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Rice diseases in Morocco

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Abstract. Nearly all the rice cultivated in Morocco is grown along the Gharb river. The cultivated area fluctuates between 6 000 and 12 000 ha, according to climatic conditions and the availability of water in the artificial lake.

The mean yield varies from 30 to 40 q/ha. Long term projections foresee an increase of the area cultivated to rice up to more than 30,000 ha.

Among the constraints of rice production in Morocco are plant pathogens, particularly *Pyricularia oryzae*, causing rice blast. The amount of research work carried out on these problems is rather limited.

The following provides a summary of the work realized.

I – Introduction

In Morocco rice is grown exclusively in the irrigated area of the Gharb region where it increases the value of the flooded land. The area cultivated with rice varies from 6 000 to 12 000 ha depending on climatic conditions and on water availability in the dam. By the end of the hydro-agricultural land arrangement in the Gharb region, the cultivated area will reach 38 000 ha (Bouhache, 1981).

Irrigation is done from the Idriss 1st dam and the water management by the *Office Régional de Mise en Valeur Agricole du Gharb* (ORMVAG). Rice is sown during the months of May and June and sometimes early in July. Seeding rate varies from 120 kg to 200 kg/ha. Rice is cultivated in the same plots for 3 to 4 years. Sometimes a different crop is introduced in between (Lakrimi, 1986).

Several varieties of French or Italian origin were used during the 1970s: Rinaldo Dibersani, Ballila Triomphe, Razza. After 1975, other varieties of Egyptian origin were added to this collection, like Nahda and 170/1S varieties. Actually, the most widely grown variety is Elio wich occupies 80% of the rice area.

Yields, although relatively good, are affected by several problems. The fungal diseases are considered by farmers, mainly during the later years, as one of the major problems. The purpose of this paper is to review the studies carried out on rice diseases in Morocco.

II – Fungal rice diseases in Morocco

Fungal diseases, particularly blast, represent one of the major problems of rice cultivation in Morocco. However, studies carried out in this field remain very much limited, probably because rice occupies less than 0.24% of the cereal total area.

Research on rice pathology is conducted in three institutions: *Institut National de la Recherche Agronomique*-INRA, *Ecole Nationale d'Agriculture*-ENA and the College of Biological Sciences-Kenitra.

1. INRA's research activities

At the INRA, research activities on rice are carried out within the Spring Cereals Research Program and essentially consist in a program of crop improvement. The main objective is to obtain new varieties with the following desirable traits:

- Short growth cycle duration (120-130 days)
- Productivity

- Lodging resistance
- Disease resistance

The first work published by INRA on rice diseases in Morocco goes back to 1952. Indeed, entire rice plantations were destroyed by blast (Ringuelett, 1955). Losses due this disease was estimated at 20% of the harvested crop.

Duangporn (1977) published the first list of seed-borne fungi encountered in Moroccan rice seed lots (Table 1). The same author, Duanporn (1979), studied 103 seed samples. She found that the most common infection in seed samples was by *Dreschlera oryzae*, *Pyricularia oryzae* with infection rates, respectively, of 35% and 23%. Field observations showed the existence of damage due to Brown spot and Sheath blight. Blast was less severe. However, there was no estimation of the attack level by each of the these fungi.

Table 1. Seed health results (Duanporn, 1977)

Pathogenes	Highest percent seed infection
<i>Curvularia lunata</i>	0.5
<i>Dreschlera oryzae</i>	39.0
<i>Dreschlera hawaisiensis</i>	0.5
<i>Dreschlera tetramera</i>	3.5
<i>Fusarium equiseti</i>	1.0
<i>Fusarium moniliforme</i>	8.5
<i>Fusarium semitectum</i>	22.5
<i>Phoma</i> sp.	0.5
<i>Pyricularia oryzae</i>	5.0
<i>Trichnoconis padwickii</i>	2.5

Lakrimi (1989), on the basis on his field observations related to yield trials, reported that the main varieties were all susceptible to blast (Table 2).

Table 2. Some characteristics of the main varieties grown in Morocco (Lakrimi, 1989)

Variety	Origin	Growth cycle (days)	Blast resistance
Triomphe	Morocco	143	S
446	Italy	118	S
Dinar	Morocco	139	M
Hayat	Morocco	129	M
Kanz	Morocco	129	M

S= susceptible

M= moderate

2. Result of the research work carried out within ENA

Only one study was carried out (Ould Sidi Ahmed, 1989). It consisted in rice seed health analysis. The results showed that the main seed-borne pathogens detected were: *Pyricularia oryzae*, *Dreschlera oryzae*, *Curvularia lunata*, *Cephalosporium* spp.

No indication was given on the importance of attacks by these pathogens in the field.

3. Research activities at the College of Biological Sciences in Kenitra (CBS)

The research work carried out at the College of Biological Sciences-Kenitra was funded by the ORMVAG. The results of a field survey in 1991-1992 showed the presence of: *P. oryzae*; *Cercospora oryzae*, *Fusarium* spp., *Helminthosporium* spp., *Alternaria oryzae*, *Curvularia* spp.. Nevertheless, no indication on the incidence nor on the severity of the attack by each of these pathogens was given (Anonymous, 1993).

Another study on seed health was also carried out at the CBS. The results indicated the presence of *Helminthosporium* spp. with an infection rate of 14% and of *Fusarium* spp. and *Cephalosporium* spp. with an infection rate of 1.7% (Benkiran et al., 1994).

Control studies of blast were undertaken *in vitro* by Douira et al. (1993). Fungicides were tested on three isolates of *P. oryzae*. Results showed the total inhibition of mycelial growth by Benomyl & Thiabendazol used at 5 and 10 ppm concentration. The amino-triazol, at 25 ppm concentration resulted in an inhibition of 49.6-65.3%. However the Phosehyl-AI used at a rate of 5,000 ppm did not inhibit the mycelial growth.

The effect of mineral fertilizers on the development of rice diseases is also studied (Anonymous, 1995). Results obtained showed that the fertilizer formula tested had no effect either on the mycoflora composition or on the severity of their attacks.

III – Conclusion

Studies conducted up to now on rice diseases in Morocco are limited and incomplete. As a result, the disease status remains partially understood. Although some research programs are underway (Table 3), with the perspective of the extension of the rice crop, adequate and well coordinated research programs are needed.

Table 3. Research programs carried out in Morocco

Institution	Topic
INRA	Screening for blast resistance Control of blast disease: chemicals; cultural practices Surveys
CBS	Impact of mineral fertilizers on rice diseases development <i>In vitro</i> studies of the efficacy of some fungicides

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