SEED TREATMENTS TO CONTROL COMMON BUNT

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To increase the toolbox to control common bunt (*Tilletia caries*) in wheat, the project SåGodt has over three ears tested different seed treatments, and evaluated the potential use in organic farming. The treatments included:

SonoSteam treatment, a method combining high pressure steam and ultrasound to break the layer of air around the seed. In this way, the heat is concentrated on the surface of the seed where the spores are, and the treatment can be stopped before the heat penetrates into vital parts of the seed. Equipment is commercially available with continuously throughput for a capacity of 1t/h, and 100% control can be achieved without significant effect on seed vigour. However, infecting seed with spores that was extracted from intact bunt sori treated with SonoSteam was able to infect the plants. This emphasizes that intact bunt sori must be effectively removed from seed lots before treatment, a measure most like also important for most other organic seed treatments.

E-Vita or **E-Pura** is a commercial available electron beam treatment available at several both mobile and fixed seed plans in Germany. Treatment with E-Vita at Nordkorn Saaten was able to control bunt without side effects on seed vigour. The treatment is based on wavelength of ~100nm which conflicts with the ban on ionising radiation in the EU regulation on organic farming. However, the German interpretation of the regulation allows the use of electron beam treatment in Germany.

Laminarin and **Fucoidan** are two polysaccharides found in brown algae. Laminarin was able to control bunt without side effects on seed vigour at a dose of 0.3% (lower dose was not tested), whereas fucoidan gave ambiguous results. Pelleting infested seed with brown algae powder reduced infections, but did not give full control.

Quinoa, sisal, corn-cockle and many other plants contains different **saponins** with anti fungal properties. Extracts from quinoa husks diluted in

water significantly reduced bunt, but also reduced germination in the tested dose. Previous trials with crushed corn cockle seed (*Agrostemma githago*) and with sisal extracts (*Agave sisalana*) gave full control without negative side effects. It is concluded that saponins from plants has a potential as seed treatments, but more work is needed to find a commercial sound source of saponin and to refine the application.

Panoramix is a biological commercial product based on *Tricoderma spp*. At the recommended dose 4ml/kg, germination was significantly reduced and bunt infection not fully prevented.

Washing infested seed in water is a traditional treatment to remove spores from the seed. To overcome the need for post treatment drying, tests were performed to "wash" the seed in fine sieved dry dirt. It is indeed possible to remove spores in this way without affecting the seed vitality, but huge amount of spore-free dirt is needed to dilute the spore concentration on the seed surface to an insignificant level, and based on this, the method is not considered practical and economical compatible to other treatments.

Vinegar is a fermented product with a natural content of acetic acid of 5%. Acetic acid is harmful to both seed and spores, and the treatment is based on the fact that spores are placed on the surface of the seed, and therefore will be exposed to the acid before the acid reaches the vital parts of the seed. The seed surface can imbibe 20ml of 4% vinegar into the bran without significantly affecting seed vigour, and this dose gives full bunt control of the seed. However, the window between positive effect on control and negative side-effects on seed vigour is narrow, and higher amounts can under certain conditions be applied. If so, it is critical that the seed surface is re-dried removing any access liquid by re-drying before 60 seconds, as the acid will then enter vital parts of the seed and reduce seed vigour.

Application of **citric acid** was not able to control bunt without reducing seed vigour, most likely because citric acid in contrast to acetic acid does not evaporate, and therefore is still present on the seed surface at the time of germination.

Aknowledgement

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