Cold-plasma mediated control of postharvest strawberry pathogens

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- Strawberries are highly perishable fruits due to their high moisture content
- Maintaining their quality to maximise postharvest shelf life is one of the major challenges for farmers and wholesalers

The rapid growth of fungi on strawberries is estimated to cause up to 50% of postharvest losses[1,5]. An effective control measure that does not affect fruit quality is required to prevent these losses. Cold plasma is an ionised gas with anti-microbial activities that has proven effective in controlling postharvest pathogens associated with strawberry fruit[2].

In this research, strawberries were treated with cold plasma (CP) or plasma activated water (PAW) by immersion and stored at 4°C. Fruit quality parameters such as firmness, spoilage, colour, and weight were measured on the day of treatment and again six days later.

Fruit treated with CP or PAW had significantly less spoilage than untreated controls when assessed six days after treatment (Figure 1). Treatment did not alter firmness, colour or weight.

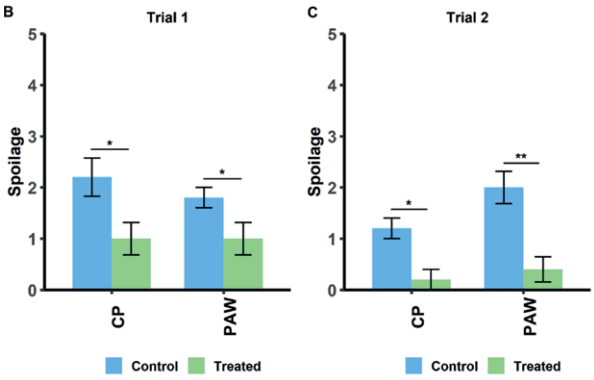

Figure 1. Spoilage of strawberries at day 6 following cold-plasma treatments. Zero (0) spoilage means none of the fruit in the sample had fungal contamination; five (5) spoilage means that all pieces of fruit in the sample had fungal contamination.

The baseline abundance of fungi associated with strawberries in WA before cold plasma treatment was measured using traditional isolation techniques and more detailed molecular analysis (Figure 2). Molecular analyses were also conducted after the cold plasma treatments to measure the inactivation of fungal communities (Figure 3). This method assessed the abundance of fungi that remained alive following treatment.

In addition to reduced spoilage, the relative abundance of fungi was also reduced on treated fruit. Two fungi appear to have survived plasma treatment, Cladosporium and Rhodoturula, but none of the remaining fungi were able to be detected.

These results demonstrate the potential of cold plasma to inactivate or kill postharvest strawberry pathogens. Further research is recommended to implement laboratory findings to large-scale industrial application.

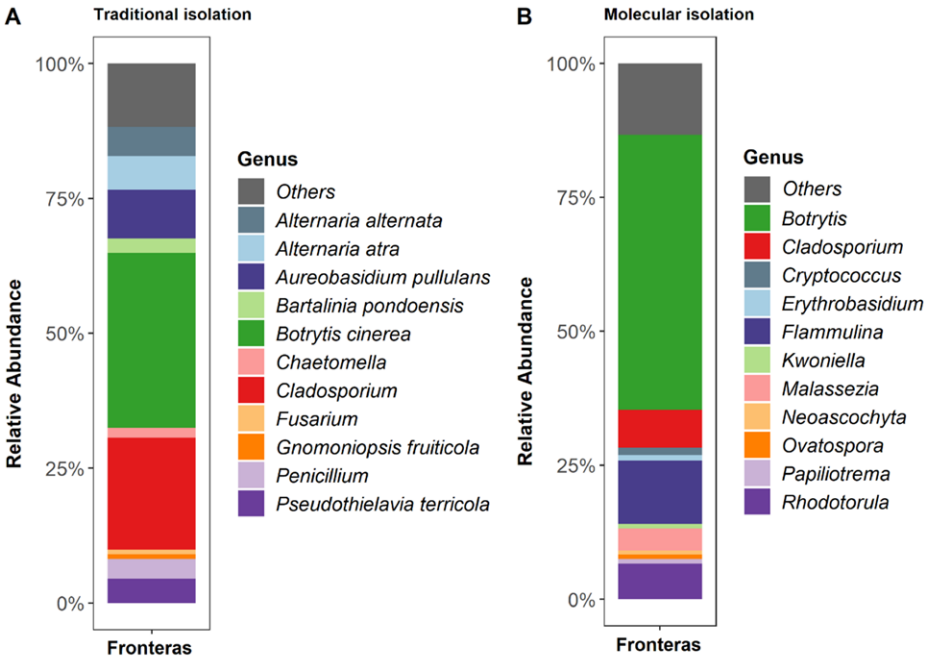

Figure 2. Relative abundance of fungal communities in Fronteras variety before cold plasma treatment (A) traditional isolation and (B) molecular approach. Top 1% fungal genera were considered for molecular analysis.

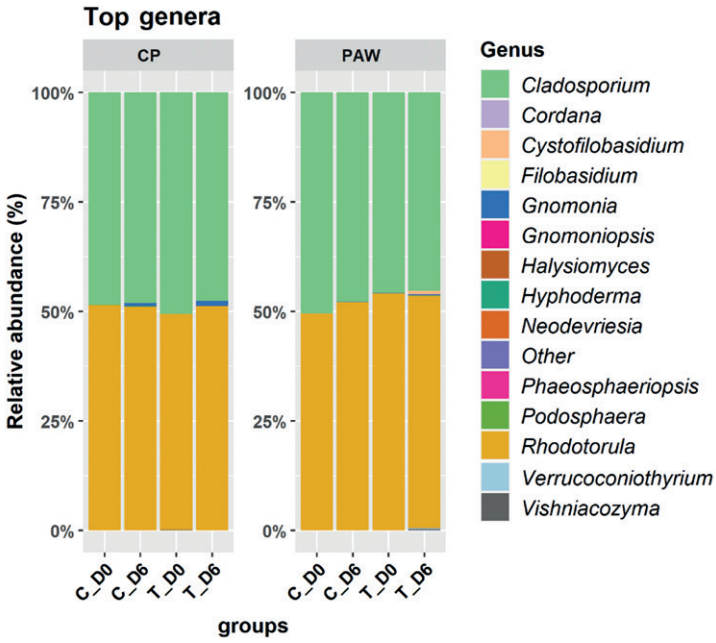

Figure 3. Live-fungal communities in a WA postharvest strawberry variety following CP and PAW treatments. C_D0 = Control Day 0, C_D6 = Control Day 6, T_D0 = Treated Day 0, T_D6 = Treated Day 6.

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