



ANTIFUNGAL ACTIVITY OF ETHYL FERULATE

Yolanda Reyes, Azucena Ochoa, Ali Asaff; Coordinación de Ciencia de los Alimentos, Centro de Investigación en Alimentación y Desarrollo, Km. 0.6 Carretera a la Victoria, Hermosillo, Sonora, 83304; yolanda.reyes@ciad.mx

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Introduction. Phenolic compounds show antimicrobial activities against a range of plant pathogens. 4-coumaric acid and ferulic acid (FA) demonstrated significant reductions of *Fusarium* species growth in vitro at different concentrations tested (1). Methyl ferulate, butyl ferulate and 2-methyl-1-butyl ferulate showed significant growth inhibition against *Bacillus subtilis*, *Staphylococcus aureus* and *Saccharomyces cerevisiae* (2) and simple aromatic esters of FA showed activity antimicrobial for Gram-positive bacteria and *Candida* strains (3). Diseases caused by *Fusarium oxysporum*, a phytopathogenic fungi, are a limiting factor in plant production and yield quantity. *F. oxysporum* causes the death of young and adult plants, with consequent economic losses.

The objective of this study was investigating the antifungal activity of ethyl ferulate (EF), a derivative of ferulic acid, on two races of a pathogen attacking commercial crops: *Fusarium oxysporum* spp. *cicer* (Foc).

Methods. Antifungal activity was determined by agar dilution method. The EF was added to potato dextrose agar (PDA) at different concentrations. Agar discs (5 mm) with Foc race 0 or 5 were added to the centre of Petri dish. The cultures were incubated at 30°C for 5 days and radial growth of mycelia was measured at this time. In the control, similar amount of FA, sodium benzoate (SB) or ethanol were added. The inhibition percentage was calculated by using the formula as follow:

$$\text{Inhibition percentage (\%)} = [(Db - Da)/Db] \times 100$$

Where Da is the diameter of the growth zone in the experimental plate and Db is the diameter of the growth in the control plate. Inhibition doses 50 and 90 (ID₅₀, ID₉₀) were determined with inhibition percentage at 2.5, 1.25, 0.25, 0.125, 0.06 and 0.02 mM, through Probit analysis.

Results. FA and EF showed strong inhibition activity against Foc compared to growth in control plate. The maximum reduction in the

mycelial growth was in PDA with EF. Thus ID₅₀ for EF showed the smallest value for both races (Table 1 and Table 2). We observed a resumption of growth after 72 h subculture on PDA, which indicated a fungistatic activity for both races. The mechanism of action of EF on fungi is little known, we are investigating this topic.

Table 1. ID₅₀ and ID₉₀ for *Fusarium oxysporum* ssp. *cicer* Race 0

	EF	AF	SB
ID ₅₀ (mM)	0.2	0.9	0.8
ID ₉₀ (mM)	1	3.6	3.9

Table 2. ID₅₀ and ID₉₀ for *Fusarium oxysporum* ssp. *cicer* Race 5

	EF	AF	SB
ID ₅₀ (mM)	0.2	0.9	0.7
ID ₉₀ (mM)	0.7	3.9	2.5

Conclusions. Ethyl ferulate showed higher antifungal activities than those of commercial preservatives such as sodium benzoate and antimicrobial like ferulic acid. Those compounds would be good candidates of noble antimicrobial agent for phytopathogens in crops.

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