

# Alternaria leaf blotch and fruit spot of apple in Australia

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# Alternaria leaf blotch symptoms



# Alternaria leaf blotch symptoms





# Alternaria leaf blotch symptom: premature defoliation

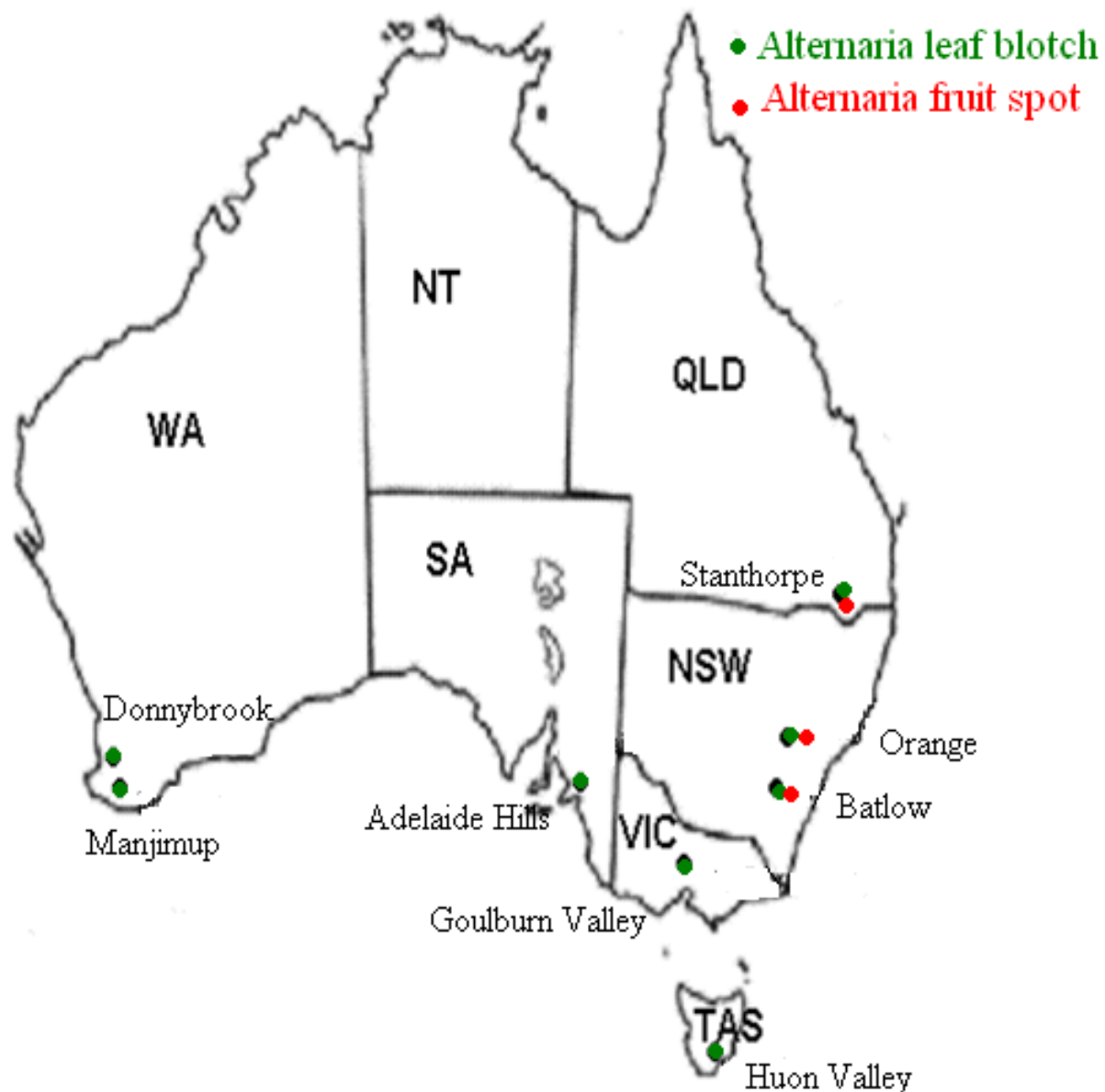


# Alternaria fruit spot symptom



# Alternaria leaf blotch and fruit spot distribution

- Pathogen: *Alternaria*
- First report leaf blotch Stanthorpe 1990's
- First report fruit spot Stanthorpe 2003





# Problem



- Erratic control of the diseases.
- Identity of the *Alternaria* species involved is still uncertain.
- No information on disease cycle.



# Research Aims

Improve our understanding of Alternaria leaf blotch and fruit spot of apples in Australia

1. Pathogen
2. Disease cycle

This study will provide a better understanding of the diseases which can serve as foundation for improved management options.



# 1. The pathogen

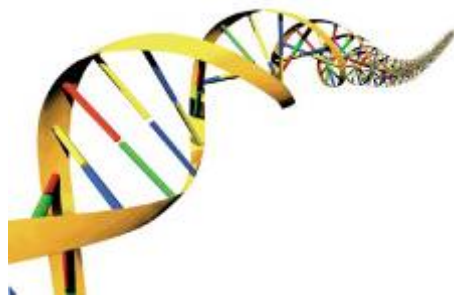
1. What is the identity and diversity of the *Alternaria* species involved in causing the diseases?
2. What is the geographical distribution of the species?
3. Do the same species infect both leaf and fruit?



# Identity and diversity of *Alternaria* species

## Experimental design

- 51 isolates obtained from leaf and fruit symptoms from different regions in six states of Australia
- DNA sequencing 5 genes and morphological examination



# Identity and diversity of *Alternaria* species

## Results

- Three different *Alternaria* species involved:
  1. *A. arborescens*
  2. *A. tenuissima*
  3. *A. alternata*
- None of the species was specific to leaf or fruit symptoms or region.
- 71% of isolates obtained from symptomatic fruit were identified as *A. tenuissima* and *A. alternata* from Queensland and New South Wales
- 70% of the isolates obtained from leaf symptoms were identified as *A. arborescens*, occurring in all states

## 2. Disease cycle

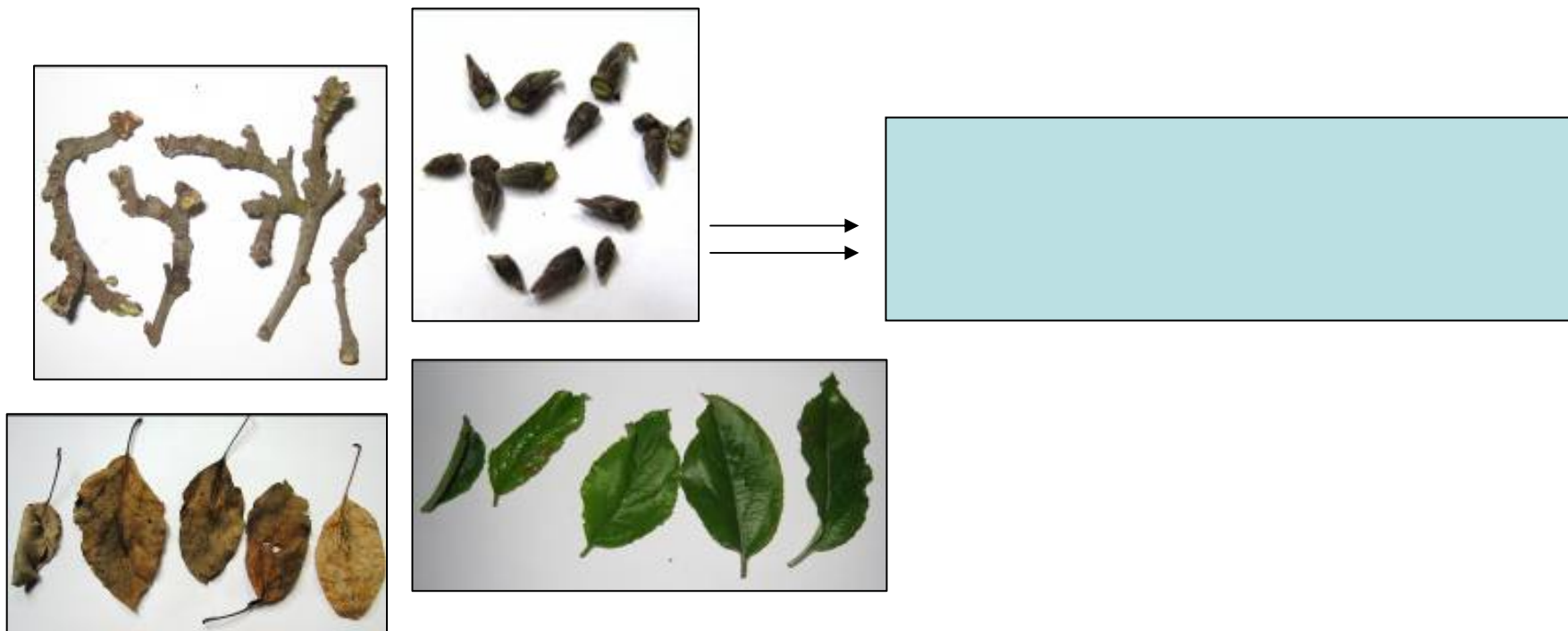
1. What are the sources of inoculum in the orchard?
2. When during the season are symptoms expressed in the orchard?
3. How do the diseases develop in the tree canopy?
4. What climatic conditions may influence disease expression in the field?





# Source of inoculum

- Three orchards at Applethorpe, Queensland.
- Monthly sample collection of 3 trees per orchard from July 2010- now

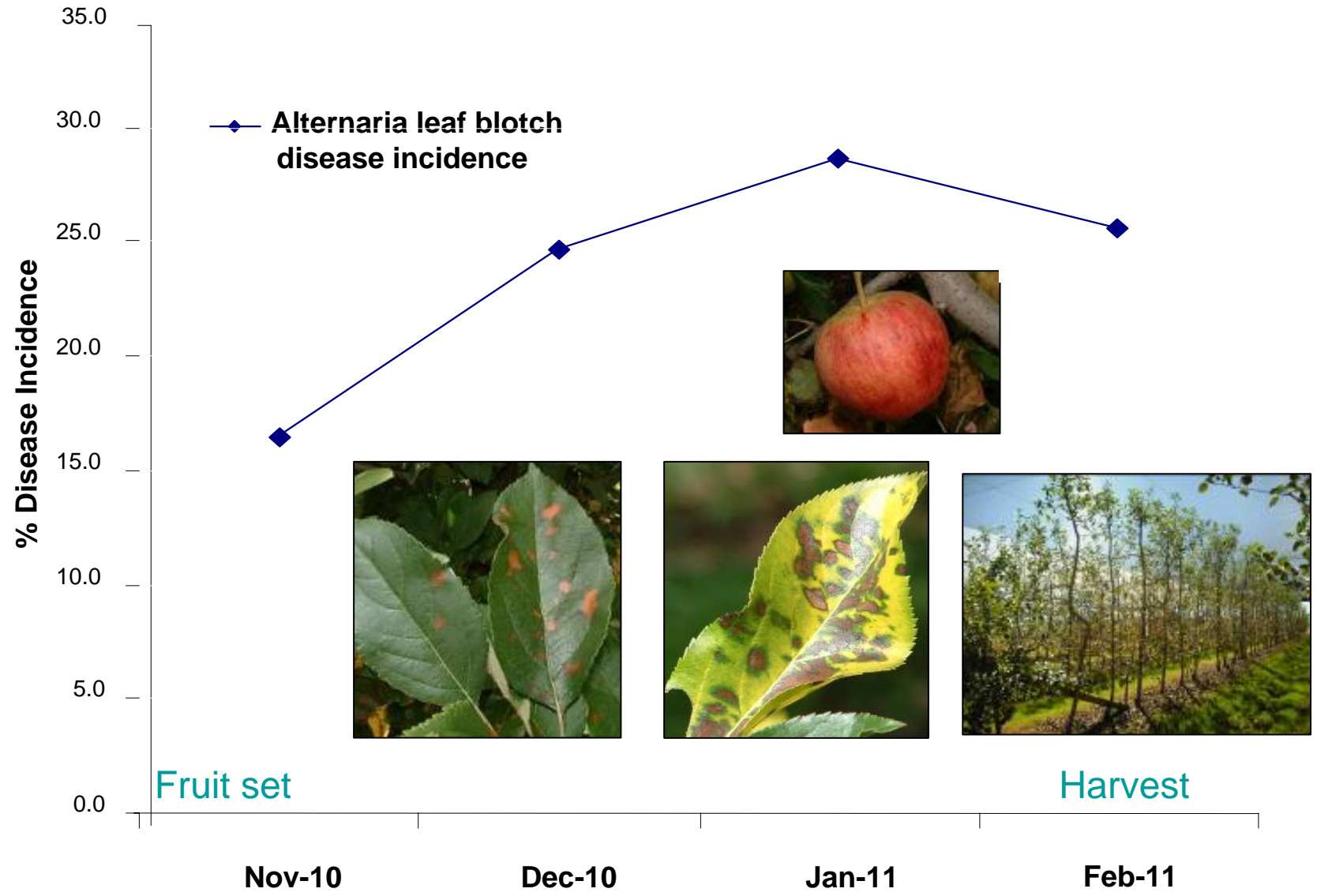


# Source of inoculum

Sources of inoculum and average quantities of *Alternaria* spp. conidia per cm<sup>2</sup>

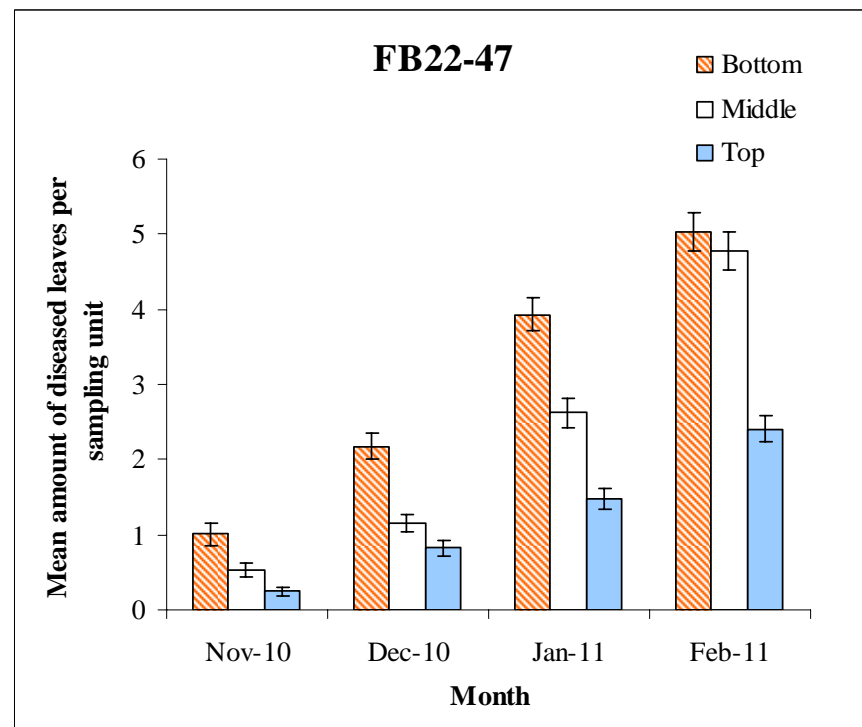
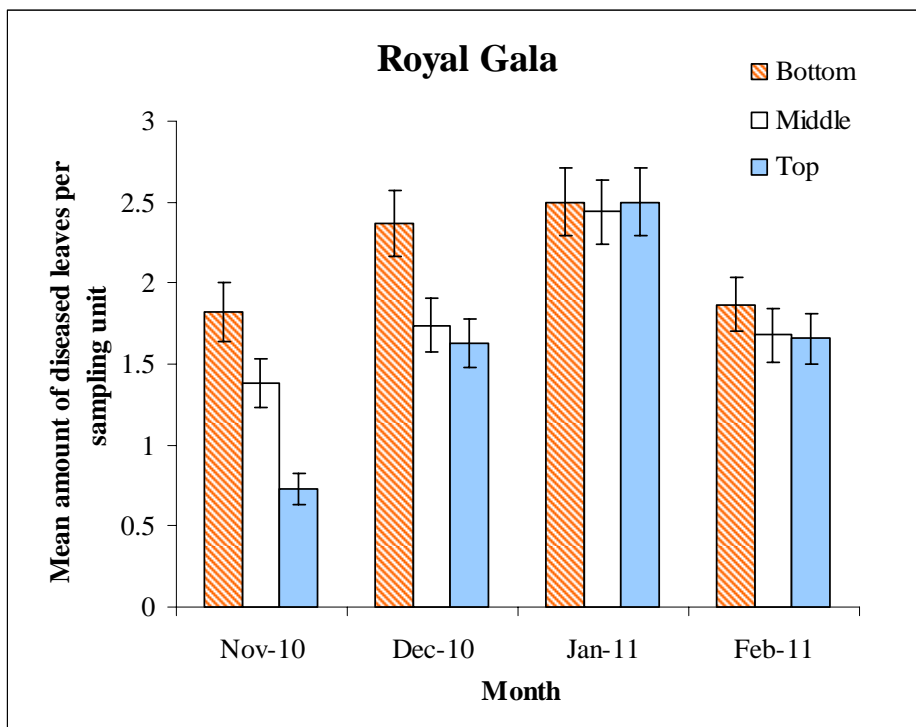
Season	Leaf residue	Buds	Twigs	Canopy leaf
Winter-'10	6842	0	41	No leaves
Spring-'10	985	No buds	103	25
Summer-'10/'11	Residue removed	No buds	161	112
Autumn-'11	959	No buds	79	223
Winter-'11	3558	63	51	No leaves

# Disease incidence



Alternaria fruit spot : end of January 2011- harvest February 2011

# Disease development in the tree canopy

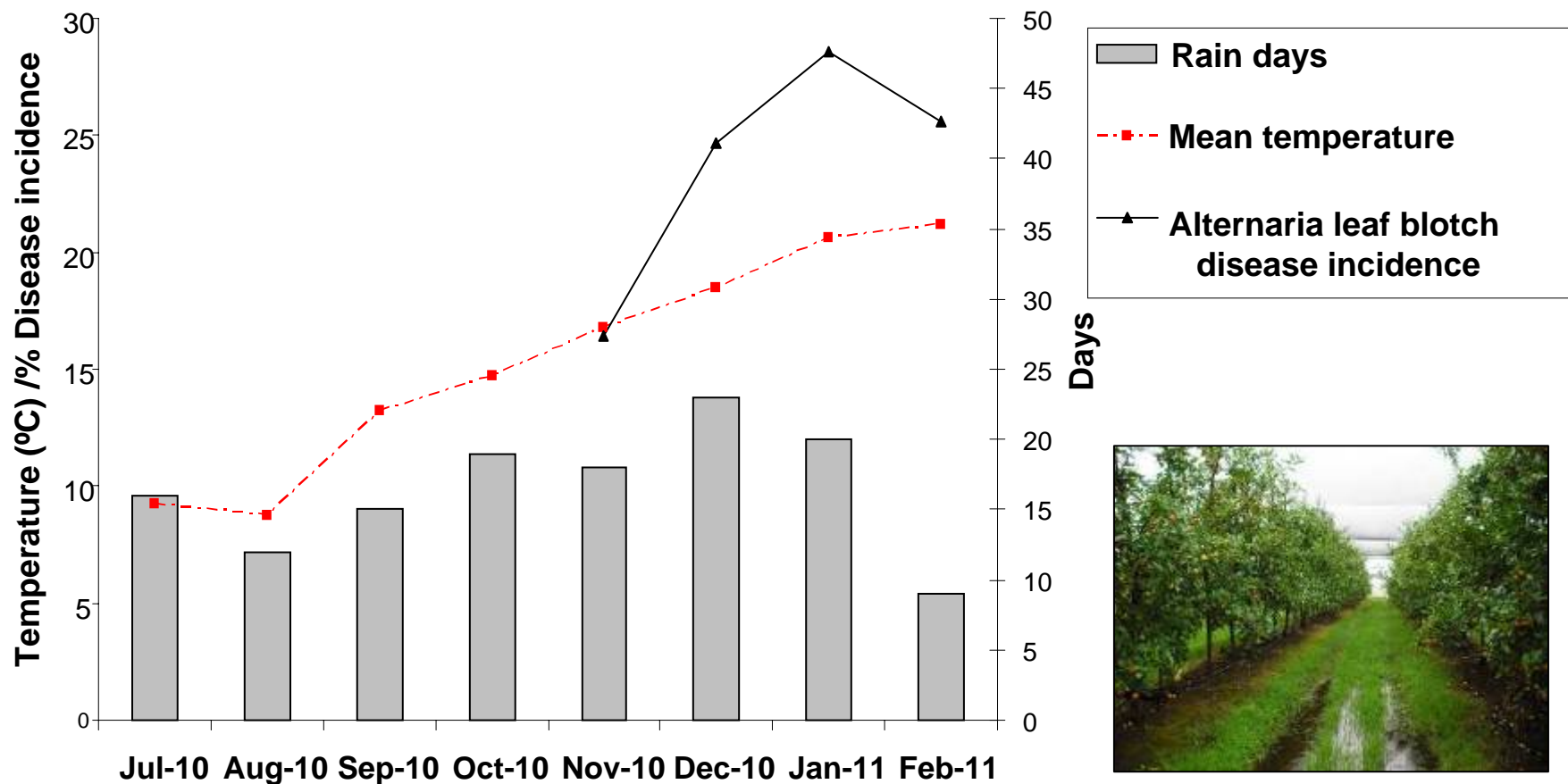


- Alternaria leaf blotch disease mostly affecting leaves at the bottom level of the trees.
- Disease initiates at all levels of tree canopy (indicates air dispersal of spores)



# Climate

➤ Climate data obtained from Bureau of Meteorology (Applethorpe station)

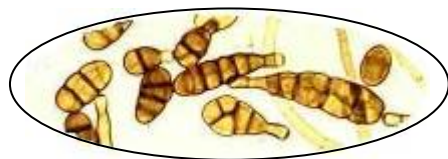




Temperature  $\pm 20^{\circ}\text{C}$   
+ high rainfall



Symptom development  
Leaf blotch: Nov–Feb+  
Fruit spot: end Jan–Feb



Multiple *Alternaria* species involved

**Disease cycle of  
Alternaria in apple**



Fungus overwinters in leaf residue and twigs

# Management suggestion so far

- Reduction of infected apple leaf residue in the orchard by application of urea.
- Orchard hygiene can reduce the amount of inoculum available to infect next season's crop.



# Acknowledgements



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