



Identification and Management of Massaria Disease of Plane

Experiences of The Royal Parks -

National Tree Officers Conference - November 2017

Royal Parks & London Plane

Bushy Park	32
Green Park	380
Greenwich Park	94
Hyde Park	800
Kensington Gardens	315
Regent's Park & Primrose Hill	375
Richmond Park	15
St James's Park/ The Mall	540
Brompton Cemetery	15
Victoria Tower Gardens	50
Grosvenor Square	38

Total: 2,654



Image by
Max Rush

Royal Parks & London Plane

Platanus spp. = 2% of Royal Parks 170,000 tree population

16% of inner parks tree population (Hyde, Kensington, Green, St James's, Regents)

***Platanus* population percentages:**

32% of Hyde Park

9% of Kensington Gardens

53% of Green Park

49% of St James's Park

7% of Regents Park

Maturing tree population due to historic planting and landscapes

678 of 800 *Platanus* in Hyde Park classed as Mature, 54 semi-mature

CAVAT value of £83,712,692 in Hyde Park



Massaria in the Royal Parks

Royal Parks trees are not subject to cyclical pruning regimes, they are generally full crowned to maturity. Management of street trees typically differs to our management which may affect levels of Massaria

Massaria identified in Hyde Park in 2008, small scale reactive management

A full time Massaria post has existed since 2012 due successive increase of Massaria

Massaria study with Treeworks Environmental Practice: mulch and compost tea application to record response

All inspections conducted initially from ground; requires favourable weather conditions and aided by binoculars (LTOA, 2013)

Some higher footfall target areas require aerial inspections

- Playgrounds
- Massaria study project inspections carried out from MEWP then findings recorded on LTOA inspection sheets

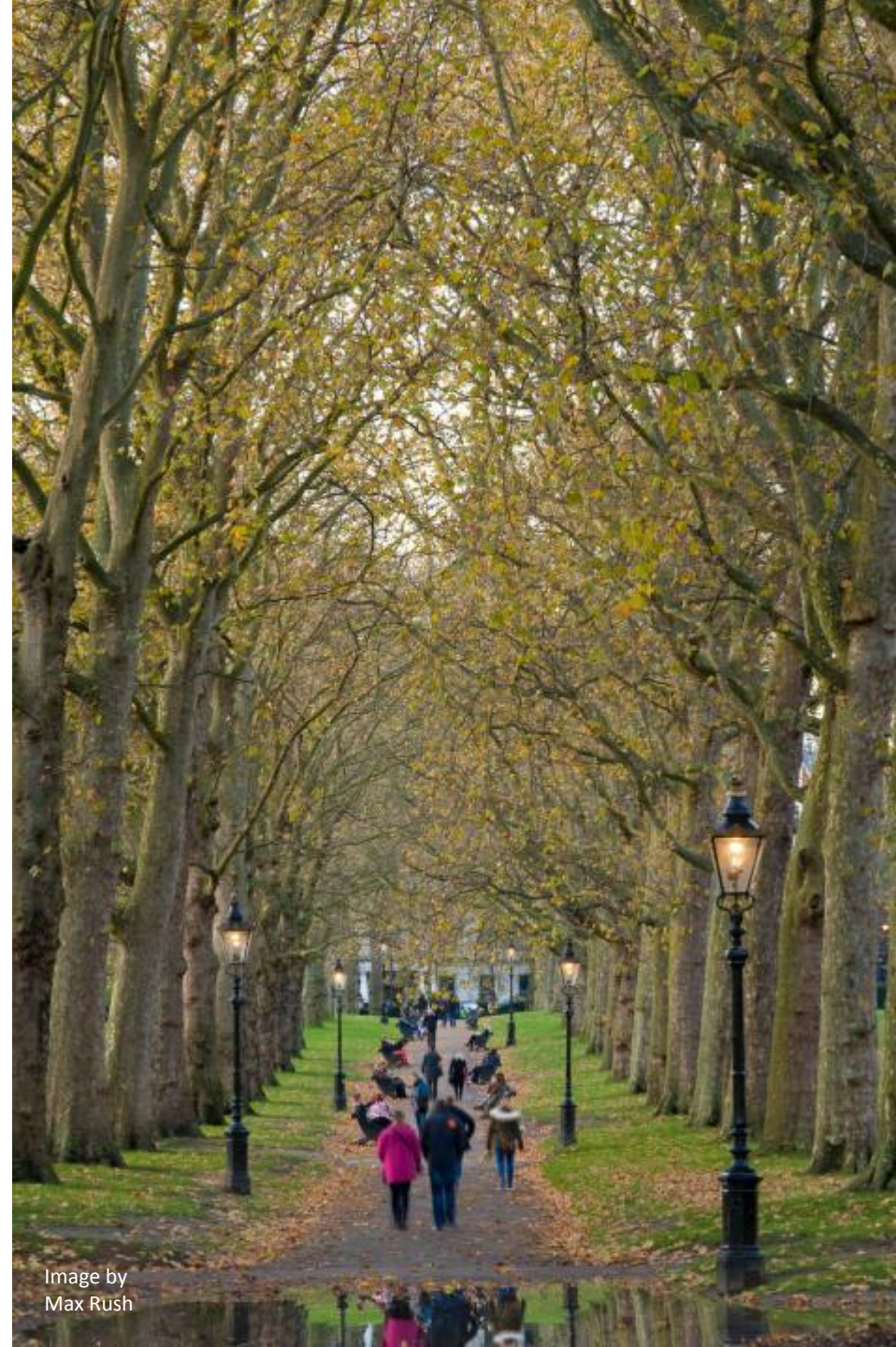


Image by
Max Rush

c.77 million+ visitors during Waves 1 – 4 (23 November 2013 - 22 November 2014)

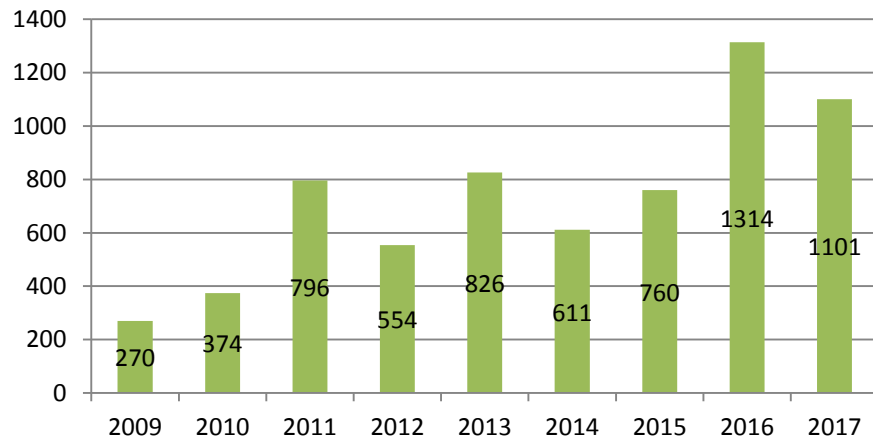
Total pedestrians, cyclists and horse riders...

	Wave 1 (Nov 2013)	Wave 2 (Feb 2014)	Wave 3 (June 2014)	Wave 4 (Aug/Sept 2014)	W1,W2,W3 & W4 combined
Bushy Park	451,811	416,127	657,115	854,003	2,379,056
Greenwich Park	838,220	926,000	1,486,461	1,510,021	4,760,702
Hyde Park	3,552,750	1,726,332	3,903,057	3,626,592	12,808,731
Kensington G'dens	1,772,103	1,978,212	3,263,265	3,363,948	10,377,528
Richmond Park	1,095,672	1,086,782	1,500,397	1,778,470	5,461,321
St James's Park	3,954,501	3,191,262	4,940,820	4,877,232	16,963,815
Green Park	3,302,757	2,361,678	4,170,039	4,388,868	14,223,342
Regent's Park	1,342,522	1,479,443	2,302,082	2,901,596	8,025,643
Primrose Hill	510,435	526,974	802,842	844,320	2,684,571
TOTAL	16,820,771	13,692,810	23,026,078	24,145,050	77,684,709

Wave 1 counts (covering 23 November 2013 to 21 February 2014) took place Sunday 24 November and Tuesday 26 November 2013. Wave 2 counts (covering 22 February to 23 May 2014) took place Sunday 23 February and Tuesday 25 February 2014. Wave 3 counts (covering 24 May to 22 August 2014) took place Sunday 01 June and Tuesday 03 June 2014 except Hyde Park, Green Park and St. James's Park, where counts took place on Sunday 15 June and Tuesday 17 June. Wave 4 counts (covering 23 August 2014 to 22 November 2014) took place on Sunday 31 August and Tuesday 02 September 2014.

Massaria in the Royal Parks

TRP MDP affected trees 2009 - 2017 (total London planes: 2654)



Significant increase from 2015 to 2016 which was consistent across London; possibly due to a warm winter and dry summer in London.

2012 had fewer occurrences of Massaria during the wet summer

2017 has fewer total trees but varied across parks

- Green/St James's +78
- Hyde Park - 62
- Kensington - 149
- Regents - 80



Overview of Massaria..Published Literature

Splanchnonema platani the causal agent of Massaria Disease of Plane

Ascomycete soft rot which can lead to brittle, sudden branch failure (Kehr, 2011; Tubby, 2015)

Considered a weak pathogen, associated with drought stress (Kehr, 2011; Tubby, 2015)

Hyphae of *S. platani* are able penetrate from cell to cell through bordered pits by forming thin perforation hyphae in order to penetrate the secondary cell wall rather than the middle lamella (Schmitt *et al*, 2014)

Reported in Germany during a drought in 2003, further reports across Europe (Kehr, 2011)

First identified in Kew Gardens in 2003 and then Hyde Park in 2008 (LTOA 2013; Tubby, 2015)

This presentation is based upon Royal Parks experience with Massaria so far combined with existing best practice documents. It is not intended as a definitive management guide



My Observations

Identification Aid: On the Ground*

Discoloured inner bark:

- Fawn/russet colour and crumbly
- Normal bark shedding is cream coloured and firm, larger

Bark spore layer:

- Flaked bark on ground can often have a black sooty spore covering which can easily be scraped off

Twigs:

- Massaria bark is much more fragile and easily comes off
- Removing the bark exposes fawn/russet discolouration

Spores on sticks:

- Delicately peeling the top layer of bark exposes the mycelium and spore structures.
- February to May best time

*May not be present in urban areas due to e.g. road sweeping, used in parks for identification



Identification Aid: Fracture Point

'Step Fracture'

- Fracture more typically associated with *Massaria* branches in published literature
- Tension wood degradation while compression wood largely intact
- Often remains attached in tree
- Less likely on ground
- Branches typically removed in Royal Parks before fracturing in this manner



'Clean Fracture'

- *Massaria* has progressed into compression wood, complete branch death
- Easily detaches from branch collar
- Most often on smaller \varnothing branches, can occur on larger branches
- Can result in sudden branch fracture
- Fracture point clean and even as opposed to jagged tear
- Pronounced rays
- I see this branch fracture more frequently



Identification Aid: In the Canopy

Possible Epicormic Growth at Branch Collar

Epicormic growth is a general stress response by the tree, not specific to Massaria

Cellular degradation of branches can cause a stress response, which can result in epicormic growth

Epicormic can be present without evident Massaria and vice versa

Can be multiple seasons worth of epicormic growth before Massaria is visible

- Is Massaria active in branch before external expression?

I use as aid for identifying Massaria branches on days of poor visibility

- Record occurrence then check on next inspection



Identification Aid: In the Canopy

Examples of Epicormic, Spores & Discolouration

Epicormic

- Epicormic growth at the base of a Massaria branch
- Appears to be over 2 seasons old

Spores

- Black, sooty covering of bark
- Spores stop in line with the branch collar, typically does not breach branch collars but are there exceptions?
- Black powdery spore layer found along branch but in higher density toward branch collar (Kehr, 2011)

Wood Discolouration & Flaky Bark

- As Massaria kills the cambium and degrades the wood, the bark weakens and flakes off
- Discoloured patches become visible from the ground
- Russet/Fawn colour characteristic



Identification Aid: In the Canopy

Massaria/Blister Strip 'Classic Massaria'

The feature most associated with Massaria in published literature

Appears on the upper side of branches making identification sometimes difficult

Can appear on lower and outer crown branches

Snake like, sinuous growth of branches can aid identification; move around the base of tree for different perspectives.

Time between emergence and branch failure can be as short as 3 months but can take 1-2 years for failure, sometimes longer

Potential for confusion with branch rubbing, similar colour



Identification Aid: In the Canopy

Massaria branches

During early Massaria progression leaves may still be present with no apparent loss of vitality. Patches of desiccating leaves can be an indicator amongst healthy canopy

As Massaria progresses, bark flakes off exposing more discoloured wood. Flaking bark is characteristic of *Platanus spp.* so does not automatically indicate Massaria.

LTOA research found that 95% of 320 branches were under 200mm Ø, 63% under 100mm Ø. Consistent with Royal Parks findings (LTOA, 2013)



Identification Aid: In the Canopy

Colour Coding Branch Degradation

Brighter coloured stick is early stage. Can still fail in this stage

Dull grey stub is advanced stage

I have observed that earlier stage branches can have a large degree of residual strength, can survive strong winds **but** can also fracture suddenly

Colour coding used to aid work priority in Royal Parks but is not an accurate measure of branch failure



Identification: Cross Section

If I find branches on the ground, I look at the cross section to determine if failure can be attributed to Massaria or storm damage

'V' Shaped Wedge

Another hallmark of Massaria within the branch itself; initially contained within the longitudinal section but later progresses radially.

Can also weaken sufficiently in tension wood via soft rot mode that longitudinal and transverse cracks emerge (Mattheck, 2007)

Cracks become longer until it meets sound wood, then loading forces combined with lack of residual strength can cause branch failure (Mattheck, 2007)



Image by
Ian Rodger



Image by
Ian Rodger

Identification: Cross Section

Even Progression

Personal and departmental anecdotal experience rarely seen 'V' shaped progression.

Discolouration tends to be more evenly spread along the cross section

Not frequently mentioned in published literature



Massaria & *Inonotus hispidus*

As *Massaria* degrades the cellulose of the tension wood, *I. hispidus* decays the core of the branch or trunk, which can result in a semi-circle or thin band of compression wood supporting the weight of the branch

Platanus are reported to withstand *I. hispidus* decay for many years. (Schwarze, 2008)

I have witnessed branch failure with this fungal combination

Anecdotally, vertical branches are more stable

I conduct a closer inspection of suspected branches with symptoms of *I. hispidus*



Image by
Ian Rodger



TRP Management of Massaria

Royal Parks management of Massaria has been developed due to high visitor numbers, the maturity and scale of trees

Royal Parks has explicitly identified *Platanus* as higher risk requiring more frequent inspections

Royal Parks divided into Risk Zones 1-4 based upon usage:

- Zone 1: Annual Inspections
- Zone 2: Biennial Inspections
- Zone 3: 3-5 Year Inspections
- Zone 4: 5+ Years - No Public Access

Platanus in central parks are inspected on a 3 month cycle in Zone 1, ad hoc inspections for events.

Inspections and work requirements recorded on ARBORtrack, then issued to contractors, work then inspected upon completion and checked off to complete inspection cycle



TRP Management of Massaria

Usual Massaria work specifications include:

Major Deadwood (>50mm Ø)

Specific Branch Removal/Reduction

Branches identified at inspection included on work order.

When in tree, arborist is expected to remove or reduce any additional found not visible from ground that are deemed hazardous and to visually inspect adjacent trees: additional works issued to cover identified branches

Whilst we normally remove Massaria branches following inspection; subject to risk assessment, there may be circumstances where we reduce or retain individual branches until a later date



My experience of managing Massaria has prompted the following questions

Can branches contain or recover from Massaria?

The initial colonisation (image right) appears to be contained within a barrier zone (wall III), a callous has also formed at the margins of the blister strip

If tree vitality is maintained, can the barrier zone remain and allow the callous to occlude the Massaria strip?

Is this resistance water dependant?

Research is needed to verify this



Image by
Tom Izod

Image by
Tom Izod

More questions from observations

**Are there different multiple colonisations?
Or different strains of Massaria?**

Does the image show multiple colonisations of Massaria? Or has the original strain breached the barrier zones and progressed through the wood?

If the latter, was this breach barrier due to water deficiency and environmental stress?

Clone type and resistance

Royal Park's experience has suggested that visually distinct *Platanus* clone types have varying levels of susceptibility

Research is needed to verify these



Future for Massaria

Massaria seems unlikely to disappear

Will the management cost outweigh the advantages of *Platanus*?

Can we mitigate Massaria on future generations of *Platanus* by improving planting conditions, hydrology and minimising wounds and damage?

Dramatic changes to the landscape?

Can a tree be killed by Massaria?

Outcome of Massaria study will hopefully inform future management

Ceratocystis platani – Current Massaria management will have to be reviewed



“Tree inspection and control needs to be balanced and proportionate to the real risks as opposed to the perceived risk, associated with Massaria within the context of overall tree management resources”

- Massaria Disease of Plane; Practical Management Guidance
- London Tree Officers Association

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