

Risk Assessment of *Tilletia controversa* Establishment in China

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Abstract: Dwarf bunt, caused by the smut fungus *Tilletia controversa* Kühn (TCK), is an important disease of wheat. Although TCK occurrence is localized and sporadic, yield losses caused by the disease are sometimes quite significant and can reach 70–80%. Now, fifteen countries including China, have listed TCK into their phytosanitary regulations in the world, and restrict the entry of TCK (USDA 1998). Wheat trade was resumed between the United States and China in the early 1970s. Some of the shipments of wheat inspected contained teliospores of TCK during 1972–1973. So, wheat producing from the northwestern United States and the area of Great Lakes in USA was forbidden to be imported to China since 1974 (TRIONE 1982; MATHRE 1996). Based on demands of wheat trade and quarantine requirements of China and the United States, the risk assessment of TCK introducing to China and establishment in China has been the research focus of scientists in the two countries (TRONE & HALL 1986; WEI *et al.* 1995; USDA 1998; CHEN *et al.* 2002). We established the geophytopathological models modified by analyzing the data and relevant information of previous studies on the biology and epidemiology of *T. controversa* (TCK). Probabilities of TCK establishment in the different sites were calculated by using the geophytopathological models modified and meteorological data of 50 years from about 500 weather stations in China. Four zones were determined, and the zone map of different risk that TCK may establish in winter wheat region in China was made by geographical information system (GIS). The results and zone map suggested that high risk zone of TCK establishment in China included the northern Xinjiang, the south-eastern Tibet, the western Sichuan, the middle-eastern Henan, the most of northern Anhui and Jiangsu, a small part of the northern Hubei and southern Gansu provinces etc. The moderate risk zone included the middle-northern Xinjiang and Sichuan, the middle part of Tibet and Shaanxi, the southern of Qinghai and Guansu, the northern Hubei, the northern and southern Henan, the southern and coastal Shandong, the southern Anhui and Jiangsu provinces. Low risk zone included the middle-southern Xinjiang, the most part of Qinghai, the north-western Tibet and Yunnan, the middle-eastern Sichuan, the northern Guizhou and Hunan, the southern Hubei and Anhui, the north-western Jiangxi, the northern Zhejiang, the middle-southern Shaanxi and Shanxi, the southern Hebei and Liaoning, the middle-northern Shandong provinces. The zone of no risk mainly included the middle-southern Yunnan, southern Guizhou, Hunan, Jiangxi and Zhejiang, all of Guangxi, Guangdong, Hainan, and Fujian provinces. The zones with high, moderate, low and no risk were 26.99%, 27.32%, 36.42% and 9.27% of all winter wheat regions, respectively. These results are obviously different from the previous work on risk assessment of TCK establishment in China (TRONE & HALL 1986; USDA 1998). This work was funded by National Basic Research and Development Program (2002CB111405) and Project of Ministry of Agriculture, PRC.

Keywords:

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