

NJF Report • Vol 3 • Nr 1 • Year 2007

Nordic Association of Agricultural Scientists —



NJF Seminar 399

Beneficial health substances from berries and minor crops –

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

Piikkiö, Finland, 14-15 March 2007

Biosynthesis of flavonoids in bilberry and blueberry – possibilities of the gene level information for the future

Laura Jaakola, Department of Biology, University of Oulu, P.O.B. 3000, FI- 90014 Oulu, Finland. Tel. +358 8 553 1544, fax +358 8 553 1061, laura.jaakola@oulu.fi

Flavonoids and phenolic acids in fruits and vegetables are offered as health-promoting dietary supplements with strong antioxidant capacity. Blueberries are recognized as one of the highest sources of flavonoids, especially anthocyanins. We have studied the biosynthesis of flavonoids in various tissues of naturally growing European blueberry (bilberry) and the blueberry cultivar 'Northblue'. Focus has also been on the biosynthesis of flavonoids in developing bilberry fruits as well as on the control genes regulating fruit development. The study involves the analyses of the expression of the flavonoid pathway genes in relation to the content and composition of the flavonoids and hydroxycinnamic acids. Two key genes controlling the fruit ripening has been isolated from bilberry. The expression of the control genes in developing fruits has been monitored with in situ hybridization and qPCR techniques. Our results demonstrate the co-ordinated expression of flavonoid biosynthetic genes in relation to accumulation of flavonoids in bilberry and blueberry plants. Although the profile of flavonoid biosynthesis was fairly similar between bilberry and blueberry in different plant parts, some characteristic differences were also detected. Our preliminary results show that the developing embryo has an important role in controlling the fruit development in bilberry. As the composition and texture of ripe fruit is for the most part genetically regulated, the gene level information offers interesting possibilities to better understand the complicated biological and biochemical processes involved in the fruit development. It also provides tools to allow a step change in our ability to modulate ripening phenomenon and accumulation of secondary metabolites like flavonoids.