



XVIII Congreso de la Sociedad Argentina de Microbiología General



Chapadmalal

R.C.T. Club Vacacional & Spa

2 al 5 de octubre

TOWARDS THE SUSTAINABLE PRODUCTION OF LEMONS: NATIVE YEASTS AS BIOLOGICAL CONTROL AGENTS

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The province of Tucumán is positioned as one of the main centers of production and processing of lemons. Among the problems associated with the production of lemons, the economic losses caused by postharvest fungal infections stand out. Chemical fungicides have traditionally been applied as control and preventive measures, but their use entails numerous problems such as environmental contamination, toxicity in humans and restrictions on international markets. However, efficient and sustainable alternatives to the use of such pesticides are not known so far. Thus, the aim of this research was to search for biological control alternatives based on native yeasts, understand the associated mechanisms of action, and formulate a sustainable biocontrol agent. Biocontrol yeasts were isolated from citrus plants and lemon packinghouses. The antagonism of the isolates against *Penicillium digitatum* in *in vitro* and *in vivo* assays as well as the possible mechanisms of action related to biological control were determined. In addition, both liquid and solid formulations were tested. Among the yeast isolates, *Clavispora lusitaniae* 146 stood out as it was able to inhibit *P. digitatum* *in vitro* and also to control green mold on lemons with high efficiency, both in room temperature and cold storage. Yeast 146 was able to resist stress factors associated with the packaging process and was compatible with carnauba wax. Among the mechanisms of action, the ability to colonize wounds and the competition for space and nutrients were evidenced. *C. lusitaniae* depicted a broad spectrum of action in controlling green mold on other citrus fruits, such as oranges, mandarins, and grapefruit. *C. lusitaniae* 146 did not negatively affect the aroma perception of fruits by consumers. Moreover, it was able to remove the mycotoxin patulin from a solution. Different liquid and solid formulations were tested; being the yeast dried by lyophilization in combination with sucrose and skimmed milk the most promising. The native yeast *C. lusitaniae* 146 is a promising biological control agent for the control of *P. digitatum* in lemons and other varieties of citrus fruits. A yeast-based formulation would replace the use of chemical fungicides and promote the organic production of lemons.