

Main source of stem blight infections and possibilities of reducing symptoms

Michael Zellner, Johann Hofbauer, Sven Keil & Marianne Benker

Introduction



Figure 1: Stem blight

- The main cause for stem blight is the latent infestation of seed tubers with *Phytophthora infestans*.
- Modern storage conditions during winter prevent visible symptoms to develop and therefore infested tubers can not be assessed during official certification.
- The pathogen grows and sporulates on tubers at high soil humidity after rainfall.
- *P. infestans* spreads inside the plant and via sporangia in soil water to neighbouring plants, leading to stem blight.

Materials and Methods

From year 2007 to 2010 a total of 41 batches (2007: n=5, 2008: n=6, 2009: n=6, 2010: n=24) of certified seed tubers from all over Europe were tested for latent infection with *Phytophthora infestans*, 47 tubers from each charge (respectively 94 in 2007). Samples were prepared and DNA extracted with DNeasy Plant Mini Kit (Qiagen). DNA was analysed by PCR with specific primers and subsequent electrophoresis.

Results

1. Seed tuber infection rate

- In year 2007 infection rates ranged from 2 to 37%, one charge of five was free of infection, the mean rate was 11.2%.
- Batches tested in 2008 were all latently infested, with rates ranging from 2 to 23% and a mean infection rate of 12.7%.
- In 2009 two batches out of six were not infected, within infested charges rates ranged from 2 to 38% with a mean rate of 9.2%.
- Seven batches of 24 were without infection in 2010, the others ranging from 2 to 43%, mean rate 7.1%.
- Results of 4 years show that 31 out of 41 examined batches were infected with *P. infestans*. The overall infestation rate was 8.7%. The data from 2007 to 2010 show a certain variability of infection rates due to differing initial infestation levels in the previous season and weather conditions during the growing season.

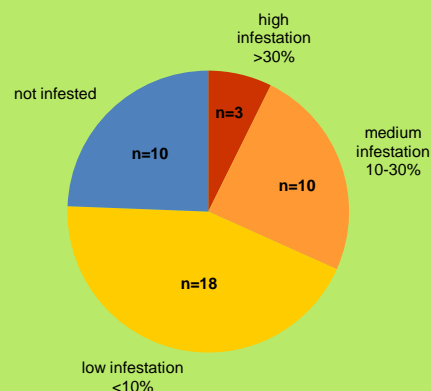


Figure 2: Infestation levels of 41 analysed batches of seed tubers with *P. infestans* 2007 to 2010, showing number of batches per level

2. Control of stem blight

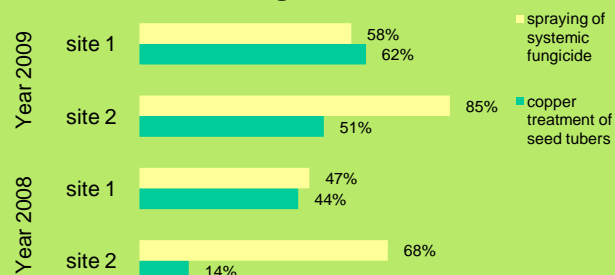


Figure 3: Effectiveness of control measures against stem blight

- In the experiment copper treatment of seed tubers or leaf treatment with systemic fungicides prior to first symptoms were used to control stem blight.
- Effectiveness of measures were calculated in relation to infestation of control plot.
- Fungicide treatment tends to be more efficient than copper treatment of seed tubers, although these results did not show significant differences (t-test).

Summary

- **Symptomless seed tubers are no guarantee for them being free of tuber blight, therefore they bear the risk of bringing *P. infestans* to the fields.**
- **Because of the high risk of using infected seed tubers control measures are highly recommended. Systemic fungicides spread into the plant tissue and can reduce the growth of the fungus from within the plant. Treating seed tubers with copper is another possibility especially in organic farming.**
- **Further research should deal with possibilities to reduce latent infections of seed tubers with *P. infestans* as they are the main reason for an early outbreak and a strong late blight epidemic.**