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Effect of nitrogen fertilisation of strawberry plants on the efficacy of defence-stimulating biocontrol products against *Botrytis cinerea*

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Nitrogen (N) fertilisation is known for its effect on the susceptibility of host plants to certain pests and pathogens and on the production of volatile secondary metabolites in response to attacks by herbivores. Although N is a key component in many compounds implicated in plant defence mechanisms, little is known on the possible effect of nitrogen fertilisation on the efficacy of defence-stimulating biocontrol agents. In the present work we examined the effect of five levels of N nutrition (0.5, 2, 5, 10 and 20 mMol L^{-1} applied as nitrate in a hydroponic system) on the susceptibility of strawberry leaves to *Botrytis cinerea* and on the protective efficacy of Serenade Max (*Bacillus subtillis* QST713) and Chitoplant (chitosan), two biocontrol products presumed to induce plant defence mechanisms.

Two days after the application of the products, batches of leaf disks were excised, inoculated with *B. cinerea* and incubated in conditions conducive to disease development. The resulting lesions were photographed and their surface was assessed with the help of image analysis software. Plant fertilisation had a highly significant ($p<0.01$) effect on disease severity for both strains of *B. cinerea* tested, with lesion sizes smallest and largest, respectively, on leaves from plants with the lowest and highest N levels. Similar effects were observed with plants treated with either biocontrol product.

In addition, plant fertilisation significantly influenced the efficacy of the biocontrol products. Compared to the untreated control, Serenade Max provided significant protection against both strains of *B. cinerea* on plants with low levels of N fertilisation (0.5 and 2 mMol L^{-1}), but not on those that received higher doses. In contrast, Chitoplant did not provide any significant protection against aggressive strain BC1. It provided a high level of protection (greater than 50%, $p<0.01$) against mildly aggressive strain BC21, but only for plants with low N fertilisation levels (0.5 and 2 mMol L^{-1}).

Possible hypotheses and the relevance of these results for integrated protection will be discussed.