

Sweet and Bitter Taste in Organic Carrots

Carrot, *Daucus carota* L., is valuable for its taste, good digestibility and high contents of provitamin A. Both epidemiological and nutritional studies have pointed out its positive impact on human health.

The taste of carrots is a unique composition between sweet, fruity and more harsh or bitter flavours. Many factors affect the balance between the different flavours in carrots and thus contribute to the final taste. Sweet taste is more common in the centre and lower, tip, part of the carrot. The phloem is mostly sweeter and also bitterer than the xylem. Bitter taste is more often detected in the upper and outer part of the carrot.

The amount of sugar in the carrots has a clear correlation to the perception of sweetness. The amount of sugar can also contribute in masking bitter taste in carrots. One possible reason for the increases in bitter taste during storage is decreasing sugar content.

The sugar in carrots consists mainly of sucrose, glucose and fructose. During the seedling phase no soluble sugar is stored, in the second phase only reducing sugar and in the third phase, starting some 50 days after sowing mainly sucrose is stored in the carrot root. The reduction in sugar during storage mainly concerns sucrose. The total amount of sugars do not differ so much between different parts of the carrot.

No particular compound has been found that explain all phenomena connected to the harsh and bitter flavours in carrot. The appearances of such flavours are probably due to a multiplicity of compounds.

Terpenes are connected both with the typical carrot taste as with harsh flavours. There are a large number of terpenes in carrot mainly in the carrot oil. They are more common in the upper part and in the phloem. The concentration of terpenes increases during growth. Higher temperatures during growing season also increase the amount of terpenes. Terpenes can mask for sweet taste but can also be less detectable by increasing sugar concentration.

Phenolic substances, as 6-methoxymellein, are synthesised along the polyketide or shikimic pathway, as a reaction of stress and increased respiration in the carrot. Together with other compounds they can contribute to bitter taste in carrot.

Polyacetylenes, such as falcarindiol, are formed from oleic acid probably as a part of the defence against pathogens. Falcarindiol is however always present in carrots, more commonly in the upper and outer part and in the phloem. There is a correlation between the amount of falcarindiol and bitter taste in carrots.

Sweet and bitter taste in carrots is dependant both on genetic as environmental factors. The choice of cultivars and cultivation methods can therefore highly affect the taste of carrots before they reach the consumer.

(Extract from "Sweet and Bitter Taste in Organic Carrot" Lars Kjellenberg, 2007, Swedish University of Agricultural Sciences.)