Sheet abstract of thesis 2017	**Disciplinary Fields** Autres et Autres

Thesis Title : (1-2 lines)

Characterization of cryptic species in two nematode species complex belonging to the genus *Globodera*

3 keywords : (1 line)   **ACRONYME** SPECIAGLOB

Speciation / population genomic / life history traits

Unit/Team of supervising : (1-2 lines)

**INRA UMR Institut de Génétique, Environnement et Protection des Plantes (IGEPP)
Equipe « Résistance et Adaptation »**

Name of the scientific director and co-director : (1 line)

Director : Eric GRENIER (INRA, UMR IGEPP)

Co-director : Laurent FOLCHER (Anses, LSV)

Contact : (1 line)
eric.grenier@inra.fr - tél. 02 23 48 51 73

Socio-economic and scientific context : (10 lines)

Speciation is a process that explains the appearance of new species. The mechanisms of speciation are variable according to the biology of the considered organisms. The difficulties in determining the species boundaries in certain groups often arise because of still ongoing speciation events. The study of speciation involves the analysis of directly observable characteristics such as morphology, life cycles, sexual behavior, and hybrid characters. Today, the study of speciation also involves the use of molecular tools that allow access to intra- and inter-population genetic diversity as well as to inter-population gene flows. Within the cyst nematodes, the genus Globodera comprises 4 species that all are able to infect Solanaceae, two of these also correspond to quarantine species (Directive 2000/29/EC). Previous investigations of South American populations of Globodera pallida and Globodera tabacum question the current taxonomy and suggest that a significant part of the native diversity of these groups was not imported into Europe.

Assumptions and questions (8 lines)

In order to better define the invasive success and the limits of the species in the two plant parasitic nematode species complexes, G. pallida and G. tabacum, we propose to address the following questions:

Question 1: What are the morphological, genetic or biological criteria for revealing cryptic species in Globodera?

Question 2: Did speciation occur by geographic isolation or sexual preference?
Question 3: Have these phenomena of speciation conferred an advantage for invasive success (extended host spectra, larger progeny) ?

The main steps of the thesis and demarche (10-12 lines)

In order to better define the limits of the species in the two investigated species complexes, we propose:

(i) to characterize intra-specific genetic variability using genotyping by sequencing and by measuring indices of differentiation between populations

(ii) to re-analyze the morphological differences between groups of genetically related individuals using classical morphological analysis techniques and also new automated morphobiometric analysis tools

(iii) to refine our knowledge on the mode of reproduction of these pathogens by investigating the existence or not of couplings by assortative mating.
(iv) to measure some important life history traits for invasive success in each of the cryptic species found in G. pallida and their hybrids to determine whether this speciation correlates with different fitness on a panel of cultivated or ornamental Solanaceae present in Europe.

Methodological and technical approaches considered (4-6 lines)
The project will require the development of nematode identification techniques (morpho-biometric and molecular), genotyping techniques (microsatellite markers or genotyping by sequencing), experimental devices under controlled conditions for the study of sexual preferences and measurement of various life history traits, as well as the knowledge and practice of some software for digital image analysis or genetic data analysis.

Scientific and technical skills required by the candidate (2 lines)
Training in Ecology, Evolution or Biology of organisms. Interested in morphobiometric, biological and molecular approaches.