

# New challenges in Croatian forest protection practices under the pressure of growing number of Invasive Alien Species (IAS)



Boris Hrasovec  
University of Zagreb  
Faculty of Forestry

Chinese Academy of Forestry  
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# Forestry research and practice in Croatia – history



## Short history

Forestry was established by the directive of Maria Theresa The Empress.

Forests were documented, measured and mapped in the period 1764 - 1765.

The result was the first forest inventory and forest maps.

First forest office in Krasno (karst area).





# Forestry within the higher education in Croatia - history



1898 - Zagreb



1860 - Križevci



today

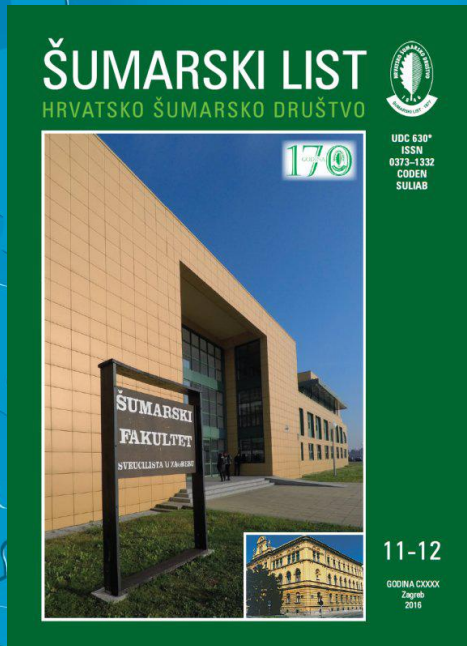


today



Faculty of forestry today

University / Faculty	Year
I. NEO-ACADEMIA ZAGRABIENSIS	1669
II. REGIA SCIENTIARUM ACADEMIA	1776
1. Facultas theologica	
2. Facultas philosophica	
3. Facultas juridica	
<b>IV. UNIVERSITY OF ZAGREB</b>	<b>1874</b>
1. Faculty of Law	1874
2. Faculty of Philosophy	1874
3. Faculty of Theology	1874
<b>4. Academy of Forestry at the Faculty of Philosophy</b>	<b>1898</b>
5. Faculty of Medicine	1919
6. Faculty of Veterinary medicine	1919
7. Tehnical Faculty	



# Higher education in Croatia – Faculty of Forestry, Zagreb



127 - Teaching staff



77 - Non-teaching staff



1082 - students

The management system of the Faculty of Forestry has been assessed and certified as meeting the requirements of EN ISO 9001:2008

<http://www.sumfak.unizg.hr/>

Postgraduate  
Doctoral

Postgraduate  
Specialist

6 semester  
180 ECTS

4 semester  
120 ECTS

Graduate

4 semester  
120 ECTS

Undergraduate

6 semester  
180 ECTS

Bachelor

Master of Science

Master Specialist

Doctor of Science

Graduate studies

Forestry

*Silviculture and  
Management Planning  
with Wildlife  
Management*

*Techniques, Technologies  
and Management in  
Forestry*

*Urban Forestry,  
Nature Conservation  
and Environmental  
Protection*





# Forestry research – Faculty of Forestry

## Organizational Units of the Forestry Section



### Department of Ecology and Silviculture

- Ecology and Pedology Laboratory
- Laboratory of Forest Seed and Nursery Production



### Department of Forest Management and Remote Sensing

- Laboratory for Measuring Forest Resources
- Laboratory for Remote Research and GIS



### Department of Forestry Genetics, Dendrology and Botanic

- Laboratory for Molecular Biology and Physiology of Plants



### Department of Forest Engineering

- Laboratory for Technical and Technology Measurements in Forestry
- Laboratory for Forest Biomass



### Department of Forest Protection and Wildlife Management

- Laboratory for Tree Pathology
- Laboratory for Forestry Zoology

## Organizational Units of the Wood Technology Section



### Department of Wood Science

- Laboratory for Wood Anatomy and Wood Protection
- Laboratory for Physical and Mechanical Properties of Wood



### Department of Materials Technology

- Laboratory for Wood Panels



### Department of Production Organization

- Laboratory for Industrial Systems



### Department of Processes Engineering

- Laboratory for Measuring Noise and Vibration



### Department of Furniture and Wood Products

- Laboratory for Wood in Construction
- Laboratory for Furniture and Furniture Parts Testing



# Faculty of Forestry – scientific research outputs

Name of doctoral study (course)	Number of mentors under which candidates defended their theses in the last 5 years*	Number of papers published by mentors in the national reviewed scientific journals in the last 5 years*	Number of papers published by mentors in foreign reviewed scientific journals in the last 5 years*
Forestry (Silviculture and Wildlife Management)	8	79	37
Forestry (Urban Forestry, Nature Conservation, Forest Management Planning and Protection)	6	64	32
Forestry (Techniques, Technologies and Forestry Management)	3	34	11
Wood Technology	6	59	19
Former doctoral study	18	122	52

\* data 2009-2013

# Forestry research – Croatian Forestry Institute

<http://www.sumins.hr/en/>



Croatian Forest Research Institute is a public research institution owned by the republic of Croatia. Objectives and tasks of research are part of the National Programme for scientific-research work of Republic of Croatia, and Development Program of “Croatian Forests” Ltd, Zagreb (Hrvatske šume d.o.o.).

Institute’s principle objectives are conservation and preservation of stability, productivity, biodiversity and genetic resources of forest ecosystems in Republic of Croatia using natural rejuvenation and the achieved level of sustainable forest management.

Conducting research and services at the Institute is organized into six Research Divisions, two departments (Department for Nursery Production, Department for Laboratory Analysis), three Regional Research Centers and Common Affairs Service, with a total of 85 employees.

Within the national framework Croatian Forest Research Institute is working closely with the Ministry of Science, Education and Sports and “Croatian Forests” Ltd. Zagreb.

Within the international cooperation framework Institute’s researchers closely collaborate in number of international research projects and programs with many foreign institutions such as EFI, FAO, IUFRO, etc. and more recently within the FP7 frame.

Institute’s strength with highly motivated professional and scientific staff and long tradition of scientific research in the field of forestry, is also in large number of young researchers who actively participate in domestic and international scientific exchange thus contributing to the further development of forestry science both domestically and internationally.





# Forestry research – Oikon – Institute of Applied Ecology



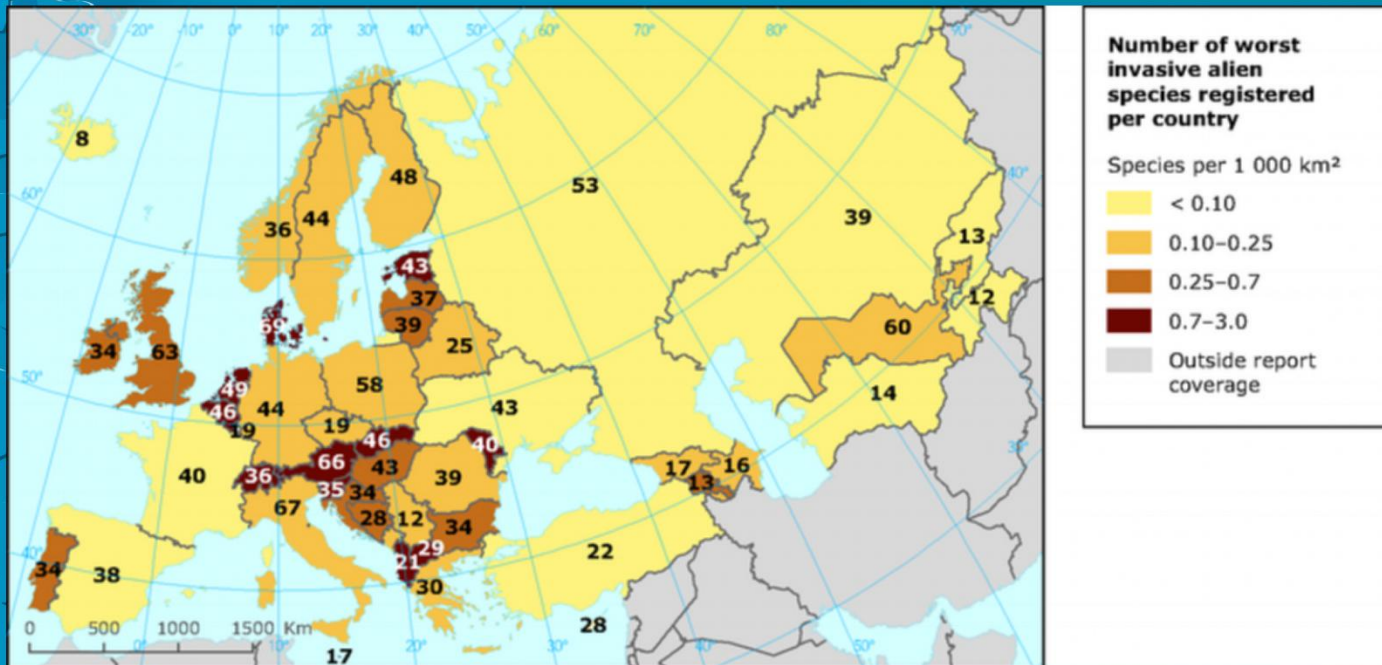
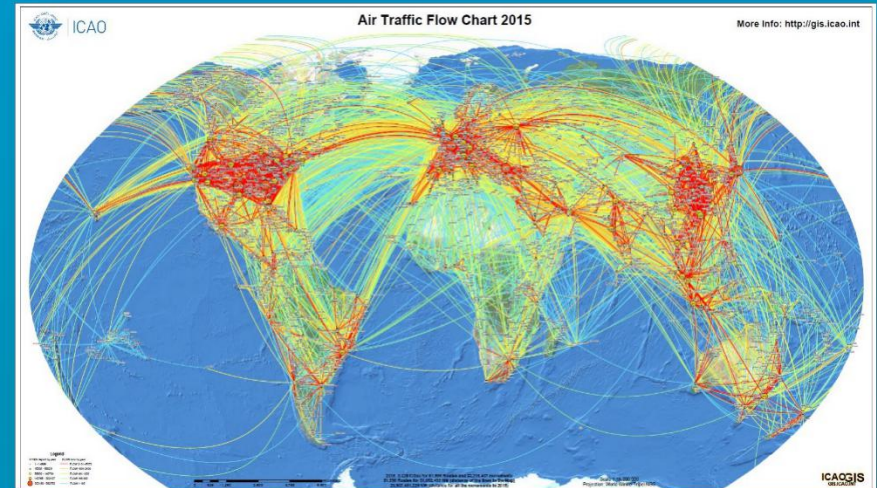
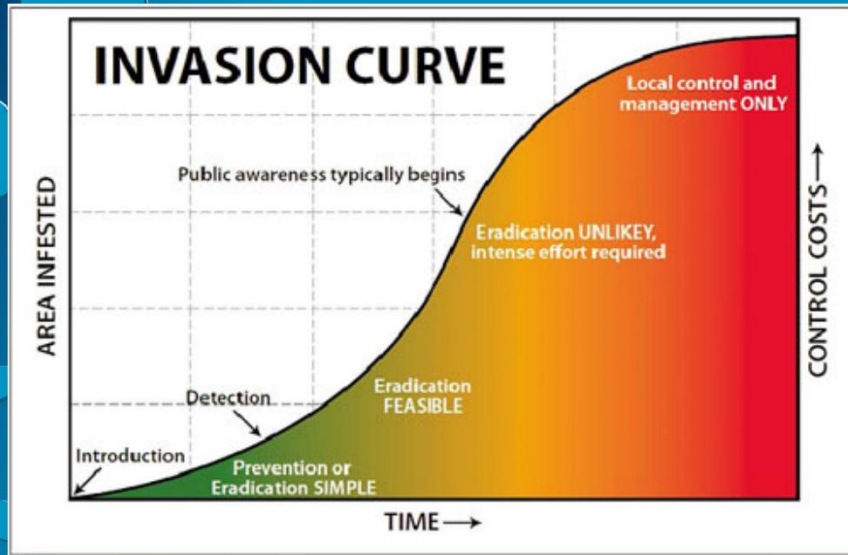
<http://www.oikon.hr>

- **OIKON is a leading licensed and accredited environmental consultancy/research institute in Croatia**
- Almost 20 years of experience, over 1,000 completed contracts, client oriented, innovative and affordable solutions
- Internationally recognized quality certificates:  

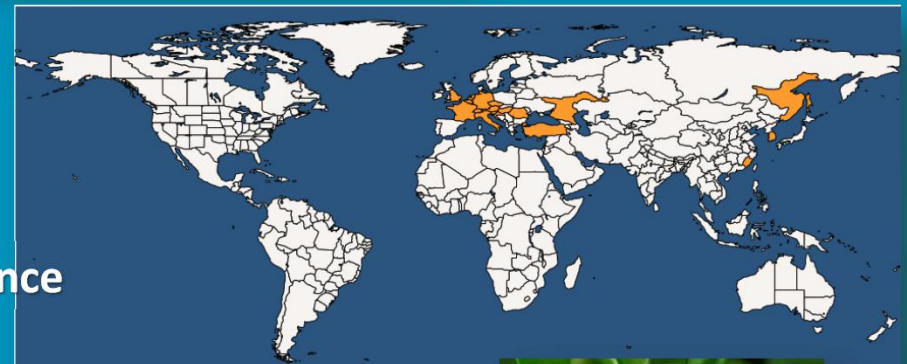
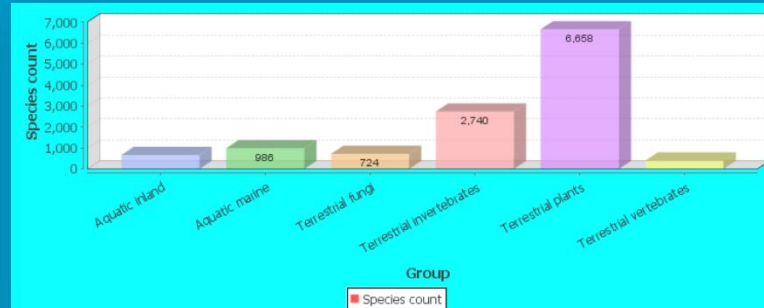
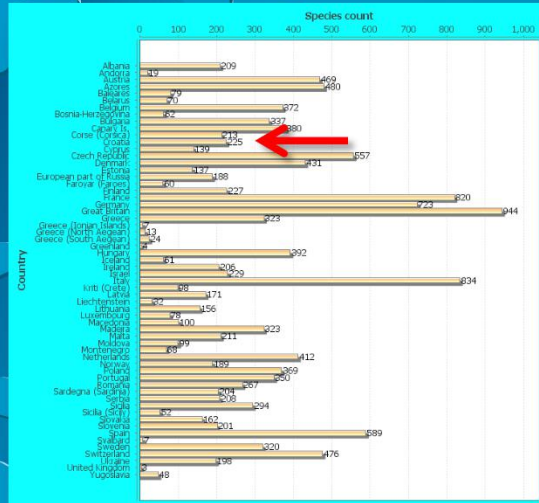
- Portfolio: Environmental and Nature Protection, Natural Resource Management, Renewable Energy Resources, Environmental Modelling, Industrial Ecology, Program and Project Management, IT and GIS
- **35 employees**, 5 PhDs (Forestry, Biology, Ecology, Chemistry), 3 PMPs, 5 scientists registered with the Ministry of Science and Education
- **IUFRO**- International council **representative** for Croatia  
(Oikon's employee- Vladimir Kušan, Phd)



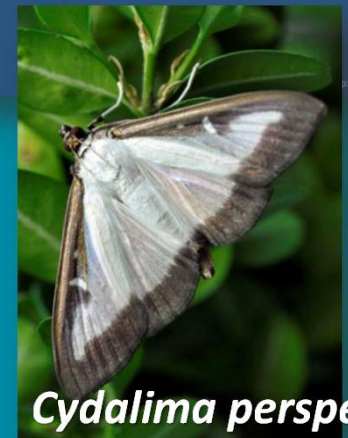
# Forest protection and IAS „invasion” – new challenges



# Number of IAS incidences in CEEC (Croatia too) is GROWING !



*Cydalima perspectalis* (DPHNPE)



*Cydalima perspectalis*

2007 – Germany, Switzerland

2008 – Netherlands, United Kingdom, France

2009 – Austria, Lichtenstein

2010 – Belgium

2011 – Italy, Czech Republic, Hungary, Romania, Slovenia, Turkey

2012 – Croatia

2013 – Russia

2014 – Bulgaria

17 countries in 7 years !

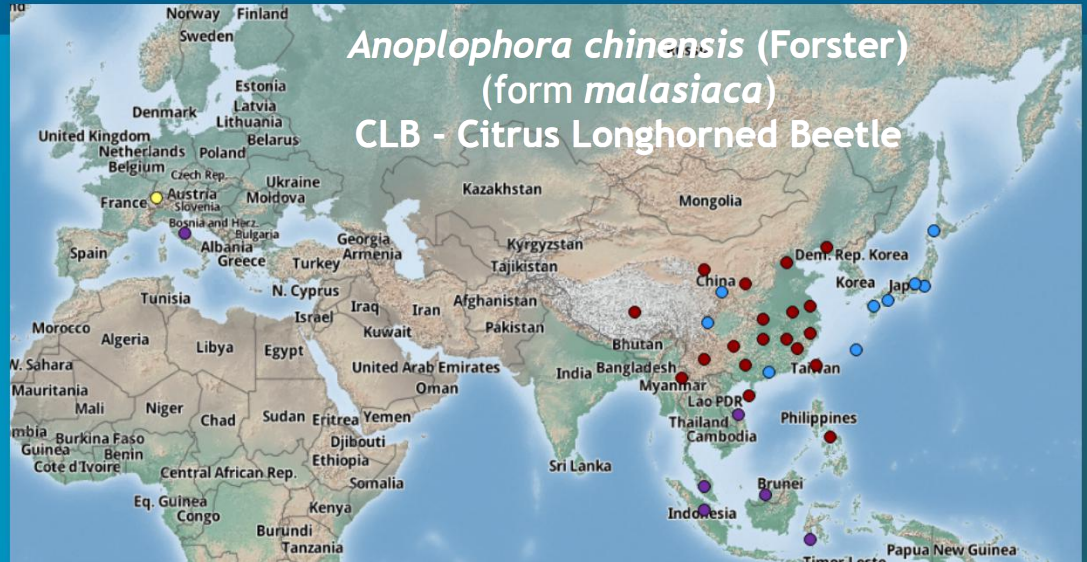


# Some IAS extremely harmful – serious consequences yet to be observed !

Croatia - First specimen isolated from the *Lagerstroemia* plants arriving from the port of Ningbo-Zhoushan in April 2007

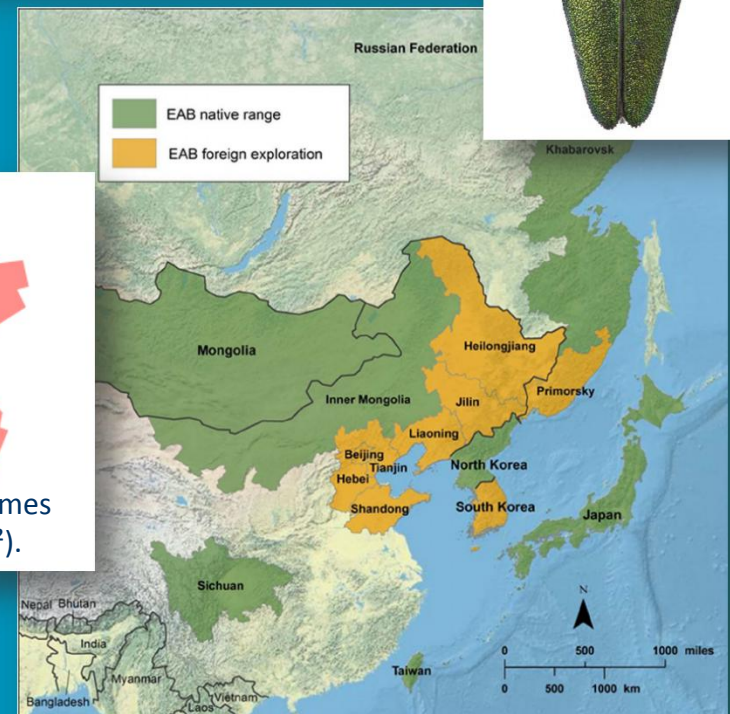
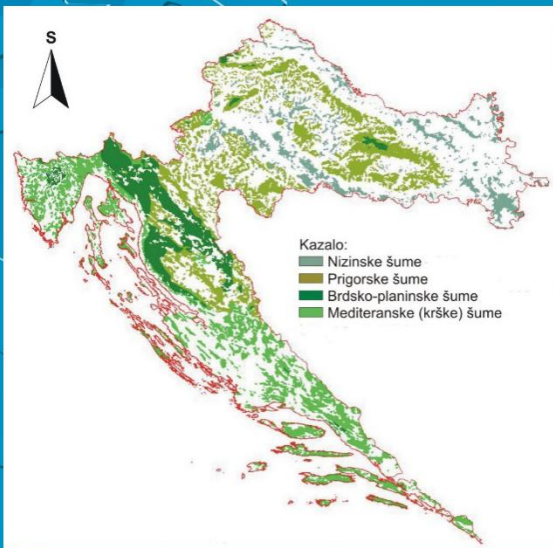
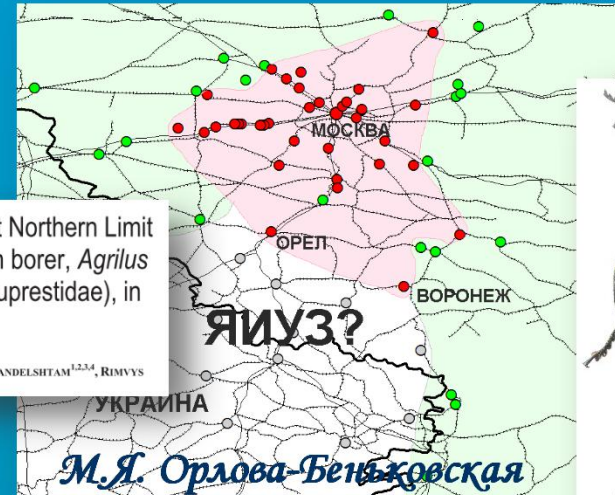
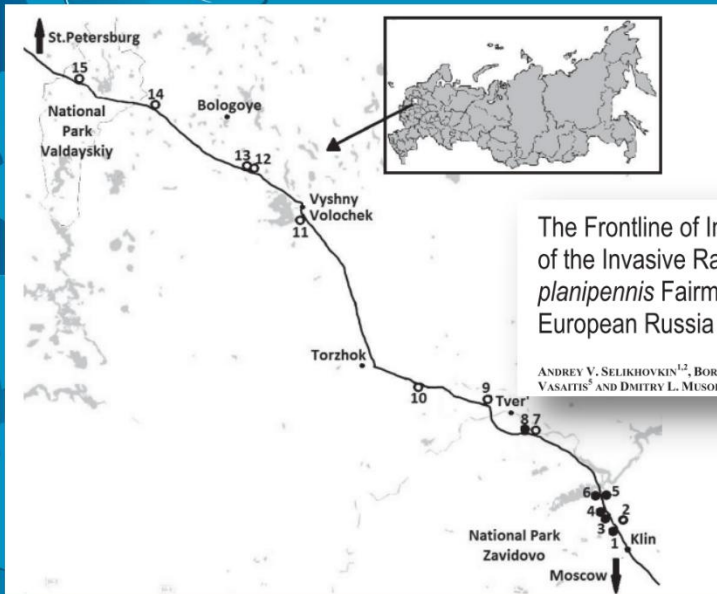


*Anoplophora chinensis* (Forster)  
(form *malasiaca*)  
CLB - Citrus Longhorned Beetle





# Some IAS extremely harmful and arriving !





# The successful (?) case of biological control of chestnut gall wasp



*Dryocosmus kuriphilus* - discovered in Croatia in 2010

*Torymus sinensis* – imported from Italy and released in 2014

The observations suggest that in all the areas where *T. sinensis* has been present for more than two years, population of *D. kuriphilus* has been dropping

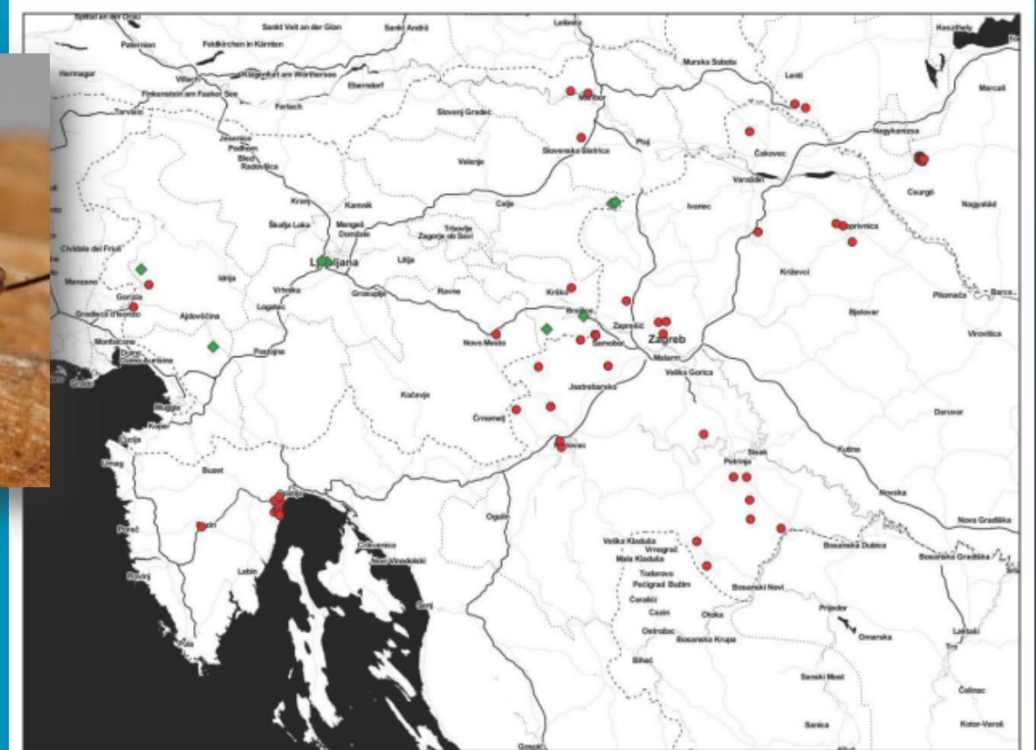


Figure 1: Release sites of *Torymus sinensis* in Croatia, Hungary and Slovenia (red dots) and localities (not release sites) where *T. sinensis* was found in 2015 (green diamonds)

# Potential areas of targeted IAS related cooperation

Early phase introductions (detections) should narrow the cooperative activities into specific cases of detected IAS

Main goal: identify the main control factors in their native range if known (many times there is a significant lack of knowledge dissemination – language barrier !)

„Too late” status of introductions: the activity should focus on the possibilities of biological control (if feasible), not necessarily in terms of natural enemy introductions but better understanding of control mechanisms in native range (evolutionary developed)

Initial activities: screening of locally significant pests (in CEEC and PRC) and preparing a list of priority (potential IAS). Screening procedure should also involve dendrological, climatic and forest type management analysis

Main goal: to identify organisms and potential pathways of introduction (in both directions)

Exchange data on existing situations in arboreta or establishment of new, specially designed „sentinel gardens

