



## Evaluation of the antagonist activity of potential biological control agents against *Verticillium dahliae*

تقييم النشاط المضاد لعوامل مكافحة البيولوجية المحتملة ضد *Verticillium dahliae*

Ola Muhammed

Córdoba, june 2021



Mr. Fco. Javier López Escudero, Associate Professor, and Mr. Antonio Trapero Casas, Professor, of the Department of Agronomy of the Higher Technical School of Agricultural and Forest Engineers of the University of Córdoba

REPORT:

That the work entitled "**Evaluation of the antagonist activity of potential biological control agents against *Verticillium dahliae***", carried out by Ola Muhammed Ahmed at the Higher Technical School of Agricultural and Forest Engineers of the University of Córdoba, meets the necessary requirements to be presented as a Thesis of the Master's Degree in Olive growing and Oil technology.

In Córdoba, June 2021

LOPEZ  
ESCUDERO  
FRANCISCO  
JAVIER -  
30524833S

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LOPEZ ESCUDERO  
FRANCISCO JAVIER  
- 30524833S  
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Fdo: D. Fco. Javier López Escudero

TRAPERO  
CASAS  
ANTONIO JOSE  
- 30399664N

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por TRAPERO CASAS  
ANTONIO JOSE -  
30399664N  
Fecha: 2021.06.16  
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Fdo: D. Antonio Trapero Casas

La alumna:

MUHAMMED  
OLA  
MUHAMMED  
AHMED -  
Y7353886H

Digitally signed by  
MUHAMMED OLA  
MUHAMMED  
AHMED - Y7353886H  
Date: 2021.06.16  
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Fdo: Dña. Ola Muhammed Ahmed

## ABSTRACT

One of the most important challenges of current olive growing is the control of verticillium wilt caused by the fungus *Verticillium dahliae*, due to its wide spread, the severity of the attacks that can cause the death of the affected tree and the difficulties of its control. In addition, the lack of effective chemical products against this disease, both for the treatment of the soil and the plant, has motivated the search for alternative control methods. Within this context, the biological control emerges as an effective and sustainable strategy that can also complement other measures, within an integrated disease management strategy. In this regard, the objectives of the present work are the evaluation of the efficacy of 34 microorganisms, 25 fungi and 9 bacteria, on the mycelial growth of *Verticillium dahliae* (isolates V-180, V-313) and the viability of the microsclerotia of the pathogen in two naturally infested soils. Likewise, the efficacy of seven of these microorganisms on the progress of verticillium wilt in olive trees of the cultivar "Picual" has been evaluated under controlled conditions using a substrate artificially infested with *V. dahliae*. In general, the results show that there is a high potential for the control of verticillium wilt of olive among the evaluated microorganisms; although, a great variability was found between the isolates, even within the same species. In particular, two *Fusarium oxysporum* isolates (PV-353 and PV-1030) were effective both in inhibiting mycelial growth and in reducing the inoculum density in the soil samples. Likewise, the treatments with the PV-1030 strains of *Fusarium oxysporum* and PV-1041 of *Trichoderma* sp. also have shown a significant reduction both on the amount of the inoculum in the soils and on the suppression of the disease under controlled conditions. In contrast, some treatments, such as *Bacillus subtilis* (PV-1112), showed high efficacy in controlling the disease, but low direct efficacy against the pathogen, suggesting a possible indirect effect through induction of resistance in the plant.