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Threshold levels for seed borne diseases in organic cereals

Bent J. Nielsen, Danish Institute of Agricultural Sciences, Department of Crop Protection, Research Centre Flakkebjerg.

If no seed treatments are used, **common bunt** in wheat (*Tilletia tritici*), **leaf stripe** (*Pyrenophora graminea*), and **loose smut** (*Ustilago nuda*) in barley are expected to cause the biggest problems in Denmark (Nielsen & Scheel 1997). Especially common bunt in wheat is subject to great concern. The situation is complicated by the fact that common bunt can be soil-borne (Nielsen & Jørgensen 1994).

Other seed-borne pathogens like *Fusarium* spp and *Septoria nodorum*, which are very dependent on the climatic conditions during the growing season, can also cause problems. However, there will not necessarily be an increased infection from one growing season to another.

Seed borne diseases and production of organic cereals

The production of organic seed in Denmark starts with certified seed (C1), which comes from conventional agriculture but is untreated. This will be grown organically, and the harvest will be sold as organic seed (C2). Both C1 and C2 are untreated, and there is a high risk of propagating seed-borne diseases at these two levels. For the 'true' seed borne diseases the tolerance is lower in C1 than in C2 to minimise the multiplication of seed borne diseases.

The tolerances we are using for the moment in C1 and C2 respectively are:

- **Tilletia tritici** and **stripe smut** in rye (*Urocystis occulta*): C1 = 0 and C2 = 10 spores/g seed (**Table 2**).
- **Pyrenophora graminea**: C1 = 0 and C2 = 5% infected seed (**Table 1**).
- **Ustilago nuda**: C1 = 0 and C2 = 2% infected seed (**Table 1**).

It means, for example, that in wheat no spores of common bunt will be accepted in certified C1, whereas in the big C2 generation sold as organic seed 10 spores per g seed will be accepted.

With diseases where multiplication during the season may occur there is no difference between the two seed generations. The threshold for *Fusarium* spp. is 15% in wheat, triticale, rye and winter barley (**Table 1** and **Table 2**).

In spring barley the threshold is 30% (**Table 1**). For *Septoria nodorum* the threshold is 15% and for ***Pyrenophora teres*** the threshold is 15% infected seeds (**Table 1**).

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The Danish organic seed is analysed for seed infestations and can in practice only be sold as organic seed in Denmark if the level of pathogens is below the defined threshold levels (**Table 1** and **Table 2**). A crucial condition for this model is a fast, effective, and representative seed analysis. Important is also the threshold levels actually used in C1 and C2.

To optimise the organic seed production, it is important that the tolerance level for seed-borne diseases and the seed health analysis are critically evaluated (Nielsen 2003b). To further minimise the development of seed-borne diseases and the number of seed lots discarded, new control methods also have to be developed (Nielsen 2003a). If the whole seed production starting from the basic seed should be organically produced then the possibilities of producing cereals would be very limited because of the risk of propagating serious seed-borne diseases over several seed generations.

The DARCOF project on organic seed (ORGSEED)

There is a need to investigate the different threshold values and to verify whether the threshold levels also apply under organic farming practice and if it is possible to adjust the levels without having unintended multiplication and spread of serious seed-borne diseases. The Danish Research Centre for Organic Farming (DARCOF) has supported a 5-year project **(ORGSEED)** that will investigate these thresholds in field trials for all relevant diseases in peas and small grain cereals and evaluate them for use under organic farming conditions.

The project will also focus upon new diagnostic methods and different control measures in organic seed production. The adjustment of threshold values, improved diagnostic methods, and preventive control methods will hopefully contribute to a reduction in the number of seed lots unnecessarily discarded and to a sustainable organic seed production system.

More **information about the ORGSEED project** can be found on the Internet.

References

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