

Quantitative Plant Nematology (C002822)

Course size (nominal values; actual values may depend on programme)

Credits	3.0	Study time	90 h	Contact hrs	40.0 h
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Course offerings and teaching methods in academic year 2018-2019

A (semester 1)	English	lecture	15.0 h
		seminar: practical PC	20.0 h
		room classes	
		demonstration	5.0 h

Lecturers in academic year 2018-2019

Been, Thomas	WE11	lecturer-in-charge
Schomaker, Cornelia	WE11	co-lecturer

Offered in the following programmes in 2018-2019

	crdts	offering
International Master of Science in Agro- and Environmental Nematology	3	A

Teaching languages

English

Keywords

Population dynamics, damage relation, sampling methods, methodology of experiments, modelling, cost-benefit calculation of control, error estimation

Position of the course

This course is an elective course of the second year and is highly recommended for those who have chosen the Agro-ecosystem module.

The prevention of spread, the estimation and prediction of yield reduction and population development under hosts, non-hosts and partial resistant hosts, and the assessment of the effect of control measures, are all aspects of nematological research targeted on the management of plant parasitic nematodes in agricultural systems. This requires insight in the quantitative aspects of the relation between nematodes, their hosts and the physical environment. Quantitative nematology develops and applies these relations, which are applicable to a broad range of nematode/host combinations. Quantitative nematology requires a methodology to set up experiments where all experimental errors are quantified and minimized to obtain results with a known variability.

Contents

Introduction to the theory and models describing the relation between tylenchoid nematodes and their hosts. The course is composed of two parts. Part I provides insights and understanding on how nematodes reduce growth of their host and subsequently reduce yields. It provides the instruments to model this relation in order to predict yield losses in the future. The population dynamics of nematodes will be examined and several models to describe this relation will be presented. Moreover, the use of these models to estimate resistance, tolerance, effect of control measure will be presented using examples from current and past research. The 'pitfalls' of nematological research will be discussed in depth. How to minimize errors in the experimental setup will be tough.

Part II describes the horizontal and vertical distribution patterns of nematodes in the field on different scales. How can they be ascertained and described in such a way that finally sampling schemes can be developed which provide reliable estimates of population densities in small plots (scientific research) and fields (yield prediction) or can detect the presence of a nematode with high probability (quarantine nematodes). Error estimation of the different steps of collecting and processing soil samples in the

laboratory will be addressed including the way to minimize them.

Initial competences

The student should have good knowledge of plant-parasitic nematodes, which is provided in the 1st year's major Nematology applied to agro-ecosystems, should have basic knowledge concerning statistics and should be able to use Excel as a calculating sheet.

Final competences

- 1 Advanced knowledge of quantitative nematology.
- 2 Understand and apply theories and models to describe the different aspects of the nematode host relation for estimating and predicting yield losses and population development.
- 3 Advanced knowledge of the special distribution patterns of nematodes and the constraints to experimental research.
- 4 Choose and justify sampling methods for various purposes.
- 5 Evaluate how these models and their biological relevant parameters influence and restrain the methodological setup of scientific research.
- 6 Be able to develop a framework with management tools to help farmers in problem-solving or problem-prevention.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Demonstration, lecture, seminar: practical PC room classes

Extra information on the teaching methods

Computer assisted lab sessions on using and exploring the application of the different models. Practical application of the theory and models on provided experimental data. Demonstration and use of management systems for nematodes.

Learning materials and price

Syllabi and PowerPoint's are put at the disposal of the students. Copies of relevant papers will be provided. Data-sets from experimental research will be made available to apply and experiment with the different models on the PC. Cost: 10 EUR

References

Perry, R.N. & Moens, M. (2006). Plant Nematology

Course content-related study coaching

Lecturers: Thomas Been, Cornelia Schomaker

Evaluation methods

end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period

Written examination with open questions, skills test

Examination methods in case of periodic evaluation during the second examination period

Written examination with open questions, skills test

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible

Extra information on the examination methods

Non-periodic bound evaluation during lectures using small assignments and certainly at the end of a chapter. Searching for the knowledge that is acquired and exploration of self-collected information.

Period bound evaluation: The exam consists of two parts: a written exam evaluating whether the student possesses the necessary basic knowledge concerning the theory and its implications as taught during the course. A computer exam on the ability of the student to apply the acquired knowledge on real life problems in Nematology.

Calculation of the examination mark