**Title** Postharvest application of organic and inorganic salts to control potato (*Solanum tuberosum* L.) storage soft rot: a physico-chemical basis

**Author** E.S. Yaganza , J. Arul, R.J. Tweddell and M.-T. Charles

**Citation** ISHS ActaHorticulturae 945:435-439. 2012.

**Keyword** *Pectobacterium carotovorum; Pectobacterium atrosepticum*; chemical control; soft-rot; plant-disease; salts; water-ionization

**Abstract**

Potato tuber storage soft rot is a devastating bacterial disease caused in temperate regions by *Pectobacterium carotovorum* subsp. *carotovorum* and *Pectobacterium atrosepticum*. Recent works have demonstrated the potential of salts as environmentally friendly alternative products to fungicides. Initial investigations on the effects of selected salts in combating the soft rot causative agents have demonstrated that salt in vitro activity relates to the capacity of salt ions to hydrolyse water molecule and on their lipophilicity. In the present work, we investigated the inhibitory effect of 21 organic and inorganic salts on soft rot development in potato tubers. Tubers were treated by dipping in the different salts solutions (0.2 M) before infection (preventive treatment), and disease development was evaluated after three days of incubation (24°C). The inhibitory action of the salts, whether effective (>20% disease reduction) or not, decreased linearly with increasing water-ionization capacity of the salts ions (i.e., increasing the acidity constant (pKa') of anions or the basicity constant (pKb') of cations). However, the relationship was clearly demarcated for effective salts ions, aluminium, bisulphite and benzoate, as well as lesser effective ions such as sorbate, propionate, and calcium. The performance of the effective salts in the tuber is attributable, in addition to their capacity to ionize water, to their specific characteristics, including easy migration in the tissue (e.g., $SO_2$ and protonated benzoate), and the complexation of aluminum ions with the polygalacturonide residues of the plant cell wall and consequent tissue acidification. This study demonstrates that aluminum chloride, sodium metabisulfite and sodium benzoate have potential in controlling potato tuber soft rot. It also provides the general basis for understanding the anti-disease action of salts in the tissue.