

Title Time course effects on primary metabolism of potato (*Solanum tuberosum*) tuber tissue after mechanical impact

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Abstract

An important feature relevant to potato (*Solanum tuberosum*) tuber quality management is the susceptibility to blackspot bruising caused by melanin production after exposure to severe mechanical stress. We analyzed the previously neglected nature and sequence of responses in primary metabolism and compared the cultivars ‘Afra’ and ‘Milva’ that differ in tissue elasticity and susceptibility to blackspot bruising. Mechanical stress application was highly standardized and differential formation of bruising damage and occurrence of small cracks in the outer tuber layers were demonstrated. Concomitant GC–TOF-MS based metabolite profiling revealed characteristic changes in central metabolism, namely in intermediates of the TCA cycle and linked parts of amino acid metabolism, with the clear exception of phenylalanine and tyrosine, the immediate precursor of melanin biosynthesis. We conclude that the initial metabolic responses and the initiation of blackspot formation are distinct, and that melanin biosynthesis is not driven by early precursor accumulation through activation of the aromatic amino acid biosynthesis pathway.