# Zoospore production in relation to temperature for current *P. infestans* genotypes

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## Introduction

The production of zoospores is a key process in tuber infection by the blight pathogen. This work investigated the optimum temperature for zoospore production by two new genotypes of *P. infestans* compared with six established ones. Earlier work at James Hutton Institute, funded by the Potato Council, demonstrated that the new genotype 13_A2 had a clear competitive advantage in foliar aggressiveness at the relatively low temperature of 13 ºC. The work reported here investigated whether this genotype also has a different optimum temperature for zoospore production compared with established genotypes.

## Methods

Indirect germination (the germination of sporangia to produce zoospores) was assessed at eight temperatures, i.e. 4, 6, 8, 10, 12, 14, 16 and 18 ºC. These covered the range prevailing later in the growing season when the risk of tuber infection is higher. Two new genotypes of *P. infestans*, 6_A1 and 13_A2, were compared with six genotypes that had been detected in the GB population for many years, i.e. 1_A1, 2_A1, 3_A2, 7_A1, 8_A1 and 10_A2. Isolates were collected in 2006 to 2008. Standardised suspensions of sporangia of two isolates of each genotype were incubated for 24 hours and the incidence of indirect germination recorded.

## Results and conclusions

Almost all previous reports stated an optimum temperature range for zoospore production between 10 and 16 ºC, i.e. 12 to 13 ºC (Crosier, 1934), 12 to 16 ºC (Bohnen,1963), 12 ºC (Yamamoto & Tanino, 1961) and 10 to 12 ºC (Schrodter & Ullrich, 1967). In the study reported here the overall optimum temperature for zoospore production by the eight genotypes was 4 ºC but the values for 6 and 8 ºC were not significantly lower. Shaw *et al*. (2006) observed a similar optimum temperature range

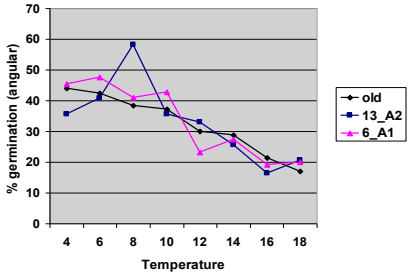


*Fig. 1 Indirect germination (%) of sporangia of six old and two new genotypes (13_A2 and 6_A1) in relation to temperature (P=0.05, LSD 7.2)*

| | Temperature (ºC) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Genotype** | **4** | **6** | **8** | **10** | **12** | **14** | **16** | **18** |
| 1_A1 | 42.4 | 45.0 | | 43.0 | | | | |
| 2_A1 | | | 47.6 | | | | | |
| 3_A2 | 43.9 | | 47.3 | | | | | |
| 6_A1 | 45.4 | 47.6 | 41.0 | 42.8 | | | | |
| 7_A1 | | 48.6 | | | | | | |
| 8_A1 | 58.7 | 62.5 | | | | | | |
| 10_A2 | 53.4 | | | | | | | |
| 13_A2 | | | 58.3 | | | | | |

*Table 1 Optimal incidences (%) of indirect germination of sporangia at different temperatures (angular transformed data). Values shown for the same genotype are not significantly different.*

of 5 to 9 ºC for 11 isolates collected and tested on leaves in 2004 and 2005, prior to the new genotypes 13_A2 and 6_A1 dominating the GB population.

In the experiment reported here, at most temperatures the difference in indirect germination between the new and old genotypes was small (Fig. 1). However, at 8 ºC the incidence of indirect germination was significantly greater for 13_A2 than the established genotypes. For some genotypes there was a clear optimum temperature, e.g. as already stated 8 ºC for 13_A2, but for others the optimum was a wide range, e.g. 6_A1 produced most zoospores between 4 and 10 ºC (Table 1).

In conclusion this study suggests that the optimum temperature range for zoospore production is not substantially different for new compared with old genotypes. Differences between recent and much earlier experiments are probably due to differences in methodology.

## References

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