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Onion Diseases in the Libyan Jamahiriya

ABDULNABI ABUGHNIA[1] & FAWZI ADAM[1]

ABSTRACT

Field diagnosis showed that downy mildew caused by *Peronospora destructor* (Berk.) Casp. and Purple blotch caused by Alternaria pori (Ell.) Cif. were the two major diseases which causes economic losses to onion. *Fusarium oxysporum* f.sp. *cepae* Schlect. emend. Snyd. & Hans. and *Fusarium roseum* Link. emend. Snyd. & Hans. and other *Fusarium* spp., were consistently isolated from onion bulbs and may be responsible for some of the losses occured in the field and in storage.

Post harvest studies indicate that bacterial soft rot disease caused by *Erwinia* spp. and *Pseudomones* spp. were primirily responsible for over 50% losses of the crop. Other microorganisms were isolated from onion such as *Aspergillus* spp., *Penicillium* spp. *Rhizoctonia* spp., and *Pyreochaeta* spp.

INTRODUCTION

Onion is an important crop in the Libyan Jamahiriya. In 1961 only 1,000 hectars were used for onion production. In 1975 the cultivated area increased to 10,000 hectars which produced 50,000 tons (16).

Onion production is concentrated in certain districts (17) Tripoli produces 49% of the total production, El-Zawia 33%, Sabha 10%, Mosrata 4% and the remaining 4% are distributed among other districts.

The average onion production in the Libyan Jamahiriya was 4 tons/ha. during the years from 1960–1968 (16). Recently production was increased to 6–8 tons/ha (17). This is considered low when compared to other countries such as Spain, Egypt, Japan and the United States where the average production is 15–30 tons/ha. (8–17).

Disease problems are considered a constant threat to onion. It is responsible for most of the losses occuring in the field and in storage (1, 8). There are major diseases which cause damage to onion such as Bacterial soft rot (8), Fusarium wilt (1, 3), Onion smudge (8, 13, 14), Pink root (2, 8), Neck rot (13) and Purple blotch (8, 15).

Few studies were conducted on onion diseases in the Libyan Jamahiriya. Pucci (12) and Martin (11) observed limited fungal diseases, but they did not record most of the important diseases or their distribution within the country. Kranz (10) also reported few other diseases prevalent in Western Libya and to assess the damage caused by these diseases in the major producing districts.

[1] Department of Plant Protection, Faculty of Agriculture University of Alfateh, Tripoli (S.P.L.A.J.).

MATERIALS AND METHODS

Onion samples were collected from different fields during 1978–1979 from Tripoli, El-Zawia, Ben Gashir and the Faculty of Agriculture Research Station at Sedi El-Masri. Randomized samples each consisting of 100 plants or bulbs were collected from each area during three different periods; starting March-May, June-July and late December.

Diagnosis of diseases was based on symptoms in the field and substantiated by direct microscopical examinations or by isolation from infected tissues. Samples of onion bulbs were examined for the presence of microorganisms. The samples were collected later in December from various farmers and markets of the above mentioned districts. The incidence of disease was estimated in each area by recording percentage of infection.

Isolations were performed whenever necessary from roots, stem plates and onion leaves. Tissues were cut into small pieces and surface-sterilized for 3–5 minutes in 10% sodium hypochlorite then rinsed in sterile distilled water. Four pieces were plated in each petri dish containing 15 ml of potato dectrose agar(PDA) and incubated for one week at room temperature.

Single spore isolations were made from different cultures as described by Tousson and Nelson (13). Pure cultures were examined microscopically and identified using different manuals (5, 6, 7, 13).

RESULTS AND DISCUSSION

Field diagnosis showed that the most prominant disease during March and April was downy mildew caused by *Peronospora destructor* (Berk) Casp. The disease was reported previously by Pucci (12) and Kranz (10) during winter. Results of this study support their observations but the disease also exist in the Spring during March and April especially in Tripoli and El-Zawia. The disease causes very severe damage to the crop. Over 60% infection occured in the fields under inspection. The high incidence of this disease is partially attributed to lack of effective control measures.

Saprophytic fungi such as *Stemphylium* spp. and *Alternaria* spp. were detected on onion leaves and bulbs. *Alternaria alternata* was isolated from the outer scales of onion bulbs.

Alternaria pori (Ell.) Cif. the causal agent of purple blotch disease was isolated from severly infected onion field used for seed production in Tripoli. The disease causes economic losses to onion in other countries (8, 13). Further studies are needed to verify the impact of this disease in Libya.

Field diagnosis during June and July indicated that wilt symptoms were clear on some of the plants. Roots showed red and pink discoloration and some roots were shrivelled and dead. Results presented in (Table 1) showed that several *Fusarium* spp. including *Fusarium oxysporum* f.sp. *cepae*, *Fusarium roseum* were prominant and consistently isolated. Over 40% of the samples yielded Fusarium. *Pyrenochaeta* spp. was isolated from an onion field in Sedi El-Masri.

Several investigators (1, 2, 3, 8, 15) have reported that *Fusarium oxysporum* f.sp. *cepae*, *Fusarium roseum* and *Pyrenochaeta terrestris* cause economical losses to onion in the field and in storage. The results of this study indicate that some of the losses may be attributed to Fusarium. Further investigation is needed to determine the effect of Fusarium wilt on onion under Libyan conditions. Studies regarding pathoginicity,

Table 1 Micro-organisms isolated from onion plants and bulbs at different locations in Western Libya.

Isolate	Locations		
	Tripoli	El-Zawia	Ben Gashir
A. Bacteria			
Erwinia spp.	+*	+*	+*
Pseudomones spp.	+	+	+
B. Fungi			
Alternaria alternata	+	+	+
Alternaria pori	+	−	−
B. Alternaria spp.	+	+	+
Aspergillus niger	+	+	+
Aspergillus spp.	+	+	+
Botrytis spp.	+	−	−
Fusarium oxysporub f.sp cepae	+	+	+
Fusarium roseum	+	+	+
Fusarium spp.	+	+	+
Peronospora destructor	+	+	+
Penicillum spp.	+	+	+
Pyrenochaeta spp.	+	−	−
Rhizoctonia spp.	+	+	−
Stemphyllium spp.	+	+	+

*(−) No fungi isolated
(+) fungi isolated

population changes and varietal response to disease severity might be of particular interest.

Post harvest diseases caused a substantial loss to onion (Table 2). Results obtained from samples examined in late December indicated that the major soft rot disease complex is caused by *Erwinia* spp. and *Pseudomones* spp. Over 50% of the samples inspected showed soft rot symptoms.

Aspergillus spp., *Penicillium* spp. and *Stemphylium* spp. were associated with bulbs infected with bacterial soft rot and were recorded predominantly (Table 2). Also *Fusarium* spp., *Alternaria* spp. and *Rhizoctonia* spp. were isolated. *Botryis* spp. was isolated from few onion bulbs obtained from market of Souk El-Tholata in Tripoli.

Table 2 Prevalance of major genera of bacteria and gungi isolated from onion bulbs at different locations in Western Libya.

	Location and % of isolation			
Alternaria spp.	24*	18*	34*	25.3
Aspergillus	28	38	46	36
Bacteria				
Erwinia spp.				
Pseudomones spp.	44	44	66	53
Fusarium spp.	51	23	49	41
Penicillium spp.	10	32	45	29
Pyrenochaeta spp.	3	—	—	1
Phyzoctonia spp.	1	—	4	1.6
Mean	23	24	34.5	1.6

*Figures derived from samples each consisting of 200 bulbs.

The high incidence of onion diseases as shown in (Table 2) in the Western part of the Libyan Jamahiriya could be attributed to many factors such as unfavourable agricultural practices, intensive farming in certain districts and system of irrigation. More studies are needed to determine the impact of these disease problems on onion production in the Libyan Jamahiriya.

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