

## First Report of *Stemphylium Eturmiunum* E.G. Simmons and *S. Vesicarium* Causing Early Blight on Tomato Plants in Iraq

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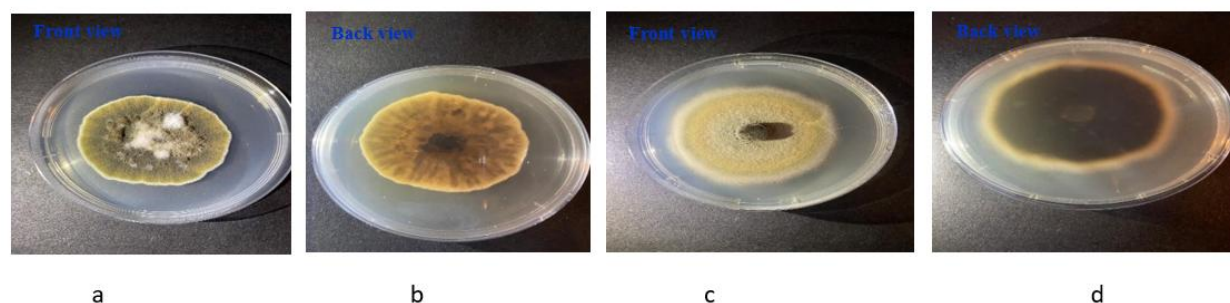
### Abstract

Early blight diseases caused for first record by *S. eturmiunum* and *S. vesicarium* that were investigated in tomato plants isolated in December 2019, from the farms of Al-Zubair and Safwan in Basrah Governorate, Iraq. The morphological and molecular Identification were adopted for the relevant fungi. Due to the pathogenicity of these fungi, treatment methods and affluent control measures must be taken to avoid the loss of important food crops.

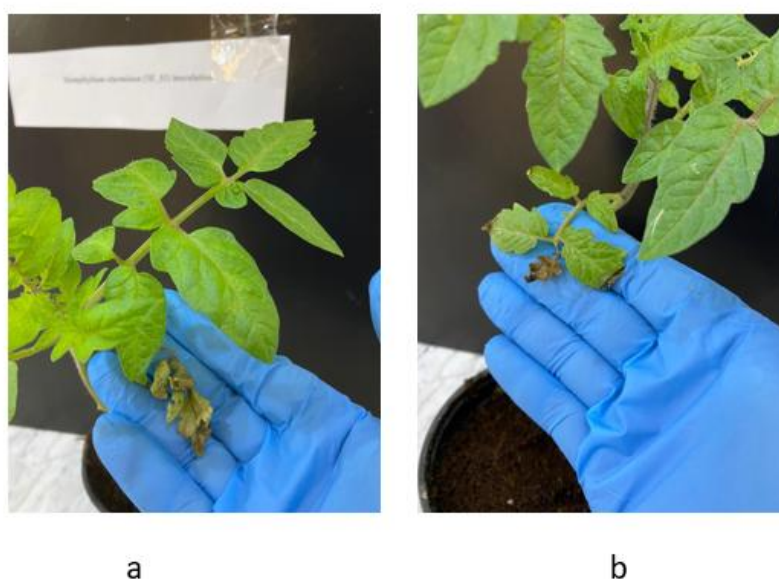
**Keywords:** *Lycopersicon esculentum* Mill, morphology, pathogenicity, phylogenetic analysis, *Stemphylium eturmiunum* E. G, Simmons, *S. vesicarium*.

Tomato plant (*Lycopersicon esculentum* Mill) is one of the crops that are produced in large quantities in the world, as it is an important food source in addition to other industrial, medicinal and cosmetic uses. The best climatic conditions for tomato cultivation in Iraq are within 10-25°C and fairly high humidity (60-70 %) where under these circumstances the standard tests required in this research were performed. Referring to the aforementioned and as a result of the economic significance of tomato, the searching and investigating the diseases that afflict tomatoes and their causes is ongoing, and with specialties, many fungi that cause diseases in tomatoes have appeared in the world recently and were recorded for the first time. Early blight diseases caused for first record by *S. eturmiunum* and *S. vesicarium* that were investigated in tomato plants isolated in December 2019, from the farms of Al-Zubair and Safwan in Basrah Governorate, Iraq. It is worth noting that in the same area of fungi isolation, an early blight disease appeared in the shoot system of tomato plant that caused by the pathogen *Alternaria arborescens* for the first time in Iraq (Razak and Abass, 2021). Phenotypical identification was completed on PDA medium for fungi as depicted in Figure 1. These morphological traits coincide the description in Simmons (2001) for *S. eturmiunum*, and Simmons (1969) for *S. vesicarium* (Table 1 and 2). The phenotypic and microbiological characteristics of the fungi isolated and investigated in this work are compatible with the results of relevant researches on Fungal concerned (Han et al., 2019; Nabi et al., 2019; Mao et al., 2021; Vaghefi et al., 2020; Spadoni et al., 2020). Additionally, the transcribed internal spacing region (ITS) was applied and amplified using the ITS1 and ITS4 primers where the sequence data for both ITS 1 and 4 (550-650 bp) gave a 99 % identity to the fungus *S. eturmiunum* (GenBank: MH843732.1) for *S. eturmiunum* (RID-5AAC22UC016), and 98% identity to the fungus *S. vesicarium* (GenBank: MT629829.1) for *S. vesicarium* (RID-5AAR7DN2013). Koch's postulates were used to test the pathogenicity of tomato plants at the age of six weeks. Early blight appeared in the plant leaves and a wilting of plant growth, with symptoms incidence estimated at thirty percent (Figure 2). According to our survey, this is the first report of *S. eturmiunum* and *S. vesicarium* causing early blight on shoot system of tomato

plant in Iraq. It may also be the first report to *S. eturmiunum* of infecting the vegetative shoot system in the tomato plant in the world, as previously this fungus infected the fruits of the tomato plant (Andersen and Frisvad; 2004). Meanwhile, in Italy, *S. vesicarium* infected tomato plant leaves with spots surrounded by yellow halo (Porta-Puglia, 1981). Due to the pathogenicity of these fungi, treatment methods and affluent control measures must be taken to avoid the loss of important food crops.



**Figure 1.** Morphological characteristics of (a,b) *S. eturmiunum* , and (c,d) *S. vesicarium*. It was morphologically colony on PDA after 7 days.



**Figure 2.** Early blight by the pathogen (a) *S. eturmiunum* , and (b) *S. vesicarium*.

**Table 1.** Morphological traits of *S. vesicarium* isolated in present work.

Item	Trait	<i>S. vesicarium</i> in present study	<i>S. vesicarium</i> in Simmons, E. G. (1969)
Colony	Color	Dark Brown to medium golden-brown	Light-dark brown to golden brown
	Size	6 cm	6 cm
Conidia	Tint	Dark brown	Dark brown
	Shape	Wide rectangular or oval	Wide rectangular or oval
	Size	20-40× 13-20 µm	22-38× 13-18 µm

**Table 2.** Morphological traits of *S. eturmiunum* isolated in present study.

Item	Trait	<i>S. eturmiunum</i> in present study	<i>S. eturmiunum</i> in Simmons, E. G. (2001)
Colony	Color	Yellowish to green brown with dense mycelium	Light yellow with dense mycelium
	Size	6 cm	6 cm
Conidia	Tint	Dark brown	Dark brown
	Shape	Oblong	Oblong
	Size	20-36× 11-20 µm	19-34 × 10-21 µm

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