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Aggressiveness of different *Phytophthora infestans* isolates from Germany 2010

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Introduction

The objective of this study was to compare the aggressiveness of *Phytophthora infestans* isolates collected from different regions of Germany in 2010. The aggressiveness index, based on latent period, spore production and necrosis development, was calculated according to the results of a bioassay.

Materials and methods

Isolates from single lesions were sampled from different regions. After storage the isolates were first cultured on tuber slices. After 3 to 7 days the sporulating mycelium was transferred to V8 agar petri dishes and incubated at 16°C. The inoculum was prepared by washing off the sporulating mycelium of two weeks old isolates, the concentration was adjusted to 1,2 to 3,8 x 10⁴ sporangia per ml. For the bioassay leaf discs of the cultivar Agra were placed in petri dishes containing water agar. Inoculation was performed by placing a 30 µl droplet of a sporangial suspension at the center of each leaf disc. The petri dishes were incubated at 16°C and 12 hours photoperiod. The assessments (necrosis development and sporulation) were carried out every 12 hours. 168 hours after inoculation the spore production per leaf disc was determined on 10 leaf discs which were 100% infected. Each experiment was independently repeated for at least two times.

Two different aggressiveness indices (AI) were calculated:

$$AI\ 1 = [\Delta \text{ necrotic development (d5-d4, mm}^2)] \times [\Delta \text{ sporulation (d6-d4) / 2, Sp mm}^{-2} \text{ d}^{-1}]$$

$$AI\ 2 = [\Delta \text{ necrotic development (d5-d4, mm}^2)] \times [\Delta \text{ sporulation(d6-d4) / 2, Sp mm}^{-2} \text{ d}^{-1}] \times [1 / \text{latent periode}]$$

Results

Tabelle 1 shows the calculated aggressiveness index (AI 1), final spore production (168 hpi) and latent period for 20 isolates from all over Germany. There was no correlation between aggressiveness index and spore production detectable. The latent period in the bioassay was between 48 and 76 hours. Figure 1 indicates the high correlation between the two different aggressiveness indices.

Isolate	Aggressiveness Index (AI 1)	Sporangia concentration 168 hpi (sporangia/ml)	Latent period (hours)
6	1194,5	30,4 x 10 ⁴	76
7	1065,8	42,4 x 10 ⁴	52
8	1942,5	33,8 x 10 ⁴	60
10	311,3	33,0 x 10 ⁴	72
11	1454,3	48,9 x 10 ⁴	66
12	1625,0	52,2 x 10 ⁴	54
15	1722,0	38,3 x 10 ⁴	54
17	1030,3	42,2 x 10 ⁴	64
18-2	1606,0	41,3 x 10 ⁴	48
18-3	1339,3	55,2 x 10 ⁴	60
19	713,7	45,6 x 10 ⁴	52
20	1068,5	52,4 x 10 ⁴	66
22	486,5	41,8 x 10 ⁴	68
23	1878,8	41,9 x 10 ⁴	48
24	641,0	35,1 x 10 ⁴	72
30	481,8	36,4 x 10 ⁴	72
31	518,2	40,3 x 10 ⁴	72
32	1909,8	39,2 x 10 ⁴	60
38	775,8	9,2 x 10 ⁴	60
57	619,8	18,8 x 10 ⁴	54

Tab. 1: Results of the bioassay: aggressiveness index (AI 1), final spore production (168 hpi) and latent period (hours).

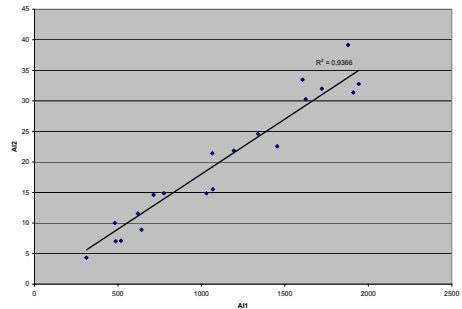


Fig 1: Correlation between the calculated aggressiveness index AI1 and AI2. There was a high correlation between both indices (R²=0,94).

Conclusions and outlook

In the present study the inclusion of the latent period into the aggressiveness index did not influence the rating of aggressiveness of the isolates. However, the latent period of the pathogen plays a key role in all DSS models. So far it is necessary to evaluate these data and update the DSS systems.