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Beneficial health substances from berries and minor crops –

- How to increase their concentration
in cultivated species, eliminate losses
in processing and enhance dietary use

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Benzothiadiazole induces the accumulation of phenolics in strawberry

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Benzothiadiazole (BTH) is a widely studied plant defence activator, which has been shown to induce resistance in many plant species against bacterial, fungal and viral plant diseases. We have studied the potency of BTH against powdery mildew disease in strawberry under greenhouse conditions, where the disease can be a problem. The BTH-treated plants were significantly less infected than the control plants.

The concentrations of phenolic compounds were measured in the fruits and leaves after BTH treatment to address their role in the induced resistance in strawberry. Phenolics were extracted with acetone and analysed with HPLC. Cell-wall-bound phenolics from the leaves were hydrolysed with NaOH after extraction of soluble phenolics, and extracted then into ethyl acetate. Phenolic compounds in the leaves and fruits were identified using mass spectrometry.

BTH induced the accumulation of several phenolic compounds in the fruits and both leaf extracts. In the leaves, ellagitannins were increased up to 2- to 6-fold 4 days after BTH treatment. Inoculation and BTH treatment were both needed to maintain the induction after 4 days. In fruits, mainly anthocyanins, flavan-3-ols and kaempferol glycosides were at higher level in the BTH-treated plants than in the controls. New compounds not previously reported from strawberry, were found in the fruits and, particularly, in the leaves. A kaempferol derivative was identified in the fruits, whereas all the newly identified soluble phenolic compounds in the leaves were ellagitannins. Three compounds were identified among the cell-wall-bound phenolics. The results show that, in addition to other cultivation techniques, BTH-induced resistance could be exploited to obtain fruits with higher amount of beneficial health compounds. The high level of ellagitannins in the leaves, and their induction by BTH in parallel with improved disease resistance, suggest that ellagitannins and other phenolics are also important for the powdery mildew resistance of strawberries.