

Targeting Coffee Berry Disease: Antifungal Properties of Rhizobacteria from Grapevine Soils

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AIM

To isolate and characterize plant growth-promoting rhizobacteria (PGPR) from the grapevine rhizosphere and evaluate their *in vitro* antagonistic potential against *Colletotrichum kahawae*, the causal agent of Coffee Berry Disease [1].

APPROACH

Isolation and *in vitro* screening of grapevine rhizobacteria for antagonism against *Colletotrichum kahawae* accordingly with the flowchart (Fig. 1).

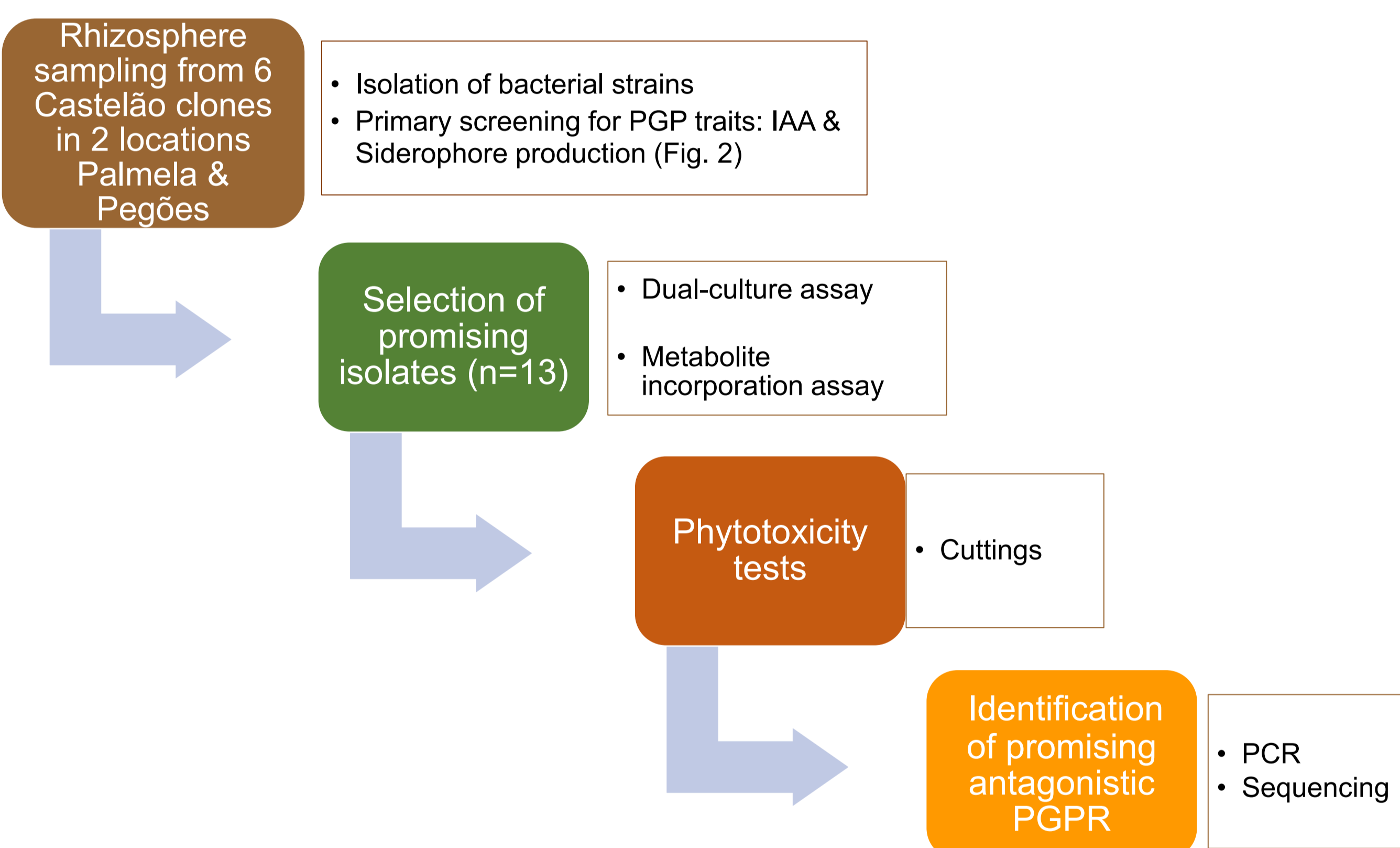


Fig. 1 – Flowchart for isolating and evaluating grapevine rhizobacteria as biocontrol agents against fungal diseases.

RESULTS

Seven out of the thirteen bacterial strains were selected based on their production of either IAA or siderophores (or both). (Fig. 2).

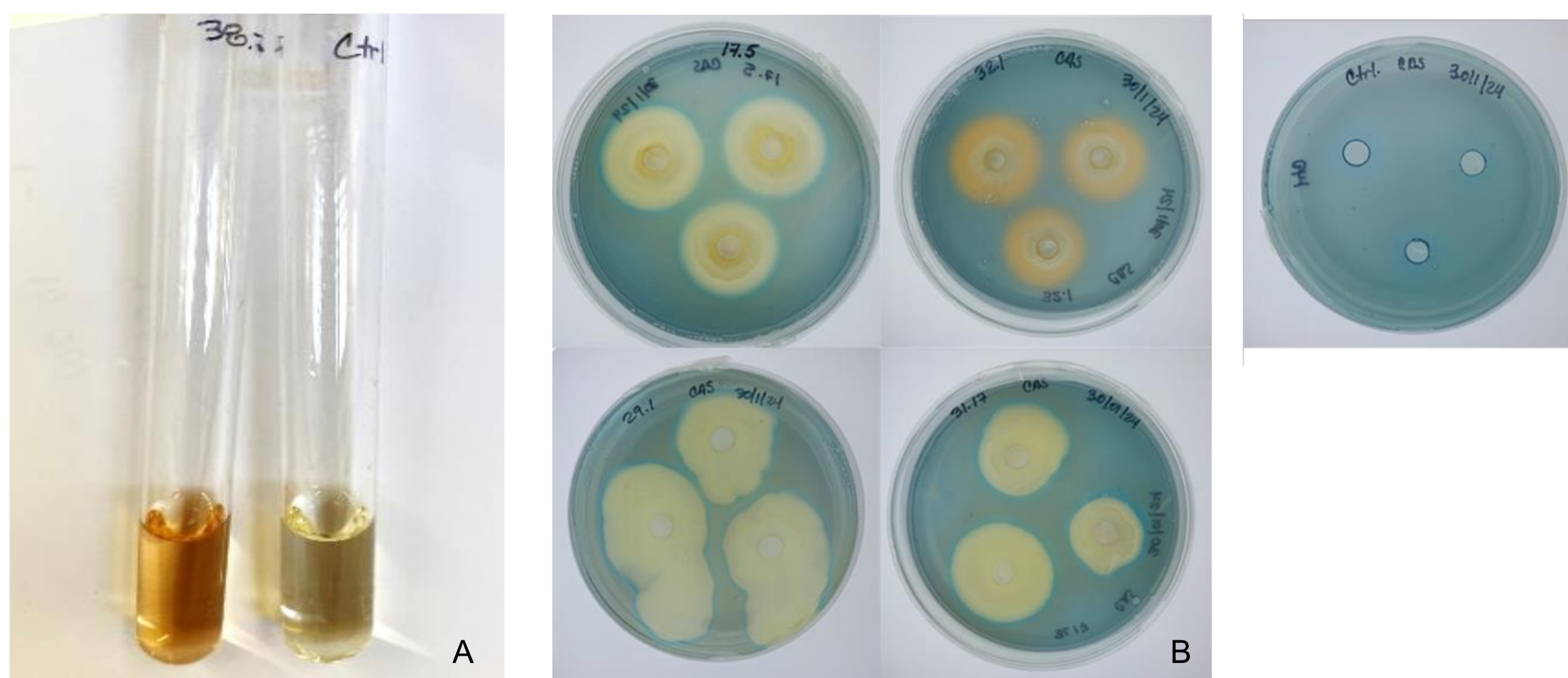


Fig. 2 – Primary screening for plant growth-promoting traits: A- IAA production (Salkowski assay) & B - Siderophore production [chrome azurol S(CAS) assay] [2].

RESULTS

Seven out of the thirteen bacterial strains were selected based on their production of either IAA or siderophores (or both). (Fig. 2). These seven bacterial strains inhibited *C. kahawae* growth by 6.24 to 56.23% *in vitro* in dual-culture assays (Fig.3). Among the isolates, the B_31.18, was the most effective, significantly delaying or completely suppressing fungal growth. Additionally, we assessed the ability of isolate B_31.18 to produce fungitoxic metabolites, which may contribute to antifungal activity (Fig. 4).

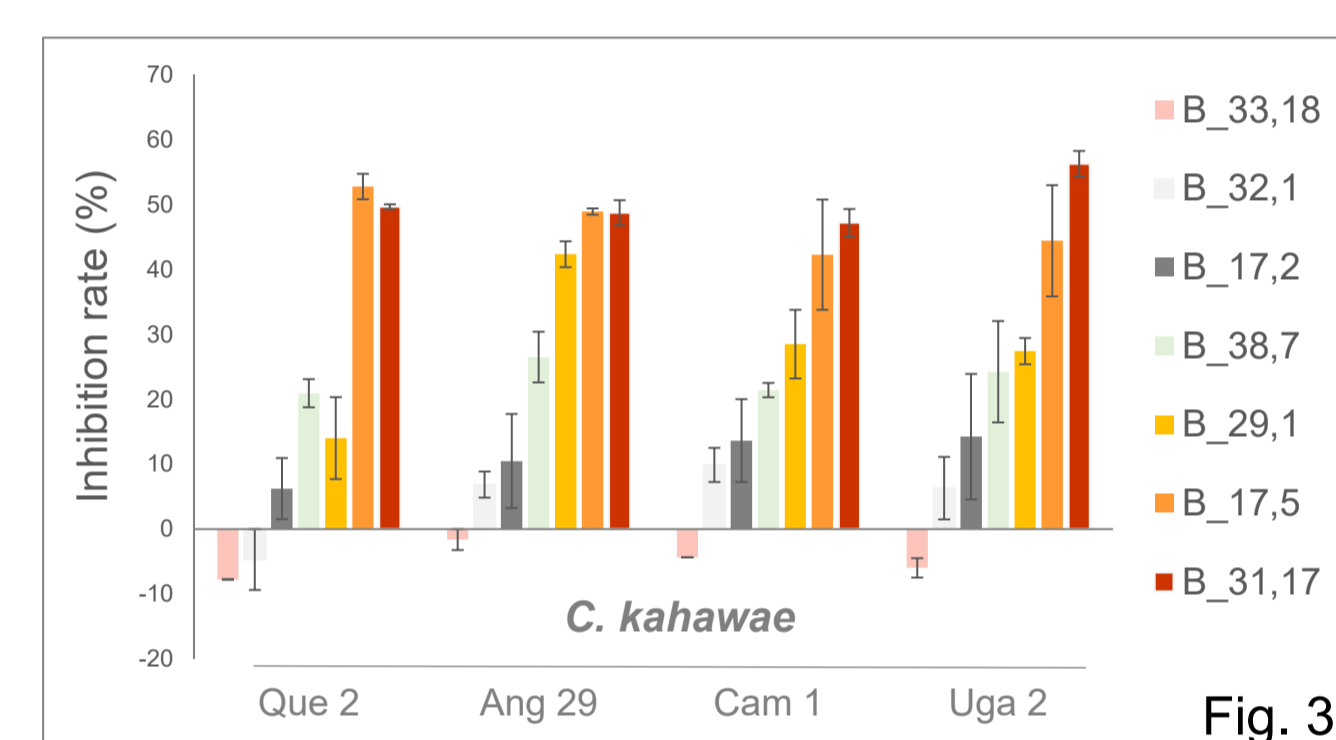


Fig. 3 - *In vitro* antagonistic activity of bacterial strains against *C. kahawae* isolates in a dual-culture assay.

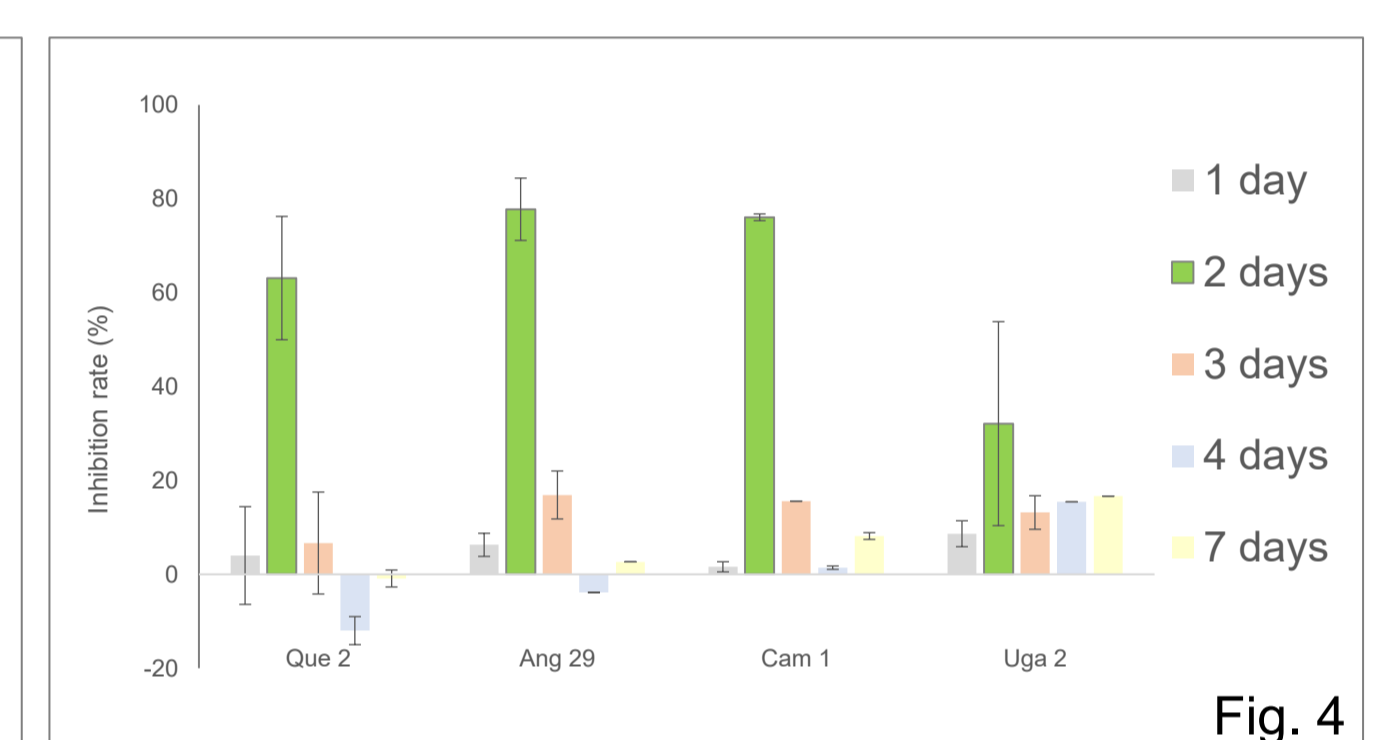


Fig. 4 - Fungitoxic activity of bacterial (B_31.17) culture medium against different isolates of *C. kahawae* over time.

Phytotoxicity evaluations on young tomato cuttings showed that only the undiluted, 3-day-old bacterial culture medium induced a slight leaf curl (Fig. 5). No other treatments produced symptoms.

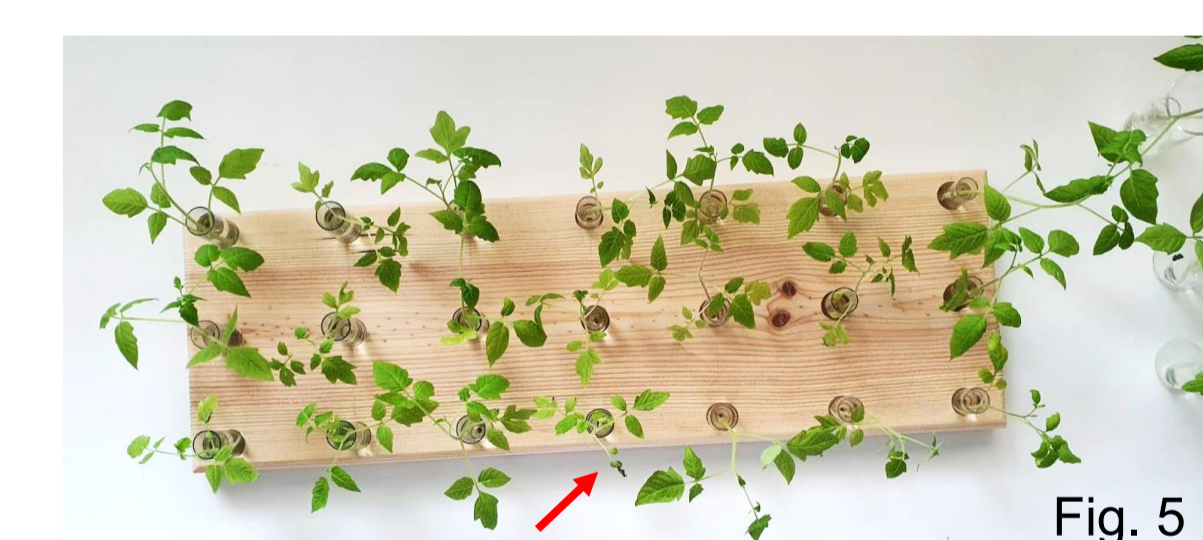


Fig. 5 - Phytotoxicity evaluations by cuttings assays of young tomato plants. Arrow indicate the curl leaf observed

Table 1 - Species identification of the Rhizobacteria strains under study

Rhizobacteria	Identification
B_17.2	<i>Bacillus</i> spp.
B_17.5	<i>Bacillus velezensis</i>
B_29.1	<i>Bacillus subtilis</i>
B_31.17	<i>Bacillus velezensis</i>
B_32.1	<i>Priestia megaterium</i>
B_33.18	<i>Priestia megaterium</i>
B_38.7	<i>Bacillus velezensis</i>

Bacterial identification by PCR successfully identify all isolates to the species level, except for B_17.2 (Table 1).

CONCLUSIONS AND PERSPECTIVES

The potent antagonistic activity of the *Bacillus velezensis* isolate B_31.17, obtained from the grapevine microbiome, highlights its significant potential for developing sustainable biocontrol agents against plant fungal diseases.

ACKNOWLEDGMENTS

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