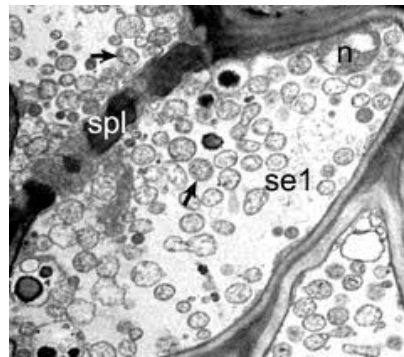
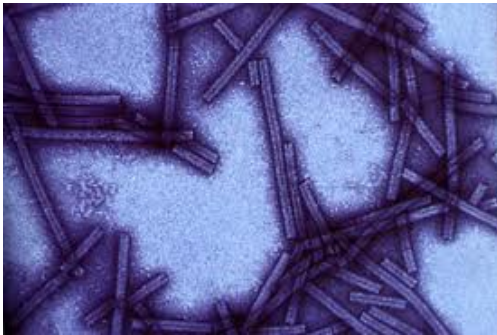




Molecular plant pathology

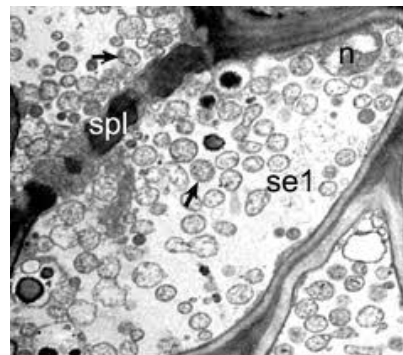
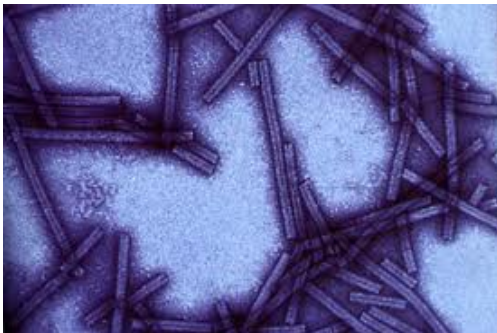


Assist. Prof. Martina Šeruga Musić

acad. year 2016/17

INTRODUCTORY LECTURE

- course description
- course content
- lab practicals
- seminars
- literature
- evaluation







How would look the Earth without plants?

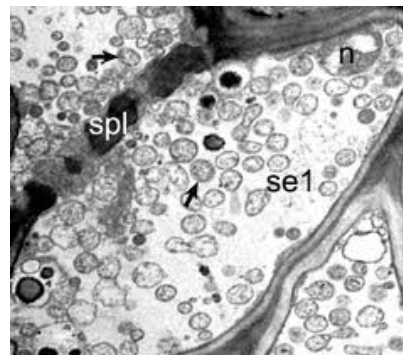
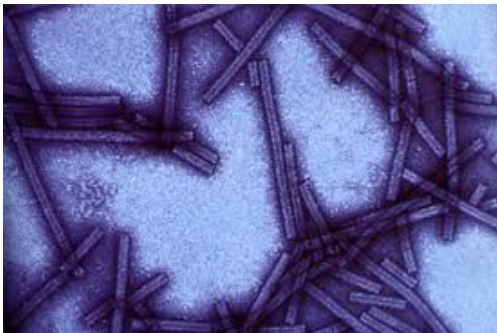


**PLANT
DOCTORS**



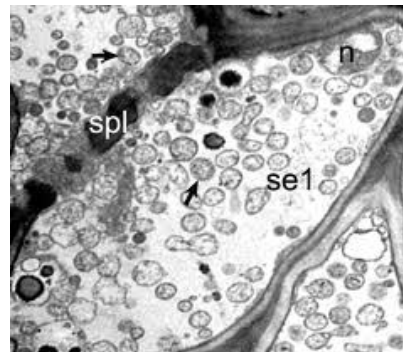
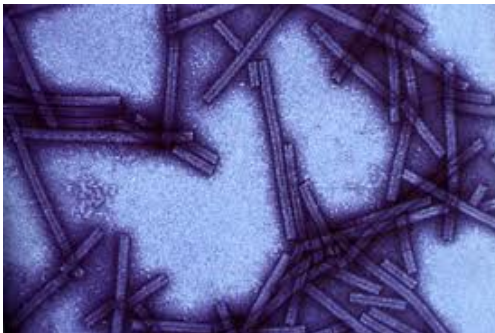
COURSE DESCRIPTION

- lectures
- lab practicals
- seminars



COURSE CONTENT

1. Introduction to plant pathology. The causal agents – fungi, the oomycota, bacteria, viruses, other.
2. The concept of plant disease. Pathogenesis – disease development.
3. Fungal and Oomycetes diseases. Pathogenesis of diseases. Effectors. Mechanisms for generating genetic variation.
4. Phytopathogenic bacteria. Pathogenesis of bacterial diseases. Bacterial-bacterial communication – quorum sensing.
5. Concept of effector biology – avirulence factors and toxins; elicitors. Type III secretion mechanism. Pathogenicity islands. The role of plasmids.
6. Phytoplasmas and Spiroplasmas as plant disease causing agents.
7. Plant viruses as plant pathogens. Structure and replication.



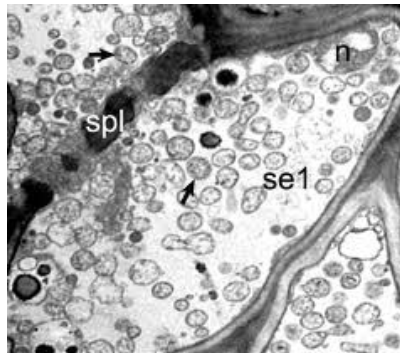
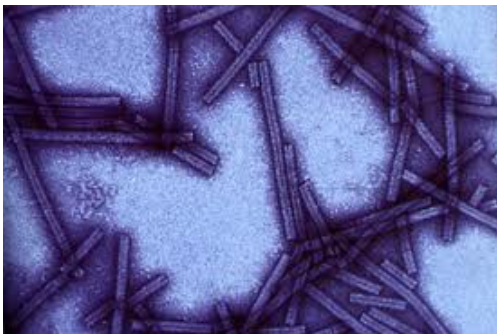
COURSE CONTENT

8. Plant viruses – movement and interaction with plants.
9. Pathogens effects on plant physiological functions. Effects of environmental factors on development of infection diseases of plant.
10. Resistance mechanisms in plants. Plant immunity. Classical concept of resistance. Preformed resistance. Induced defenses. Gene-to-gene resistance.
11. Signaling in plant disease resistance mechanisms. PAMP-triggered immunity (PTI). Effector triggered immunity (ETI).
12. Genetics and molecular epidemiology of plant diseases.
13. Molecular diagnostics of plant diseases.
14. Application of molecular biology to conventional disease control strategies.
15. Transgenic approaches for crop protection. Pathogen-derived resistance. Plantibodies. Overexpressing defense genes. Expression of vaccines in plants.



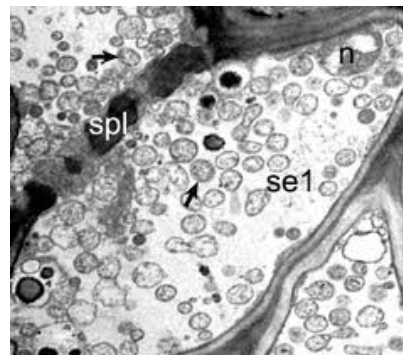
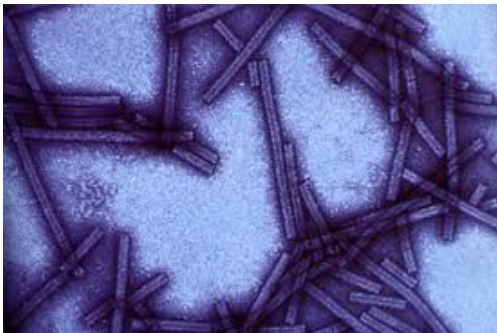
LAB PRACTICALS

1. Isolation of total nucleic acid (TNA) and determination of TNA concentration (4 h).
2. Isolation and SDS-PAGE of total proteins (4 h)
3. Multilocus sequence (MLST) analyses -PCR amplification of different pathogen gene regions followed by RFLP and sequencing (6 h).
4. Pathogen detection by real-time PCR (2 h).
5. SSCP analyses for detection of molecular variability (6 h)
6. Southern blot analyses (6 h)
7. Phylogenetic sequence analyses (2 h)



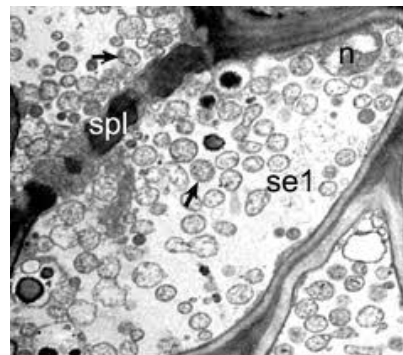
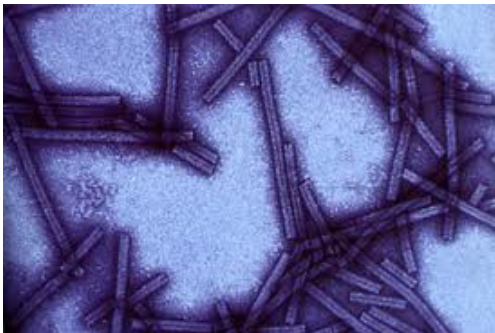
SEMINARS

- Selection of seminar topics from the molecular plant pathology field
- Literature search
- Oral presentation of seminars



LITERATURE

- Dickinson M (2003) Molecular Plant Pathology. BIOS Scientific Publishers, London.
- Agrios GN (2005) Plant Pathology (5th Edition). Academic Press, New York.
- Wiley J, Sherwood L, Woolverton C (2013) Prescott's Microbiology, 9th edition, McGraw-Hill, Boston.
- Prescott LM, Harley JP, Klein DA (2002) Microbiology. McGraw-Hill, Boston.
- Hull R (2002) Matthews' Plant Virology, Fourth Edition . Elsevier Academic Press, London.



EVALUATION

- Class and lab attendance 10% 3 points
 - Seminar and presentation 30% 9 points
 - written exam 60% 18 points
- 30 points

excellent (5) 27-30 points
very good (4) 23-26 points
good (3) 19-22 points
pass (2) 15-18 points

