

REACTION OF WHEAT VARIETIES TO FOOT ROT AND ROOT ROT DISEASE OF WHEAT IN PAKISTAN

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The occurrence of foot rot and root rot disease of wheat in Pakistan has been reported from Sindh (Fafmi, 1949) and the Punjab (Sattar & Hafiz, 1952; Chaudhary & Hafiz, 1954) mainly due to the attack of *Helminthosporium sativum*. Upto 7.7% reduction in germination of various cultivars of wheat seed has been observed (Kamal & Moghal, 1968). During the last 20 years period new varieties of wheat have been evolved and released for cultivation. The present report describes the incidence of foot rot disease in 10 different cultivars of wheat at different stages of growth.

Random samples of 10 different varieties of wheat plant at seedling, tillering, boot and flowering stages were collected from Karachi and Hyderabad district. A seedling was considered to be suffering from root rot disease where atleast 5 necrotic lesions were present on the roots. In mature plants, necrotic lesions measuring 3-5 cm in length out of the total length of a root was considered to be suffering from root rot disease whereas the appearance of a prominent lesion of base of the plant as foot rot disease. Foot and root rot disease was quite frequent in seedling stages. Recovery of the plants from the disease was however noticed as the plants grew older. Wheat cvs., LU-26, Khushal-69, Indus-79 and Kisan showed severe root rot disease whereas cvs., Blue Silver, Pavon, TJ-83, ZA-77, Zamindar showed lesser extent of root rot disease (Table 1). Wheat cv. Mexi-Pak showed severe foot and root rot disease. Foot rot disease was evident in cvs. LU-26, Khushal-69, Indus-79 and Kisan. At the Atomic Energy Agriculture Research Centre field station, Tandojam, wheat cvs., Pavon, Blue silver, TJ-83, ZA-77 were found less affected by root rot disease at seedling stages but were found to be free from foot and root rot disease at maturity. The absence of foot and root rot disease of wheat at the AEARC-Tandojam was presumably due to extensive management practices.

Using the method of Leander & Curl (1972), 20 fungal species belonging to 10 genera were isolated from the surface disinfected foot and root rot specimens and identified after reference to Barnett (1980), Ellis (1971), Booth (1977), Domsch & Gams (1980). There was a preponderance of *Drechslera sorokiniana*, *Rhizoctonia solani*, *Fusarium culmorum* in all the 10 wheat cvs., cultivated in irrigated and dry soil of Sindh (Table 2). *Pythium debaryanum* was isolated from the roots of Mexi-Pak and LU-26 from the irrigated soil in Karachi and Hyderabad district only. At times *D. sorokiniana* and *F. culmorum* were isolated from a single root rot lesion present on the roots of wheat cvs. Mexi-Pak,

Table 1. Percent incidence of foot and root rot disease of wheat at different stages of growth.

Wheat seasons Growth Stages Wheat vars	1985-1986						1986-87						1987-88															
	SS		TS		BS		FS		SS		TS		BS		FS		SS		TS		BS		FS					
	Rr	Fr	Rr	Fr	Rr	Fr	Rr	Fr	Rr	Fr	Rr	Fr	Rr	Fr	Rr	Fr	Rr	Fr	Rr	Fr	Rr	Fr	Rr	Fr				
LU 26	20	06	18	02	04	02	02	02	02	18	12	05	02	02	02	02	02	02	02	19	09	18	02	04	—	04	—	
Khushal 69	18	09	11	04	06	02	02	02	02	16	08	08	02	02	02	—	—	—	17	10	17	02	02	—	02	—	02	—
Indus 79	16	08	08	02	04	02	02	02	02	17	11	06	02	02	02	02	—	—	16	08	14	02	02	—	02	—	02	—
Kisan	19	08	10	02	06	02	02	02	02	17	08	05	03	02	02	02	—	—	18	04	12	02	02	—	02	—	02	—
Blue Silver	05	02	04	02	02	02	02	02	02	06	04	06	03	03	03	—	—	—	11	06	08	—	—	—	—	—	—	—
Pavon	08	08	06	04	—	—	—	—	09	02	08	02	02	02	02	—	—	—	09	02	07	—	—	—	—	—	—	—
TJ 83	11	06	06	06	—	—	—	—	06	02	05	02	02	02	02	—	—	—	07	04	08	03	—	—	—	—	—	—
ZA 77	07	04	05	02	—	—	—	—	06	02	04	02	02	02	02	—	—	—	06	04	06	03	—	—	—	—	—	—
Zamindar	08	06	04	02	—	—	—	—	07	02	02	02	02	02	02	—	—	—	08	02	06	02	—	—	—	—	—	—
Mexi Pak	20	20	18	17	08	04	06	02	20	20	16	17	10	04	04	04	02	18	20	17	10	07	10	07	08	04	04	04

SS = Seeding Stage, TS = Tillering Stage, BS = Boot Stage, FS = Flowering stage. Rr = Root rot, Fr = Foot rot 02-04% very slight, 05-10% = slight, 11-15 = Moderate, 16-20 = Severe. Absence of the disease shown by horizontal bar (—).

Table 2. Fungi associated with the necrotic tissues showing foot rot and root rot disease symptom in wheat.

Fungal species	Districts		Irrigated		Dry land soil		Khairpur
	Karachi	Hyderabad	Wheat vars.		Jacobabad	Wheat vars.	
			Mexi-Pak LU-26	Pavon TJ-83			
<i>Drechslera sorokiniana</i>	+	+	+	+	+	+	+
<i>D. State of Cochiobolus specifer</i>	+	+	-	+	+	-	-
<i>D. australiensis</i>	+	+	+	-	-	-	+
<i>D. hawaiiensis</i>	+	+	+	+	-	-	-
<i>D. bicolor</i>	-	+	+	-	-	+	-
<i>D. rostrata</i>	-	+	+	+	-	-	+
<i>D. halodes</i>	-	+	-	-	-	-	-
<i>Fusarium culmorum</i>	+	+	+	+	+	+	+
<i>F. equiseti</i>	-	+	+	-	-	-	-
<i>F. moniliforme</i>	+	+	+	+	-	-	-
<i>Alternaria alternata</i>	+	+	+	-	-	-	+
<i>A. citri</i>	+	+	+	-	+	-	-
<i>Rhizoctonia solani</i>	+	+	+	+	+	+	+
<i>Macrophomina phaseolina</i>	+	+	+	+	-	-	-
<i>Periconia macrospina</i>	+	+	+	+	+	+	+
<i>Acremonium fusidioides</i>	-	+	+	+	+	+	-
<i>Pythium debaryanum</i>	+	+	+	+	-	-	-
<i>Sclerotium rolfsii</i>	-	+	+	+	-	-	+
<i>Verticillium albo-atrum</i>	-	+	+	+	-	-	-
<i>Fusarium fusarioides</i>	+	+	+	+	-	+	-

+ = Present, - = Absent.

Indus-79 and Kisan. Generally *D. sorokiniana* and *F. culmorum* were isolated from the diseased roots of wheat plants growing in irrigated soils and dry soils respectively. These two fungi by the soil inoculation method (Onkar & James, 1985) either separately or as a mixed culture in roots of Mexi-Pak seedlings produced symptoms of foot and root rot diseases. Mixed culture produced prominent symptom of foot and root rot disease than inoculation with a single culture.

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