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Opinion

Wheat Blast in Bangladesh Threatening South Asia Wheat Production

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Wheat (*Triticum aestivum* L.) is one of the most important cereal crops in the world and second most important cereal crop in Bangladesh. Globally, it is a common human food grain and created optimistic impact on the national economy. It provides 20% of the world food calories and it is staple food for nearly 40% of the world population [1]. It is largely grown as winter crop and covers almost 444805 ha of land with a total production of 1347759 metric tons and the average yield is only 3.03 t/ha in 2016, while 3.086 t/ha was obtained by 2015 in Bangladesh [2]. But national yield rate has been declined in 2016 which is 1.78% lower than 2015 due to blast disease of this crop found in some districts [2].

Wheat blast symptoms and its causal agent were not previously reported in Bangladesh. A great deal of controversy how this disease was invaded in Bangladesh. Three probable reasons might have caused wheat blast invasion in Bangladesh. Firstly, virulent strains of *M. oryzae tritici* have been introduced with a seed-transmitted pathogen escaping quarantine regulations from South America. Secondly, virulent strains of *M. oryzae tritici* have evolved from pre-existing avirulent strains in Bangladesh. Finally, strains of minor cereals blast fungus (*Pyricularia oryzae*) that is already diverse and widespread in Bangladesh become pathogenic to wheat under changing climatic conditions [3]. Wheat blast symptoms was appeared first in the middle of February of 2016 in Chuadanga and Meherpur districts and rapidly spread to adjacent four districts within two weeks (http://en.prothom-alo.com/bangladesh/news/102091/) and caused severe yield loss in the affected areas. Blast infected field in Bangladesh Agricultural Development Corporation (BADC) seed producing farm was burnt [4]. Officials from the Department of Agricultural Extension (DAE) informed that the infected area was estimated about 15,000 ha, which correspond to ~3.5% of total wheat fields in Bangladesh. The infected wheat fields were burned, which contributes to 15% decrease in wheat production of nine infected districts [5, 6] http://www.thedailystar.net/backpage/wheat-blast-threatens-yield-784372). Prevalence of wheat blast implied a favorable condition with high humidity and temperature at the right time of wheat growth stage (prior and during heading) with the presence of blast inoculums [7].

It also is likely that wheat blast will persist in the presence of alternative hosts (e.g. wild grass species, non-wheat crops), which undermine the prospects of eradicating the disease. Greater losses will occur once this disease spreads to other major wheat producing areas of Bangladesh, India, and Pakistan due to the existing favourable condition for the blast pathogen. Phylogenetic analysis revealed that the Bangladesh outbreak strains and the Brazil outbreak strains were the same phylogenetic lineage [8].

Wheat blast (WB), caused by *Magnaporthe oryzae Triticum* pathotype (MoT) (anamorph *Pyricularia oryzae Triticum*) is major constraint to wheat production in several South American countries [9]. The disease was reported for the first time in Brazil, from the northern part of the state of Paraná in 1985 [10]. In adjacent countries with agroecological regions with higher rainfall (Brasil, Paraguay, Bolivia) was known about the disease and cultivar resistance [9, 11]. The most significant symptom of wheat blast in the field is the premature bleaching of spikelets [12, 13]. The entire head is damaged in severe cases.

Suggestions for the farmers to protect the disease have been advised by Bangladesh Wheat and Maize Research Institute. Wheat blast is a seed borne disease, seed treatment with Provax 200 WP (Carboxin 37.5% + 37.5% thiram) 3 gram per kg seed before sowing the seed may help to prevent this disease during seedling stage [14]. Wheat blast pathogens attack both leaves and heads, the fungicide Nativo 75 WG 0.06% (Tebuconazole 50% + Trifloxystro-

bin 25%) or Amistar Top 325 SC 0.1% (Azoxistrobin 20% + Difenoconazole 12.5 %) should be sprayed two times during the emergence of heading and after 15 days of first spraying in controlling the disease. Seeds from blast free disease fields and blast resistant variety as BARI GOM 32 and BARI GOM 33 should be used [14]. Moreover, phosphite minerals and silicate treatment were found to show effective in field trials [15]. *Bacillus methylotrophicus* also has been regarded as an efficient biological agent and alternative control means against wheat blast [16]. Garlic clove extract (1:10) was the most effective in inhibiting the mycelial growth up to 93.33% in-vitro condition, and reduced lowest disease incidence and severity, and marked highest yield in pot experiment. Nativo 0.2% (Trifloxystrobin + Tebuconazole) also showed similar results for yield attributes as reported by the researchers [17]. Prioritized attention should be given to develop blast resistant wheat varieties that will be a long-term solution, and combination of different methods with resistant lines may control this disease.

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