

Abstract

Fusarium head blight (FHB) is one of the most important fungal diseases of wheat in throughout the world. Sterility of the florets, formation of shriveled seeds, and reduction in grain are characteristics of FHB which lead to yield losses in wheat. *Fusarium graminearum* isolates produce a large number of trichothecenes including deoxynivalenol and its derivatives, nivalenol and fusarenone X, and the oestrogenic mycotoxin zearalenone. This research was performed to detect the genes involved in trichothecene production in *Fusarium graminearum* isolates, the causal agents of wheat Fusarium Head Blight (FHB) in Sistan va Baluchestan Province. The wheat ear samples were collected from five cities in Sistan va Baluchestan province including; Zabol, Zahedan, Saravan, Khash and Iranshahr. Sampling was performed in March and April, 2010. The fungal isolates were separated, purified, and identified using *Fusarium* keys. Totally, 293 isolates of *Fusarium* species belonging to nine species were isolated and identified. Among the isolates identified as FHB, *F. graminearum* showed the highest frequency (68.8%) compared to other species. When the isolates of *F. graminearum* were morphologically identified, 168 isolates were chosen using species-specific primer pairs (Fg16F/Fg16R). In these isolates, the presence of three genes: Tri13, Tri5 and Tri7 were detected by using PCR and specific primers for the genes (Tri13, Tri5, and Tri7). With gene specific primer pairs, the four trichothecene chemotype including; NIV and DON was detected among isolates of *F. graminearum*. The results of PCR reaction with primers showed that all isolates tested possess the genes involved in production of trichothecene. Also in this study, two populations of 7C1 and 6A5 were identified in between *F. graminearum* isolates. 7C1 population (Lineage 7) was highly distributed in different regions and the dominant chemotype in this population was DON. To check the relationship of these genes and trichothecene production, six representative isolates were analyzed by HPLC. Trichothecene production was tested by HPLC in eight isolates of *F. graminearum*. The results confirmed the capability of trichothecene production in the studied isolates. Therefore, the detection of genes involved in trichothecene production using species-specific primers determine *Fusarium* isolates that produce trichothecene can alternative the chemical expensive and time procedure.

Key words: Trichothecene, chemotype, *Fusarium graminearum*, NIV, DON, Sistan Va Baluchestan province



University of Zabol
Graduate school
Faculty of Agriculture
Department of Plant Protection

**The Thesis Submitted for the Degree of M. Sc
(in the Field of Plant Pathology)**

**Determination of trichothecene
chemotypes of *Fusarium graminearum*
isolates in wheats of Sistan va
Baluchestan province**

Supervisor:
Dr. S. K. Sabbagh

Advisors:
Dr. M. Salari
Dr. N. Panjehkeh

By:
Payam Mahmoodi

October 2012