

Effects of some seed disinfectants and a fungicidal ear protection in winter wheat grown from seed heavily infested with *Monographella (Gerlachia) nivalis*

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Abstract. Control of *Monographella nivalis* in winter wheat was investigated by studying the results of different fungicidal seed treatments and of spraying the crop with a fungicide.

Key-words: *Monographella nivalis*, *Gerlachia nivalis*, wheat, seed treatment, crop density, head blight, fungicide.

Introduction. In the period from 1979 till 1983 *Monographella nivalis* (stat. con. *Gerlachia nivalis*) caused a high rate of mortality of seedlings and a lot of head blight in winter wheat in the Netherlands. It was assumed that one of the causal factors was an inadequate seed disinfection resulting from an acquired resistance of the fungus against the fungicidal ingredient fuberidazol (Hartke & Buchenauer, 1981; Elmsheuser, 1982). This subject was investigated in a series of field experiments which aimed at improving the control of the disease and which included the testing of a direct ear protection with a captafol-containing fungicide. This was done in collaboration between the Plant Protection Service, the Research Institute for Plant Protection and the Government Seed Testing Station at Wageningen and the Research Station for Arable Farming and Field Production of Vegetables at Lelystad, Netherlands.

Experiments and observations. In 1981 three identical split-plot block experiments were carried out in each of which three fuberidazol-containing seed disinfectants (BT, VS, NV; see Fig. 1), two other agents containing guazatine (PN) and methylmercurybenzoate (AA) respectively and an untreated control (OO) were compared in the main plots in four replications. The direct ear protection was performed in the subplots by spraying the crop shortly before flowering with 0.02 kg/100 m² of a fungicide containing 65 % captafol and 6.25 % triadimefon. This programme was repeated in 1982, but instead of BT we now included an object with a larger quantity (25 % extra) of untreated sowing seed (EZ). The experiments were situated in four locations throughout the country (De Bouwing, Ebelsheerd, Rusthoeve, De Kandelaar; also mentioned in Fig. 1). They were performed with the cultivars Marksman and (in one case) Nautica. The sowing seed used originated from the 1980 and 1981 harvests and was heavily infested (40-57 % of the seeds)

with *M. nivalis* and slightly with *Fusarium* spp. In all (sub)plots quantitative assessments were made about crop density before tillering and after flowering, the occurrence of foot rot and head blight mainly caused by *M. nivalis*, leaf and ear condition in general and yield.

Results. 1. Seed treatment especially improved the emergence of the crop and its density before tillering. It did not add much to the ultimate number of ears (higher plant density causing poorer tillering), but it increased the percentage of main stems considerably.

2. The wheat crops grown from treated seed were not healthier than those from untreated seed. Rather the contrary was the case: the former crops displayed more foot rot and head blight caused by *M. nivalis* and *Fusarium* spp. and an earlier senescence of the leaves. It is assumed that the seed treatments have indeed improved the chances of survival for the infected seedlings, but in doing so they did the same for the fungi which caused the seedling infection. So the seed treatment may have opposed the natural process of the survival of the fittest. This explanation is supported by the fact that extra untreated seed (EZ) caused the same effects, though to a lesser extent than the chemical seed treatments. Indications for the phenomenon also occur in data presented by Duben & Fehrmann (1979) and Hewett (1983).

3. Nevertheless in 70 % of all cases the chemical seed treatment resulted in statistically significant ($P \leq 0.05$) yield improvements with an average of 10.3 kg/100 m².

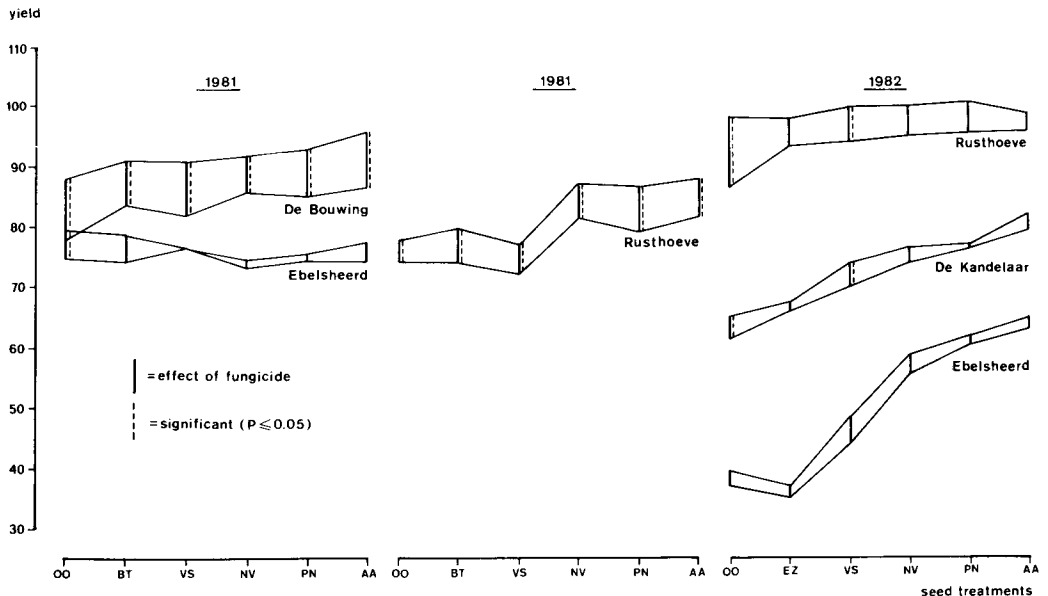


Fig. 1. Mean yield per seed treatment (in kg/100 m²) in each of the six experiments, with and without application of a fungicide shortly before flowering.

This must have been caused by the much higher percentage of main stems with their better productivity and partly by a slight increase of the total number of ears. Improvement of crop density and yield by seed treatment was by far the best in two experiments in which the crops suffered seriously from frost (viz. De Kandelaar and Ebelsheerd in 1982; see Fig. 1). In one experiment seed treatment did not increase the yields at all (Ebelsheerd 1981). The effects of extra seed (EZ) on the yield were less important than those of the chemical seed treatments.

4. The disinfectant containing both fuberidazol and sodium dimethyldithiocarbamate (NV) and those containing guazatine and methylmercurybenzoate respectively (PN and AA) were found to have by far the best effects on crop density and yield. Under normal conditions these three agents were about equally effective; only under very bad winter conditions methylmercurybenzoate acted best.

5. Of the fuberidazol-containing agents those which also contain another ingredient active against *M. nivalis* (viz NV and BT with sodium dimethyldithiocarbamate and triadimenol respectively) had significantly better results than an agent containing fuberidazol and a fungicide not active against this fungus (viz VS with quintozene). Moreover the agents containing the systemic fuberidazol were certainly not more active than those with the non-systemic ingredients guazatine and methylmercurybenzoate. These results point to a reduced sensitivity of *M. nivalis* to fuberidazol in the two lots of sowing seed used for these experiments.

6. The fungicide applied shortly before flowering prolonged the green condition of leaves and ears, it reduced the ear attack by *M. nivalis* and *Fusarium* spp. by about one third on an average and resulted in yield improvements of 4.6 kg/100 m² on an average. These yield improvements, however, were seldom significant and paying when the production level was lower than 80 kg/100 m², but they were nearly always both significant ($P \leq 0.05$) and paying when the production level was higher.

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