

Plant viruses visualized by electron microscopy

## Fields of Activity

### Pathogen diagnostics – detection, identification, differentiation and characterisation of plant pathogens

- Biological, serological and molecular methods for the detection and surveying of genetic diversity (strains, races, pathotypes, etc.) of pathogens
- Ultrastructure of host-pathogen interactions
- Quality management of diagnostic protocols
- Morphological and physiological properties, structural and functional genetics of pathogens
- Serological diagnostics and preservation of the pathogen collections

### Ecology of microorganism associated with crop plants or phytopathogens

- Plant and soil specific microflora and strategies to use it to improve crop yield and sustainability
- Interactions between pathogens, antagonists and plants
- Dissemination and genetic mobility of antibiotic resistance genes
- Human pathogens associated with crop plants



Experimental greenhouse

**Head of Institute:** Dr. Thomas Kühne  
**Vice-Head of Institute:** Prof. Dr. Kornelia Smalla

Julius Kühn-Institut · Federal Research Centre for Cultivated Plants  
Institute for Epidemiology and Pathogen Diagnostics

Currently, the staff of the Institute is located at Braunschweig, Münster and Quedlinburg. In the future, the whole Institute will be relocated to JKI Braunschweig.

#### Headquarters Braunschweig

Messeweg 11-12  
38104 Braunschweig, Germany  
Phone: +49 531 299-5 (operator)  
Fax: +49 531 299-3006

#### Site Quedlinburg

Erwin-Baur-Str. 27  
06484 Quedlinburg, Germany  
Phone: +49 3946-470 (operator)  
Fax: +49 3946-47-500

#### Site Münster

Toppheideweg 88  
48161 Münster, Germany  
Phone: +49 251 87106-0 (operator)  
Fax: +49 251 87106-33

ep@jki.bund.de (for all locations)

#### Editorial and Layout:

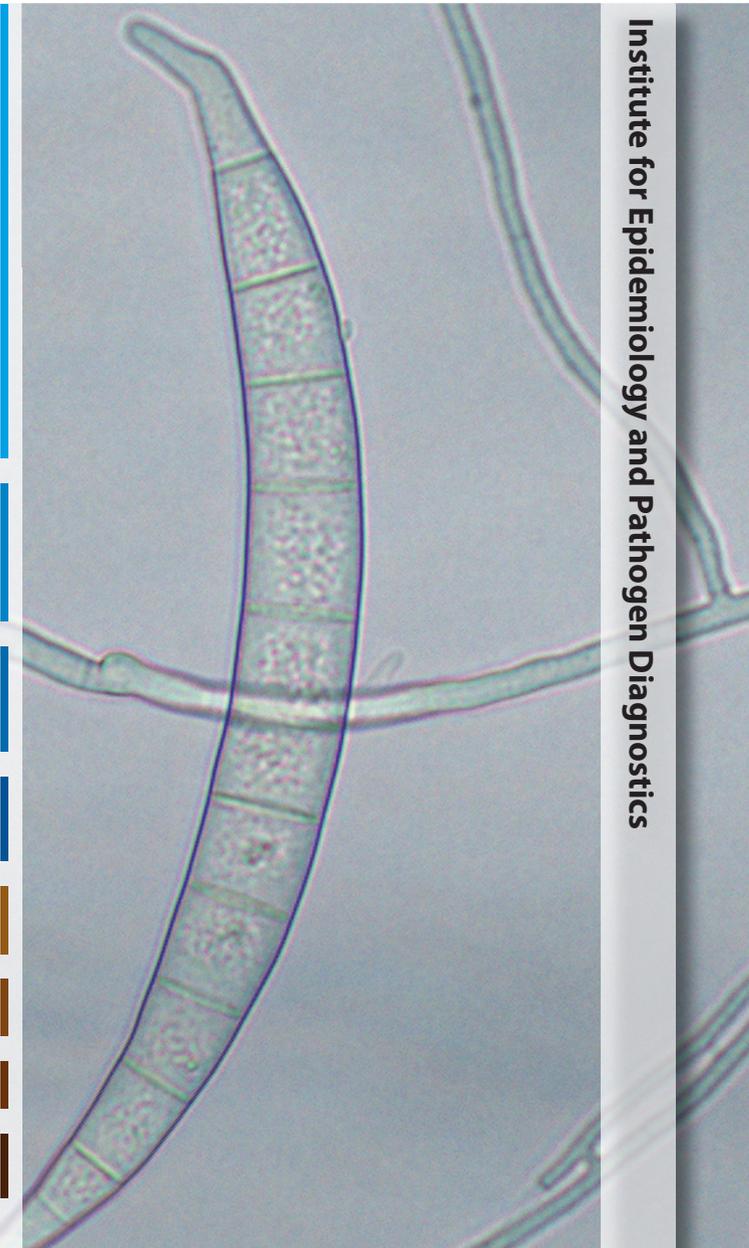
Dr. Gerlinde Nachtigall und Anja Wolck (JKI)

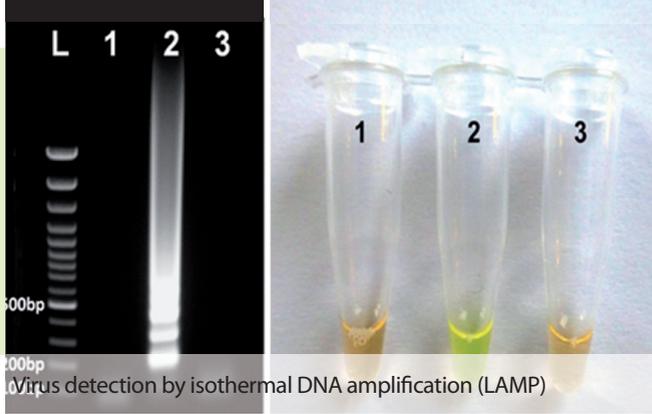
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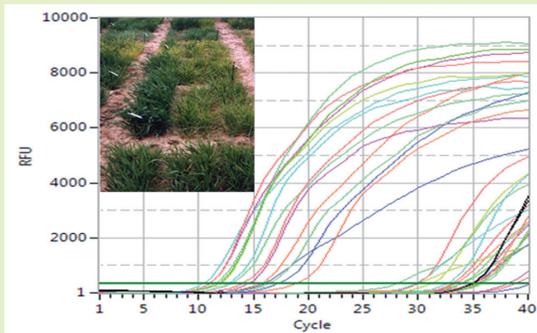
## Who we are?

### Biologists, Agronomists and Biochemists Working as a Team

The Institute for Epidemiology and Pathogen Diagnostics is one of 16 research institutes of the Julius Kühn-Institut (JKI). The JKI is the Federal Research Centre for Cultivated Plants, both a federal research institute and a higher federal authority reporting to the Federal Ministry of Food and Agriculture. We develop the scientific bases for the guidance and professional endorsement of our ministry in the field of phytomedicine and plant protection. In cooperation with the Federal Plant Variety Office, we accomplish sovereign functions in the framework of examination of varieties for resistance to viruses and nematodes. We also cooperate closely with the plant protection services of the federal states and numerous national and international scientific partners as well as with plant breeders. To reflect the overall responsibility for a broad spectrum of plant pathogens the institute is divided into the following research groups:

- Nematology
- Bacteriology/Microbial ecology
- Mykology
- Virology

### Quantification of virus content in plants



Carrots damaged after nematode infestation

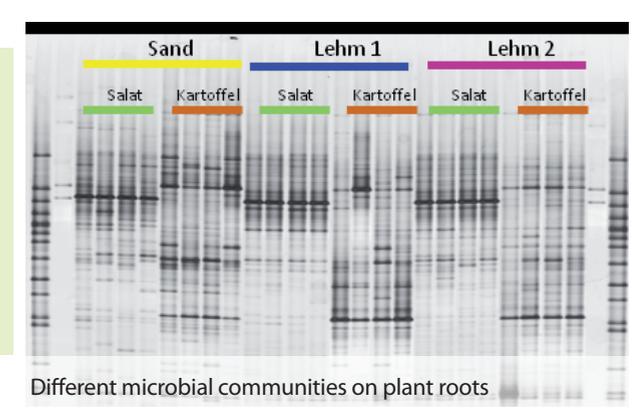
## What we do?

### The Pathogens of Cultivated Plants are our Research Objects

The Institute provides important inputs to fulfil the current strategies of our government in the areas of agriculture and consumer protection. Even today pathogens, i. e. viruses, bacteria and fungi, as well as animal pests cause tremendous crop losses. In addition, they can reduce quality of harvest and even produce toxic substances. The basis of any counter measurements is the availability of specific detection methods that are effective, reliable and highly-sensitive. All four working groups focus on the development, optimisation and standardisation of these techniques.

The detection methods are applied in epidemiological tests where, for instance, the aim is to gain knowledge about the complex interaction between hosts and pathogens. They are also necessary to evaluate the potential of new pathogens for their spatial and seasonal spread. Fast and reliable diagnostics are the premise for the effective surveillance of pathogens in agricultural land. Plant breeders also need these diagnostics for the development of new resistant varieties, which can reduce the need for chemical control of pathogens thus developing a more environmentally-friendly and sustainable agriculture.

Today, crops are considered to be biological systems. With respect to the production of healthy plants, the scientific focus should not solely be directed toward the organisms causing the primary symptoms. It is becoming clear that, for example, soil-borne microorganisms in the rhizosphere are also important for the healthy development of our crops. However, so far little is known about the microbial potential of soils and the complex interactions of microbial communities and plants are poorly understood. Therefore, the Institute has several research projects to investigate these interactions.



Different microbial communities on plant roots

The Institute uses a broad range of diagnostic methods combining classical biological methods with serological and molecular techniques as well as light and electron microscopy. The Institute maintains reference strain collections of phytopathogens and produces diagnostic antisera for their own requirements and for scientific partners.

## Fields of Activity

### Epidemiology of infected crops with viruses, bacteria, fungi and nematodes

- Biology of viruses, bacteria fungi and phytopathogenic nematodes as well as their dissemination, frequency and population dynamics
- Cause of symptoms and diversity (biological and genetic) of the causal agents
- Transmission and dispersal pathways as well as the interactions between pathogens and host plants as well as the interactions between plant viruses and their vectors
- Effect of climate change and changes in agricultural production systems on the spectrum of pathogens as well as the progression of plant diseases.