

Calcium phosphate nanoparticles doped with copper ions as efficient tools for downy mildew prevention

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Nowadays the management of crops requires the use of a large quantity of pesticides, herbicides and fertilizers, especially in high-income crops such as vines, which undergo several treatments per year. Their use, however, is highly inefficient, with considerable losses that have harmful effects on the environment and human health. For this reason, the interest towards methods able to make agronomic practice more sustainable is growing noticeably. Particular attention is paid to nanotechnology applied in agriculture, as this could lead to the development of nano-agrochemicals more effective than conventional ones, concerning leaching and treatment persistence on plant. In fact, nanomaterials allow to bind the molecules of interest and to transport them directly to the target site in the plant, thus reducing the overall doses used and their dispersion into the environment. According to this perspective, in this work two types of calcium - phosphate nanoparticles were applied on Chardonnay grapevine cultivar: the aim was to evaluate their potential as vectors for low amounts of ionic elements, which may have a nourishing or biocidal function. In particular, two different methodologies have been used for functionalization with copper (Cu II), aiming to investigate its inhibitory action on *Plasmopara viticola* infection and to verify its entry into the leaves.