Calcium supplementation of soil augments the control of *Phytophthora cinnamomi* by phosphite.

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Introduction:

The application of either phosphite or calcium salts separately improve plant resistance to disease caused by *Phytophthora* spp.[1, 2]. Here we examine the combined effect of applying both calcium sulphate to the soil and phosphite to the leaves on disease development in a highly susceptible native Australian species, *Banksia leptophylla*.

Method:

1.Six month old *B. leptophylla* were transplanted into pots containing river sand supplemented with 0, 3, 10 and 30 mM calcium sulphate, and watered with suspensions of calcium at similar levels at regular intervals.
2.Foliage of plants from each calcium treatment was sprayed once to run off with 0, 0.1 and 0.3% phosphite.
3.The roots of plants were then inoculated with pine plugs colonised with *Phytophthora cinnamomi*.
4.Disease symptoms (chlorosis, wilting, lesions) and time to death were recorded for 12 months post inoculation.
5.The trial was harvested one year post-inoculation.

Results:

1.Supplementation of soil with increasing concentrations of calcium sulphate (0 - 30 mM) improved plant survival and reduced development of disease symptoms.
2.Increasing phosphite levels (0 - 0.3%) increased survival and reduced disease symptoms.
3.The combination of increasing both phosphite and calcium sulphate gave better plant survival and disease control than either treatment by itself.

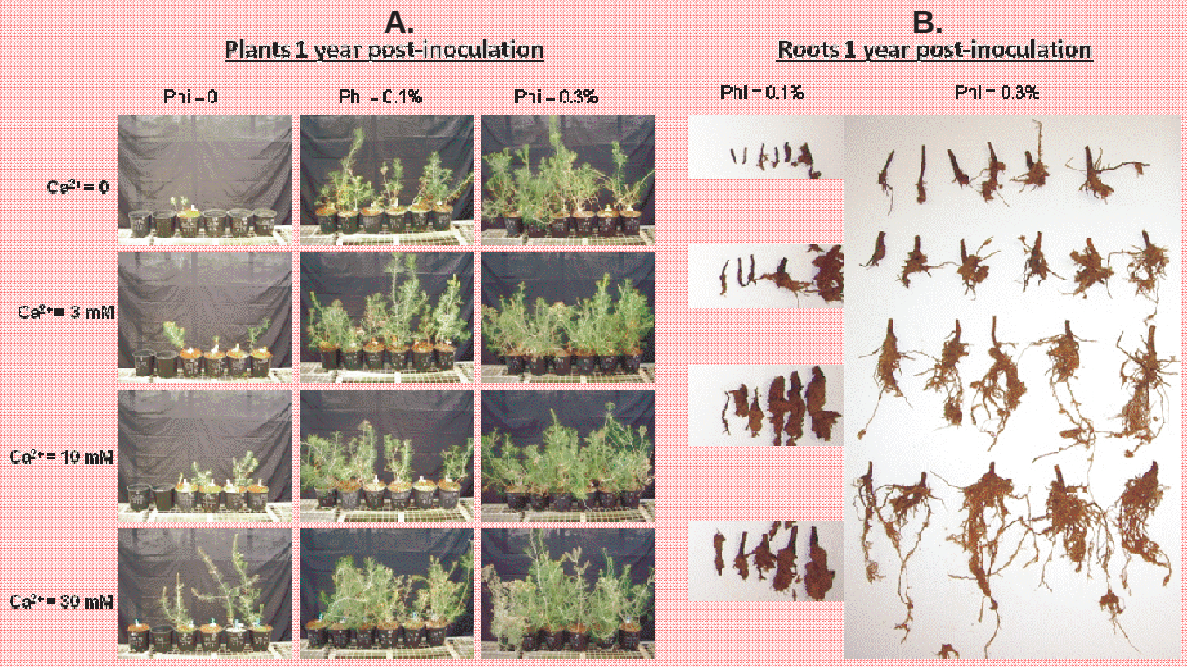

Figure 1. Surviving foliage *in situ* **(A)** and washed roots **(B)** of inoculated *Banksia leptophylla* plants 12-months after soil infestation with *Phytophthora cinnamomi* in each combination of treatment of phosphite and calcium. Soil was amended with calcium sulphate at concentrations of 0, 3, 10 and 30 mM in combination with phosphite spray at 0, 0.1% and 0.3% as indicated.

Conclusions:

1.Soil supplementation with calcium sulphate (3 – 30 mM) improved the efficacy of phosphite (0.1 – 0.3%). This will allow better (a) control of dieback symptoms, (b) a reduction in the concentration of phosphite needed to be applied, (c) and longer periods between phosphite treatments.
2.These results will have application in horticulture and, in certain instances, natural ecosystems.
3.The synergy between the effect of calcium ions and phosphite on symptom development may be explained by inhibition of a calcium dependent ATPase[3].

References:

1.; 2.; 3.