

Innovative strategies based on the use of biostimulants to manage plant diseases and minimize the application of synthetic fungicides in grapevine and stone fruits

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Plant diseases can severely affect the grapevine and stone fruit production, contributing to food losses and food waste. The ordinary way to control plant diseases consists in the use of synthetic fungicides. However, restrictions due to legislation and the request from consumers of food free from pesticide residues triggered the investigation on natural alternatives. Among these, there is a biopolymer extracted from crab shell called chitosan that is able to produce a film on treated commodities. This biopolymer has antimicrobial, eliciting and film-forming activities, contributing for about 40%, 35% and 25%, respectively, to its control of plant diseases. When applied to grapevine canopy, chitosan reduced downy mildew, caused by *Plasmopara viticola*, at the same magnitude of copper widely used in organic agriculture, but it accumulates in the soil being phytotoxic and harming soil microbiota. Chitosan application on stone fruit decreases the development of brown rot on sweet cherries cold stored and exposed to shelf life. Since consumers are worried about the presence of fungicide residues in fruit, retailers impose to the growers a reduction on the pesticide residues far below the legal threshold. Moreover, copper is a candidate to the substitution, then, in few years, its application in agriculture can be banned in the EU. Therefore, the use of a biostimulants as chitosan, that is a natural compound used in slimming diets then safe for humans and the environment, is a strategy welcomed by organic growers, and applied in several wineries to manage grapevine downy mildew.

Key words: *Botrytis cinerea*, biostimulants, chitosan, induced resistance, *Monilinia* sp., *Plasmopara viticola*