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Organic farming 2018: Risk assessment posed by diseases in context of integrated management of wheat - Anna Wenda-Piesik - University of Science and Technology, Poland

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Abstract

Risk assessment in the context of integrated pest and disease management considering crop sequence, sowing date, and control by fungicide application was carried out. This method also investigates the grain yields of wheat to address the context of disease risk with grain production. The experimental factors were fixed: pre-crop for wheat (sugar beet, corn for grain, wheat), the sowing date: facultative in late autumn and spring, fungicidal intensification: untreated, one treatment at T2 stage (BBCH 32–65) with fluoxastrobin and prothioconazole, two treatments made at T1 (BBCH 30–32) with prothioconazole and spiroxamine and at T2 (BBCH 41–65) with fluoxastrobin and prothioconazole, three treatments performed at stage T1 (BBCH 29–31) with prothioconazole and spiroxamine, T2 (BBCH 37–51) with fluoxastrobin and prothioconazole, and T3 (BBCH 65–69) with prothioconazole and tebuconazole. A total of 12 wheat diseases were diagnosed, four units for foot and root rot and eight related with leaf and head. Crop sequence was found the prime factor for the risk posed by foot and root rot diseases, while the lack of fungicidal control mostly impacted the risk posed by leaf and head pathogens. The highest increases in yield from controlled crops were attributed to facultative wheat followed after beet (49–66 %) or wheat (36–47 %). The cost-effectiveness based on two indicators E and Q has been calculated for fungicide treatments on all 48 crops. We investigated incidences of Fusarium head blight (FHB) and concentrations of six mycotoxins (deoxynivalenol, nivalenol, 3-acetyldeoxynivalenol, T-2 toxin, HT-2 toxin, and zearalenone) in wheat from 2010 to 2013. Field trials were conducted at the Experimental Station of Cultivar Testing in ChrzÄstowo, Poland (53o11'N, 17o35'E). The dominant Fusarium species observed on wheat heads were F. culmorum, F. avenaceum (Gibberella avenacea) and F. graminearum (Gibberella zeae), at 21.1%, 17.2%, and 7.1%, respectively. In wheat planted after wheat or corn, the FHBi was higher compared with a pre-crop of sugar beet. A double application of fungicides at BBCH 30–32 with prothioconazole and spiroxamine and at a BBCH 65 with fluoxastrobin and prothioconazole effectively reduced the FHBi and mycotoxin concentrations, respectively, in grain. Total mycotoxin levels in wheat were correlated with five determinants: duration of the period between the end of flowering and the beginning of kernel abscission, FHBi, F. culmorum isolation, G. zeae isolation and Fusarium ratio (FR) as a % of total mold isolations. Although, the mean concentration of mycotoxins in grain did not exceed the maximum permissible values for unprocessed wheat our study suggests necessity to monitor and mitigate FHB risk for susceptible cultivars when wheat spring sowing follows corn or wheat.

This work is partly presented at World Congress on Plant Pathology & Plant Biotechnology and International Conference on Organic Farming, Biodynamics on September 24-25, 2018 held in Dallas, USA.