

Bygythiad i'n coetiroedd, gweunydd a gerddi hanesyddol
A threat to our woodlands, heathlands and historic gardens

Phytophthora ramorum



Ardal o gwmpas Rhododendron heintiedig
Area around infected Rhododendron

Beth yw e a ble mae i'w weld?

Mae *Phytophthora ramorum* yn bathogen difrifol ar blanhigion sy'n debyg i ffwng ac sy'n achosi niwed i amrywiaeth eang o goed a phlanhigion yn Ewrop a'r Unol Daleithiau.

Yn yr UE, mae cofnodion bod *P. ramorum* yn bresennol yn yr Almaen, Denmarc, Estonia, Ffindir, Ffrainc, yr Eidal, yr Iseldiroedd, Iwerddon, Gweriniaeth Tsiec (mewn meithrinfa a'i ddiddymu), Gwlad Belg, Gwlad Pwyl, Latfia, Lithwania, Luxembourg, Portiwgal, Slofenia, Sbaen (gan gynnwys Mallorca), Sweden a'r Deyrnas Unedig (gan gynnwys Ynysoedd y Sianel). Mae wedi'i gofnodi hefyd yn Norwy a'r Swistir.

Yn yr Unol Daleithiau, California ac Oregon sy'n dioddef waethaf gyda llawer o goed wedi'u lladd gan yr haint yno. Mae wedi'i weld ar amrywiaeth o blanhigion addurnol mewn meithrinfeydd mewn sawl talaith yn UDA, ac yng Nghanada.

Credir bod y pathogen wedi cyrraedd yr Unol Daleithiau ac Ewrop yn gymharol ddiweddar ond ar drywyddau gwahanol, o bosibl o Asia. Mae'r pathogen yn bod ar ffurf dau deip paru ar wahân (A1 ac A2) a dim ond pan ddaw'r ddau deip at ei gilydd y gall atgennedlu rhywiol ddigwydd. Os bydd yn llwyddiannus, gallai arwain at sborau all fyw'n gymharol hir a chanddynt fwy o botensial am amrywiaeth enynnol, gan wneud y clefyd yn llawer anoddach i'w reoli. Er hynny, yn ôl astudiaethau diweddar, mae hwn yn ddigwyddiad prin. Pryder arall yw'r cyfnod pan fydd y sborau ynghwsg (chlamydosbôr) – maen nhw'n gallu goroesi yn y pridd ac yng ngweddillion planhigion am flynyddoedd mawr.

PLANT DISEASE FACTSHEET

What is it and where is it found?

Phytophthora ramorum is a serious fungus-like pathogen causing damage to a wide range of trees and plants in Europe and the USA.

In the EU, *P. ramorum* has been recorded as present in Belgium, Czech Republic (eradicated nursery finding), Denmark, Estonia, Finland, France, Germany, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Poland, Portugal, Slovenia, Spain (including Mallorca), Sweden and the UK (including the Channel Islands). Elsewhere in Europe, *P. ramorum* has also been recorded in Norway and Switzerland.

In the USA, California and Oregon have been worst affected with numerous trees killed as a result of infection. It has also been found in a range of ornamental plants in nurseries in several US states and Canada.

The pathogen is considered to have been introduced separately and relatively recently to the USA and Europe, possibly from Asia. The pathogen exists as two separate mating types (A1 and A2) and sexual reproduction can only occur if these two types come together. If this mating system is functional, it would result in relatively long-lived spores and potentially, greater genetic variability, thereby making control of the disease much more difficult; however recent studies have suggested that this is an unlikely event. Of further concern is the resting spore (chlamydospore) stage that can survive in the soil and plant debris for many years.

Pam poeni ac ar ba blanhigion y mae'n byw?

Mae'r clefyd yn epidemig yng Nghalifornia ac Oregon lle mae'n lladd llawer o goed deri a deri dwysflodeuol. Yr enw cyffredin arno yno yw Marwolaeth Sydyn y Deri (Sudden Oak Death). Mae wedi'i weld hefyd ar amrywiaeth eang o goed a phlanhigion brodorol eraill yng Ngogledd America. Yn yr Unol Daleithiau, ystyriwyd mai clefyd y coetiroedd oedd *P. ramorum* yn y lle cyntaf, ond ers 2003 mae wedi cael ei weld ar blanhigion mewn meithrinfeydd mewn sawl talaith yn UDA. Mae wedi'i gofnodi mewn sawl ardal yng Nghnada hefyd.

Ym Mhrydain ac yn Ewrop, mae'r pathogen yn cael ei weld yn bennaf ar blanhigion addurnol mewn meithrinfeydd mewn sawl gwlad. Ond mae wedi'i weld hefyd y tu allan i feithrinfeydd mewn ambell ardd a choetir lled-naturiol ar lwyni caled (rhododendron yn bennaf), ac effeithio ar nifer o goed ym Mhrydain (De Orllewin Lloegr sydd wedi dioddef fwyaf) a'r Iseldiroedd.

Hyd yma, mae'r pathogen wedi ymosod ar y planhigion addurnol canlynol ym Mhrydain ac Ewrop: Rhywogaethau o *Arbutus*, *Calluna* (grug), *Camellia*, *Choisya*, *Cornus*, *Garrya*, *Ilex*, *Griselinia*, *Hamamelis* (collen ystwyth), *Kalmia*, *Laurus* (llawryfen), *Leucothoe*, *Lonicera* (gwyddfif), *Magnolia*, *Michelia*, *Osmanthus*, *Parrotia*, *Photinia*, *Pieris*, *Rhododendron*, *Ribes*, *Syringa* (lelog), *Taxus* (ywen) mewn tybiau, *Umbellularia californica* (llawryfen California), *Vaccinium* a *Viburnum*. Mewn meithrinfeydd, y rhywogaethau y cafwyd y pathogen amlaf arnynt yw'r *Rhododendron*, *Viburnum* a *Camellia* mewn tybiau.

Fodd bynnag, i goed a phlanhigion ecolegol bwysig eraill, fel planhigion y gweunydd, y mae'r bygythiad mwyaf. Ym mis Hydref 2003, derwen goch y de (*Quercus falcata*) oedd y goeden gyntaf ym Mhrydain i gael ei heintio gan *P. ramorum*. Yr un pryd, gwelwyd y pathogen am y tro cyntaf yn yr Iseldiroedd, ar dderwen goch y gogledd (*Quercus rubra*). Ers hynny, mae wedi'i weld ym Mhrydain ar nifer o fathau o goed deri eraill (derwen anwyw yr hafnau, derwen anwyw California, derwen fythwyrdd, derwen fytholwyrdd Siapan, derwen Twrci, derwen mes di-goes) yn ogystal â choed ynn, coed camffor, coed chinguapin, cochwydd California, ffawydd, coed ewcalyptws, coed castan, helyg deilgron, *Lithocarpus*, coed masarn bach, *Nothofagus*, *Osmanthus*, *Schima*, bedw arian, castan pêr, sycamor, sbriws-hemlog y gorllewin a choed rhisgl Winter.

Ym mis Awst 2009, gwelwyd bod coed llawrydd Siapan (*Larix kaempferi*) wedi'u heintio'n gas ar sawl safle yn ne-orllewin Lloegr. Pa le bynnag y mae coed wedi'u heintio ym Mhrydain, mae'r

rhododendron gerllaw hefyd wedi'u heintio (heblaw am rai achosion ger coed llarwydd). Mae gwaith arbrofol wedi'i wneud hefyd i weld pa goed eraill ym Mhrydain allai gael eu heintio gan *P. ramorum*. Yn eu plith y mae ffynidwydd Douglas (llety naturiol iddo yn UDA), ffynidwydd llwydglas, cypryswydd Lawson a sbrïws Sitka.

Yn ôl y gwaith ymchwil cyntaf, nid oedd y pathogen i'w weld yn ymosod ar blanhigion *Vaccinium*. Fodd bynnag, ym mis Rhagfyr 2008, cafwyd llus (*V. myrtillus*) wedi'u heintio gan *P. ramorum* mewn coedlan yng Nghernyw ac ers hynny, mewn sawl safle gwyllt arall. Mae profion mewn labordai wedi dangos bod rhai mathau o rug (rhywogaethau *Erica*) a grug yr ysgub (*Calluna vulgaris*) yn agored i'r pathogen. Mae grug yr ysgub yn lletywr naturiol iddo ar dir mawr Ewrop (mewn meithrinfeydd), cafwyd llus coch (*V. vitis-ideae*) wedi'u heintio mewn meithrinfa yn y DU ac mae llus America (*V. ovatum*) yn gartref naturiol iddo mewn coedlannau yng Ngogledd America.

Cafwyd cofnod gan feithrinfeydd bod y pathogen yn ymosod ar nifer o blanhigion eraill gan gynnwys *Calluna*, *Pyracantha* a *Photinia* a chafwyd adroddiadau ei fod yn ymosod ar *Rosa gymnocarpa* yn eu cynefin yn UDA; er hyd yn hyn, nid oes cofnod ym Mhrydain eu bod yn lletya'r pathogen.

Why the concern and what are the hosts?

The disease has reached epidemic proportions in California and Oregon where it is causing widespread death of species of oak and tanoak trees and is commonly known there as 'Sudden Oak Death'. It has also been found on a wide range of other trees and plants native to North America. In the USA, the pathogen was originally considered a woodland disease, but since 2003 been impacting nursery plants in several US states. It has also been found in areas of Canada.

In the UK and Europe, the pathogen had been found predominantly on ornamental plants in nurseries in several European countries. However, it had also been found outside nurseries in a few managed gardens and semi-natural woodland areas on hardy shrubs (principally rhododendron) and affecting a number of trees in the UK (South West England being the worst affected area) and the Netherlands.

To date the full range of known ornamental hosts in the UK and Europe include species of *Arbutus*, *Calluna* (heather), *Camellia*, *Choisya*, *Cornus*, *Garrya*, *Ilex*, *Griselinia*, *Hamamelis* (witch-hazel), *Kalmia*, *Laurus* (laurel), *Leucothoe*, *Lonicera* (honeysuckle), *Magnolia*, *Michelia*, *Osmanthus*, *Parrotia*, *Photinia*, *Pieris*, *Rhododendron*, *Ribes*, *Syringa* (lilac), container grown *Taxus* (yew), *Umbellularia californica* (Californian bay laurel), *Vaccinium* and *Viburnum*. Most nursery findings have been on container-grown *Rhododendron*, *Viburnum* and *Camellia* plants.

However, the main threat is to tree species and other ecologically important plants, such as heathland species. In October 2003, an American southern red oak tree (*Quercus falcata*) was the first tree infected with *P. ramorum* in the UK coinciding with the first tree finding in the Netherlands on a northern red oak (*Quercus rubra*). There has since been findings in the UK on several other oak species (canyon live oak, coast live oak, holm oak, Japanese evergreen oak, turkey oak, sessile oak), as well as ash, camphor, chinquapin, coast redwood, European beech, eucalyptus, horse chestnut, goat willow, *Lithocarpus*, maple, *Nothofagus*, osmanthus, *Schima*, silver birch, sweet chestnut, sycamore, western hemlock and winter's bark.

In August 2009 severe infection of Japanese larch (*Larix kaempferi*) was found at a number of sites throughout south west England. Infected rhododendrons have been in close proximity to all infected UK trees (except some outbreaks on larch) to date. Experimental work has highlighted other tree species that could also be at risk from *P. ramorum* in the UK. These include Douglas fir (a natural host in the USA), Noble fir, Lawson cypress and Sitka spruce.

Initial UK surveys of *Vaccinium* species in heathland environments did not detect the pathogen. However, in December 2008, bilberry (*V. myrtillus*) was found infected by *P. ramorum* in woodland in Cornwall and has since been found at a number of locations in the wild. Laboratory tests have shown that some species of heather (*Erica* species) and Scottish heather (*Calluna vulgaris*) are susceptible to the pathogen. Scottish heather has been recorded as a natural host in mainland Europe (nursery finding), cowberry (*V. vitis-ideae*) was found infected on a UK nursery and huckleberry (*V. ovatum*) is a natural host in woodland in North America.

Several other hosts such as *Calluna*, *Pyracantha* and *Photinia* have been reported as natural hosts for *P. ramorum* from nurseries and Californian wood rose (*Rosa gymnocarpa*) has been reported as a natural wild host from the USA; although to date these hosts have not been found infected in the UK.

Mae'r rhestr ddiweddaraf o'r planhigion lletya i'w gweld ar wefan Fera yn <http://www.defra.gov.uk/fera/plants/plantHealth/documents/suscept.pdf>

Mae data am arbrofion ar sensitifedd coed a phlanhigion eraill ar gael yn <http://www.defra.gov.uk/fera/plants/plantHealth/documents/testhost.pdf>

Mae rhagor o fanylion am blanhigion lletya naturiol ac mewn arbrofion yn <http://rapra.csl.gov.uk/>

The most recently-updated list of known hosts is available on the Fera website at <http://www.defra.gov.uk/fera/plants/plantHealth/documents/suscept.pdf>

Experimental data on the susceptibility of tree and non-tree species is available at <http://www.defra.gov.uk/fera/plants/plantHealth/documents/testhost.pdf>

Further details of known natural hosts and experimental susceptibility can be found at <http://rapra.csl.gov.uk/>

Beth yw'r symptomau?

Ar *Rhododendron*

Mae *P. ramorum* yn achosi malltod ar y brigau a'r egin. Mae'r brigau a'r egin hynny'n troi'n lliw brown i ddu a gall lledaenu i'r dail trwy goesyn y dail. Mae'r dail yn gallu cael eu heintio heb i'r brigau gael eu heintio; nid oes haint ar y gwreiddiau. Mae'r symptomau'n debyg i effaith ffyngau eraill ar *Rhododendron* ond bod hwn yn datblygu'n gynt.

Mae'r symptomau nodweddiadol yn cynnwys duwch o gwmpas bon coes y dail a blaen y dail a gall ymestyn ar hyd y wythien ganol. Gall cancrau ar y brigau beri i'r egin wywo; gall y dail bara ar y brigyn a phara'n ddi-friv.

What are its symptoms?

On *Rhododendron*

P. ramorum causes shoot/twig and leaf blight. Affected shoots or twigs develop a brown to black discolouration that can spread into the leaves via leaf petioles (leaf stalk). Leaf infection can also occur without twig infection; roots are unaffected. Symptoms can be similar to those caused by other fungal pathogens on *Rhododendron*, but their development can be more rapid.

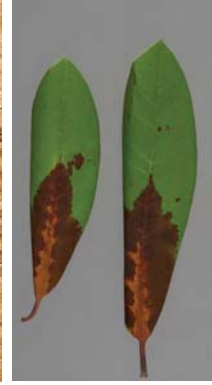
Characteristic symptoms include blackening of the petiole leaf base and leaf tip that may extend along the mid-rib. Twig cankers can lead to wilting of shoots; in such cases leaves remain attached but may not develop any lesions.



Brigau Rhododendron yn gwywo
Aerial dieback of *Rhododendron*



Duwch ar flaen a gwythiennau canol dail Rhododendron
Blackening around the tips and mid-ribs of *Rhododendron* leaves



Ar *Viburnum*

Fel arfer, bôn y coesyn sy'n cael ei heintio, gan wywo cyn marw. Gall arwain at heintiadau brown a du ar y dail, yn enwedig ar fathau bythwyrdd a gall effeithio hefyd ar y blodau. Mae'r pathogen wedi'i weld ar wreiddiau planhigion sydd â briwiau wrth fôn coesyn y dail, ond nid oes prawf bod gwreiddiau'n cael eu heintio.

On *Viburnum*

Infection commonly occurs at the stem base causing wilting and then death. The pathogen may also cause brown to black leaf infections, especially on evergreen species and can also affect flowers. It has been isolated from roots associated with stem-base lesions, but root infection has not been proven.



Dail a blodau ar *Viburnum* wedi gwywo
Flower and foliage dieback on *Viburnum*

Ar *Pieris*

Mae *P. ramorum* yn achosi briwiau brown ar goesynnau gan arwain at wywo'r brigau a dail fel ag a ddisgrifir ar *Rhododendron*.

On *Pieris*

P. ramorum causes brown stem lesions that lead to aerial dieback and leaf symptoms as described on *Rhododendron*.



Dail *Pieris* yn gwywo
Foliage dieback on *Pieris*

Ar rywogaethau *Camellia*, *Griselinia*, *Kalmia*, *Magnolia*, *Laurus* (llawryf), *Leucothoe*, *Syringa* (lelog) ac *Umbellularia californica*

Mae'r pathogen fel arfer ond yn heintio'r dail. Mae'r briwiau ar y dail fel arfer yn flotiau brown a du, fel arfer ar flaen neu ymylon y dail. Ar *Camellia* a *Magnolia*, mae'r egin hefyd yn gallu cael eu heintio a gall hynny arwain at wywo.

On species of *Camellia*, *Griselinia*, *Kalmia*, *Magnolia*, *Laurus* (laurel), *Leucothoe*, *Syringa* (lilac) and *Umbellularia californica*

The pathogen usually only causes leaf infections. Leaf lesions are usually brown to black areas, typically occurring at the tip or edges of the leaves. On *Camellia* and *Magnolia*, some shoots have also been found infected leading to dieback.



Malltod ar ddail *Kalmia*
Kalmia leaf blight



Necrosis ar ddail *Leucothoe*
Leucothoe leaf necrosis



Malltod ar ddail *Camellia*
Camellia leaf blight



Malltod ar ddail lelog
Lilac leaf blight

Ar *Hamamelis* (collen ystwyth) a *Parrotia*

Symptomau tebyg i'r rhai ar *Rhododendron*. Fel arfer ar flaen ac ymylon y dail gyda'r gwythiennau'n aml yn ffiniau i'r briwiau.

On *Hamamelis* (witch-hazel) and *Parrotia*

Symptoms are similar to *Rhododendron*, mainly visible at the tip and edge of leaves and are usually delimited by the veins.

Ar *Vaccinium*

Mae'r symptomau ar *V. myrtillus* a

V. vitis-idaea yn debyg. Mae'r briwiau brown necrotig sydd i'w gweld ambell waith fel modrwyon ar goesau planhigion yn gyffredin ar *Vaccinium*. Gall achosi i'r egin wywo neu farw wrth i'r clefyd ymledu. Mae'r dail hefyd yn gallu dioddef, gyda briwiau du yn ymestyn o goesyn y dail i weddill y ddeilen. Mae achos difrifol o'r haint yn gallu lladd y planhigyn.

On *Vaccinium*

Symptoms caused by *P. ramorum* on *V. myrtillus* and *V. vitis-idaea* are similar. Necrotic brown stem lesions that occasionally can be seen in the form of bands are common on *Vaccinium* stems, and these can lead to shoot dieback or death as the disease progresses. Leaves can also be affected where black lesions can extend from the petiole end into the rest of the leaf. Severe infection will kill the plant.



Briwiau necrotig a gwywiad ar goes *Vaccinium*
Necrotic stem lesions and dieback of *Vaccinium*



Briwiau necrotig ar goesau *Vaccinium*
Necrotic stem lesions on *Vaccinium*

Ar goed

Mae'r pathogen yn gallu effeithio ar y rhisgl (e.e. ffawydden) yn unig neu ar y rhisgl, y dail a'r egin (e.e. derwen ddwysflodeuog yng Nghalifornia). Ar ambell goeden, dim ond y dail sy'n cael eu heintio (e.e. onnen lle gwelwyd bod y dail yn cael eu heintio ond hyd yma, ddim y rhisgl).

Mae'r heintiad ar y rhisgl yn ymddangos fel arfer fel canfrau mawr brown i ddu ar y rhisgl allanol, gyda nodd coch tywyll yn diferu ohonynt. Maen nhw i'w gweld gan amlaf ar rannau isaf y boncyff.

O dan y rhisgl allanol, gwelir darnau brych o ddeunydd necrotig (marw neu ar fin marw) a bydd y rhisgl mewnol wedi'i afliwio. Weithiau, bydd llinellau duon o gwmpas ymylon y darn heintiedig. Bydd chwilod y rhisgl yn crynhoi ar y darnau heintiedig. Os bydd cylch o ganfrau'n amgylchynu'r boncyff, bydd yn marw. Gall farw'n sydyn iawn, fel ag yn achos y deri dwysflodeuog (*Lithocarpus densiflorus*) yn yr Unol Daleithiau neu gall gymryd sawl blwyddyn, fel ag yn achos coed *Quercus* yn America. Nid oes canfrau o dan y pridd ac nid ydynt wedi'u gweld ar y gwreiddiau.

Mae'r heintiad yn ymddangos ar ddail gan amlaf fel blotiau necrotig brown, yn aml ar flaen neu ymyl y ddeilen. Ar goed llydanddail yn Ewrop, mae heintiadau wedi'u gweld ar ddail ac egin deri bythwyrdd, coed ynn, coed rhisgl Winter a chastan pêr.

On trees

The pathogen can affect just the bark (e.g. beech), or both bark, leaves and shoots (e.g. tanoak in California); it is also possible that some trees may be just leaf hosts (e.g. ash, which has susceptible leaves, but has not yet been found to have susceptible bark).

Bark infections appear most typically as large cankers that have brown to black discoloured outer bark that seep dark-red sap (commonly called 'bleeding cankers' or 'tarry spots'). These cankers usually occur on the lower portion of the trunk.

When the outer bark is removed mottled areas of necrotic (dead and dying) and discoloured inner-bark tissue with black 'zone lines' around the edges may be seen. Diseased areas may become colonised by bark beetles. When cankers girdle the trunk, death of the tree occurs. Death can be rapid such as in tanoak (*Lithocarpus densiflorus*) in the USA, or may take one or more years, such as in

American *Quercus* species. Cankers do not extend below the soil line and do not appear to infect the roots.

Leaf infections most commonly appear as brown necrotic areas, often at the edge or tip of the leaf. On broadleaved tree hosts in Europe, leaf and shoot infections have been found on holm oak, ash, Winter's bark and sweet chestnut.



Briwiau ar foncyff *Nothofagus* sp. (ffawyddden ddeheuol)
Stem lesions on *Nothofagus* sp. (southern beech)



Cancr diferol ar *Quercus falcata* (derwen goch y de)
Bleeding canker on *Quercus falcata* (southern red oak)



Briwiau ar risgl mewnol boncyff *Nothofagus* sp.
Inner bark stem lesions on *Nothofagus* sp.



Dail wedi'u heintio ar *Q. ilex* (derwen fythwyrdd)
Q. ilex (holm oak) infected foliage



Dail wedi'u heintio ar *Fraxinus excelsior* (onnen)
Fraxinus excelsior (ash) infected foliage

Ar goed conwydd

Mae'r pathogen yn achosi malltod ar nodwyddau ffynidwydd Douglas, cochwydd California a'r ffynidwydd mawr ac i'r egin ifanc wywo. Er hynny, nid yw'r coed hyn yn heintio'n naturiol ym Mhrydain. Ar goed llarwydd, mae'r symptomau cyffredin yn cynnwys heintiad ar y nodwyddau, egin yn gwywo a chancrau ar y canghennau a'r boncyff. Mae blaen egin heintiedig yn gwywo ac yn marw ac mae nodwyddau heintiedig yn troi'n ddu. Hefyd, mae coed yn bwrw nodwyddau heintiedig.

On conifers

The pathogen causes a needle blight and dieback of young shoots of Douglas fir, coastal redwood and grand fir. However, natural infection of these species has not occurred in the UK. Needle infections, shoot dieback, branch and trunk cankers are typical symptoms observed on Larch. Infected shoot tips wither and wilt and infected needles appear blackened. Early needle abscission of infected needles also occurs.



Malltod a gwywad ar flagur llarwydden
Needle blight and dieback of larch shoots

Sut y mae'n dablygu ac yn lledaenu?

Mae'r pathogen yn cynhyrchu dau fath gwahanol o 'sbôr' anrhywiol: sporangia (sy'n gysylltiedig â gwasgaru'r pathogen) a chlamydosporau (sy'n gysylltiedig â goroesi). Mae'r ddau fath yn gallu cael eu cynhyrchu ar ddail planhigion lletya, ond hyd yma, nid ydynt wedi'u gweld ar y canrau ar risgl coed. Ym Mhrydain, mewn arbrofion mewn labordai, gwelwyd bod y pathogen yn gallu goroesi yng ngweddillion planhigion am o leaf tri gaeaf o'r bron. Fodd bynnag, o'i gymharu â *Phytophthora* eraill tebyg, ceir awgrym y gallai *P. ramorum* fyw'n hirrach eto. Credir ei fod yn cael ei wasgaru yn niferion glaw sy'n tasgu, mewn glaw sy'n cael ei chwythu gan wynt, wrth ddyfrhau ac mewn dŵr daear. Mae enghreifftiau o'r pathogen wedi'u casglu drwy'r flwyddyn yng ngweddillion planhigion, cyrsiau dŵr a phridd hyd at ddyfnder o 15cm ar safleoedd heintiedig. Mae'n cael ei wasgaru'n bellach trwy gael ei gario ar blanhigion heintiedig, o bosibl yn y cyfrwng tyfu, ac mewn pridd sy'n cael ei gario ar gerbydau, peiriannau, ar esgidiau ac o bosibl ar anifeiliaid.

How does it develop and spread?

The pathogen produces two different types of asexual 'spores': sporangia (involved in pathogen dispersal) and chlamydo-spores (involved in survival). Both types of spores, may be produced on leaves of susceptible hosts, but as yet have not been observed directly on bark cankers on trees. Leaf hosts are therefore an important source of inoculum for initiating tree infection. In the UK, quarantine controlled experiments have shown that the pathogen can survive in plant debris for at least three consecutive winters. However, comparisons with similar *Phytophthora* species indicate that *P. ramorum* could possibly survive for longer. It is thought to be dispersed locally by rain splash, wind-driven rain, irrigation or ground water. *P. ramorum* has been recovered throughout the year from plant debris, water courses and soil up to a depth of 15cm at infected sites. Long distance spread occurs by movement of contaminated plant material, possibly on growing media, and in soil carried on vehicles, machinery, as well as on footwear or possibly on animals.

Beth sy'n cael ei wneud?

Mae camau statudol i'w ddileu neu i'w gadw rhag lledaenu yn cael eu cymryd pa bryd bynnag y gwelir arwyddion y pathogen. Mae'r camau hynny'n cynnwys dinistrio planhigion heintiedig, olrhain stoc cysylltiedig mewn meithrinfeydd a chadw golwg fanwl ar blanhigion sy'n cael eu mewnfario. Ers 2001, mae Arolygwyr Iechyd Planhigion a Hadau Fera a'r Comisiwn Coedwigaeth wedi bod yn cadw golwg fanwl ar feithrinfeydd, canolfannau garddio, porthladdoedd, parciau, gerddi a choedlannau yng Nghymru a Lloegr, gan archwilio rhyw 3,000 o safleoedd masnachol a thua 2,000 o barciau, gerddi a choetiroedd.

What is being done?

Statutory action of eradication or containment is being taken whenever the pathogen is found. Measures include the destruction of affected plants, tracing of related stocks on horticultural plants moving in trade, and increased monitoring of imported host plants. Since 2001, Fera Plant Health and Seeds Inspectors and the Forestry Commission have conducted an intensive surveillance programme of nurseries, garden centres, ports, parks, gardens, and woodlands in England and Wales, inspecting annually around 3,000 commercial premises and around 2,000 parks, gardens and woodlands.



Arolygydd lechyd Planhigion a Hadau
Fera'n codi sampl o rododendron
Fera Plant Health and Seeds inspector
sampling *Rhododendron*



Pecynnau maes i brofi am
P. ramorum
In-field test kits for
***P. ramorum* diagnosis**



Dinistrio coed a phlanhigion
wedi'u heintio
Destruction of infected trees
and plants

Beth gallwch chi ei wneud

Aferion garddwra da yw'r allwedd i gadw rheolaeth ar *P. ramorum*. Dilynwch y camau ymarferol syml hyn wrth ddelio â phlanhigion sy'n gallu dal y clefyd er mwyn lleihau'r risg:

- Cadw golwg fanwl – dysgwch symptomau'r clefyd a pha blanhigion all ei ddal er mwyn ichi allu eu hadnabod yn gyflym.
- Gofal – golchwch a diheintiwch wellau ac offer yn rheolaidd gyda chynnyrch addas. Byddwch yn ofalus wrth drin planhigion gan fod deilen glwyfedig yn fwy tebygol o ddal yr haint, yn enwedig os yw'r tywydd yn ffafriol i ledaenu'r haint. Tociwch y planhigion mewn tywydd sych.
- Dwrhau – os medrwch, dwrhewch eich planhigion yn y bore yn hytrach na'r nos. Gofalwch nad yw planhigion mewn potiau'n sefyll yn eu dŵr yn rhy hir.
- Bylchau rhwng planhigion – mae symudiad rhydd o aer yn helpu i rwystro'r clefyd rhag lledaenu.

What you can do

Good cultural practice is key to effective control and management of *P. ramorum*. Follow these simple practical steps when dealing with susceptible plants to reduce disease risk:

- Monitor - familiarise yourself with the disease and its host range so that you are able to recognise symptoms promptly.
- Husbandry - clean and disinfect secateurs and tools regularly with an appropriate product. Take care when handling plants as a wounded leaf can be more susceptible to infection, especially if weather conditions are favourable to disease infection. Prune susceptible host plants in dry weather.
- Watering – if possible water plants in the morning rather than at night. Ensure that potted plants are not standing in water for any length of time.
- Plant spacing – good air movement helps to combat disease spread.

Cadwch lygad barcod

Mae *Phytophthora ramorum* yn bathogen hysbysadwy ac mae'r ddeddf yn gofyn eich bod yn cymryd camau i'w rwystro rhag cyrraedd a lledaenu.

Os ydych yn credu bod y clefyd yn bresennol ar eich safle, yng Nghymru neu Loegr, cysylltwch â'ch Arolygydd lechyd Planhigion a Hadau Fera lleol:

Ffôn: 01904 465625

Ebost: planthealth.info@fera.gsi.gov.uk
Gwefan: <http://www.fera.defra.gov.uk/plants/plantHealth/pestsDiseases/pRamorum.cfm>

Yn yr Alban, cysylltwch ag Uned Garddwriaeth a Marchnata SEERAD, Caeredin:
Ffôn: 0131 244 6303
Ebost: hort.marketing@scotland.gsi.gov.uk
Gwefan: www.scotland.gov.uk

Yng Ngogledd Iwerddon, cysylltwch â llinell gymorth DARDNI:
Ffôn: 028 9052 4999
Gwefan: www.dardni.gov.uk

Yng Nghymru, Lloegr neu'r Alban, os ydych chi'n amau bod y clefyd ar goed, cysylltwch â Gwasanaeth Iechyd Planhigion y Comisiwn Coedwigaeth, Caeredin:
Ffôn: 0131 3146414
Gwefan: www.forestry.gov.uk

Keep a good look out

Phytophthora ramorum is a notifiable pathogen and statutory action is being taken to prevent its introduction and spread.

If you suspect the presence of this disease on your premises, in England and Wales, you should immediately contact your local Fera Plant Health and Seeds Inspector or:

Tel: 01904 465625
Email: planthealth.info@fera.gsi.gov.uk
Web: <http://www.fera.defra.gov.uk/plants/plantHealth/pestsDiseases/pRamorum.cfm>

In Scotland contact the SEERAD Horticulture and Marketing Unit, Edinburgh:
Tel: 0131 244 6303
Email: hort.marketing@scotland.gsi.gov.uk
Web: www.scotland.gov.uk

In Northern Ireland contact the DARDNI helpline:
Tel: 028 9052 4999
Web: www.dardni.gov.uk

In England, Wales and Scotland, if you suspect the presence of the disease on trees you should contact the Forestry Commission Plant Health Service, Edinburgh:
Tel: 0131 3146414
Web: www.forestry.gov.uk