahead will be find out how much silicon a plant can take in order to benefit its growth therefore to work out the most suitable application rate for commercial growing.

Acknowledgement

Thanks to Harriet & Henry Duncalfe, Maltmas Farm for providing the field trial. Thanks to Gidon Bahiri and OrionFT for providing Sirius for the silicon trial and their support to this project.

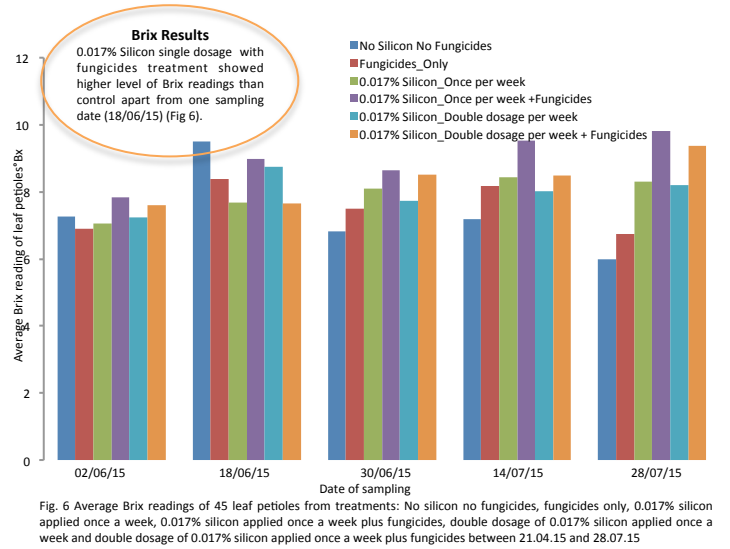

Fig. 6 Average Brix readings of 45 leaf petioles from treatments: No silicon no fungicides, fungicides only, 0.017% silicon applied once a week, 0.017% silicon applied once a week plus fungicides, double dosage of 0.017% silicon applied once a week and double dosage of 0.017% silicon applied once a week plus fungicides between 21.04.15 and 28.07.15