

Epidemiology of Primary *Phytophthora* Infections on Potato

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Introduction



Fig. 1: Stem blight

Successful management of potato late blight, caused by *Phytophthora infestans*, depends critically on the timing of the first application of control tactics.

The decision when to make this application is complicated by the fact that the time of onset of the disease can vary considerably among years, occurring early in some years and late in others.

Materials and Methods

Field experiments with infected seed tubers were carried out at two sites, Puch (heavy soil) and Strassmoos (light soil), to determine the effect of precipitation and soil moisture on the incidence of primary infections.

At both sites, tubers inoculated with 50 zoospores of the pathogen were planted either early (early April) or late (early May).

Results and Discussion

Following crop emergence, the first symptoms of primary *Phytophthora* infection became evident one week after about 20 mm of rain had fallen (Fig. 3). Potatoes planted at Puch in early April subsequently developed 10% incidence of primary stem infection, while those planted in early May had an incidence of primary infection of less than 1%. This difference was most likely due to differences in soil moisture: while the total amount of precipitation prior to symptom appearance was similar for the two planting dates, the temperature sum accumulated between the precipitation

The colonization of above-ground plant parts by *P. infestans*, causing symptoms of primary infection on stems (Fig. 1) or on foliage, is either initiated when the pathogen grows upward from infected tubers through the stems, or when the pathogen sporulates on the tubers, releasing zoospores which are spread with soil water to the surface and to neighboring plants (Fig. 2).

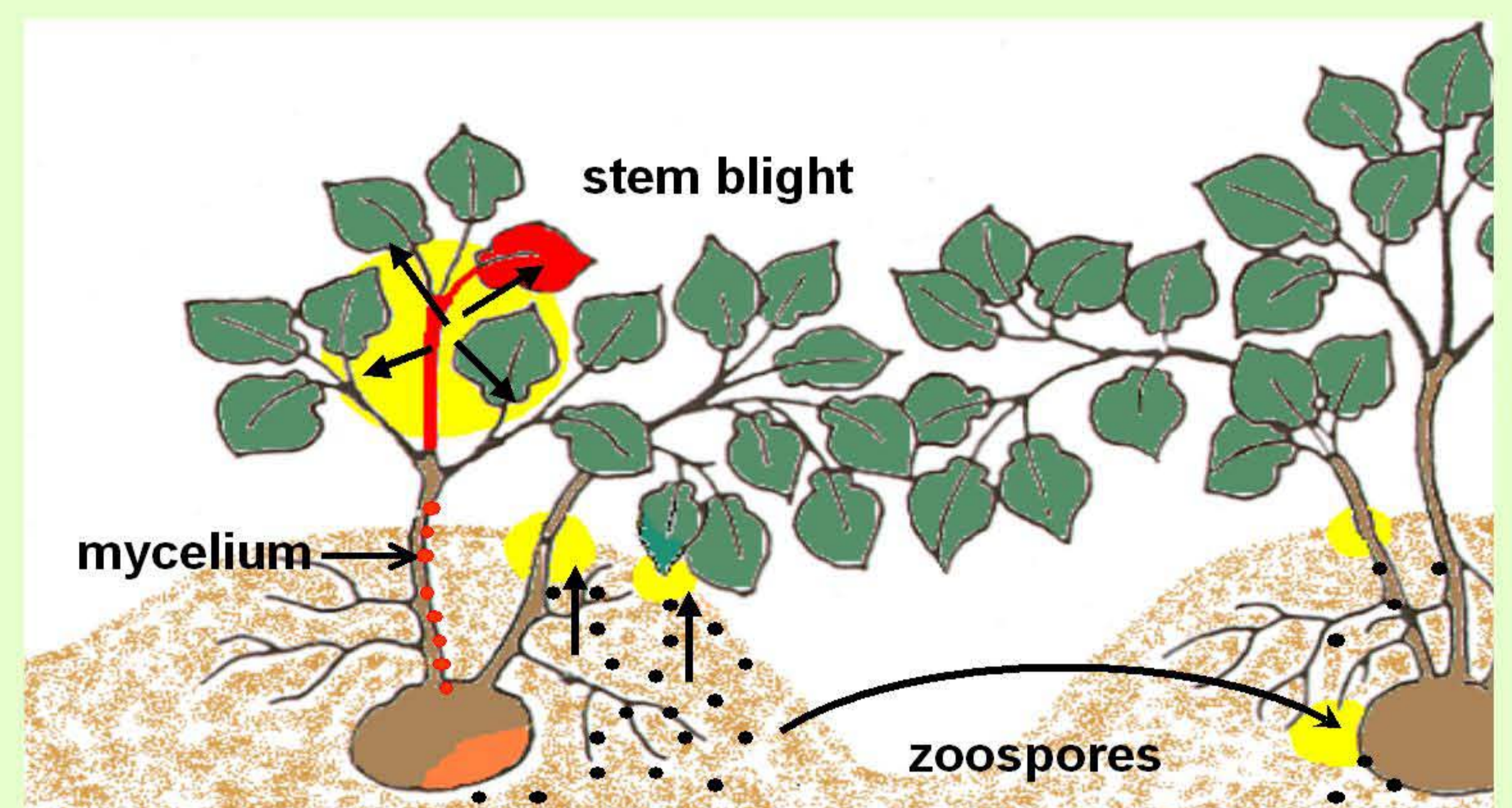


Fig. 2: Growth and spread of *Phytophthora infestans*

and symptom appearance was increased by about one-third for the later planting date (Fig. 4). This resulted in lower soil moisture and, consequently, reduced incidence of primary infection for the later planting date. At the Strassmoos site, soil moisture was generally low because of the light soil, leading to a low incidence of primary infection of less than 1% for both planting dates. These results show that site (including precipitation, temperature, and soil type) and planting date have a major impact on the incidence of primary *Phytophthora* infections.

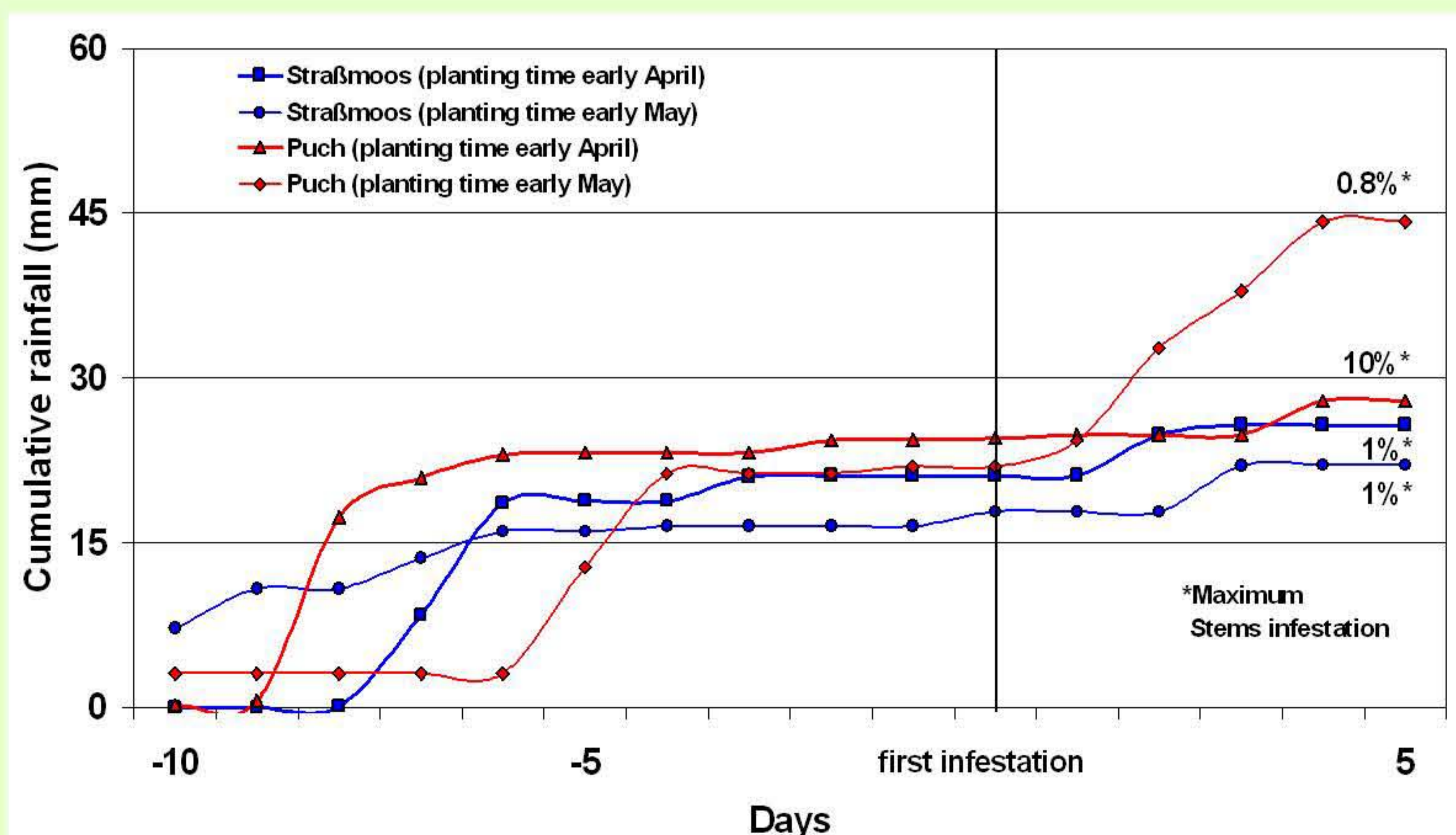


Fig. 3: Relationship between cumulative rainfall and time of first symptom appearance

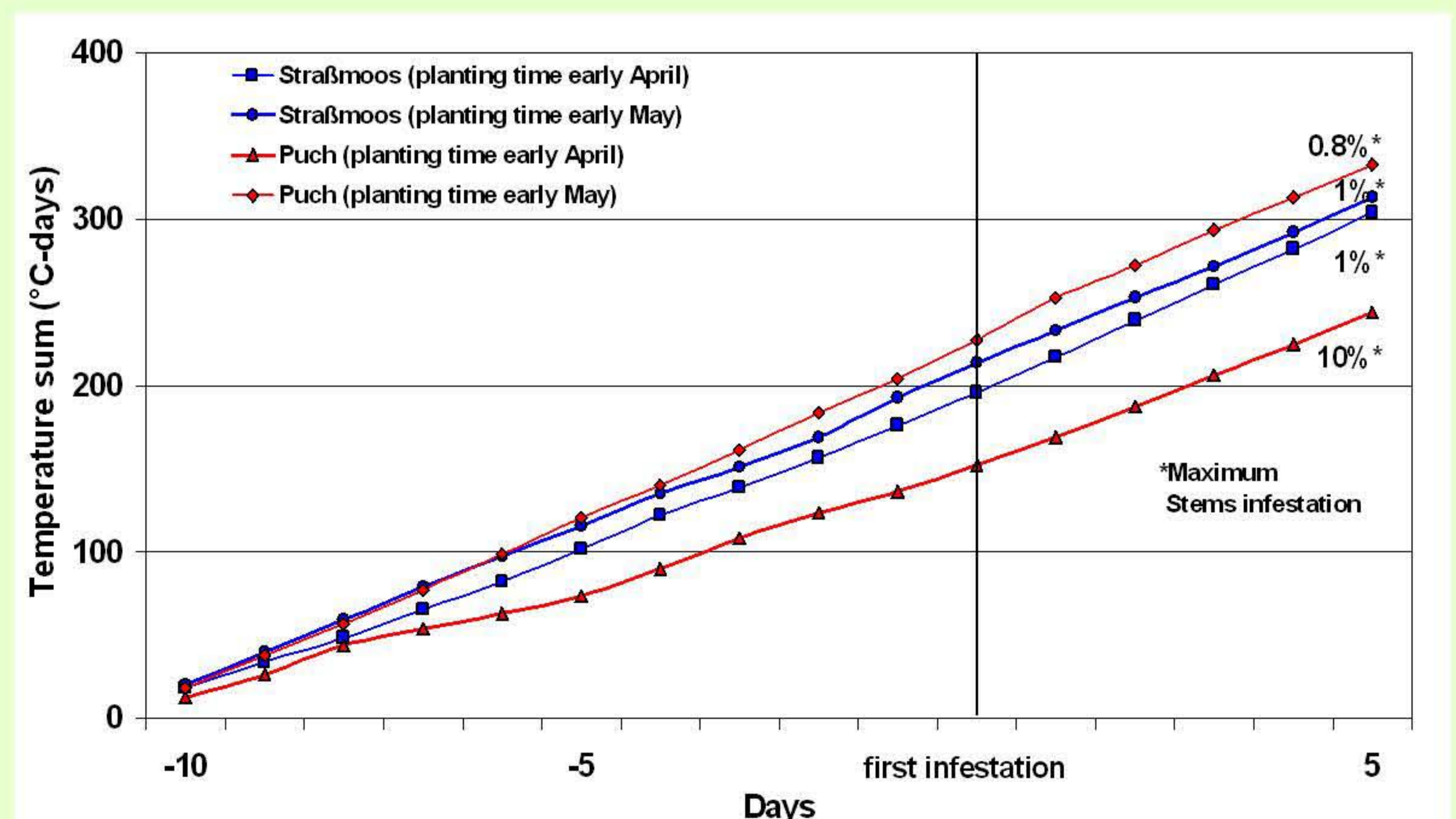


Fig. 4: Relationship between temperature sum and time of first symptom appearance