MTT's berry varieties - rich in phytochemicals

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Berry breeding at MTT is based on classical cross-breeding and selection. It often involves hybridisation of hardy varieties with those with some other favorable properties. The selection is done in the field at MTT Piikkiö under southwestern Finnish growing conditions characterized by fluctuating winter temperature without a proper protective snow cover. As hardy parents for hybrid seedling populations, both well-adapted old varieties and native, wild types of plants have been used. In addition to the agronomic quality of the cultivars, also nutritional property is studied in new and candidate varieties.

Breeding of sea buckthorn *(Hippophaë rhamnoides)* at MTT has resulted in disease resistant cultivars widely adaptable to growing conditions in Finland (Karhu 2003). The pistillate or female cultivars 'Terhi' and 'Tytti' originate as seedlings from X-ray radiated seeds from an open pollination of a natural stand of Finnish pistillate plants. The content of vitamin C of these cultivars exceeds that of the majority of cultivated varieties, being usually over 200 mg per 100 g, in 'Tytti' even over 300 mg per 100 g.

There are several Finnish blueberry *(Vaccinium)* cultivars created by MTT. The recent highbush blueberry *(V. corymbosum)* hybrid variety 'Arto' was created by the interspecific crossings [(*V. uliginosum* × 'Rancocas') × 'Bluecrop'] × 'June' (Tahvonen et al. 2008). Its anthocyanin and proanthocyanidin contents of berries exceed those of the control variety 'North Blue' (Mattila et al. 2007). Also the halfhigh cultivar 'Aino', ['Rancocas' × (*V. uliginosum* × 'Rancocas')] × *V. angustifolium* 'Augusta' (Lehmushovi 2000), was found to contain notably high amounts of anthocyanins and proanthocyanidins. It, as well as another halfhigh blueberry cultivar 'Alvar', *V. angustifolium* 'Brunswick' × 'June' (Lehmushovi 2000), were found to be characterized by high contents of phenolic acids, mainly chlorogenic acid, too (Mattila et al. 2007).

Green-fruited blackcurrant *(Ribes nigrum)* cultivars are a specialty of Finnish small fruit breeding activity and favoured by both berry wine makers and home gardeners. The new cultivars 'Venny' and 'Vilma' originate from the reciprocal crossings of an unnamed green-fruited blackcurrant stand and the green-fruited cultivar 'Vertti' (Tahvonen & Hellsten 2009). The level of vitamin C in the berries of these new cultivars is about 200 mg per 100 g, being about twice of that of the commonly cultivated blackcurrant varieties in Finland, 'Mortti' and 'Öjebyn'. Their vitamin C contents of berries also exceed the value of 135 mg per 100 g of the parent variety 'Vertti' that was created by the self-pollination of 'Öjebyn' (Junnila et al. 1987).

The new red currant *(R. rubrum)* cultivar named in 2007 as 'Punahilkka' ("Little Red Riding Hood") has exceptionally intense red berries (Tahvonen & Hellsten 2009).

Accordingly, the anthocyanin content of its berries, 57 mg per 100 g, highly exceeds that of the control cultivar 'Red Dutch', 31 mg per 100 g.

The realized importance of the phytochemical quality of berries in human nutrition has given new focus and importance to berry breeding programs. The breeding work at MTT achieves to keep the inner quality of berries at high level, and even increase it, in addition to reach the agronomic breeding targets in the changing climatic conditions in the North.

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