

Effects of Azoxystrobin on Mycotoxin Production in a Carbendazim-Resistant Strain of *Fusarium sporotrichioides*

J.P. Felix D’Mello, Ann M.C. Macdonald and Rosalie Rinna¹

Carbendazim-resistant (RS) and control (CS) strains of *Fusarium sporotrichioides* Sherb., previously developed in our laboratory, were exposed to graded concentrations of azoxystrobin in broth media under shake-culture conditions for 2, 3, 4 and 8 days. Azoxystrobin concentrations were 0, 1, 10 and 100 mg l⁻¹ broth and cultures were incubated at a constant 25°C. Mycelial growth was significantly affected by strain ($P < 0.01$), azoxystrobin concentration ($P < 0.001$) and incubation time ($P < 0.001$). Combined results for the four incubation times showed that CS yielded higher mycelial mass than RS ($P < 0.01$) only in the absence of azoxystrobin. At fungicide additions of 1, 10 and 100 mg l⁻¹ mycelial growth was reduced ($P < 0.001$) with minimal strain differences ($P > 0.05$) at all three doses of azoxystrobin. Significant ($P < 0.05$ or better) strain–fungicide interactions were recorded in trichothecene production following exposure to azoxystrobin. At 4 and 8 days of incubation, the 10 mg l⁻¹ addition of azoxystrobin stimulated T-2 toxin synthesis ($P < 0.05$) only in RS cultures. In contrast, T-2 toxin enhancement in CS cultures occurred only on day 8 but at a lower level of azoxystrobin (1 mg l⁻¹). Thus, the stimulation of T-2 toxin synthesis depended upon strain and azoxystrobin level. Production of diacetoxyscirpenol (DAS) was affected by a more complex set of interactions. Overall means showed that, in comparison with initial values (on day 2 or 3), DAS output maximized significantly ($P < 0.05$) on day 4 in RS cultures and on day 8 in CS. Marked strain effects were observed on exposure to the 10 mg l⁻¹ level of azoxystrobin. At this level, DAS production was enhanced in RS only after 4 ($P < 0.01$) and 8 ($P < 0.05$) days of incubation, while in contrast, CS reduced DAS production. As with T-2 toxin, DAS production in CS was stimulated ($P < 0.05$ or better) only at low exposure levels of azoxystrobin. In the case of neosolaniol (NEO), however, the main effect of strain was significant ($P < 0.05$), with CS producing consistently more of the mycotoxin than RS on day 4 of the experiment. At this point, the NEO:T-2 toxin ratio was also higher in CS (0.63) than in RS (0.12), a feature reported by us previously. In conclusion, the present investigation has shown for the first time that the development of resistance to one fungicide can affect trichothecene production in *F. sporotrichioides* on exposure to a second fungicide. These results have been incorporated into a new classification scheme for fungicide efficacy which is also presented in this paper.

KEY WORDS: Azoxystrobin; carbendazim-resistance; *Fusarium sporotrichioides*; trichothecene production; fungicide classification.

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¹The Scottish Agricultural College, Crop Science Department, Edinburgh, UK [e-mail: f.dmello@ed.sac.ac.uk].