

BOX BLIGHT

From a talk given by Dr Beatrice Henricot at The Royal Horticultural Society

The following is a 'question and answer' talk based on the presentation given by Dr Henricot at the AGM on the 7th June 2003.



Volutella buxi



Cylindrocladium buxicola



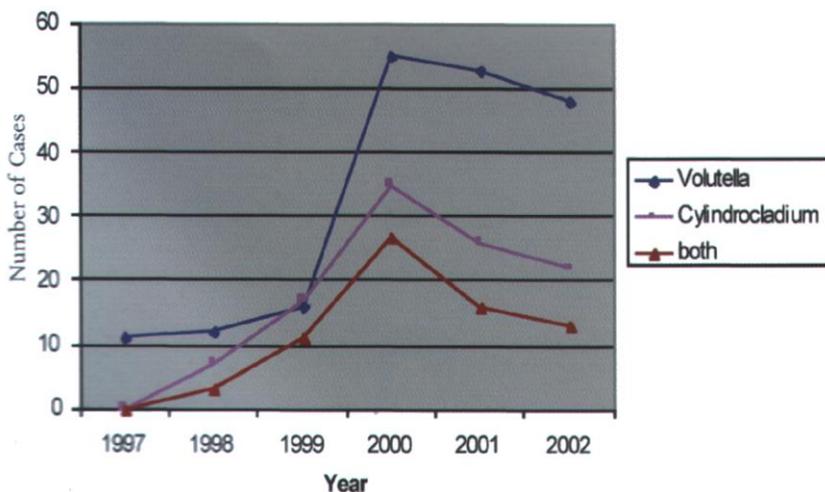
Q What are the main causes of box blight?

A They are two-fold: either *Volutella buxi* or *Cylindrocladium buxicola*

Q What can you tell us about *Cylindrocladium buxicola*?

A It was detected in the UK in the mid 90s. The symptoms are brown leaf spots that enlarge and coalesce in humid conditions, causing defoliation and black streaks on the bark. Koch's postulates were applied and a very high humidity is required for infection. The three photos above show box attacked by *Cylindrocladium*.

Cases of *Cylindrocladium* and *Volutella* and mixed infections



Q Is box disease on the increase?

A Yes it is, as the graph shows above. Most noticeable is the recorded increase in the incidence of *Volutella*, which rose dramatically in 1999. However, in 2002 both *Cylindrocladium* and *Volutella* dropped a little.

Q Are all box species vulnerable?

A The advisory service has recorded the disease on the following box species:

- *Buxus sempervirens*
- *Buxus sempervirens* 'Suffruticosa'
- *Buxus sempervirens* 'Variegata'
- *Buxus sempervirens* 'Suffruticosa Variegata'
- *Buxus sempervirens* 'Elegantissima'
- *Buxus sempervirens* 'Latifolia Maculata'
- *Buxus sinica* var *insularis* 'Justin Brouwers'
- *Buxus microphylla* var. *japonica* 'Morris Midget'
- *Buxus microphylla* var. *japonica* 'National'

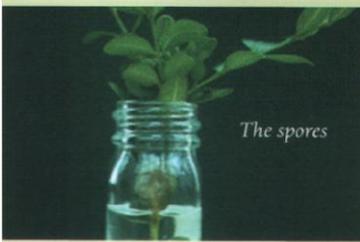
Q What is the life cycle of *Cylindrocladium buxicola*?



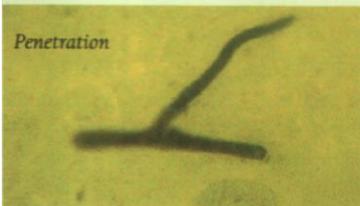
A Primary infection is short range from sticky spores which are airborne or splash dispersed. Secondary infection is from infected leaves.



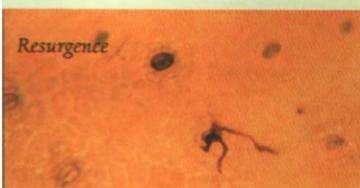
Germination starts three hours after infection, but only if humidity is high.



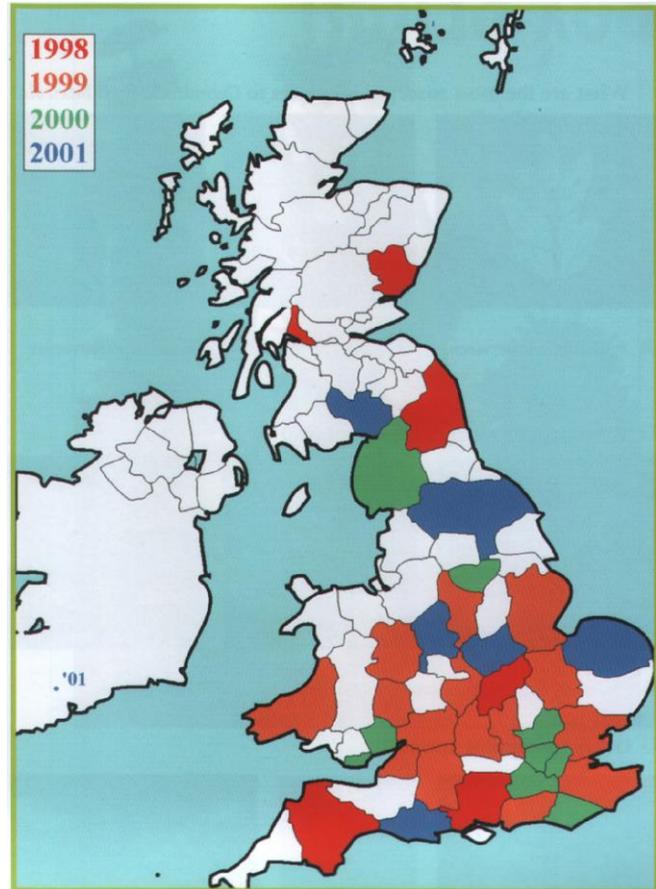
The photo left shows the infection by the fungus only where the air is saturated.



Penetration occurs directly through the cuticle (5.7 hours post infection).



Resurgence through the stomata can occur 48 hours after infection (disease cycle is quick).



Q Is the disease only prevalent in the UK or also further afield?

A Our research shows that it is indeed now widespread throughout the UK, but also to be found in Ireland, Belgium, Italy, France and Holland. Strangely enough it has also been found in New Zealand. The figure above shows the distribution of the disease throughout the UK, between 1998 and 2001.

Q How fast does the fungus grow in culture?

A There are no significant differences amongst isolates from
 box minimum temperature: 5°C
 optimum temperature: 25°C
 maximum temperature: below 30°C
 lethal temperature: 33°C
 This is a low temperature species (can grow below 10°C)



BOX BLIGHT

Q What are the most susceptible species to *Cylindrocladium buxicola*?



Buxus sempervirens

Buxus sempervirens
'Suffruticosa'

Buxus macowanii

Q What are the most resistant species?



Buxus balearica

Buxus tiparia

Sarcococca

Q Other susceptible species?



Buxus bodinieri

Buxus glomerata
'Green Gem'

Buxus harlandii



Buxus japonica
'National'

Buxus microphylla
'Faulkner'

Buxus sinica
var. *insularis*

Q What are the most important conclusions in your research?

A The morphological characteristics and sequence data show that the *Cylindrocladium* sp causing box blight is a new fungal species and has been named *c. buxicola*.

- The fungus has a heterothallic mating system.
- UK and New Zealand isolates are the same.
- The origin of box blight is unknown. It is not hybrid and therefore likely to have been introduced from a geographically isolated area.

- No box species so far tested is immune to the disease.
- The most effective fungicides to inhibit the growth in vitro of the fungus are carbendazim and kresoxim-methyl.

Q What work do you plan for the future?

A We will be carrying out pathogenicity assays on a range of *Buxus* spp. as well as continuing with fungicidal trials.

Q What can we as consumers do to try and prevent the spread of the disease?

- A** Buy healthy plants
- Cut out and dispose of affected plant material
Remove top soil
 - There are, to date, no fungicides labelled to control this disease for the amateur gardeners, but as the crop is statutory (not the disease), products labelled to control any diseases on ornamentals may be used to control box blight at the owner's risk. These are myclobutanil (Bio Systhane or Bio Fungus Fighter ready-to-use) and penconazole (Scotts Fungus Clear or Fungus Clear Gun! ready to use) which are labelled for some specific problems on ornamentals.
 - The chemical available to professionals for container grown stock and hardy nursery stock is Octave (prochloraz) labelled for 'fungal diseases' but under the off-label arrangements, pesticides approved on many growing crops may be used on hardy nursery stock at the owners' risk.

Q What are the effects of the fungicides you have tested on spore germination?

- A** 90-100% germination inhibition
- mancozeb (2 µg ai/ml)
 - carbendazim (1 µg ai/ml)
 - azoxystrobin (20 µg ai/ml)
 - kresoxim-methyl (0.2 µg ai/ml)

Not effective (less than 50% of germination inhibition)

- copper oxychloride (5 µg ai/ml)
- myclobutanil (50 µg ai/ml)
- thiophanate methyl (50 µg ai/ml)

Q What are the effects of fungicides on mycelium growth?

- A** 90-100% inhibition of mycelium growth
- penconazole (0.5 µg ai/ml)
 - prochloraz (0.5 µg ai/ml)
 - carbendazim (0.8 µg ai/ml)
 - kresoxim-methyl (0.5 µg ai/ml)
 - thiophanate-methyl (50 µg ai/ml)
 - myclobutanil (50 µg ai/ml)

Not effective (less than 50% inhibition growth)

- copper oxychloride (5 µg ai/ml)
- mancozeb (5 µg ai/ml)

Acknowledgements

Dr Alastair Culham (Reading)
Dr Brian Spooner (Kew)
Andrew Peace (Forestry Commission) Dr Caroline Gorton Langley Nursery
Sir Harper and J Glenn for the use of their pictures