

## Use of Thermotherapy and Natural Antifungal Compounds against Post Harvest Diseases on Apples

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In France, short hot water treatment (2/3min.) can now be applied in food industry. As far as *Phlyctaena vagabunda* is concerned (lenticel spot disease or *Gloeosporium*) hot water treatments are very effective. We know now more about the hot water risk injuries : only a few varieties can be treated at 52 °C. By contrast, at 50 °C a lot of varieties are not susceptible to hot water risk injury. Unfortunately Golden delicious apples can not be treated at 50 °C/3 min., a slight change of skin coloration is unacceptable commercially. In fact, Golden delicious apples are the most susceptible to thermotherapy. In this case it is possible however to lower the temperature up to 48 °C. Such a treatment is completely safe for all varieties assayed, but the efficacy is less than the 50 °C treatment.

In that case we can use some natural antifungal compounds extracted from edible plants.

Eugenol and natural clove oil, have been selected in our laboratory as the best antifungal compounds in fight lenticel spot disease. Considerable experiments have been performed on Golden delicious apples, finally a combination of hot water treatment (48 °C/3 min.) and eugenol (1,5g a.i./l) gives a high efficacy without any skin injury. A prolonged antifungal effect was obtained as expected.

Hot water treatment can be applied immediately in food industry. In the case of eugenol,

we have to wait 2003 to get it commercially available for organic farmers (XEDA INTERNATIONAL).

If we are able in food industry to combine hot water treatment, the use of natural compounds and /or biofungicides (such as yeasts), it could be reasonably envisaged to obtain a very high efficacy close to that of chemical treatments.

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