

Persistence of *Phytophthora kernoviae* and *P. ramorum* on infested sites: impact on disease management

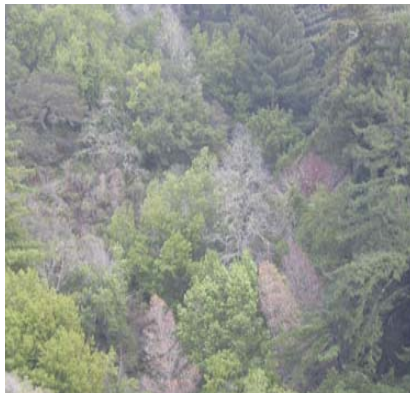
Joan Webber, Forest Research

3rd International Phytophthora Workshop

Forest Research
The Research Agency of the Forestry Commission

P. kernoviae / *P. ramorum*

- Both apparently introduced invasives in Britain
- Both aerial Phytophthoras which cause foliar/shoot symptoms on rhododendron
- Rhododendron is the UK 'bay laurel'
- Both cause bleeding lesions on trees, mainly beech (*Fagus sylvatica*)
- Both thrive under similar climatic regimes typical of Cornwall in south west England, so the majority of outbreaks are there



Disease outbreaks: 2002/03 - 08

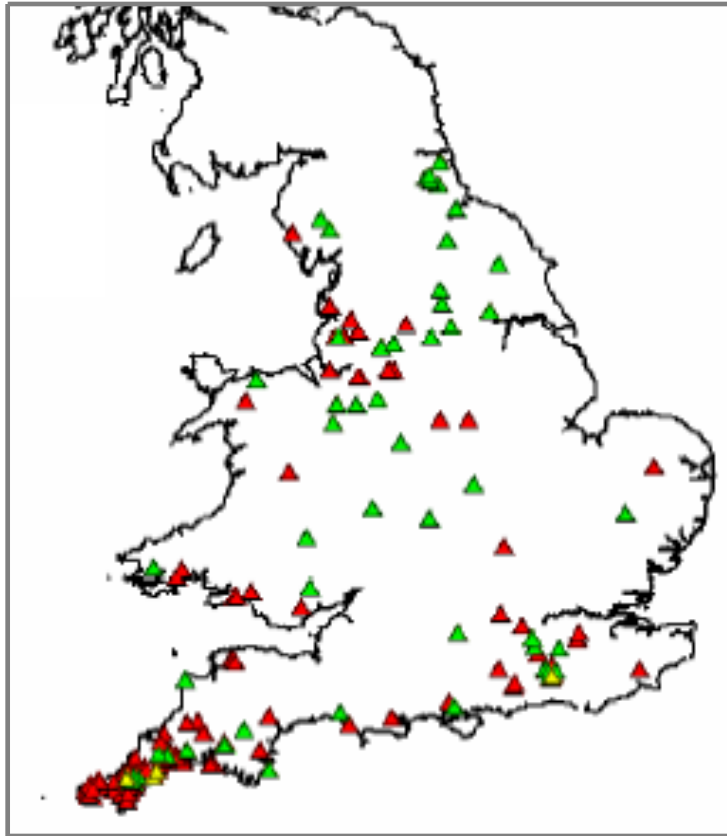
England, Scotland and Wales

Pathogen	Nurseries/ retail plant sales	Managed/ unmanaged
<i>P. ramorum</i>	611 (498*)	224 (68*)
<i>P. kernoviae</i>	4 (3*)	55 (2*)
Total	615 (501*)	279 (70*)

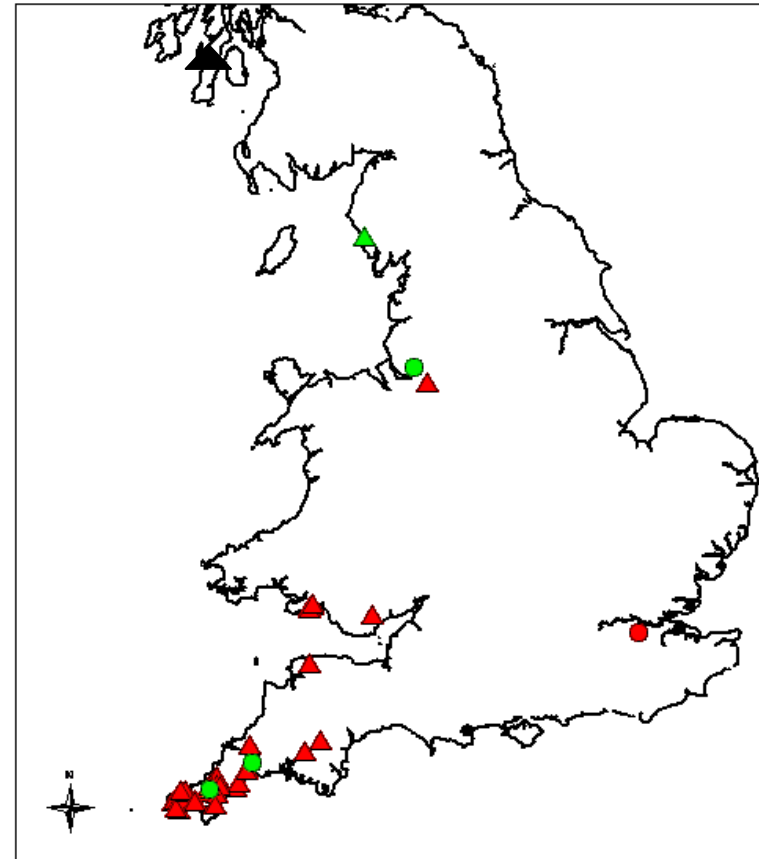
* eradicated outbreaks

Data derived from Defra Consultation document 2008

Distribution of Pr



Distribution of Pk





Impact of rhododendron eradication over 1-3 years

- Time frame for persistence in naturally infected leaves of rhododendron?
- Persistence in litter and soil?
- Regrowth and re-infection of the rhododendron?

How long does inoculum persist?



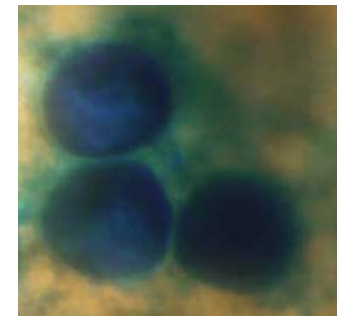
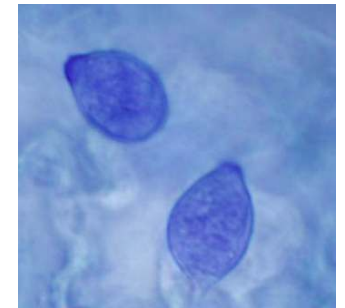
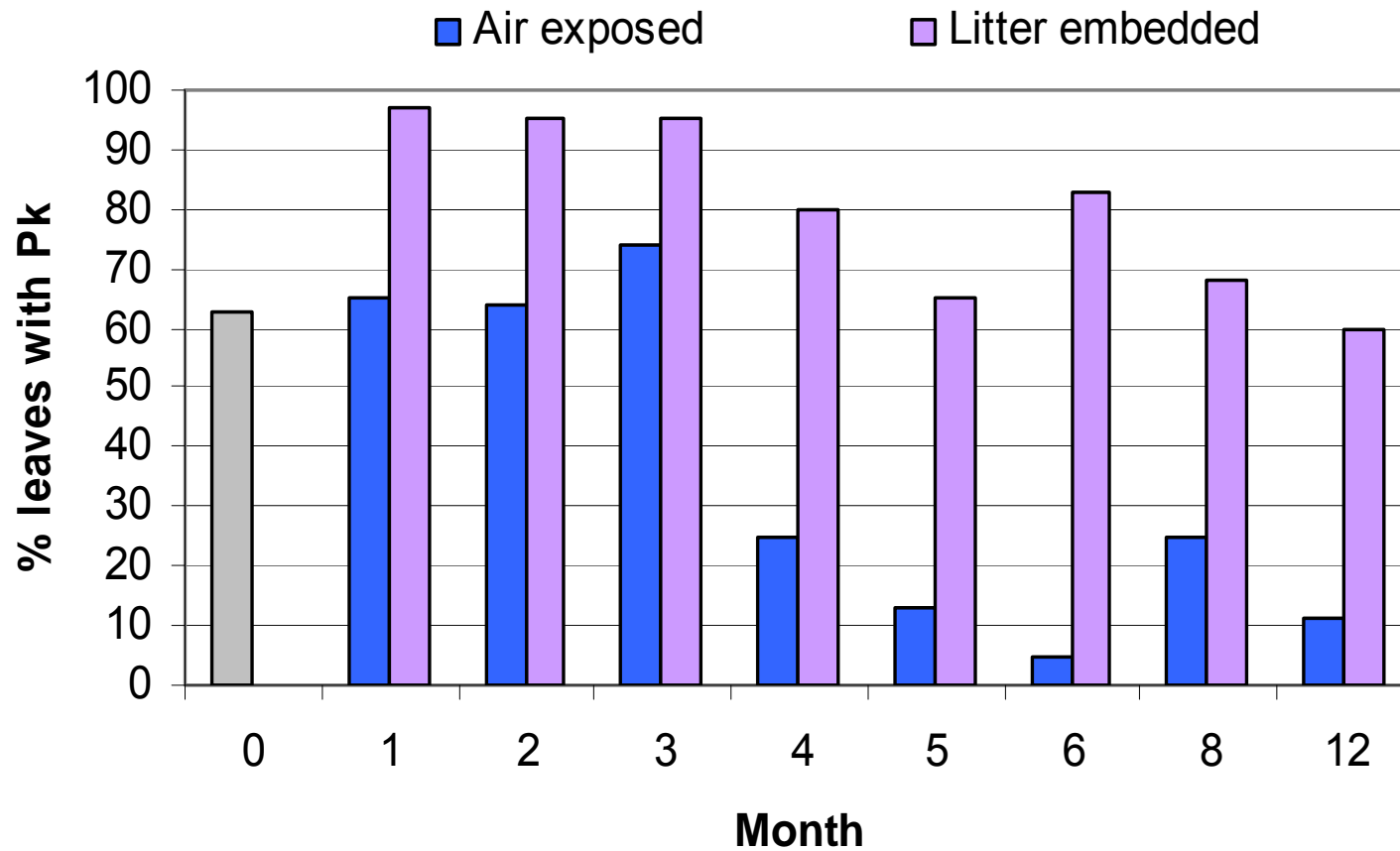
Persistence of *Pk* inoculum



Naturally infected leaves put into bags and air suspended or put in litter layer



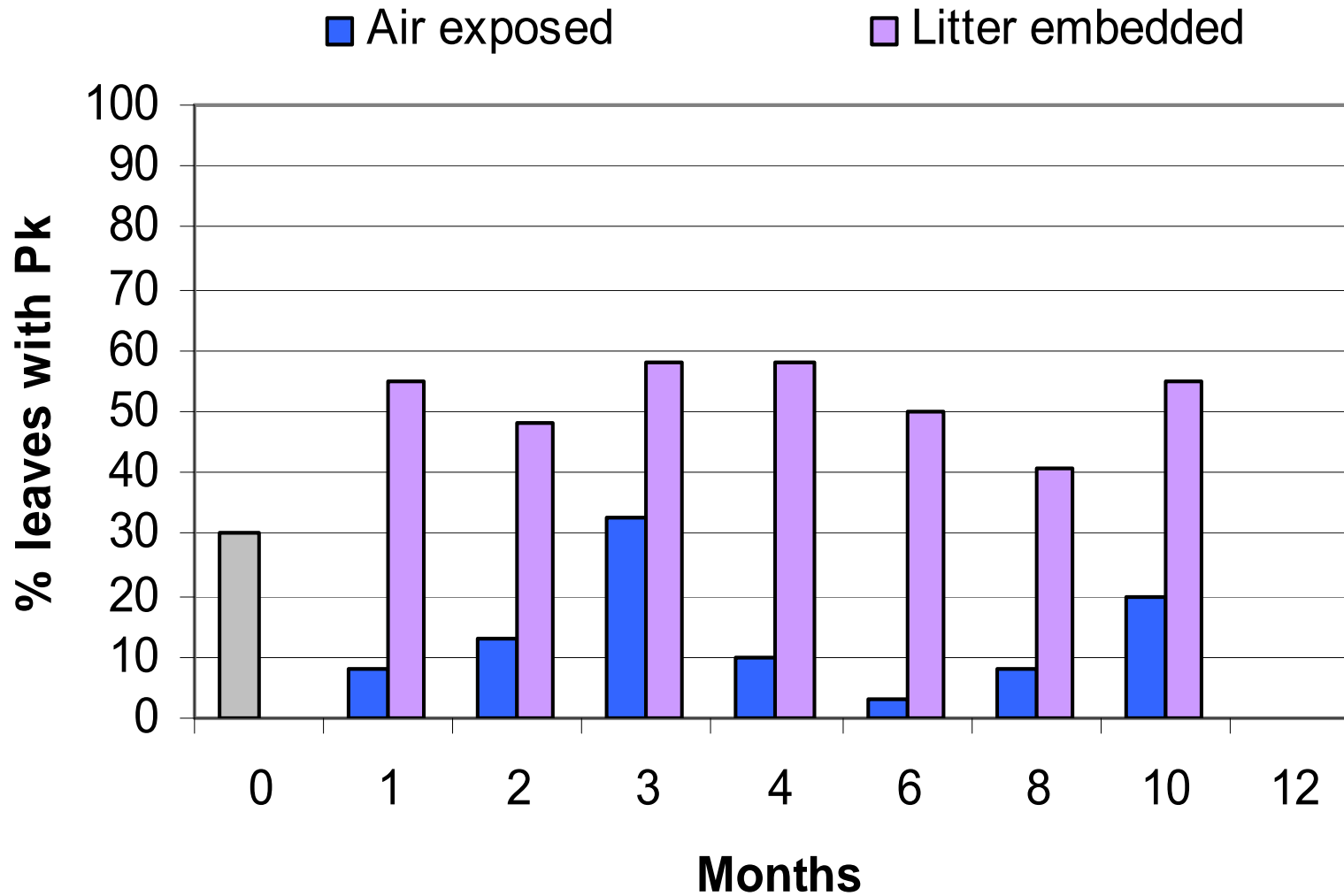
Survival of Pk in naturally infected leaves: 2005 - 06



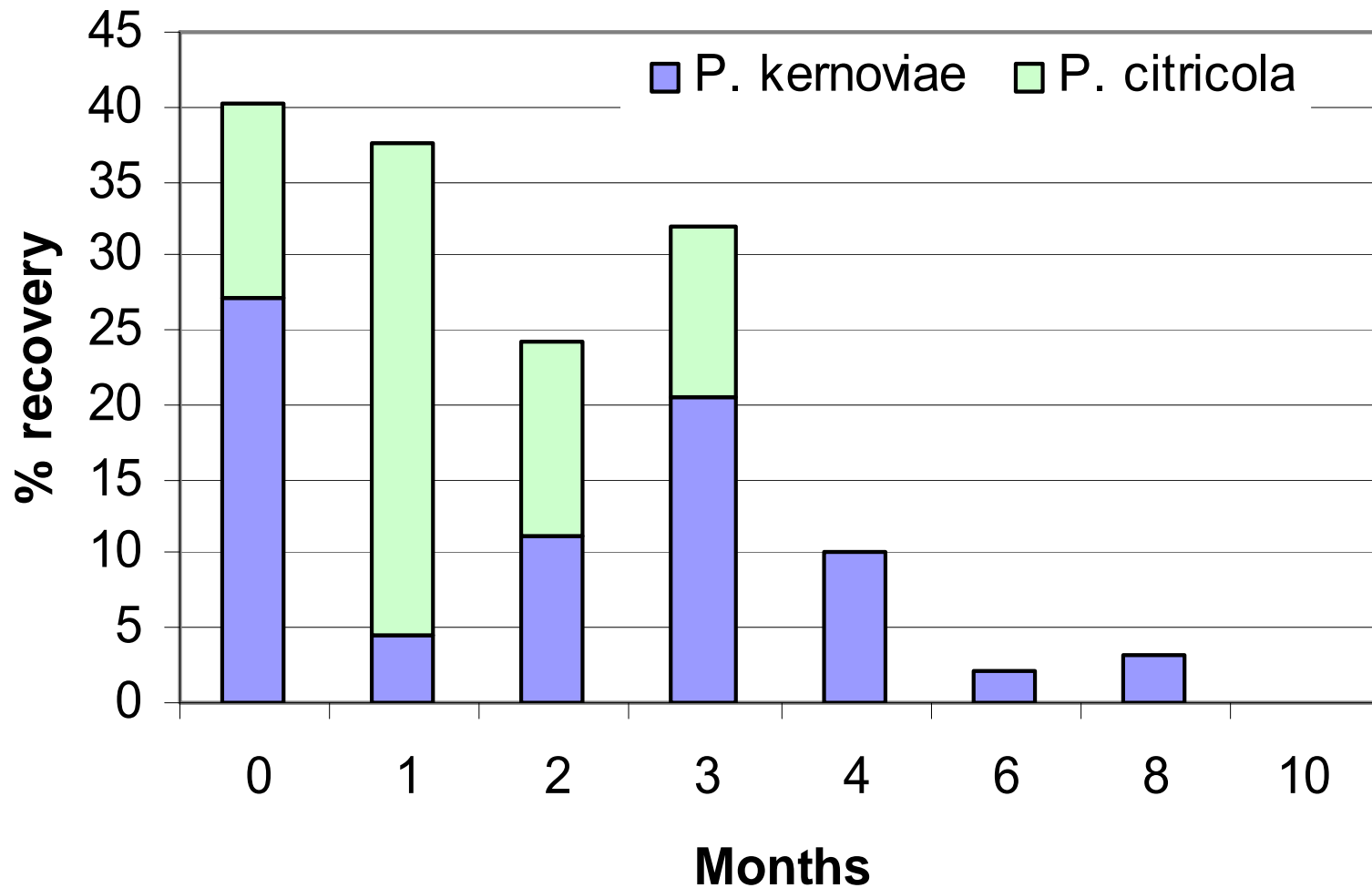
Deterioration of leaves over in the litter layer



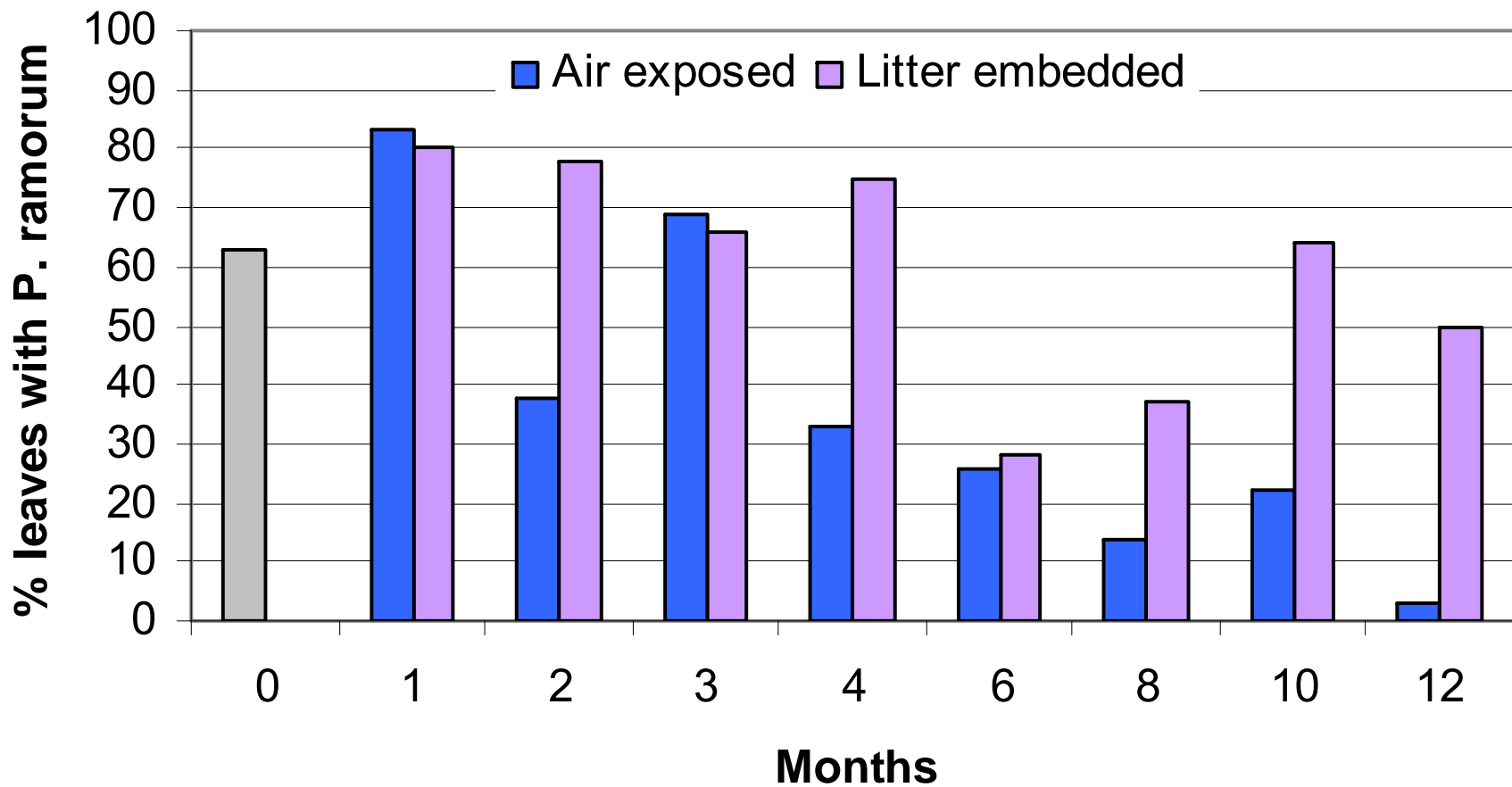
Survival of Pk in naturally infected leaves: 2006 - 07



Survival of *Phytophthora* in naturally infected leaves: 2006 - 07



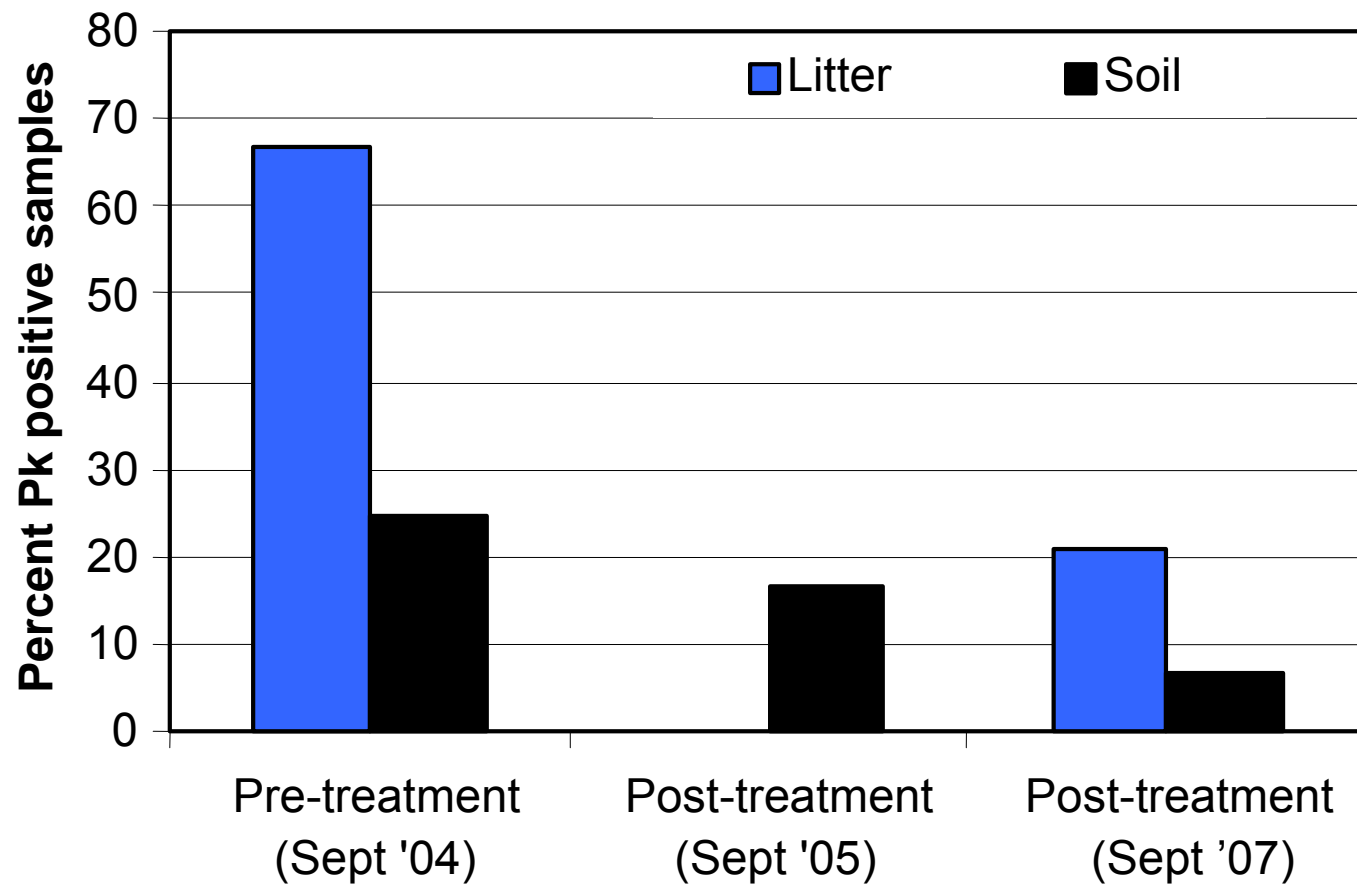
Survival of Pr in naturally infected leaves: 2006 - 07







Pre and post *R. ponticum* removal in a Pk infested woodland



What happens to inoculum.....



◀ Re-sprouting from rhododendron stumps with infection

Recruitment of new ► rhododendron seedlings

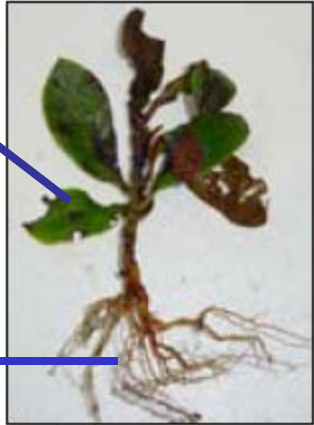


Impact of persistent Pk inoculum on rhododendron recruitment

Seedling	Foliage	Soil	Roots
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			



Emerging *R. ponticum* seedlings in a *P. kernoviae* management site



Symptomatic seedling with asymptomatic roots



Fichtner et al., 2008: APS

Conclusions

- Both Pr and Pk are proving to be difficult to eradicate from infected natural or semi- natural environments
 - eradication process must involve litter removal
 - but persistence is extended and signs of disease by Pk return after more than 3 yr following eradication
 - additional issue of asymptomatic infection of rhododendron roots by Pk
- Is it worthwhile?
 - removing the infected rhododendron does safeguard trees in woodlands from Pk infection
 - reduces inoculum and therefore likely to reduce the opportunities for Pk to get into the nursery trade
 - consultation on ‘is it worthwhile’?
www.defra.gov.uk/corporate/consult/phytophthora-ram-kern/index.htm