A WEATHER-BASED SIMULATION MODEL FOR WHEAT BLAST INCIDENCE

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Wheat Blast incited by *Magnaporthe oryzae* is a serious disease of wheat causing yield failures and significant economic losses during epidemic years. The disease was first identified in 1985 in Paraná State of Brazil and has since spread to important wheat-producing regions of Brazil, Bolivia, and Paraguay. Despite the sporadic nature of wheat blast outbreaks, it is now considered a major threat to wheat production in this region. Warm temperatures and high humidity favor disease development. The pathogen infects all aboveground parts of the wheat plant, but spike infection is the main concern. The potential damage can account for 10 to 100% crop losses. Disease control is limited by lack of effective fungicides and resistant varieties. This study investigated relationships between climate and occurrence of wheat blast. Recorded incidence of wheat blast was obtained from fields trials carried out in 2009 at Itaberá, SP. The wheat blast susceptible cultivar IAC 370 was sowed on April 17th and May 5th of 2009, respectively. The plots measuring 3 x 10 meters were replicated six times. The plots were assessed for wheat blast incidence at 10, 18, 21, 25 and 32 days after spike emergence. Wheat blast was only observed in plots with late sowing date. A two-compartment model was used to predict wheat blast incidence. In the first compartment, inoculum potential is estimated based on the frequency of days considered favorable for sporulation. In the second, spike infection risk is estimated based on daily maximum temperature (>23 °C), temperature amplitude (>13 °C) and relative humidity (>70 %). The parameterized wheat model indeed reproduced the field observations. Finally, the wheat blast model was loosely coupled to the CSM-CROPSIM: WHEAT simulation model. The date of first spike emergence simulated by the wheat model launches the wheat blast model. A user friendly- application tool was created to run the model over multiple locations, years and sowing dates. Risk maps were produced from different years (2002-2014) and locations in the state of Paraná, Brazil. In general, the disease risk maps coincided with historical observations.

Keywords: *Triticum aestivum*; brusone; forecast; mapping