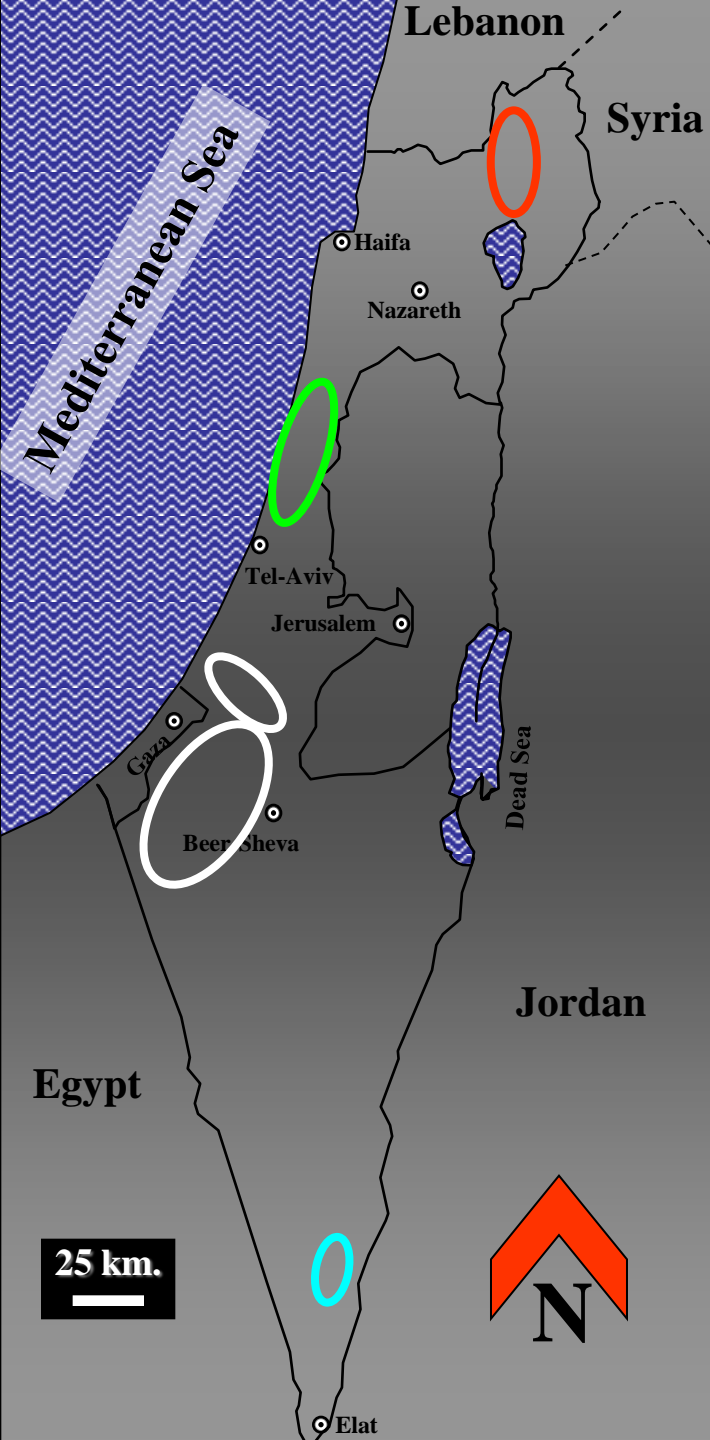




# Alternaria diseases of potatoes: epidemiology and management in Israel

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# Potato production in Israel

**Cultivated area ~16,000 ha**

**~500 ha in the north**

**~3,000 ha in the Sharon area**

**~12,300 ha in the northern Negev**

**~200 ha in the Arava**

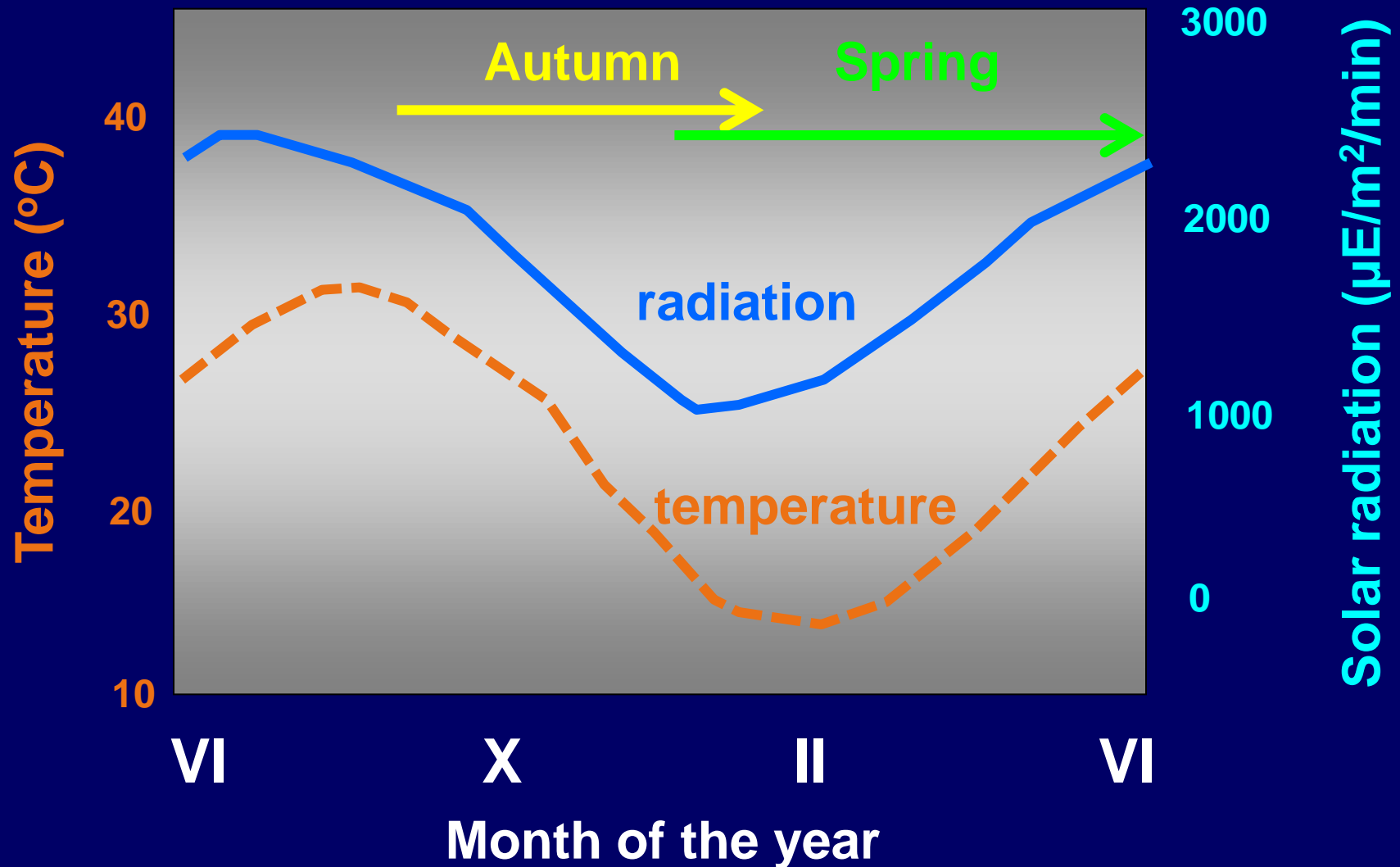








# Potatoes are produced in Israel in two growing seasons





**Late blight – *Phytophthora infestans***









**Early blight – *Alternaria solani***













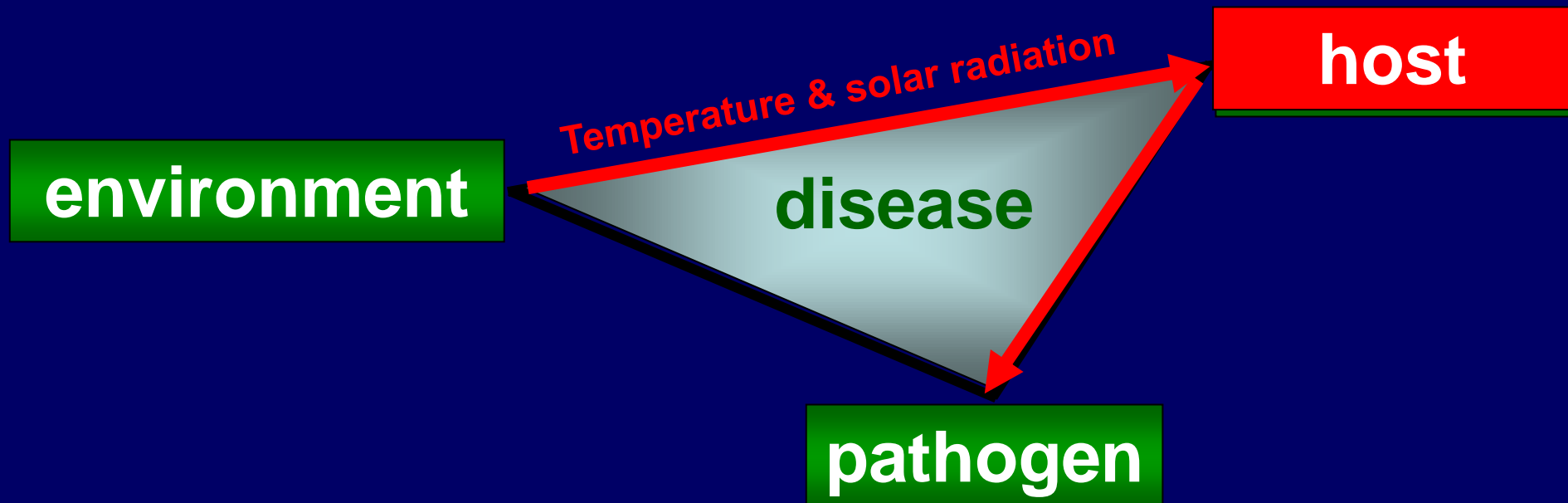
# Necrotic lesions – *Alternaria alternata*





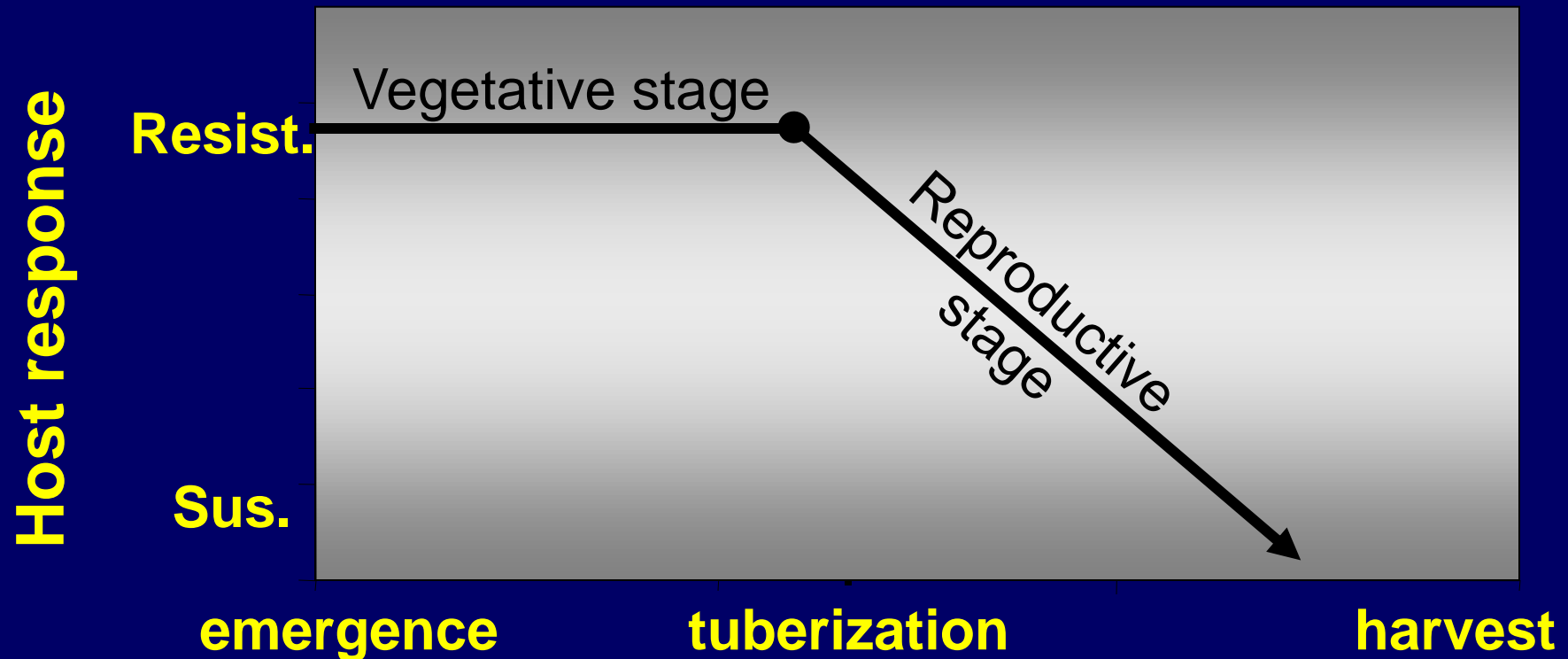
# Observations – early blight

1. The primary factor governing early blight intensity is host physiology, as affected by the environment;
2. The disease is intensified in senescing leaves towards the end of the growing season.



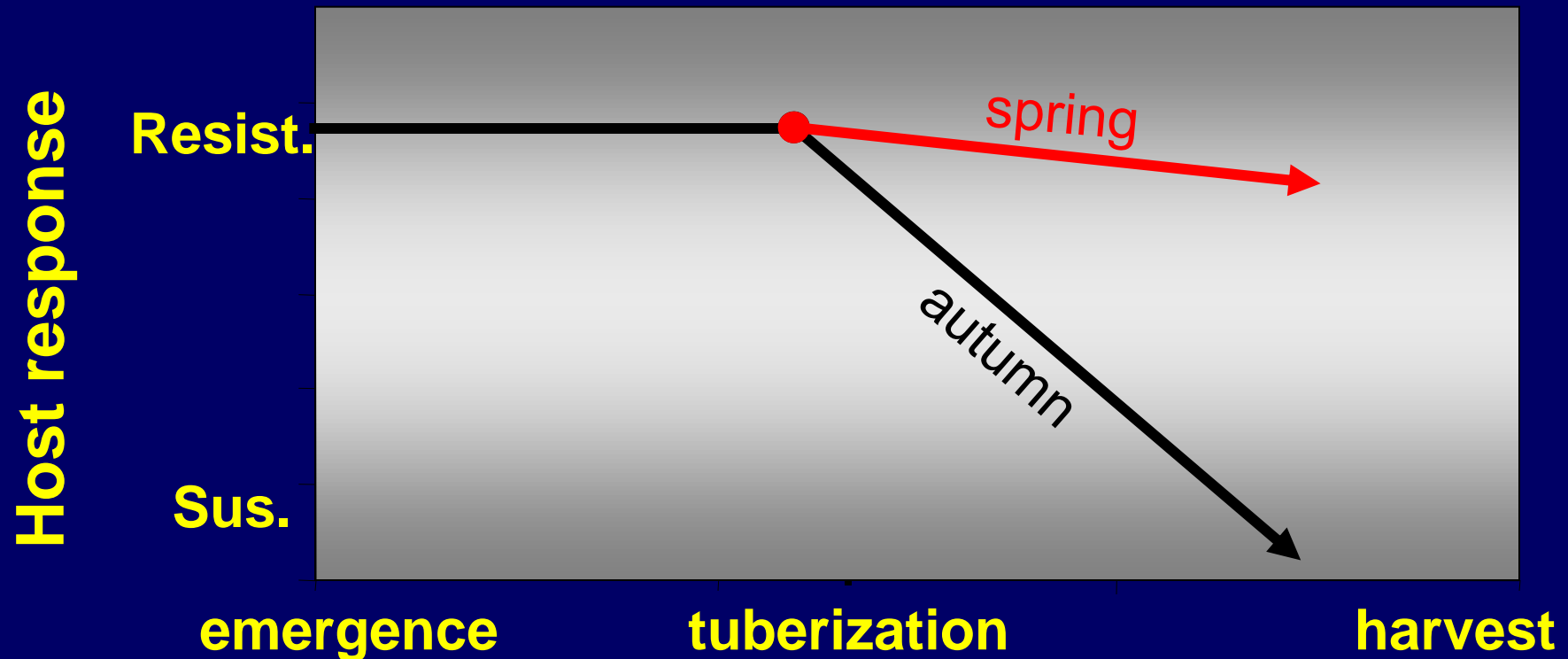


# Conceptual model describing the changes in host response to early blight over time



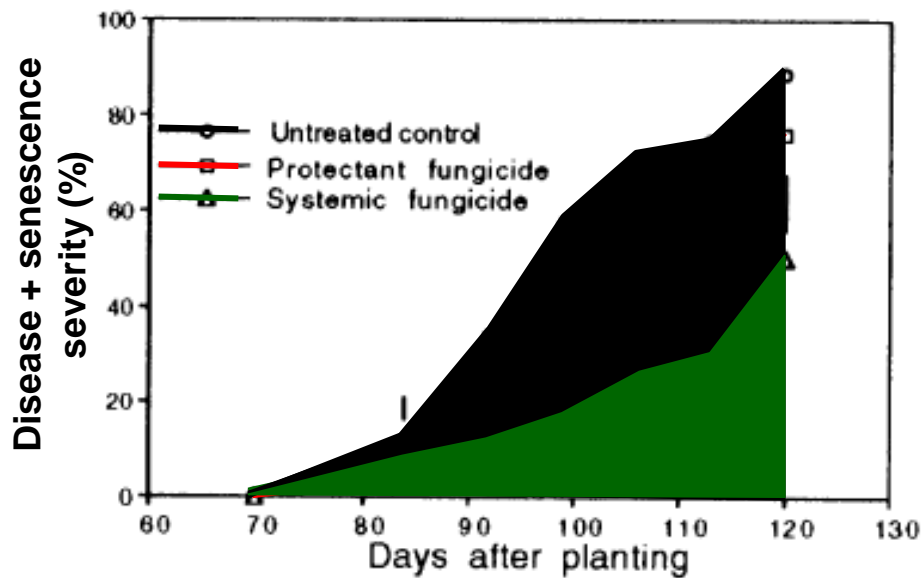


# Using the conceptual model for describing differences among the two growing seasons

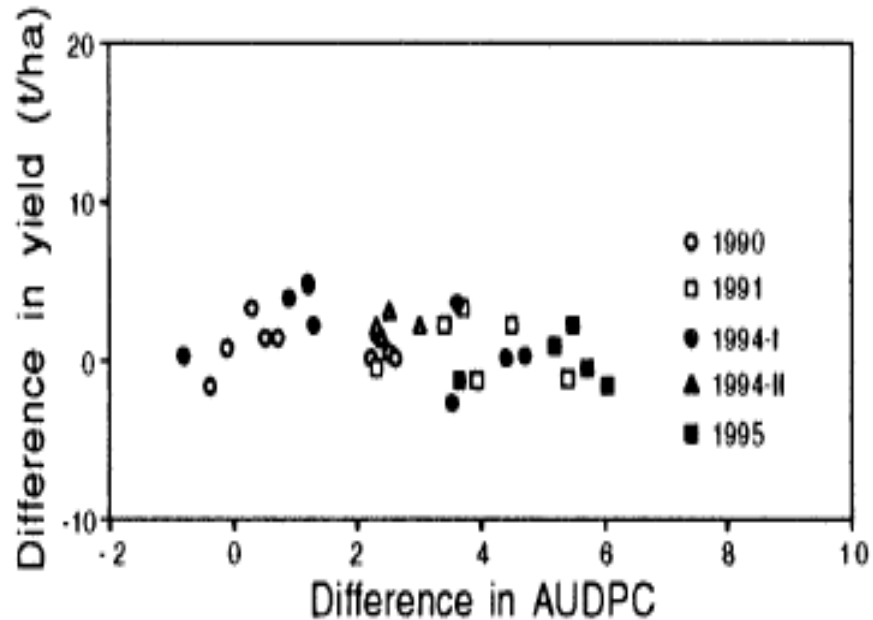
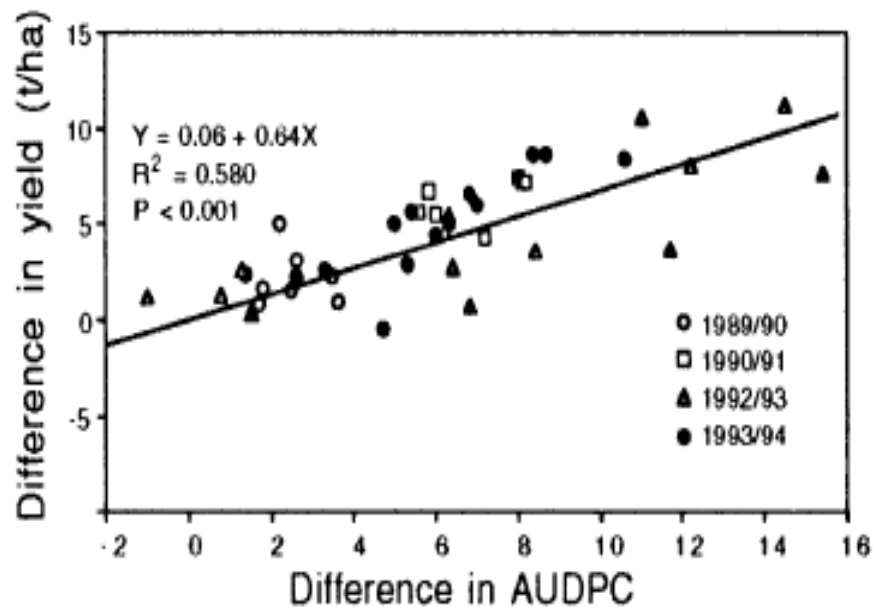
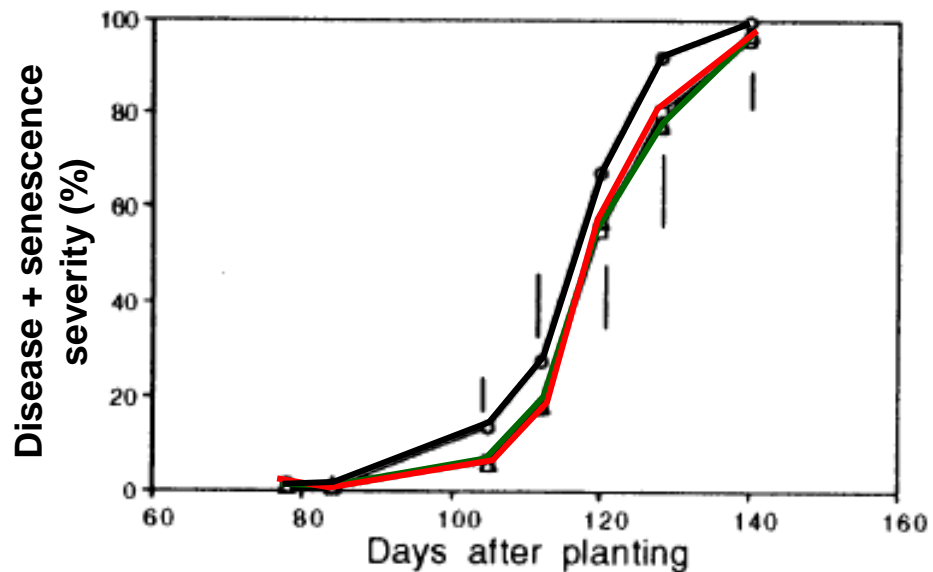




## Autumn season

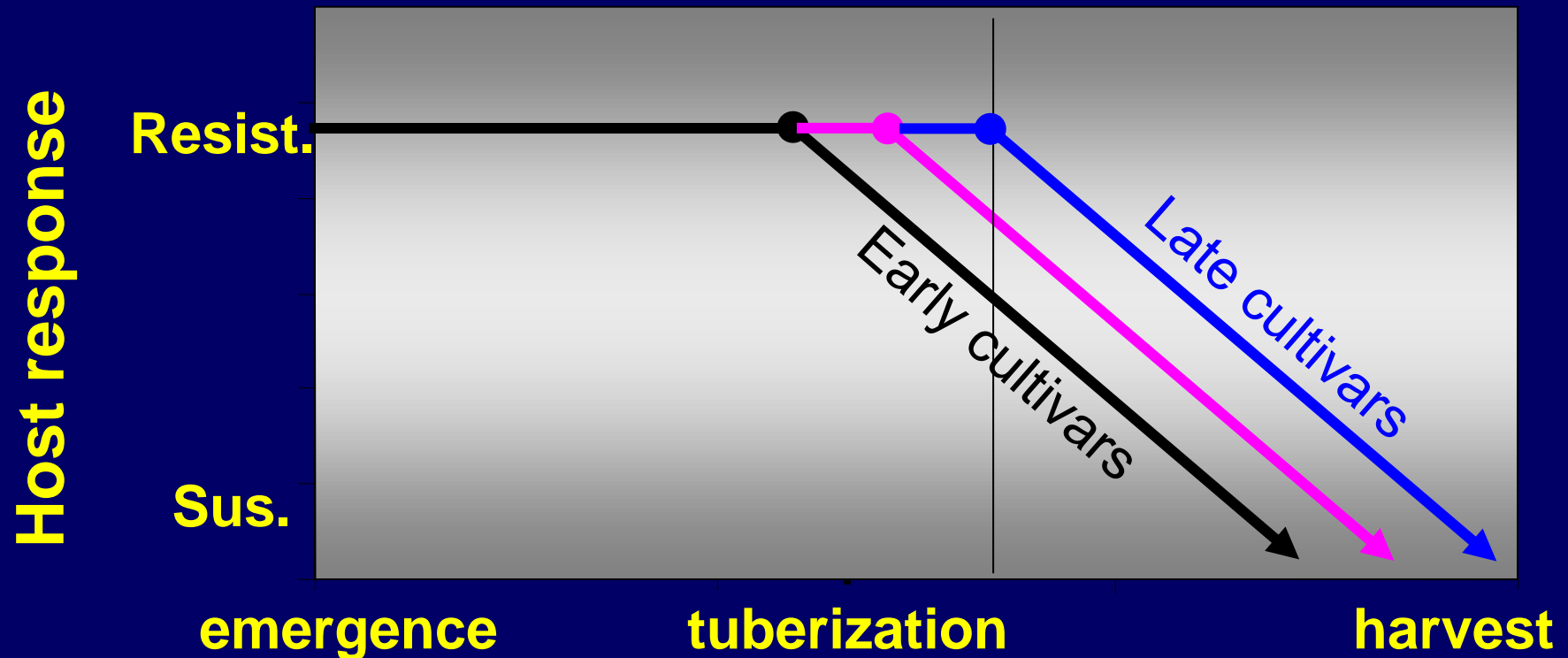


## Spring season



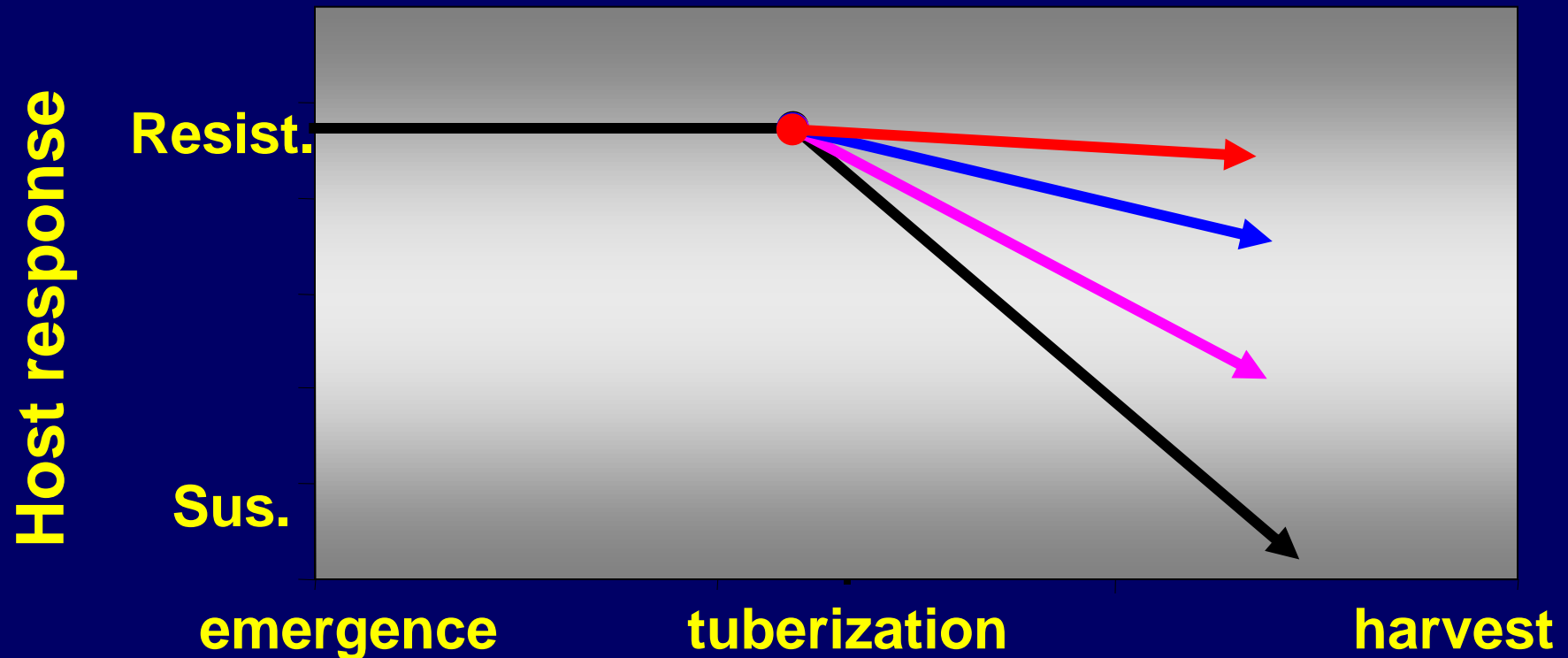


# Using the conceptual model for describing the response of cvs. with different maturity levels



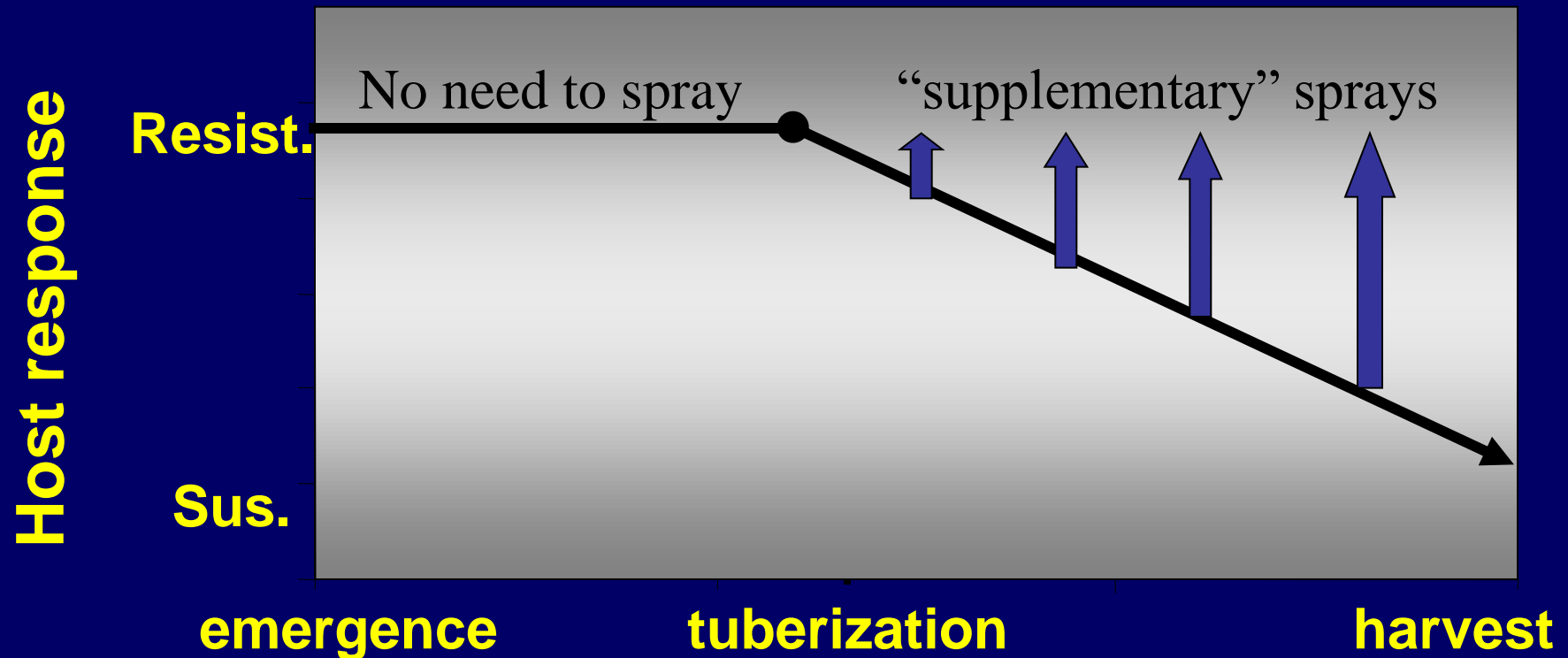


# Using the conceptual model for describing the response of cvs. with different genotype resistance levels





# Using the conceptual model for describing the need for fungicide application





# Integrated management strategy for EB + LB

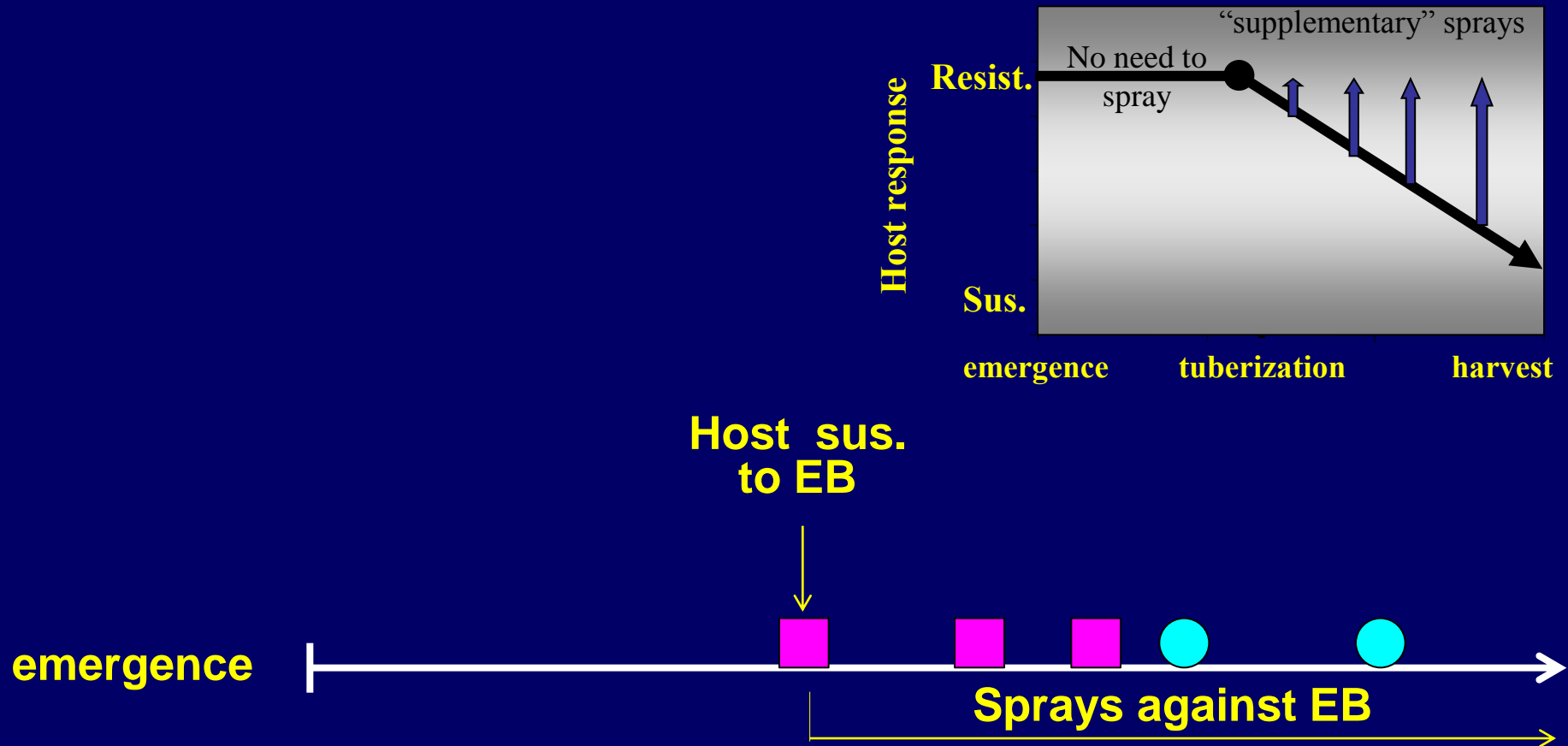
The goal: to effectively manage both diseases

## Components in the strategy

- the growing season (autumn or spring)
- genotype resistance (to EB and to LB)
- age related resistance (to EB)
- weather suitability (to EB and LB)
- fungicide type and efficacy



# Autumn season: management of EB

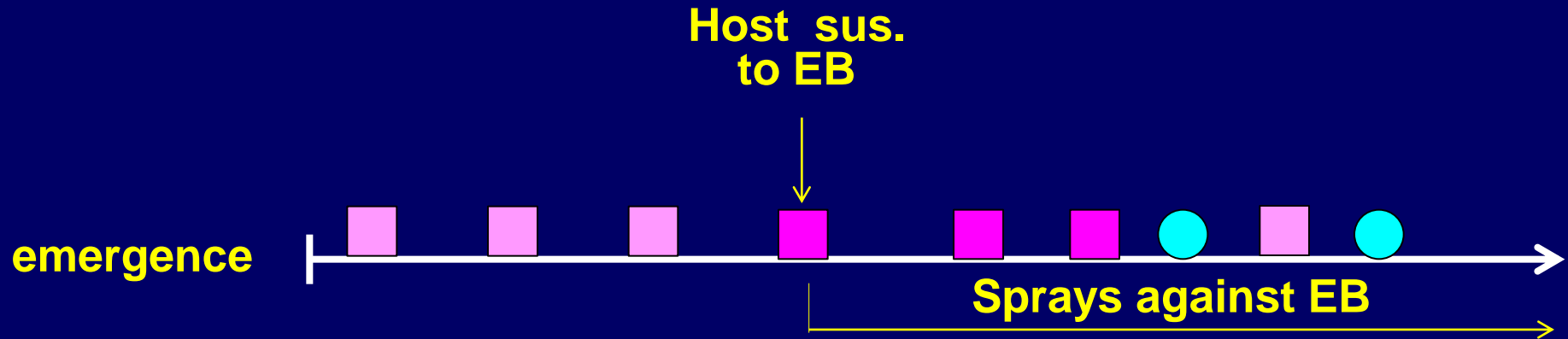


- Full rate protectant
- Systemic against EB



# Autumn season: management of EB and LB

## A. no report of LB in the region



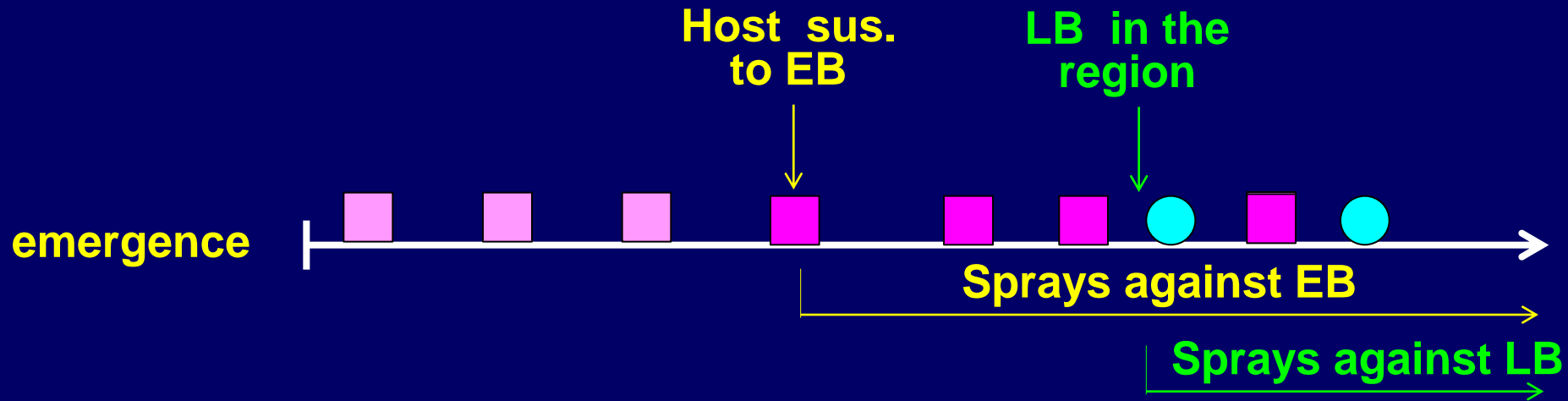
■ Full rate protectant

■ Half rate protectant

● Systemic against EB

# Autumn season: management of EB and LB

## B. LB in the region but not in the field



■ Full rate protectant

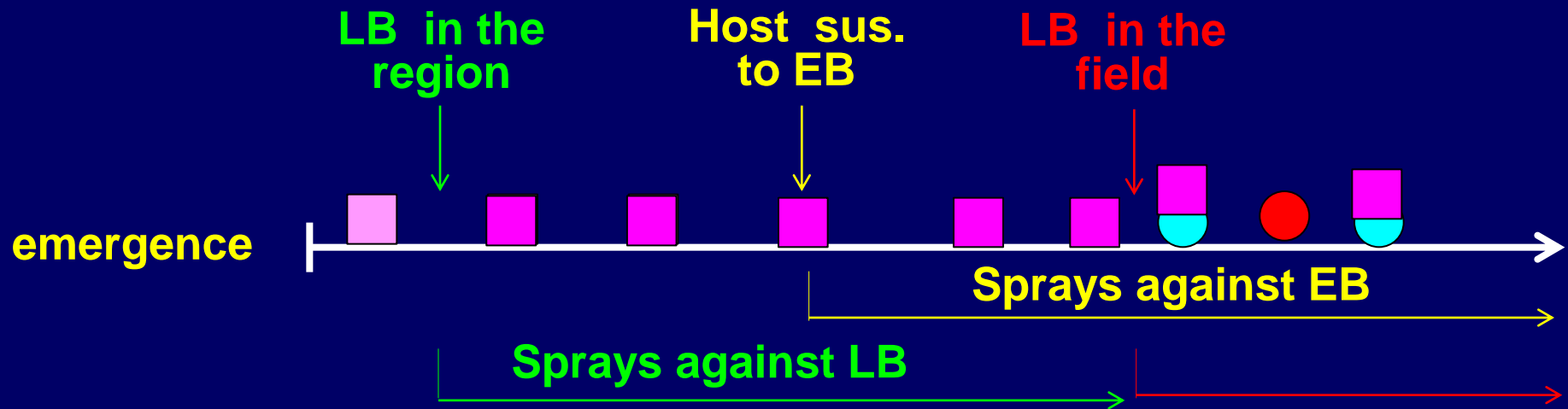
■ Half rate protectant

● Systemic against EB



# Autumn season: management of EB and LB

## C. LB in the region and then in the field



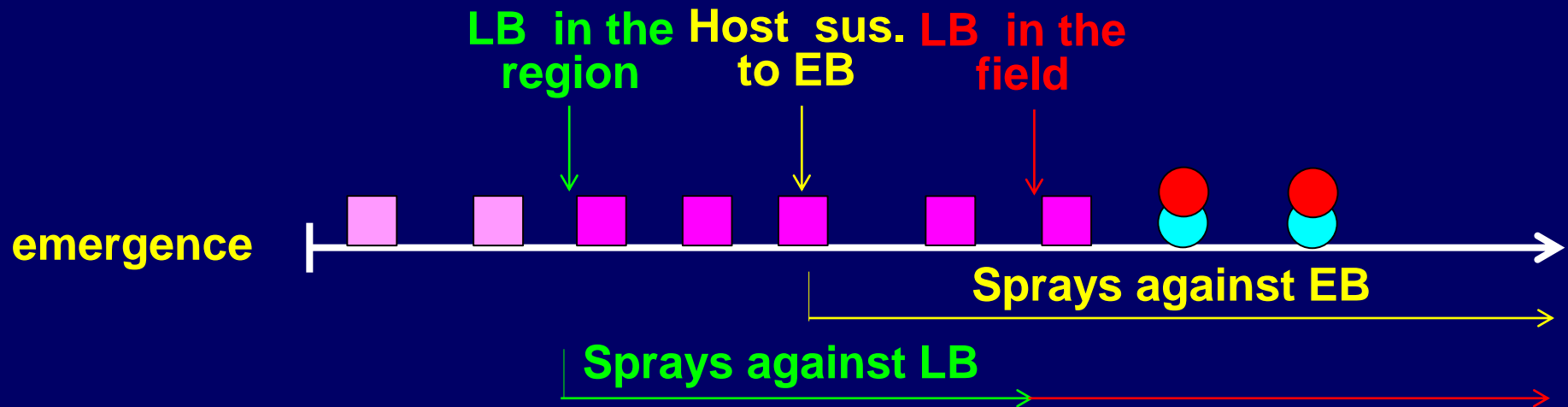
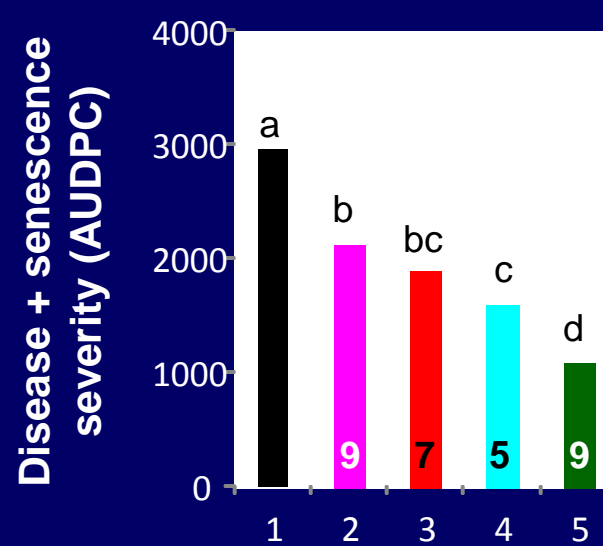
■ Full rate protectant

■ Half rate protectant

● Systemic against EB

● Systemic against LB

# Autumn season 1997/8



■ Full rate protectant

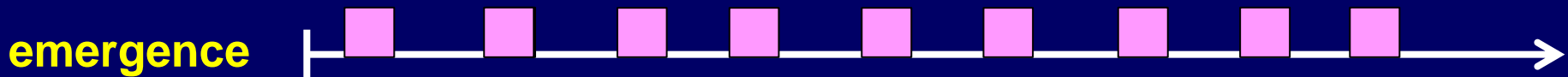
■ Half rate protectant

● Systemic against EB

● Systemic against LB



# Spring season: management of LB



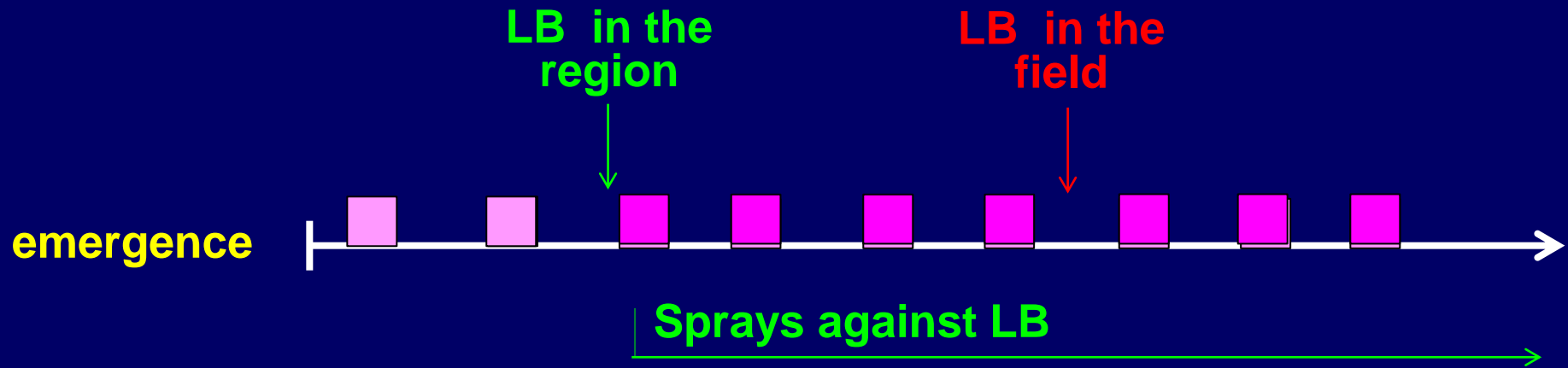
■ Full rate protectant

■ Half rate protectant

● Systemic against EB

● Systemic against LB

# Spring season: management of LB



■ Full rate protectant

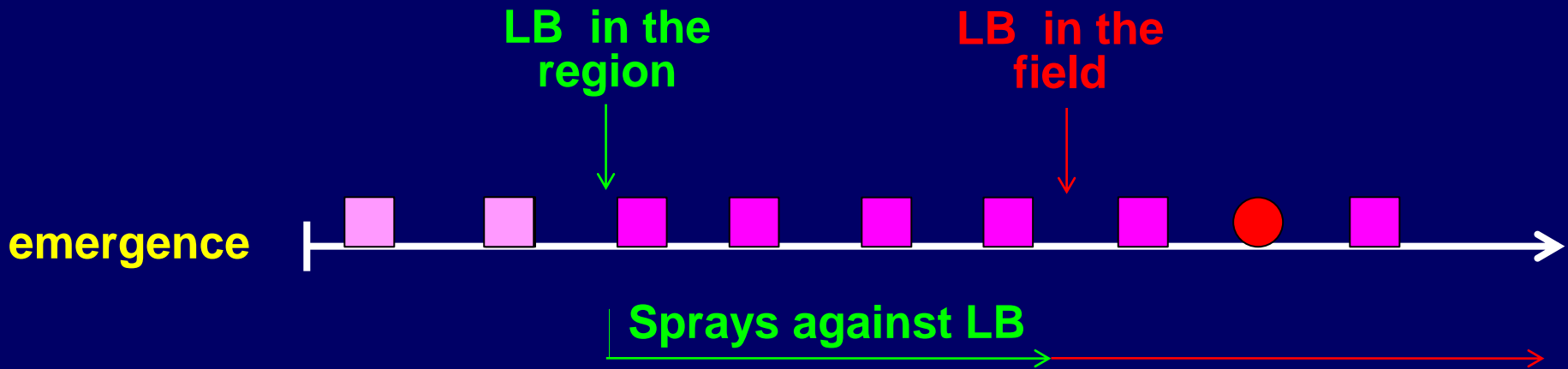
■ Half rate protectant

● Systemic against EB

● Systemic against LB



# Spring season: management of LB



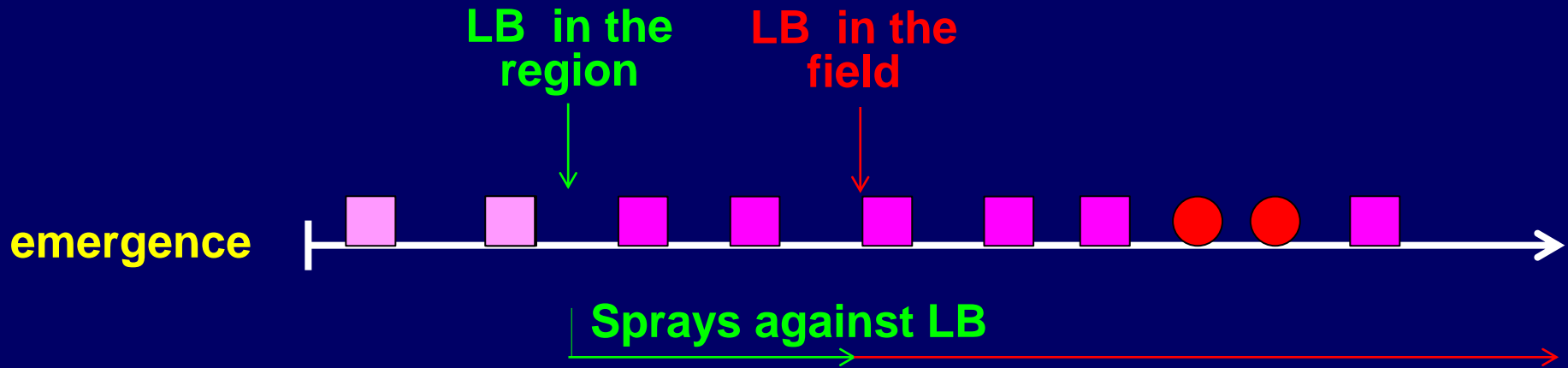
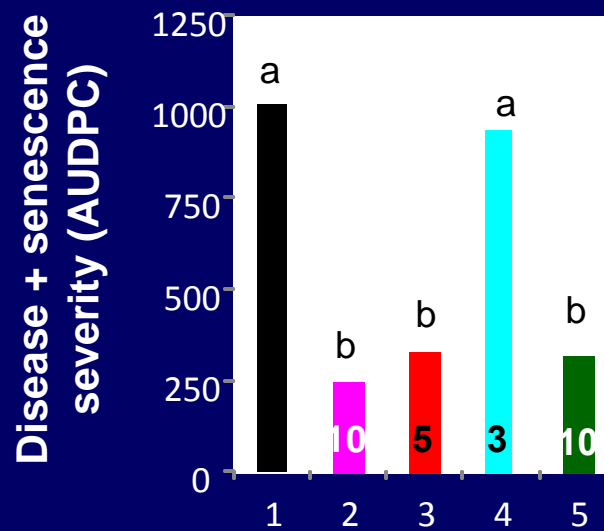
■ Full rate protectant

■ Half rate protectant

● Systemic against EB

● Systemic against LB

# Spring season 1996



Full rate protectant

Half rate protectant

Systemic against EB

Systemic against LB



# Necrotic lesions – *Alternaria alternata*







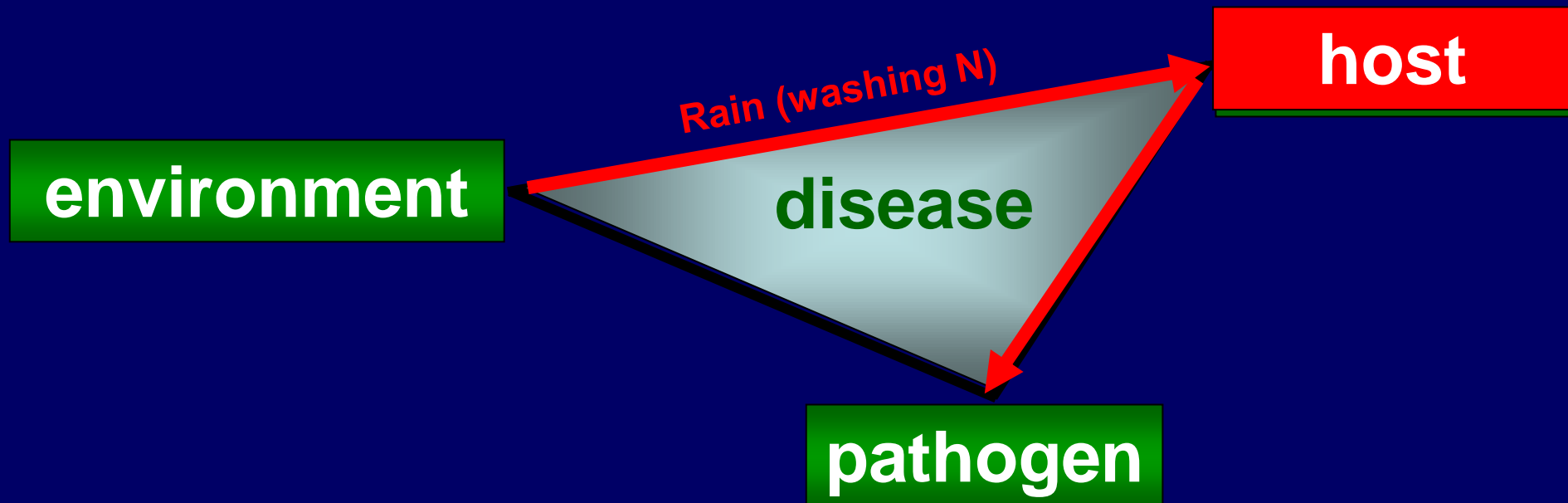
# Observations

1. Necrotic lesions appear suddenly in large areas, often after heavy rain events;
2. The phenomenon is more common in crops growing in sandy soils;
3. *Alternaria alternata* was isolated from necrotic lesions and the Koch postulates were completed and proved the pathogenicity of that fungus.

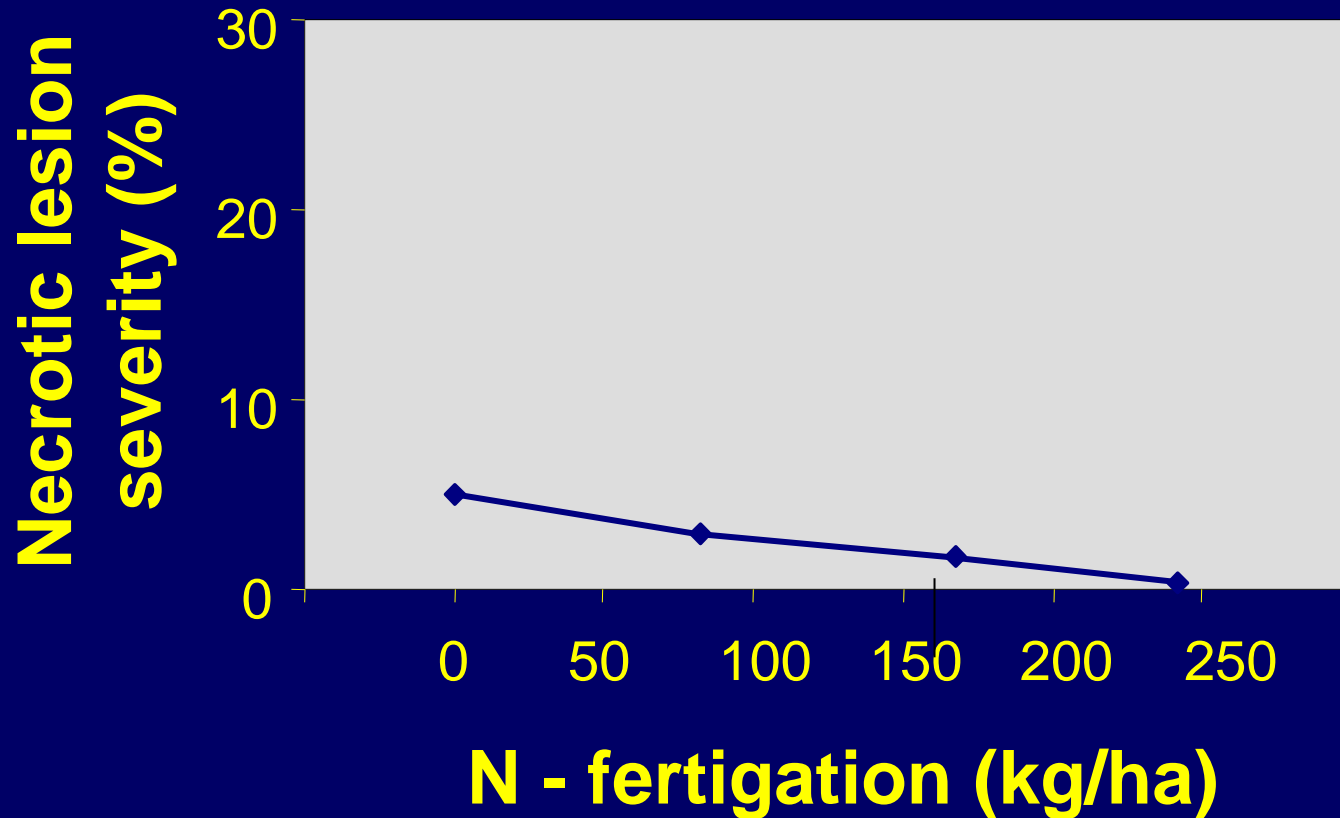


# Working hypothesis

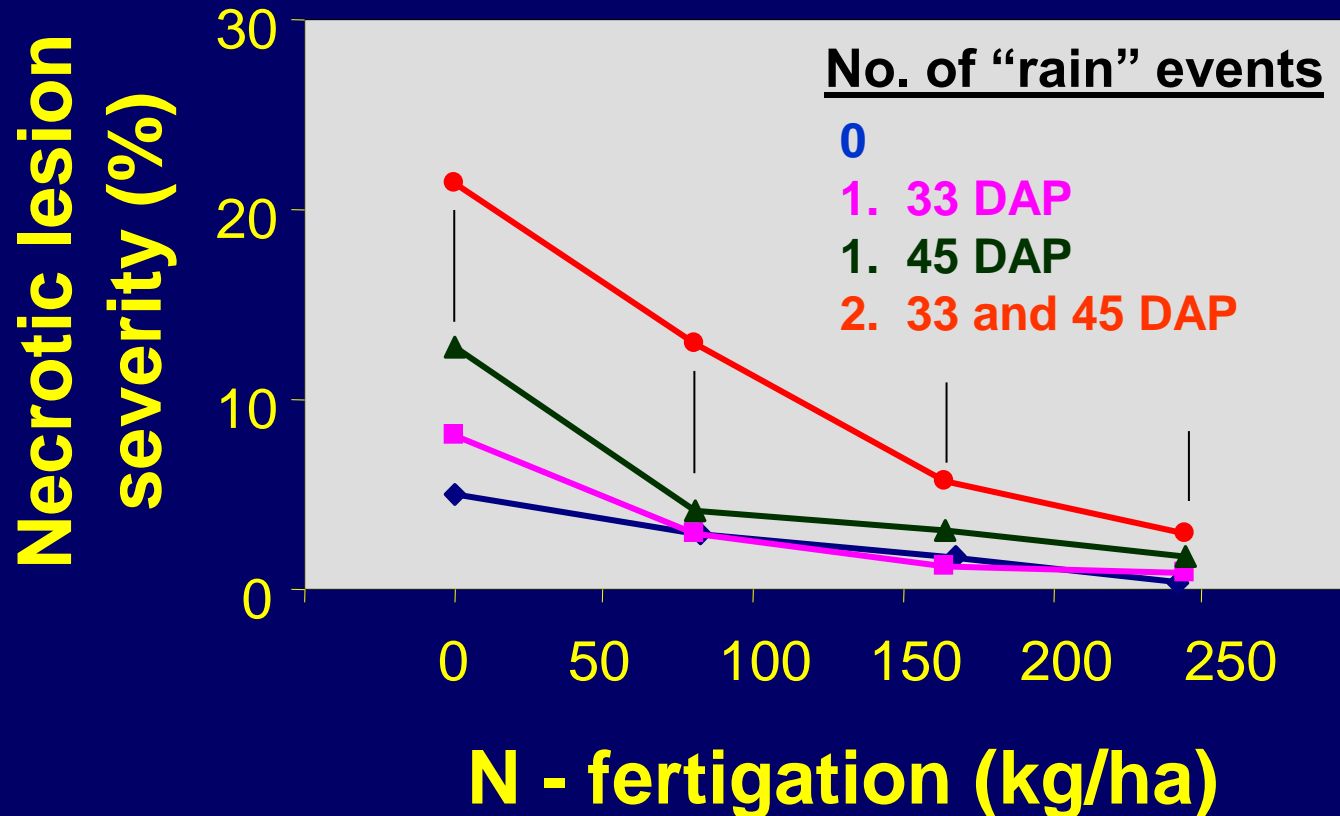
1. Heavy rains wash the nitrogen fertilizer from the root zone.
2. Necrotic lesions appear in plants suffering from stress imposed by sudden reduction in nitrogen content in the foliage.



# The interactive effects of N fertigation on necrotic lesion severity



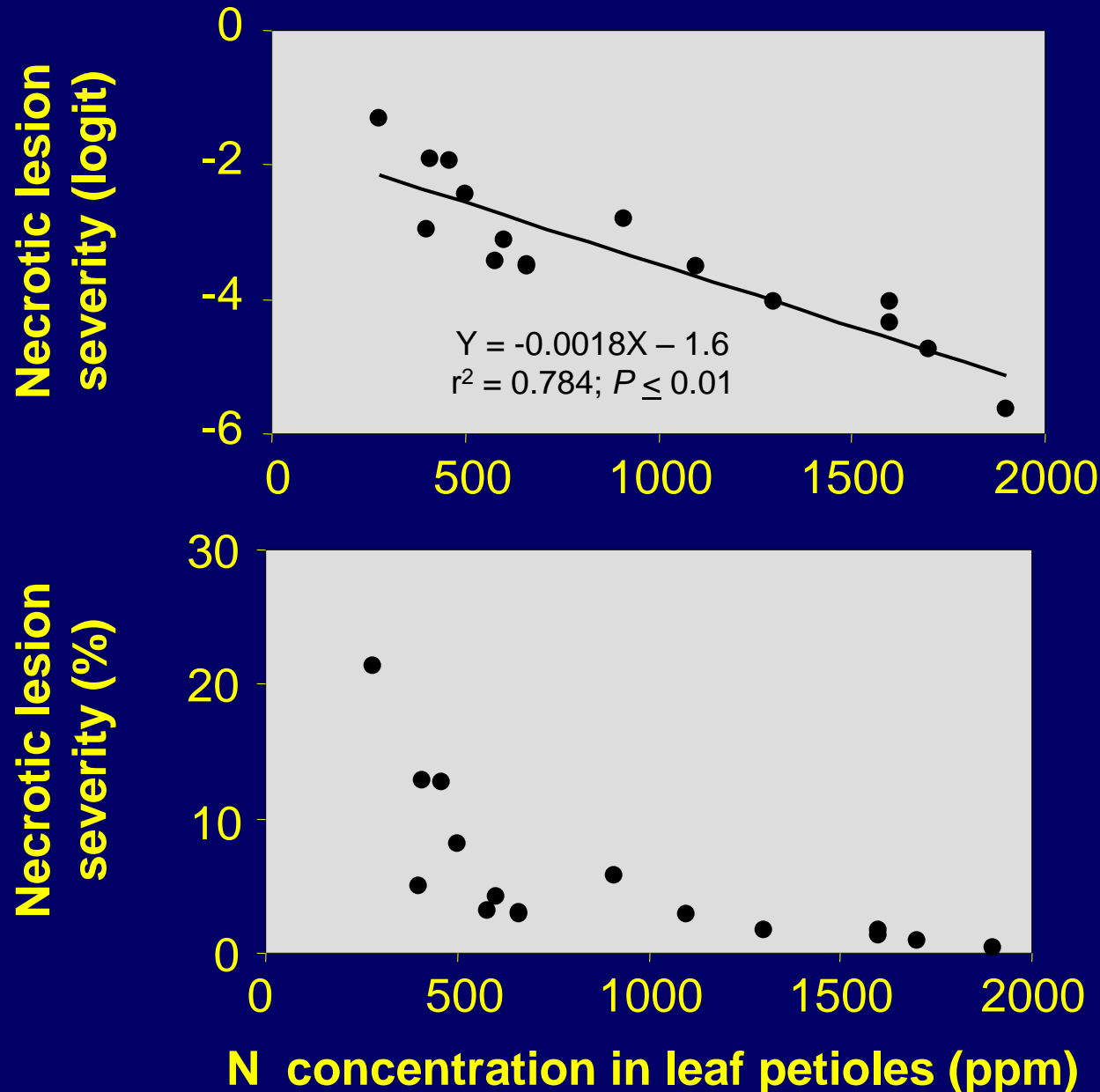
# The interactive effects of N fertigation and “rain” on necrotic lesion severity



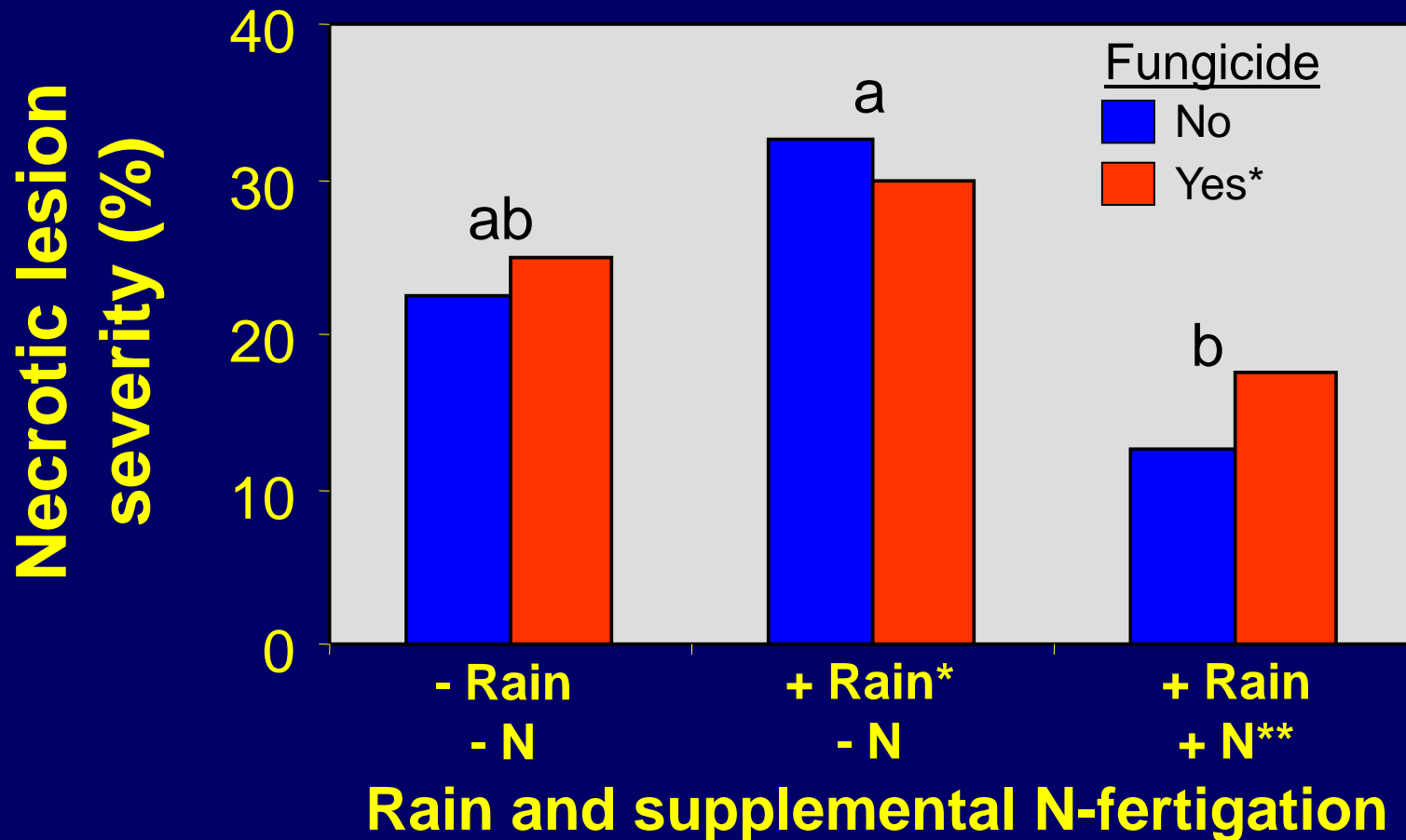
“rain” was mimicked by over head irrigation of 600 m<sup>3</sup> water /ha



# Relationships between N concentration in leaf petioles and severity of necrotic lesions



# The interactive effects of “rain”, supplemental N fertigation, and fungicides, on necrotic lesion



\*800 m<sup>3</sup> water / ha

\*\*180 kg N / ha

\* 4 tebuconazole sprays

# Take home messages

- 1. Early blight development is governed by host physiology. Its management should relate to the response of the host to the pathogen.**
- 2. Early blight should be managed only in the autumn season; Late blight - in both seasons.**
- 3. Necrotic lesions develop primarily in nitrogen-stressed plants. Applying supplemental N fertilization reduces necrotic lesion severity.**
- 4. Concepts for managing potato early and late blight were developed, examined and found effective. The concepts are implemented commercially by Israeli growers for more than a decade.**



# Thank you for your attention

