



Stability of resistance of potato genotypes to late blight

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1-9 point resistance scale used in DSS

Classified according to Hansen et al., 2005

2	3	4	5	6	7
Aminca	Bintje	Asterix	<u>Agria</u>	Escort	Ando
Arielle	Carlita	Ditta	Ants	Juku	Anti
Berber	Courage	<u>Fakse</u>	Evita	Oleva	Sarme
Platina	Evita	Fontane	Granola		
Princess	<u>Folva</u>	Milva	Maret		
Sinora	Impala	<u>Sante</u>	<u>Piret</u>		
Velox	Latona	Satina	<u>Raja</u>		
	Red Scarlet	Sava	<u>Reet</u>		
	Secura	VanGogh	<u>Remarka</u>		
	<u>Victoria</u>	Vigri	V. kollane		

**Changed
scorings**



Stability concepts

Static concept - using the environmental variance, a desirable genotype will not react in changing environmental conditions

Measurement of stability of absolute values RS

Dynamic concept - all genotypes react similarly on the changes of the environment, only the deviations of a genotype from this general reaction are considered as a contribution to instability

Stability is defined in relation to the varieties under test. Dependence from selected varieties. Selection of varieties influence results RNS



Parametric stability analyses

- | Normal distribution and
- | homogenous variance are needed

- | The analyse should be statistically valid in case of large numbers of genotypes, environments and replications, with no outliers of either genotypic or environmental effects and with homogeneous error variances of genotypes,



Nonparametric stability analyses

Measure stability according to dynamic concept

- | Rank analyses
- | No requirements for distribution
- | Not affected by outliers
- | Less sensitive to errors of measurements
- | Missing values are permitted



Geometrical methods

- | Represent each genotype by a point in some Euclidean space so that genotypes which are similar to one other are represented by points which are close together
- | Principal coordinates analysis, non-metric multidimensional scaling, biplot method
- | Numerical-geometrical analyse
- | Additive main effects and multiplicative interaction (AMMI) model



Peer review articles on stability of late blight resistance

Haynes et al., 2002 Foliar Resistance to Late Blight in Potato Clones Evaluated in National Trials in 1997

- mean absolute rank difference
- variance of the rank
- box and whisker plot of ranks

Flier, van den Bosch, Turkensteen 2003 Stability of partial resistance in potato cultivars exposed to aggressive strains of *Phytophthora infestans*

- ANOVA

Forbes et al., 2005. Stability of resistance to

***Phytophthora infestans* in potato: an international evaluation**

- mean absolute rank difference
- variance of the rank
- AMMI

AUDPC was used in all trials

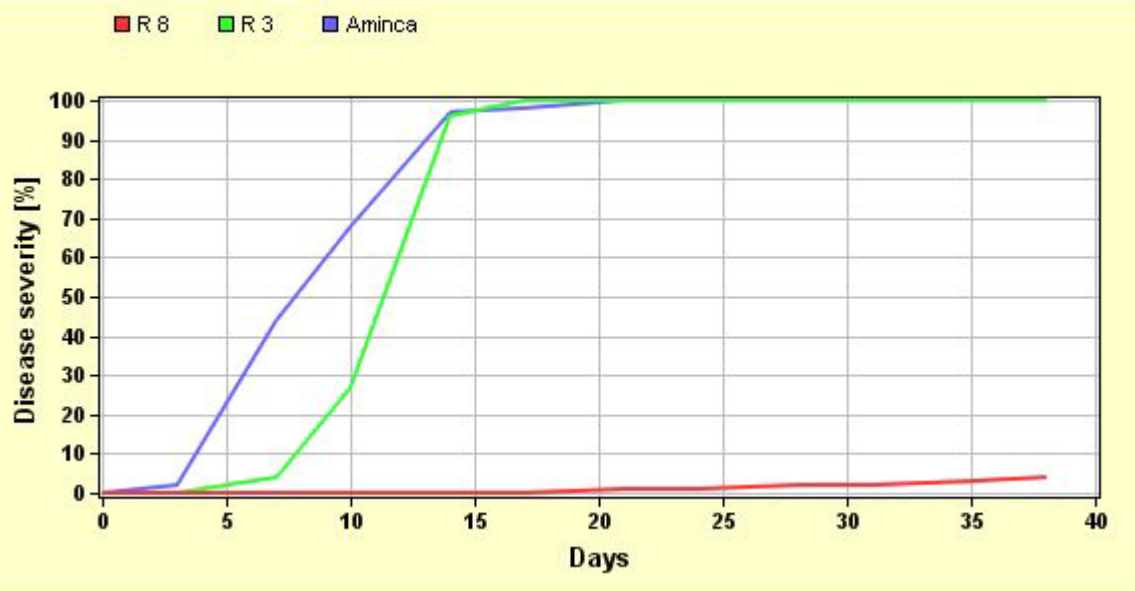


Limitations of stability analyses

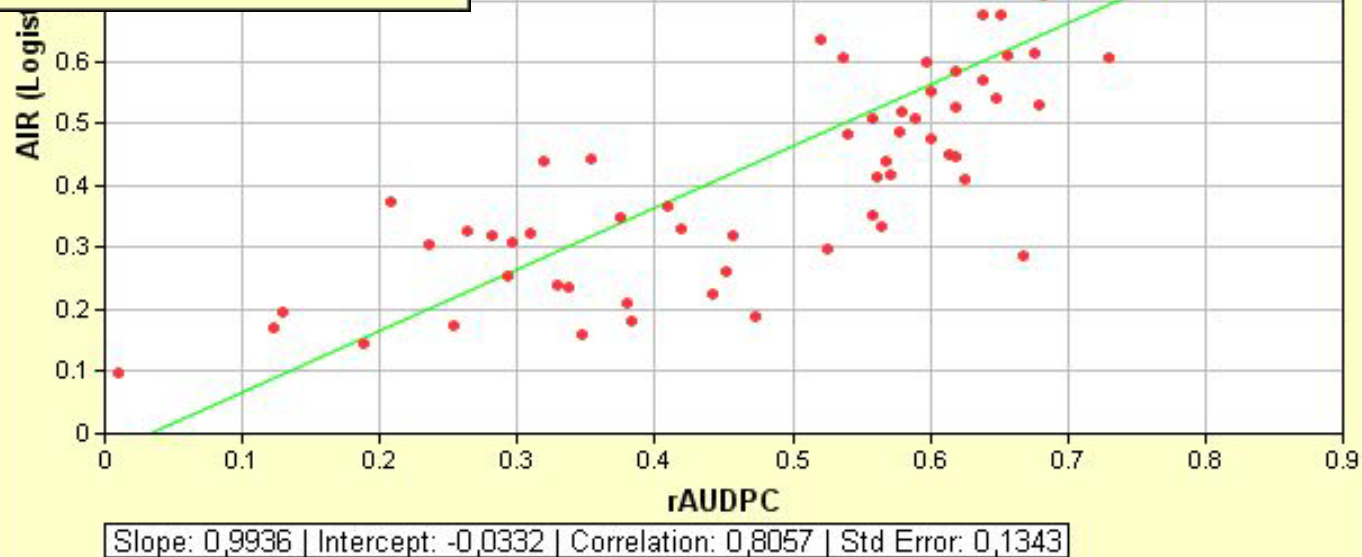
- | Valid within the same set of varieties
- | Non repeatable
- | Trials for analysing stability of late blight resistance in potato varieties are complicated and expensive



Expression of late blight resistance



2005_EE_05_01



Slope: 0,9936 | Intercept: -0,0332 | Correlation: 0,8057 | Std Error: 0,1343



Delta method

Delta t - difference between Days until 1% for the cultivar tested and Days until 1% for Bintje

Delta a - difference between AIR for the cultivar tested and AIR for Bintje

Susceptible cultivars: Same or a higher AIRr and less number of Days until 1 % disease than Bintje.

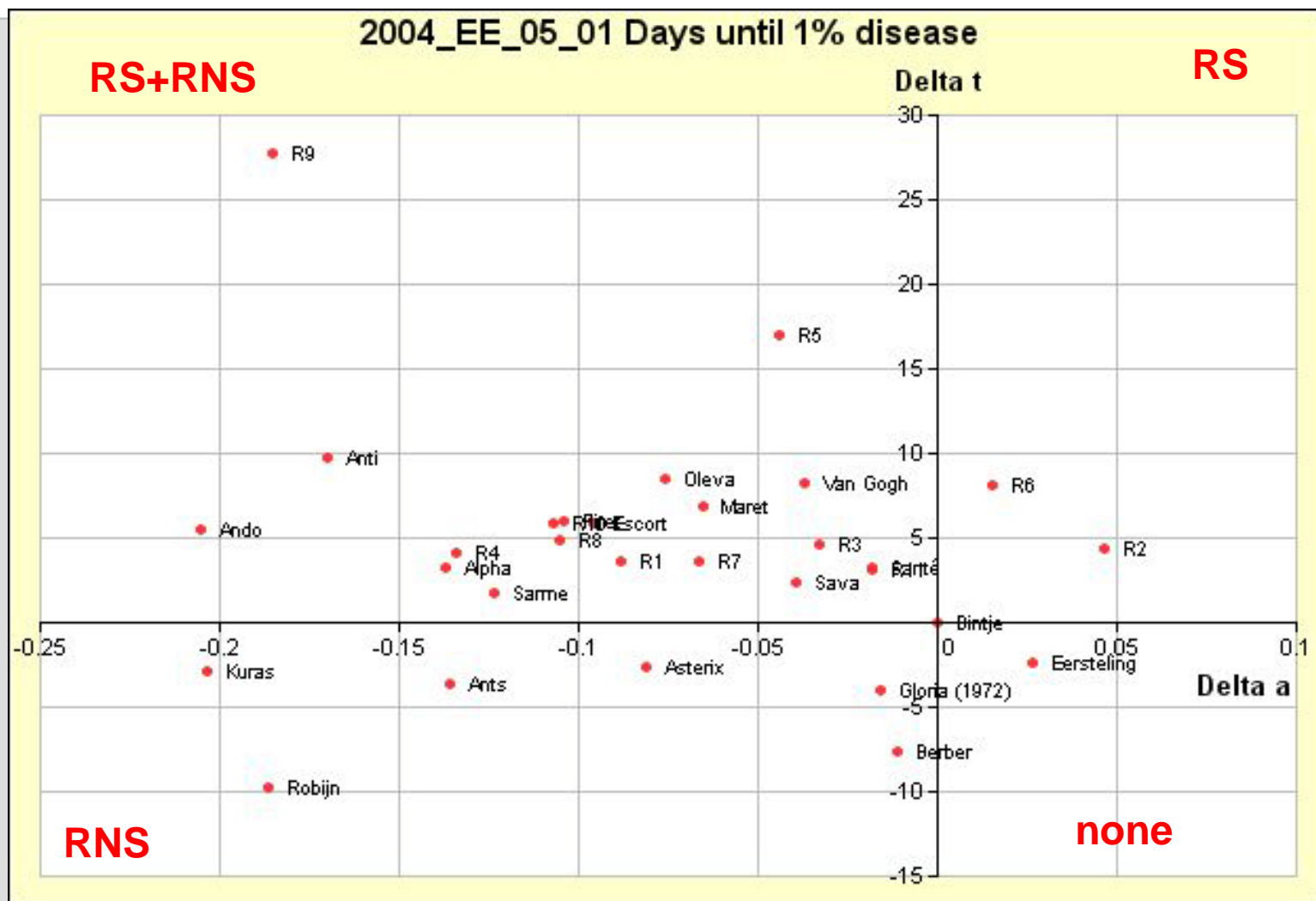
Race-specific cultivars (RS): Same or a higher AIR and more Days until 1 % disease than Bintje.

Race-non-specific cultivars (RNS): Lower AIR and the same or less number of Days until 1 % disease than Bintje.

RS + RNS (or RS not overcome): Lower AIR and more Days until 1 % disease than Bintje.



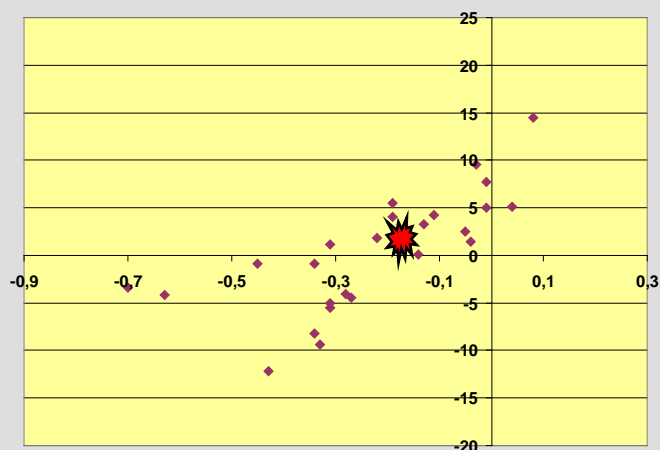
Delta plot (delta t – delta a)



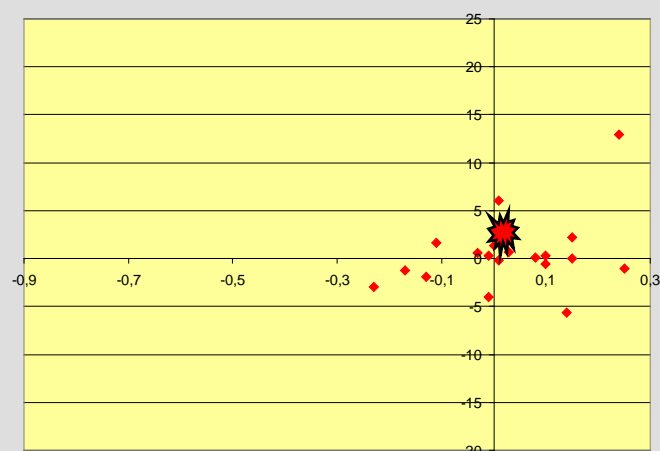
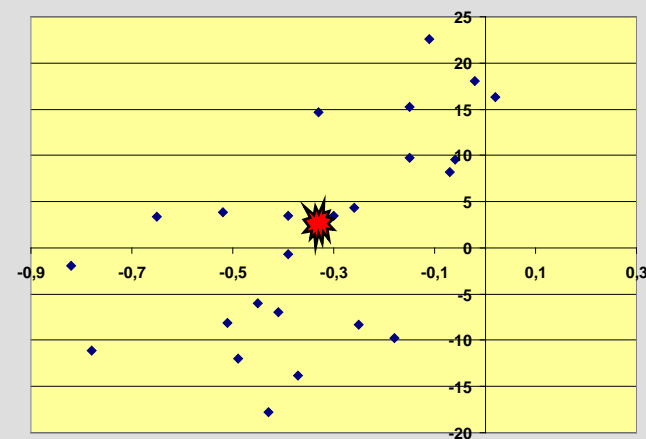
Delta plots based on EUCABLIGHT data



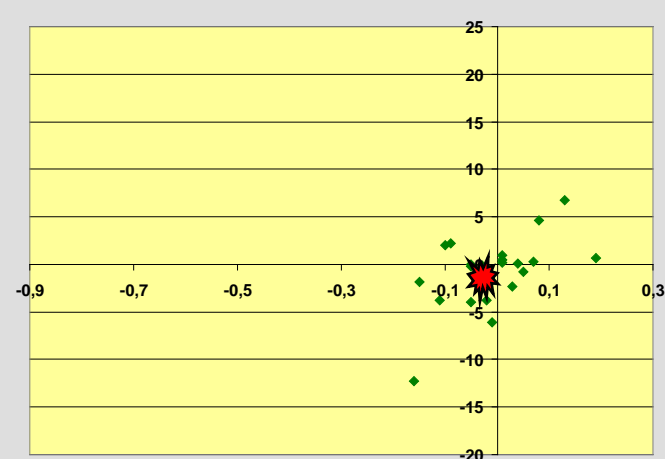
Alpha N=25 Stdv 6.2; 0.20



Robijn N=24 Stdv 11.2; 0.23



Gloria N=20 Stdv 3.85; 0.13

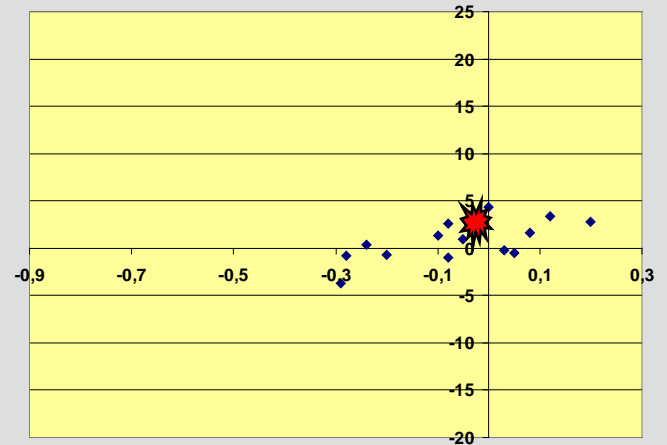


Eersteling N=21 Stdv 3.91; 0.09

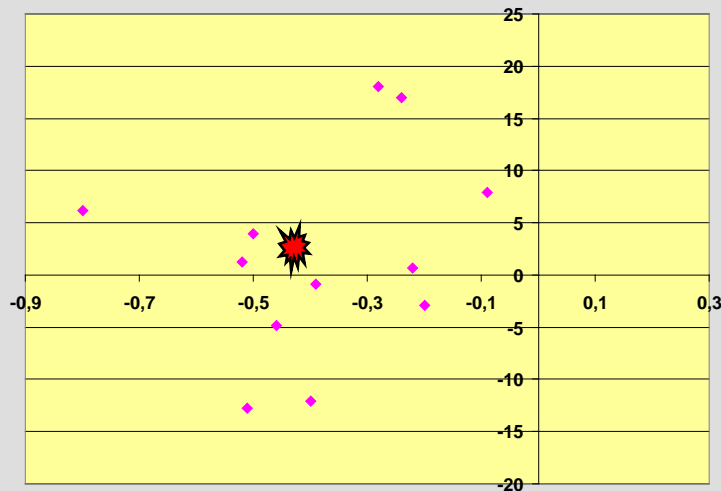
Resistance stability in EUCABLIGHT network



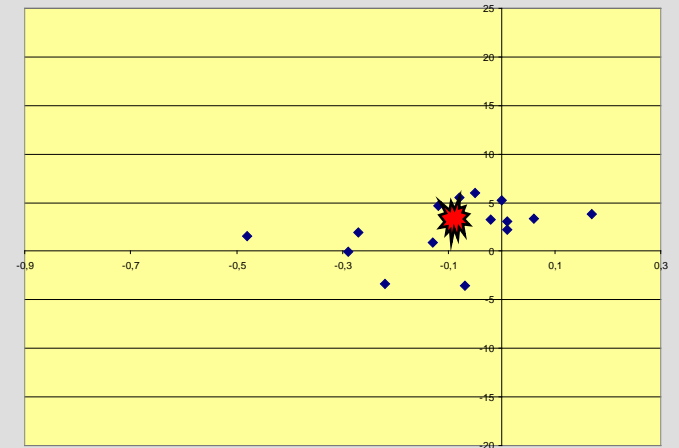
Premiere N=14 Stdv 2.11; 0.15



Kuras N`14 Stdv 13.2; 0.18



Sante N=14 Stdv 2.81 0,16



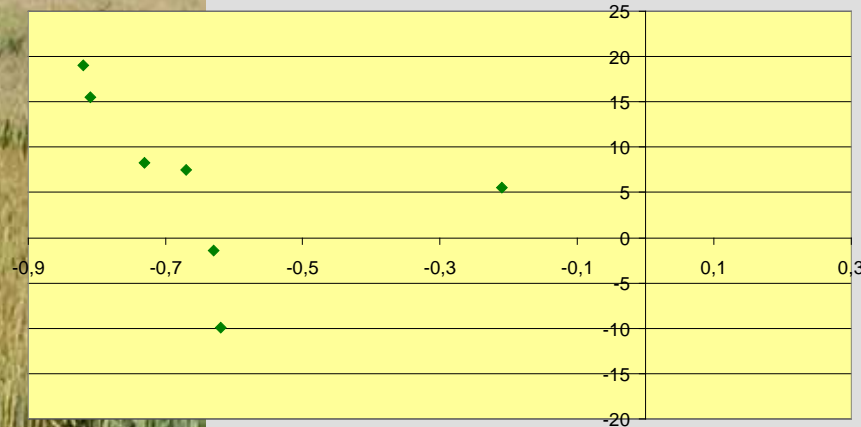
Variation in 1-9 point scale values

	Average	Range
Alpha	3.8	3,2-5.1
Gloria	2.5	2.3-2.9
Eersteling	2.7	2.2-3.1
Robijn	6.0	4.7-7.2
Kuras	6.6	3.4-7.7

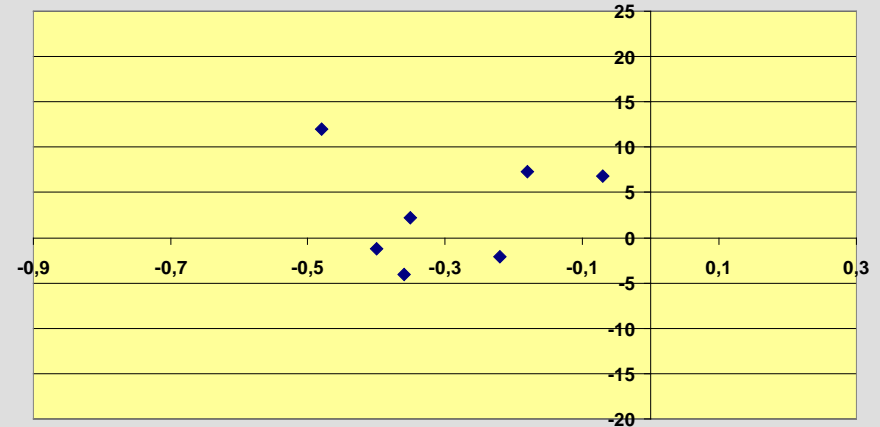


Resistance stability of Estonian varieties (N=7)

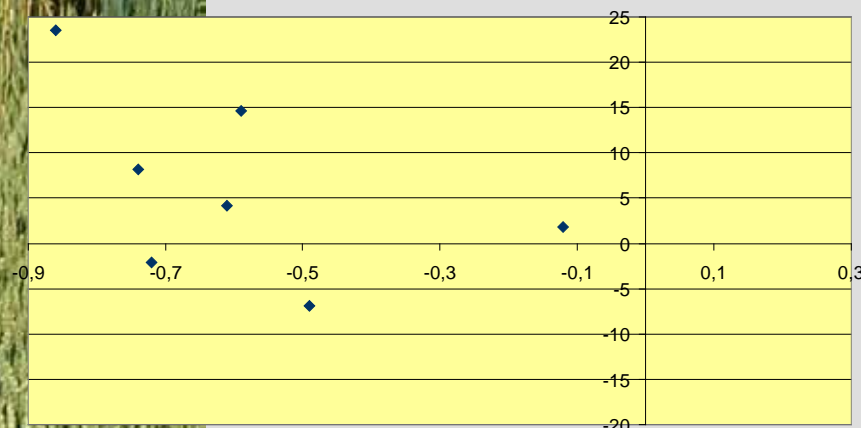
Ando Stdv 9,78; 0,21



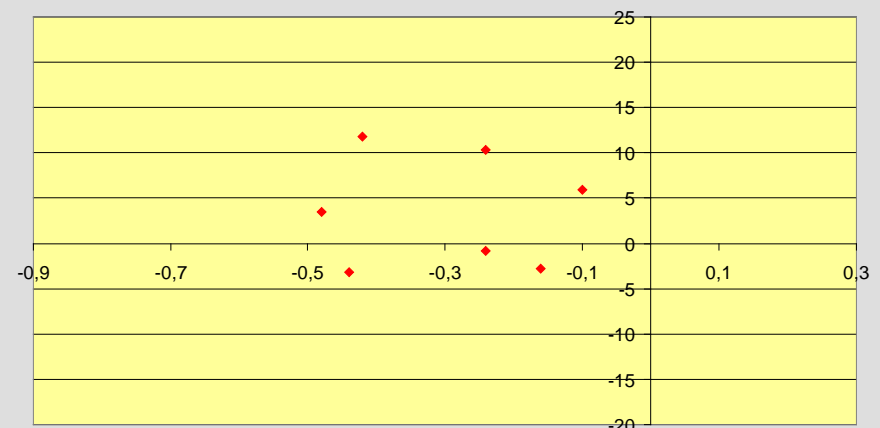
Maret Stdv 5.90; 0,14



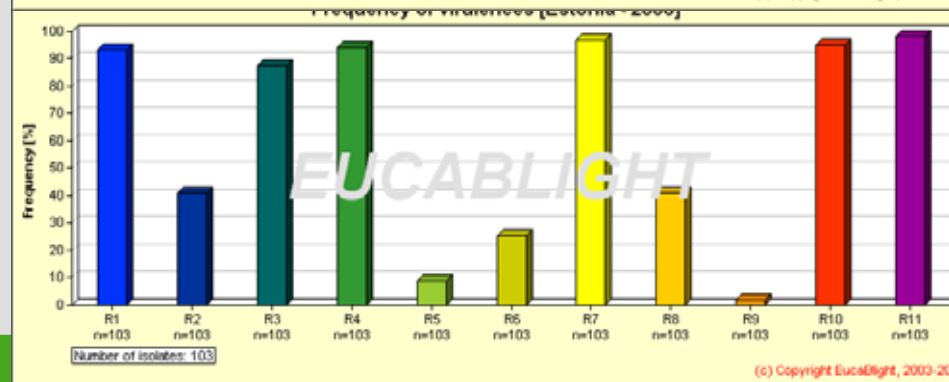
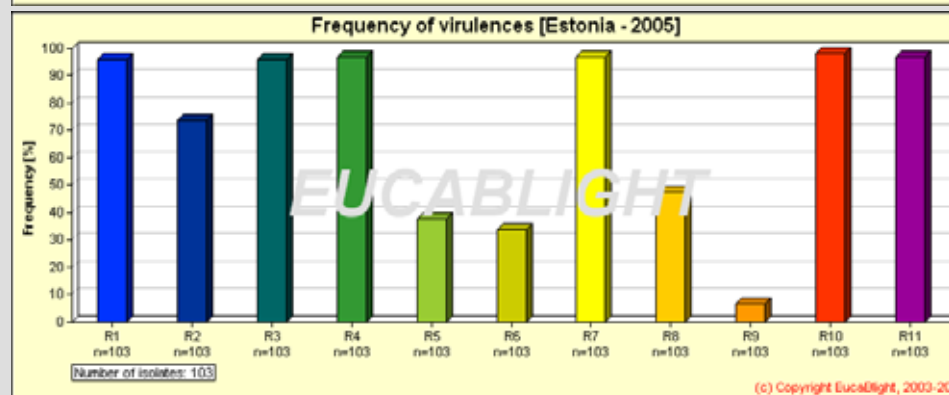
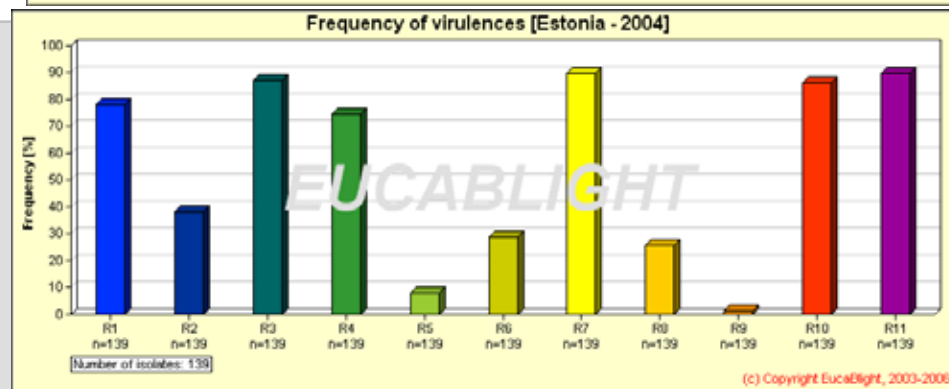
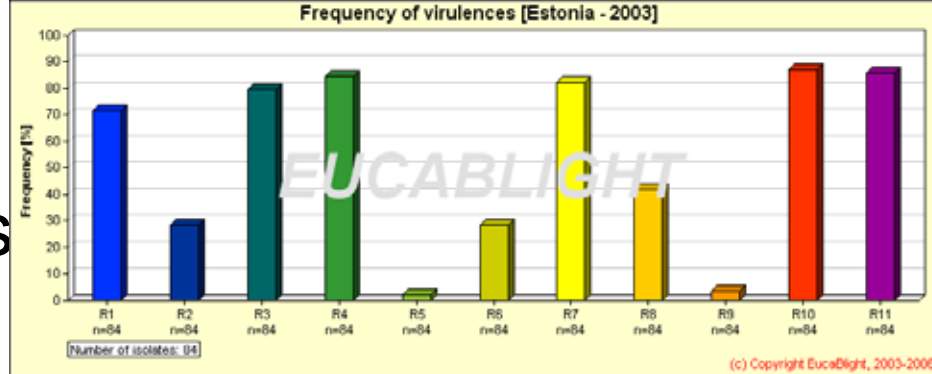
Sarme Stdv 10.30; 0,23



Piret Stdv 6.10; 0,15



Virulence of *P. infestans* isolates





Thank you for attention

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