

Short communication

Isolation and Identification of Fungal Diseases of Broad bean (*Vicia faba* L.) in Ain- Zara region, Tripoli, Libya

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ABSTRACT

The study was conducted to determine the incidence of fungal plant diseases on faba bean in some fields located in the Ain – Zara region - Tripoli and to identify the causal agents. A total of one- hundred plants of faba bean were collected during 2020-2021 season from some local farms in Ain – Zara region Tripoli (February – April). Fungal pathogens associated with leaves, stems, pods and roots of faba bean have been isolated and identified. The most important and widespread fungal diseases observed: Chocolate leaf spot, Root rot, Anthracnose, Alternaria blight, Ascochyta blight and Sclerotinia stem rot caused by *Botrytis fabae*, *Fusarium solani* F. oxysporum, *Colletotrichum* spp, *Alternaria alternata*, *Ascochyta fabae* and *Sclerotinia* sp respectively. To reduce the risk of diseases of faba bean, cultural practices should be followed including crop rotation and sowing disease-free seeds, burning of plant debris, destruction of any faba bean volunteer seedlings, good weed control and lowering sowing rate to reduce the relative humidity and favors aeration are strongly recommended to minimize the disease severity.

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INTRODUCTION

Broad bean or faba bean (*Vicia faba* L.) is a leguminous crop which consumed for its high protein content [1]. It is cultivated in the countries of the Nile valley, North Africa and west Asia [2,3]. In Libya it is grown in the coastal area specifically in Tripoli, Zawia, Al-Jable Al- Akhdar and Benghazi [4,5].

Faba bean is affected by a wide range of fungal diseases including: Chocolate leaf spot, Aschochyta leaf blight, Rust, Alternaria blight and Root rot [3-5]. Fungal diseases of fabae bean in Benghazi, were surveyed and observed that the most important and widespread fungal diseases include: Chocolate spot, Rust, Alternaria leaf spot and Aschochyta fabae [5].

Nwara and Bouazzoum, identified *Botrytis fabae* as the causal agent of broad bean in Al-marg and Al-wasitah in Al-Jable–Al-Akhdar region. Akam and Bellar, indicated in a survey that the most important and widespread fungal diseases in the main fabae bean growing regions of Syria were: Rust (*Uromyces fabae*), Chocolate spot (*Botrytis fabae* and *B. cinerea*), Aschochyta blight (*Aschochyta fabae*), leaf spot (*Alternaria alternata* and *Macrophomina phaseolinal*) [2]. Faba bean is mainly grown and consumed in Libya as a fresh vegetative pods and to a lesser extent as

dry seeds. The quality and quantity is affected by the infection of different diseases, especially the fungal diseases. The aim of this study is to list the main fungal diseases of Broad bean (*Vicia faba* L.) in Ain - Zara, Tripoli region.

METHODS

Isolation, Purification and Identification of the isolated fungi

During the growing season of 2020-2021, a severe disease infection of faba bean was observed in some local farms in Ain – Zara Tripoli. To diagnose the fungal diseases, one hundred plants were selected randomly. The diagnosis was based on the visual disease symptoms in the field, and samples from the selected plants were taken to the laboratory at the department of Botany, Faculty of Science University of Tripoli - Libya for isolation and identification of the causal pathogens (Fig. 1).

For the isolation of fungal pathogens from leaves, stems, pods and roots. These plant organs were washed using running water, cut into small pieces and were surface sterilized, using 0.5% sodium hypochlorite solution, for 3 minutes, then washed three times with sterilized distilled water and blotted between sterilized filter papers to get rid of excesses water. Small pieces of each part were inoculated in PDA culture media and incubated at 25^{Co}. The colonies and spore development were observed after one-week, pure cultures were obtained for each of the isolated fungi using hypha tips. and single spore technique (6), then the isolated fungi were identified by using the proper methods (macroscopic and microscopic characteristics).



Figure 1. Disease symptoms of broad bean plants from the study region: A. Vegetative part, B. Whole plant, C. Leaves, D. Root.

Disease incidence was measured as proportion of the randomly selected plants displaying symptoms in the field [9,10].

$$\text{Disease incidence} = \frac{\text{Number of disease plants}}{\text{Total number of plants observed}} \times 100$$

RESULTS

Several fungal diseases were observed on faba bean in Ain-ZZara, Tripoli region, which include chocolate leaf spot infected leaves, anthracnose observed on pods, Alternaria blight and Ascochyta blight both infected leaves and pods, Sclerotinia stem rot observed on stem and root, and root rot observed on root (Table 1.). Six genera cause these diseases. Chocolate leaf spots showed the highest incidence (100%), followed by root rot (90%), while the incidence of Anthracnose, Alternaria, Sclerotinia, stem rot, and Aschochyta blight did not exceed 40% (Table 2 & Fig. 2). Chocolate leaf spot caused by *Botrytis fabae* affected most of the plant leaves, whereas root rot caused by *Fusarium oxysporum* was constantly isolated from roots. *Colletotrichum* sp. infected the pods and reduced their quality. The remaining diseases are caused by *Alternaria alternata*. *Aschochyta fabae* and *Sclerotinia* sp showed mild effects by the end of April.

Table 1. Fungal Diseases of Broad bean (*Vicia faba*) in Ain - Zara Tripoli

Disease	Causal organism	Leaves	Pods	Stem	Root
Chocolate leaf spot	<i>Botrytis fabae</i> <i>Botrytis</i> spp	+	–	–	–
Anthracnose	<i>Colletotrichum</i> spp		+		
Alternaria blight	<i>Alternaria alternata</i>	+	+		

Ascochyta blight	<i>Ascochyta fabae</i>	+	+	—	—
Sclerotinia stem rot	<i>Sclerotinia</i> sp	—	—	+	+
Root rot	<i>Fusarium solani</i>	—	—	—	+
	<i>Fusarium oxysporum</i>	—	—	—	+

Table 2. Disease incidence of Broad bean plants selected in the study

Disease	Disease incidence during 2020-2021 %
Chocolate leaf spot	100
Root rot	90
Anthrachnose	40
Alternaria blight	30
Ascochyta blight	25
Sclerotinia stem rot	20

DISCUSSION

The results shown in table 1 indicated that the fungi associated with fabae bean in Ain-Zara Tripoli were: *Botrytis fabae*, *Fusarium solani*, *F. oxysporum*, *Colletotrichum* spp, *Alternaria alternata*, *Ascochyta fabae* and *Sclerotinia* spp., These results agree with the results obtained by [2,7-13].

The disease incidence of fabae bean as shown in table 2 and fig 1, indicated that the Chocolate leaf spot disease caused by *Botrytis fabae* was the most effective on the foliar parts of fabae bean, all the plants examined were infected (100%), followed by the Root rot (90%). The percentage of infection for the other diseases ranged between 20-40 %. These results agree with previous study in Libya and other countries [3]. The high disease incidence of Chocolate leaf spot and Root rot may be attributed to the occurrence of the presence of seeds and the infected plant debris which considered as the source of inoculum for the next crop. There are other factors which increased the disease incidence as the weather and high humidity which occurred in Tripoli in winter during the last few years. More studies are needed to test the response of different varieties of fabae bean to the main fungi isolated in this study.

CONCLUSION

To reduce the risk of diseases of faba bean, cultural practices should be followed including crop rotation and sowing disease-free seeds, burning of plant debris, destruction of any faba bean volunteer seedlings, good weed control and lowering sowing rate to reduce the relative humidity and favors aeration are strongly recommended to minimize the disease severity.

Conflict of Interest

There are no financial, personal, or professional conflicts of interest to declare.

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عزل وتشخيص الامراض الفطرية في نبات الفول (*Vicia faba* L.) في منطقة عين زارة , طرابلس – ليبيا

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المستخلص

اجريت هذه الدراسة لتحديد مدي الاصابة بالامراض النباتية الفطرية علي الفول البلدي في بعض الحقول الواقعة في منطقة عين زارة – طرابلس وتحديد العوامل المسببة لها . تم جمع ما مجموعه مائة نبات من الفول البلدي خلال الموسم 2020-2021 من بعض المزارع المحلية في منطقة عين زارة – طرابلس (فبراير – ابريل). تم عزل وتحديد مسببات الامراض الفطرية المرتبطة بأوراق وسيقان وقرون وجذور الفول البلدي . وكانت اهم الامراض الفطرية واكثرها انتشارا : تبقع اوراق الشوكولاتة , عفن الجذور , الانتراكنوز لفحة *Alternaria* , لفحة *Ascochyta* , عفن الساق *Sclerotinia* المسبب عن طريق *Botrytis fabae* , *Fusarium solani* , *F. oxysporum* , *Colletotrichum* , *Alternaria alternata* , *Ascochyta fabae* و *Sclerotinia* sp علي التوالي .

الكلمات الدالة. الفول البلدي, الامراض الفطرية , الاصابة , عين زارة , طرابلس - ليبيا