Pest Risk Analysis For *Pratylenchus mediterraneus*

STAGE 1: PRA INITIATION

1. What is the name of the pest?

Pratylenchus mediterraneus Corbett Pratylenchidae (a root-lesion nematode)

2. What is the reason for the PRA?

The PRA was initiated following 14 interceptions of this organism in soil accompanying ware potatoes (*Solanum tuberosum*) from Israel between January and May 2005.

This organism has previously, though rarely, been detected in soil in consignments of potatoes e.g. once from Cyprus (1998) and twice from Israel (once in 2002 and once in 2003).

3. What is the PRA area?

This PRA considers the UK and northern Europe, because it is already present in the Mediterranean region.

STAGE 2: PEST RISK ASSESSMENT

4. Does the pest occur in the PRA area or does it arrive regularly as a natural migrant?

No.

5. Is there any other reason to suspect that the pest is already established in the PRA area?

No.

6. What is the pest's EU Plant Health Directive status?

Not listed.

7. What is the pest's EPPO Status?

Not listed.

8. What are its host plants?

Potatoes, wheat (Orion & Shelvin, 1989) and carrots (Orion *et al.* 1988), vine, olive and sesame (Kepenkci, 2002). It is also reported to be able to survive on 'legumes and cereals comprising most of the natural vegetation in the region [the arid northern Negev region of Israel]'. *Vicia sativa* (common vetch) is a known to be an excellent host for *P. mediterraneus*, it is grown as a forage crop in the northern Negev and is a native wild plant in the UK (Glazer & Orion, 1983).

9. What hosts are of economic and/or environmental importance in the PRA area?

Potatoes, wheat and carrots.

10. If the pest needs a vector, is it present in the PRA area?
No vector is required. This is a free living organism.

11. What is the pest's present geographical distribution?

North America:	Absent, no record
Central America & Caribbean:	Absent, no record
South America:	Absent, no record
Europe:	Cyprus (intercepted on imported potatoes in the UK, 1998)
Africa:	Present in Algeria, Tunisia & Morocco (Greco & Vito, 1994)
Asia:	Present in Israel, Turkey (Kepenkci, 2002 & Vito *et al.*, 1994) and north-east Syria (Greco & Vito, 1994)
Oceania:	Absent, no record

12. Could the pest enter the PRA area?
Yes. This organism has been detected in consignments (see 2.)

13. Could the pest establish outdoors in the PRA area?
Probably not. The Mediterranean and desert climates in the areas where the nematode is currently found are very different to the temperate climate found in the UK and the rest of northern Europe. However, there are examples of nematodes becoming established outside of their normal climatic range. For example, *P. mediterraneus* and the related *P. thornei*, both have the capability to withstand hot and dry conditions such as in dry clods of soil on vehicles. This would enable them to move from field to field or from region to region (as with all root-lesion nematodes). Both species are suspected to be native or old inhabitants of the semi-arid region of the eastern Mediterranean (Orion, 2000). *P. thornei* and *P. mediterraneus* are believed to survive the dry season in this region by going into an anhydrobiotic state and are then reactivated by the following winter rains. Glazer & Orion (1983) tested the ability of *P. thornei* to withstand extreme conditions in a laboratory experiment and found that it was able to withstand conditions of 0% relative humidity and desiccated nematodes could withstand temperatures of up to 40ºC.

It is likely that *P. mediterraneus* needs the higher temperatures that are found in the Mediterranean region for it to develop, but there are no data available to support this. The northern Negev region of Israel, which is one of the areas where *P. mediterraneus* is reported to be a pest, is much drier than the UK and northern Europe. The UK typically has 600-1000mm of rain per year, and some rain in every month. In contrast, in the northern Negev, rainfall is about 200-250mm per year (Pearce & Smith, 2000; Orion & Glazer, 1987) and there is usually no rain between May and August. *P. mediterraneus* is presumably frost tolerant, because winter temperatures in the Negev can be cold with occasional snow or sleet.

14. Could the pest establish in protected environments in the PRA area?
No. Host plants are generally not grown in protected environments, such as glasshouses, in the PRA area. Carrots can be grown under mulches or under

protective sheeting during winter months, but such conditions will not replicate the warm dry environments of the region where this organism occurs.

15. How quickly could the pest spread within the PRA area?
This is uncertain, but it could probably spread throughout the PRA area over a period of years or decades. Even though individual nematodes have limited natural dispersal ability, the nematode could be spread by anthropogenic means, such as the movement of plant material, and in soil residues on tubers and root crops, farm machinery, vehicles or on the soles of shoes. There have been examples of non-indigenous nematodes spreading throughout new potential habitats in Israel (Orion, 2000). Nematodes of tropical origin such as the citrus nematode *Tylenchulus semipenetrans* and the spiral nematodes (*Helicotylenchus multicinctus, Hoplolaimus* spp. and *Rotylenchus* spp.) and the reniform nematode (*Rotylenchulus reniformis*) were introduced to citrus orchards, banana plantations and cotton fields and spread wherever these crops were grown, and they have stayed there ever since inflicting heavy damage. There are also examples of plants, such as apple and pear trees and grapevines, introduced into Israel from temperate climates, bringing with them nematodes that have become established (Orion, 2004).

16. What is the pest's potential to cause economic and/or environmental damage?
Not high. Wheat and potatoes are among the most important crops grown in the UK and northern Europe. This pest is able to cause significant damage to these crops in Israel and so has the potential to cause some economic damage in the PRA area although since the establishment potential is low, the potential economic impact is not high.

The potential of causing environmental damage is unknown and would be difficult to predict because of the wide host range of the nematode. In Mediterranean countries, the damage caused by *Pratylenchus* spp. (root-lesion nematodes) is reported to be less severe at farm level than that caused by root-knot and cyst nematodes, but because they are more widely distributed losses are considered to be higher at a country level (Greco & Vito, 1994).

In an efficacy test of furathiocarb against *P. mediterraneus* in wheat, Orion & Glazer (1987) found that a granular application and seed dressing combined could reduce nematode numbers by 75% and a seed treatment of 15 ml/kg seeds (using Promet 666 SCO, a formulation containing 666 g a.i./l) increased yields by 39% over control. In carrots, Orion *et al.* (1988) found that that applications of fenamiphos resulted in 50-65% control of the *P. mediterraneus* and a 38-45% increase in marketable carrot yield.

17. What is the pest's potential as a vector of plant pathogens?
There are no published reports of *P. mediterraneus* being a vector of plant pathogens. However, *Pratylenchus* spp. including *P. mediterraneus* are known to have a synergistic effect with *Verticillium dahliae* (Verticilium wilt), worsening the symptoms of Potato Early Dying Syndrome (PEDS) (CABI,

2002). Verticilium wilt is already present in the UK, but it is uncertain whether the presence of *P. mediterraneus* would increase the risk of diseases such as PEDS to a level higher than that caused by the nematodes that are already present in the UK.

STAGE 3: PEST RISK MANAGEMENT

18. What are the prospects for continued exclusion?

Reasonable. Continued exclusion is dependent upon the potatoes that are shipped to the UK being sent without the considerable volume of soil that they arrived with in 2005. Alternatively potatoes should be thoroughly cleaned in the UK and the waste carefully disposed of or sterilised by an approved technique such as heat treatment. The preferable option would be that the potatoes arrive in a clean condition, without much soil. *P. mediterraneus* is thought to parasitise roots rather than tubers and so the tubers themselves are considered to be low risk (S. Hockland, CSL, pers. comm.). It is unclear why there was such a large increase in the number of interceptions of this nematode in 2005 (14), compared to recent years (see section 2), but it is possible that the potatoes are now being sourced from new areas where *P. mediterraneus* occurs at higher densities (P. Bartlett, CSL, pers. comm.).

19. What are the prospects of eradication?

In the unlikely event of this organism being able to establish in northern Europe, then the prospects for eradication are very poor. Nematodes are likely to remain undetected for a long time, and it is most likely that they will have spread to a number of locations before they are noticed. The ability of the species to parasitise a wide range of potential crops and natural hosts would also make any eradication attempts very difficult or impossible. Nematicides can provide some control of populations, but would be of limited use when attempting eradication.

20. What management options are available for containment and control?

The use of fallow years, crop rotation and/or nematicides. In the northern Negev, crop rotation with legumes or fallow periods every 3-4 years is the usual practice to control cereal cyst nematodes (*Heterodera avenae* and *H. latipons*) and *P. mediterraneus* in wheat (Orion, 2000). Neither of the active ingredients referred to in section 16, furathiocarb and fenamiphos, are registered for use in the UK. The soil sterilants Dazomet and metam-sodium are both available for outdoor use in the UK, but the high financial cost of treating large areas would be prohibitive and the environmental costs may be unacceptable. Aldicarb is available as a nematicide in the UK on potatoes and carrots, but the approval expires at the end of 2007. Other approved nematicides in potatoes are fosthiazate, 1-3 dichloropropene and oxamyl and for carrots, carbosulfan. The efficacy of these products against *P. mediterraneus* and the practicality of using these products is not known.

CONCLUSION OF THE PEST RISK ANALYSIS

It is uncertain whether *P. mediterraneus* would be able to survive in the UK or a northern European climate and, if it could survive, whether it would be a significant pest. The countries in the native range of the nematode have a Mediterranean or desert climate rather than the temperate conditions that exist in northern Europe, so it is very unlikley that *P. mediterraneus* would find suitable conditions in northern Europe. If *P. mediterraneus* is able to adapt to the northern European conditions, evidence from exclusion work in Israel suggests that it would have the potential to cause dramatic yield losses (up to 45%) in some of the most important crops in the region.

Overall, the risk of establishment and impact is very low and would be reduced further if potato imports from regions where *P. mediterraneus* occurs arrive with a minimal amount of soil.

UNCERTAINTIES AND FURTHER WORK

Section of PRA	Uncertainties	Further work that would reduce uncertainties
Taxonomy	None.	None.
Pathway	The amount of soil accompanying potatoes from Cyprus and Israel	
Distribution	Distribution within other EU / EPPO states is uncertain.	Contact other EU / EPPO states to ask for information about presence of the pest.
Hosts		
Establishment	Suitability of climate in the UK/ northern EU for establishment.	Experimental data to determine the thermal biology of the pest.
Spread	Rate of natural spread	
Impact	Impact under UK climatic conditions	
Management		

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