

# **COST**

Domain Committee Food and Agriculture

## **COST Action 872**

Exploiting genomics to understand plant-nematode interactions

### **MONITORING PROGRESS REPORT**

**Period:** *From 4<sup>th</sup> December 2006  
To 31<sup>st</sup> December 2006*

This report is presented to the relevant Domain Committee and contains two parts:

- I. **Management Report** prepared by the COST Office*
- II. **Scientific Report** prepared by the Chair of the Management Committee of the Action*

I. *Management Report prepared by the COST Office*

## Action Fact Sheet

### Action 872

Exploiting genomics to understand plant–nematode interactions

Domain : Food and Agriculture

Action Web Site : [None](#)

CSO approval date : 27/06/2006 Entry into force : 21/09/2006

End of Action : 03/12/2010

[Austria](#) 04/10/2006 Confirmed [Belgium](#) 03/10/2006 Confirmed [Germany](#)

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[Netherlands](#) 20/09/2006 Confirmed [Norway](#) 25/09/2006 Confirmed [Poland](#)

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[France](#) 15/11/2006 Intention

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## Action Fact Sheet

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Domain : Food and Agriculture

Action Web Site : [None](#)

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None

None

None

## ***II. Scientific Report prepared by the Chair of the Management Committee of the Action***

### ***II.A. Results achieved during the period 4<sup>th</sup> December 2006 to 31<sup>st</sup> December 2006***

The main objective of the Action is to develop a co-ordinated approach to exploitation of genomics information that is appearing for plant parasitic nematodes and host crops. Since this action was only running for three weeks at the end of 2006 there will clearly be little to report for this period. However, several significant steps forward have been reported in the areas covered by this Action since the original proposal was formulated, and these are noted below.

#### *Scientific developments*

The identification of parasitism genes is no longer a bottleneck for our understanding of plant-nematode interactions. Consequently, the focus of many researchers is beginning to shift towards the design of novel functional assays to study genes involved plant-nematode interactions. Several groups have reported the use of RNAi to study gene function in plant parasitic nematodes, confirming that this technique will be an important tool for functional studies on plant parasitic nematodes. In addition, three independent publications have reported the generation of transgenic plants expressing dsRNA targeting (different) nematode genes followed by an assessment of the effects on parasitism. Studies on genes important in parasitism have previously been focused on the economically important root knot and cyst forming nematodes. However, in 2006 further publications on genes important in the parasitic process of another nematode – the pine wood nematode *Bursaphelenchus xylophilus* were reported. These studies demonstrated that multiple independent horizontal gene transfer events from bacteria and fungi have played an important role in the evolution of nematode parasitism of plants in several nematode taxa.

Genome projects for two major nematode species continued in 2006. Work is in progress in the USA on a sequence for *Meloidogyne hapla* and one invited speaker for the 2007 COST 872 meeting will provide further details of the *M. hapla* project. Within the EU, work has begun on the sequence of the *M. incognita* genome; at the time of writing 5X coverage has been achieved and gene-finding software is being used to analyse the sequence. An application for funds to sequence the genome of a cyst nematode *Globodera pallida* is under review at the time of writing.

Progress was made in several aspects of the plant response to nematode infection. The role of a range of enzymes in metabolism of free radicals produced response to nematode infection has been studied and it has been shown that reactive oxygen species are produced in the early stages of an incompatible interaction between cyst nematodes and plants. The roles of various phenylpropanoids in basal resistance of banana against nematode infection have also been analysed. Meanwhile, in other plant-pathogen

interactions, a range of avirulence proteins have been identified including Avr3a from late blight and dspE from *Pectobacterium*. These studies have shown that avirulence proteins frequently have an important role in manipulation of plant defence signalling pathways. The prospect that nematodes may produce proteins with similar functional roles will be investigated by several groups within COST 872.

For the compatible interaction, the role of host expansins in development of the feeding site has been studied using microarrays. Several studies have also examined the molecular mechanisms underlying sugar translocation into nematode feeding sites. Studies published in 2006 have shown that expression of genes encoding sucrose transporters is activated in syncytia and that functional plasmodesmata are formed between the phloem and syncytia during the later stages of syncytium formation.

#### *COST 872 Activities in 2006*

The first MC meeting for COST 872 was held in Brussels on December 4<sup>th</sup> 2006 at which the working structures of the Action were agreed and the Chair, vice-chair and WG coordinators were elected. As outlined in the original MOU, three WGs were established in the areas of “Functional genomics of plant parasitic nematodes”, “Comparative genomics of nematodes” and “Functional genomics of plant responses”. It was agreed that the aims of the Action would be best served by holding a relatively large inter-WG workshop in 2007 in order to encourage communication between scientists working on various aspects of molecular host-parasite interactions. A gathering of this type has not taken place in the community for some years.

In order to encourage participation of younger scientists in COST 872 plans were made to set aside a substantial sum of money for STSMs from the 2007 budget. An STSM committee composed of the Action chair, Action vice-chair and the WG Coordinators has been set up to evaluate applications for funds under this scheme.

#### ***II.B. Dissemination of results***

Given the short time frame that the Action has been running in 2006 little progress has been made in this area. However, the Chair is building a website for COST Action 872 that will incorporate a SharePoint site to facilitate reporting. We have aimed to include representatives from industry at all stages of the planning of this Action in order to encourage uptake of knowledge that is generated by the Action. In this regard it is encouraging to note that MC representatives for two countries are from the commercial rather than the academic sector.