Yellow rust in CWANA in 2010 & 2011: The situation and measures taken to control it*

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Abstract

Wheat is the most important cereal crop in Central, West Asia and North Africa (CWANA). The total acreage in CWANA is approximately 53 million hectares. Wheat stripe (yellow) rust caused by *Puccinia striiformis* f. sp. *tritici* (*Pst*) continuously poses a serious threat to wheat production in CWANA. Several factors have contributed to the current severe epidemics of stripe rust, including: the rapid shift of virulence in the pathogen population, genetic uniformity of mega-cultivars, favorability of environmental conditions, and an overlapping/continuous crop calendar.

During 1985-1997 the widespread appearance of *Yr9* virulent pathotypes in CWANA, and eventually in the Indian sub-continent, resulted in several epidemics that caused a series of severe crop losses in popular cultivars known to be protected by the *Yr9* resistance gene. Following the *Yr9* virulence epidemics, susceptible cultivars were extensively replaced with CIMMYT-derived germplasm such as Kauz, Atilla, Opata, Nacozari, Bucbuc and Crow. The resistance of many of the replacement cultivars, including the mega-cultivars in India (PBW343), Pakistan (Inquilab-91, Bakhtwar), Iran (Chamran, Shiroudi), Ethiopia (Kubsa), and Syria (Cham 8) was based on *Yr27*. Breakdown of *Yr27* resistance in PBW343, Inquilab 91 and Chamran, in India, Pakistan, and Iran, respectively, was reported between 2002-2004. Although occasional stripe rust outbreaks appeared in some areas, unfavorable environmental conditions presumably restricted the increase of the *Yr27* *Pst* population until 2009, when conducive environmental conditions resulted in severe epidemics in several CWANA countries e.g., Morocco, Algeria, Uzbekistan, Turkey, Iran, Azerbaijan, Georgia, and Afghanistan. Environmental conditions favouring rust development continued into 2010, with mild winters and adequate rainfall in several CWANA countries resulting in early outbreaks of stripe rust. The 2010 stripe rust outbreaks occurred throughout the major wheat growing areas in the CWANA and Caucasus countries, causing severe yield losses particularly in Syria where Cham 8 (with *Yr27*) occupied more than 70% of the wheat areas. In spite of favorable environmental conditions in many areas in CWANA in 2011, similar severe stripe rust epidemics have not been reported to date.

Climate change now appears to be playing a major role in *Pst* population dynamics in CWANA. Direct, multiple affects of climatic changes on epidemiology of rust pathogens are expected, including the survival of primary inoculum, the rate of disease development, duration of rust epidemics, and development and distribution of rust populations. Emergence of stripe rust in non-traditional areas, changes in the frequency of new race evolution, early infection of stripe rust, shifts in predicted pathways of rust migrations, and finally wide spread epidemics of stripe rust in warmer areas as a potential indicator of adaptation to high temperatures are considered as possible consequences of climatic changes. Regional pathogen surveys indicated the widespread distribution of aggressive *Pst* pathotype (*s*) with adaptation to higher temperature. In the absence of resistant varieties, fungicide application remains the only practical measure to control stripe rust. Effective disease surveillance and monitoring systems, coupled to timely application of fungicides has effectively controlled stripe rust epidemics in Iran, Turkey, and Syria during 2010-11.

Regional monitoring of pathogen variability and disease development must be undertaken as a matter of high priority, and timely chemical control measures will continue to play a major role for control of stripe rust in CWANA in the short-term. In the medium to long-term, existing resistant varieties and advanced breeding lines need to be promoted and susceptible varieties have to be urgently replaced.

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