



**Short Notes**

**First Report of *Alternaria arborescens* Causing Early Blight on Tomato in Iraq**

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Received 5<sup>th</sup> January 2021; Accepted 10<sup>th</sup> February 2021; Available online 27 February 2021

**Abstract:** In this paper, the isolation of the fungal species *Alternaria arborescens* was done from symptomatic tomato leaves and diagnosed morphologically and molecularly using ITS primers. Subsequently, pathogenicity determination was achieved for the diagnosed fungal species on tomato plant. It's noteworthy, this work on *A. arborescens* was not previously recorded as a potential pathogen on the shoot system of tomato in Iraq.

**Keywords:** *Alternaria arborescens*, *Lycopersicon esculentum* Mill, morphology, pathogenicity, phylogenetic analysis.

Tomato plants (*Lycopersicon esculentum* Mill) diagnosed by different disease symptoms including leaf spot; lesion and early blight diseases caused by several pathogenic fungi which were examined in the fourth quarter of 2019 in greenhouses in Basra Governorate, Iraq. The examination was overall for all the symptoms that presented in relevant farms to make a comprehensive detection on the fungal pathogens isolated symptomatic tomato plant; but particularly this research focused on identification of certain *Alternaria* species (*Alternaria arborescens*) causing early blight disease. *A. arborescens* isolates are effective pathogen in a cool weather of 10-25° C and

fairly high humidity which consider a potential pathogen on tomato plants. Primarily, to identify the pathogen, phenotypical identity of the isolates was adopted on PDA medium and under standardized conditions (Fig. 1) as it was found that it matches somewhat what was mentioned in a number of relevant literature (Simmons & Roberts, 1993; Rao *et al.*, 2017; Ramezani *et al.*, 2019). The colony was usually dark olive gray with white margin. Conidia were ovoid in shape with dark brown colour (11 to 33 × 6.0 to 14.0 µm). Conidiophores had narrow and spire configuration, 50 to 200 × 2.5 µm.



**Fig. (1):** Morphological traits of *A. arborescens* (a) colony morphology on PDA after 7 days, (b) conidia and surface decorations. Scale bar = 10  $\mu$ m.

It is worth noting that the comparison of phenotypic traits among reference literature have not given reliable discrimination; in addition, as it is still confusing in the phylogenetic description among some of *Alternaria* species especially in comparison among *A. alternata*, *A. arborescens* and *A. tenuissima* isolates (Kahl *et al.*, 2015). In addition, the internal transcribed spacer (ITS) region from relevant isolate had amplified

adopting primers ITS1 and ITS4 and sequenced (GenBank Accession No. MZ027641). The 560-bp amplicons had 98% identity to *A. arborescens* (GenBank Accession No. MT367636.1). Phylogenetic analysis gave a well identification that the isolated fungus is *A. arborescens*.

Koch's postulates were carried out on the tomato seedlings with full-grown leaves at the age of 6 weeks at greenhouse conditions (15-25° C with high relative humidity; Ramezani *et al.*, 2019). Five tomato seedlings were inoculated via the pathogen ( $1 \times 10^6$  spore/ml), where early blight symptoms appeared on the leaves in some seedlings after two weeks (Fig. 2). The symptoms incidence was 40%. This investigation considers as first report of tomato early blight caused by *A. arborescens* in Iraq. It is worth mentioning, recently the tomato early blight caused by *A. arborescens* was also recorded in Iran (Ramezani *et al.*, 2019).



**Fig. (2):** Tomato early blight symptoms caused by *A. arborescens*.

## Acknowledgment

The authors thank the staff of Basrah Department of Plant Protection, as well all Ministry of Agriculture, Iraq, for their fruitful cooperation in accomplishing research work.

## Conflicts of interest

The authors declare that they have no conflict of interests.

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## التسجيل الأول للفطر *Alternaria arborescens* كمسبب ممرض الى اللفحة المبكرة في نبات الطماطة في العراق

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**المستخلص:** تم عزل الفطر *Alternaria arborescens* من أوراق نبات الطماطة ظهرت عليها أعراض اللفحة في محافظة البصرة خلال الموسم الزراعي لسنة 2019، لتتبعه عملية التصنيف المظهري والتشخيص الجزيئي بإستعمال الواسم ITS. كما أجريت إختبارات تحديد الأمراض على نباتات الطماطة لتثبت النتائج إمرضية الفطر والتي تعد بذاتها اول تسجيل كمرض على نبات الطماطة في العراق.

**الكلمات المفتاحية:** *Alternaria arborescens*، نبات الطماطة ، الصفات المظهرية ، الإمرضية.