The *Ralstonia solanacearum* species complex, causal agent of bacterial wilt in the South West of Indian Ocean

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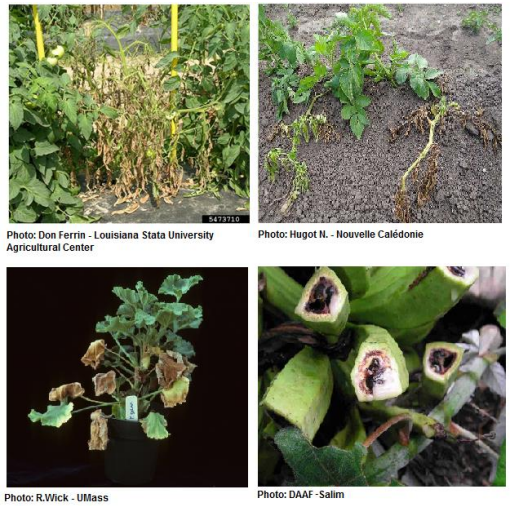

Background: The Ralstonia solanacearum species complex is responsible for bacterial wilt on many food crops with high economic and food potential. It constitutes one of the major constraints to the sustainable development of the Solanaceae sector, with heavy socio-economic consequences for small farmers in the South-West Indian Ocean islands (Madagascar, Reunion, Mauritius, Mayotte, Comoros and Seychelles). The measures commonly used to limit losses are the implementation of regulations on the circulation of plant material, crop rotation, the use of healthy seeds, etc. These measures are rather prophylactics and the use of varietal resistance must be added to better control the disease.

Statistical question:
What are the environmental factors related to the occurence of bacterial strains in plants ?

Mechanistic question:
How do tolerant and resistant plants maintain specific bacteria strain in Madagascar ?

Ralstonia solanacearum
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Acknowledgements:
Thanks to Cesaire and Tahiana, and all E2M2 instructors for improving my work

Statistical question:

What are the environmental factors related to the occurence of bacterial strains in plants ?

Data:

Sampling campaigns were conducted following reports of bacterial wilt in farmer's plant fields, since 1957 in the southwestern Indian ocean.

In the laboratory, the bacteria strain of *Ralstonia* was isolated and identified at a genetic level (sequevar, a way for us to identifiy the bacteria strain.

In the field, data on geographical position, elevation, plant species and the date of sampling were also collected.

Rainfall and temperature data will be taken from historical data.

Hypothesis:

The occurrence of bacteria strains depends on the environmental characteristics of the site of sampling.

Response variable: occurrence of bacteria strains (each sequevar)

Predictor variables: family of pant, elevation, date, rainfall, temperature, site of sampling

Family: binomial

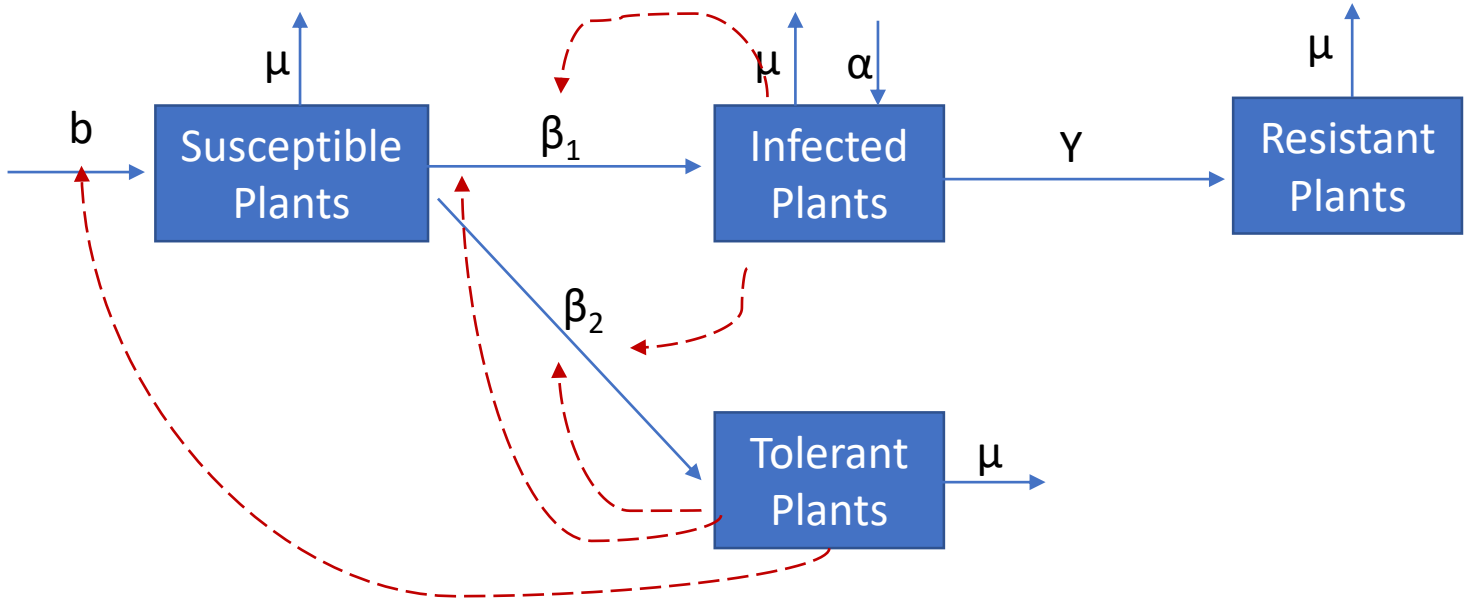
Link: log it

R code:

glm (occurrence ~ plant + elevation + date + rainfall + temperature + site, family = "binomial", llink = log it).

Mechanistic question:

How do tolerant and resistant plants maintain specific bacteria strain in Madagascar ?



States:

Susceptible plants
Infected plants
Resistant plants
Tolerant plants

Processes:

b: birth
Y: Resistant rate
B_1: Transmission rate to infected
B_2: Transmission rate to tolerant
μ: Death rate from natural mortality
α: Death rate from infection

Next steps:

- Learn more about mechanistic model
- Start the analysis and test some models with my actual data
- Evaluate the efficacy of bacterial wilt resistance in some plant accession
- Write an article