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Application of *Boni Protect*[®] against postharvest diseases in integrated apple production

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Postharvest diseases are caused by a wide range of different fungi and cause major losses in pome fruit production every year. In integrated production (IP) one to three preharvest applications with chemical fungicides are conducted to prevent postharvest rots during storage. Preharvest intervals of up to 21 days resulting from maximum residue limits, the risk of resistance development by pathogens, as well as the pressure from consumers to reduce chemical fungicides increasingly complicate their use. Especially detection of a range of different chemical residues impair the image of fruit as healthy food and some trade chains already demand produce containing less than five detectable chemical residues.

Boni Protect[®] is based on antagonistic strains of the yeast-like fungus *Aureobasidium pullulans* isolated from the apple surface and is able to prevent the infections of wounds by plant pathogenic fungi. The product has no preharvest interval and can therefore be applied until harvest and between different pickings.

Since 2002 preharvest use of *Boni Protect*[®] in field trials has been showing results comparable to efficiencies of chemical fungicides (Mögel and Kunz, 2006; Weiss *et al.*, 2006). Three preharvest *Boni Protect*[®] applications in a field trial (variety Golden Delicious) reduced incidence of postharvest rots from 35.7 % to 13.6 % (efficiency of 62 %) in Portugal in 2009. Using Pomarsol as chemical standard a reduction of incidence to 21.8 % (efficiency of 39 %) was obtained. During the time period of 2007 to 2009 *Boni Protect*[®] showed its potential to replace chemical fungicide applications in six more European countries, achieving a maximum efficiency of 89 %.

In addition to the replacement of chemical fungicide treatments *Boni Protect*[®] can be used to supplement their use to achieve higher efficiencies by applying *Boni Protect*[®] in their preharvest interval. In four field trials adding up to two *Boni Protect*[®] treatments to standard fungicide treatments an additional reduction of infected fruits to 4 % was obtained, which leads to an additional yield of 1200 kg ha⁻¹. Therefore *Boni Protect*[®] has a high potential for replacing as well as for supplementing chemical fungicide treatments and offers new strategies for fruit growers in reducing postharvest rots. Furthermore it is able to make an important contribution to minimize residues and the risk of resistance development by fungal plant pathogens.

Mögel, G.; Kunz, S. 2006. Vier Jahre Praxisversuche mit dem Hefepreparat Boni-Protect. Obstbau, 31: 468-470.

Weiss, A.; Mögel, G.; Kunz, S. 2006. Development of 'Boni-Protect' – a yeast preparation for use in the control of postharvest diseases of apples, pp. 113-117 in FÖKO e.V. (Ed.), 12th International Conference on cultivation technique and phytopathological problems in organic fruit growing, FÖKO e.V, Weinsberg.