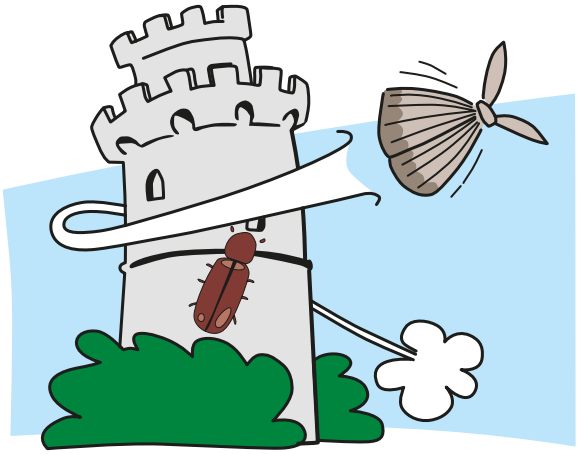
Abstract Book



Forest Insects and Pathogens in a Changing Environment: Ecology, Monitoring & Genetics

Joint Meeting of IUFRO WPs

7.03.05 "Ecology and management of bark and wood boring insects"
7.03.10 "Methodology of forest insect and disease survey"

11-15 SEPTEMBER 2017
THESSALONIKI • GREECE

TECHNICAL CHAMBER OF GREECE /
SECTION OF CENTRAL MACEDONIA

WWW.IUFROGREECE2017.COM
#IUFROGREECE2017

IUFRO

UNDER THE AUSPICES

MINISTRY OF ENVIRONMENT & ENERGY

HELLENIC REPUBLIC
Ministry of Rural Development and Food

REGION OF CENTRAL MACEDONIA

CITY OF THESSALONIKI

HELECOS

HELLENIC ENTOMOLOGICAL SOCIETY 1979

NOVAGRICA Hellas S.A.

Pheromones for monitoring and management of more than 80 pests

Dispenser types and formulations


natural rubber or halobutyl septa


PE or PP microtubes


PVC mini pouches


cellulose strips


PET vials with ceramic wick


organogels, biopolymers

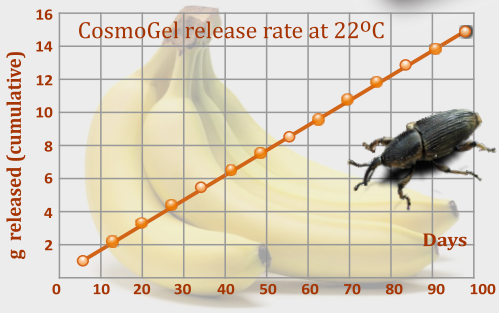

polymeric matrices


flowable formulations

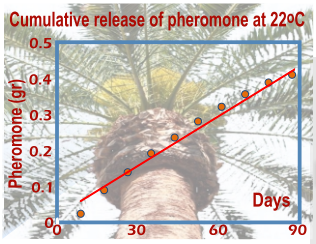
COSMOgel

Pheromone dispenser for *Cosmopolites sordidus*

Pheromone and kairomones in a gel matrix with a constant release rate for more than 90 days*.



Pheromones for *Rhynchophorus ferrugineus*



RPW magnet

Pheromone release rate 4 to 7mg per day over 60 days*

RHYNCHOgel

Pheromone dispenser for *Rhynchophorus ferrugineus*

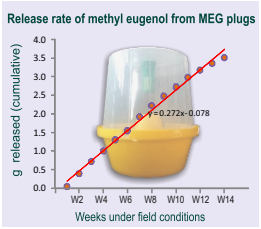
Aggregation pheromone and synergists in a gel matrix .

** depending on trap placement and weather conditions*

Parapheromones for fruit flies

High load of active ingrediends in small sized polymeric dispensers for all types of fruit fly traps.

Smooth evaporation (40mg/day) for 14 weeks (100 days)*.



NovAgrica
Biological Products & Solutions

TE.S.P.A "Lefkippos", N.C.S.R. "DEMOKRITOS"
Patriarchou Grigoriou, 15310 Ag. Paraskevi, GR
Tel: +30 2103306490 info@novagrica.com
www. novagrica.com

Forest Insects and Pathogens in a Changing Environment: Ecology, Monitoring & Genetics

Joint Meeting of IUFRO WPs

7.03.05 "Ecology and management of bark and wood boring insects"
7.03.10 "Methodology of forest insect and disease survey"

11-15 September 2017
Technical Chamber of Greece / Section of Central Macedonia
Thessaloniki, Greece

www.iufrogreece2017.com

Table of Contents

Publications Management: ARTION Conferences & Events
Comic artwork by Stavros Kioutsoukis

Sponsors Acknowledgements

The Organizing Committee of the Joint Meeting of IUFRO's WP 7.03.05 & WP 7.03.10 would like to thank its sponsors and media sponsors for their contribution and support to the Meeting.

WITH THE SUPPORT

HELLENIC MINISTRY OF RURAL DEVELOPMENT AND FOOD
HELLENIC AGRICULTURAL ORGANIZATION "DEMETER"

SPONSORS

BASF
We create chemistry

NovAgrica
Biological Products & Solutions

ANTISEL
A. SELIDIS BROS S.A.

αλάδρασις
anadrasi@otenet.gr
2310 813 122

AgroEcoSystem

ION PLUS

COMMUNICATION SPONSORS

ΑΓΡΟΤΥΠΟΣ ΑΕ

Περιοδικό
Γεωργία
ΚΤΗΝΟΤΡΟΦΙΑ

agrotypos.gr

Agrenda

AgroNews
Καλλιεργεί ιδέες

forests
an open access journal by MDPI

ΠΡΑΚΤΟΡΕΙΟ
ΑΘΗΝΑΪΚΟ - ΜΑΚΕΔΟΝΙΚΟ
ΠΡΑΚΤΟΡΕΙΟ ΕΙΔΗΣΕΩΝ

πρακτορείο
από τη συχνότητα της ΔΕΘ
104,9 FM

Welcome Address

Dear friends and colleagues,

As you read these words you are obviously in Thessaloniki, on the onset of the Joint Meeting of IUFRO's WP 7.03.05 (Ecology and Management of Bark and Wood boring insects) and 7.03.10 (Methodology of Forest Insect and Disease Survey in Central Europe) under the main title "Forest Insects and Pathogens in a Changing Environment: Ecology, Monitoring & Genetics".

It has been a long (and not necessarily easy) road to come where we are, a journey that started two years ago in Bariloche (Argentina), when we undertook the organization of the current meeting. It was then, when Dr. Juan Corley and his team organized a marvellous meeting that set some very high standards for the meetings to follow. Together with my experienced colleagues in ARTION, we have tried the almost impossible: to deliver an even more exciting and unforgettable meeting.

We may not know yet if this goal has been achieved; in any case though, there are many colleagues whose contribution should be mentioned. First of all, I am grateful to Dr. Eckerhard Brockerhoff (Coordinator of IUFRO's Division 7), Mag. Brigitte Burger (IUFRO's Web Management) and Dr. Martin Schroeder, Dr. Diana Six and Dr. Juan Corley (Coordinators of IUFRO 7.03.05) for their valuable suggestions upon the initial planning of the meeting. I would like to thank also in alphabetical order Dr. David Coyle, Dr. Massimo Faccoli, Dr. Andrew Liebhold, Dr. Miloš Knížek, Dr. Alberto Santini and Dr. Rudolf Wegensteiner for assisting greatly in the scientific organization of the meeting, as well as Dr. Ken Raffa and Dr. Carole Kerdelhué for preparing and delivering two very exciting keynote presentations. Last but surely not least, I would like to thank each and every one of you separately, as your presence here is the key component for a successful meeting.

I really wish you enjoy and make the most of this meeting, not only because you participate in a high level scientific event but also for experiencing some moments of Greece which will become unforgettable memories you can recall many years later.

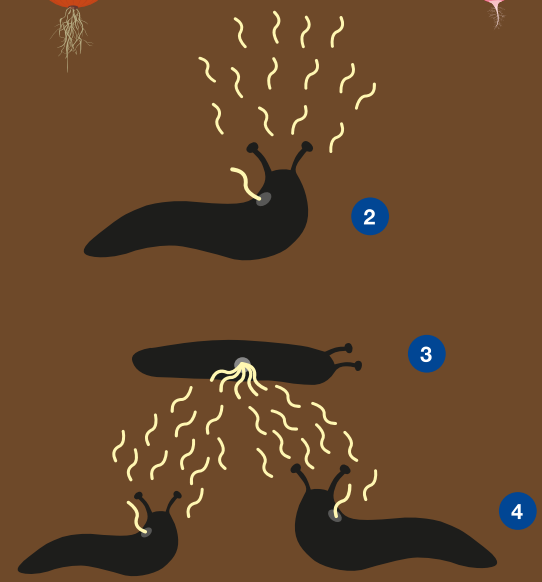
With my warmest regards,

Best Regards,

Dr Dimitrios N. Avtzis
Leader of the Organizing Committee
Forest Research Institute,
Hellenic Agricultural Organization Demeter
Greece

Nemasys® & Nemaslug®

Πώς λειτουργούν οι ωφέλιμοι νηματώδεις.



1. Οι νηματώδεις εφαρμόζονται στο έδαφος, χρησιμοποιώντας ποτιστήρι ή με ψεκαστήρα.
2. Οι νηματώδεις επιτίθενται στα προνυμφικά στάδια των παρασίτων και των γυμνοσαλιάγκων, καθώς εισέρχονται από ανοίγματα του σώματος ή νεκρό δέρμα.
3. Οι νηματώδεις απελευθερώνουν βακτήρια, τα οποία διακόπτουν τη θρέψη του παρασίτου και πολλαπλασιάζονται μέσα στο σώμα του.
4. Μόλις ο ξενιστής πεθάνει, νέοι πεινασμένοι νηματώδεις φεύγουν και κυνηγούν νέα λεία.

Όταν οι νηματώδεις δε μπορούν να εντοπίσουν πλέον ξενιστή (προνύμφη εντόμου), πεθαίνουν.

Προϊόντα συμβατά με τη βιολογική γεωργία (ΚΑΝ. 834/2007).

www.pestcontrol.basf.gr

BASF
We create chemistry

Programme Overview

Sunday, 10 September 2017 – Arrivals	
19:30	"Ouzo & Meze" Ice Breaker Dinner (optional)

Monday, 11 September 2017 – Joint Meeting	
08:30 - 09:45	Registration
09:45 -10:30	Opening Ceremony
10:30 - 11:00	Keynote Speech
11:00 - 12:00	Meeting Session 1: Forest pests and climate change
	Oral Presentations
12:00 - 13:15	Lunch break
13:15 - 14:45	Meeting Session 2: Environmental factors influencing forest pests
	Oral Presentations
14:45 - 15:15	Poster Presentations
	Poster Presentations
15:15 - 15:45	Coffee break
15:45 - 17:30	Meeting Session 3: Monitoring of forest pests: chemical ecology and control
	Oral Presentations

Tuesday, 12 September 2017 – Joint Meeting	
09:00 - 09:30	Keynote Speech
09:30 - 10:45	Meeting Session 4: Expansion and genetics of forests pests and pathogens
	Oral Presentations
10:45 - 11:30	Coffee break & Family photo
11:30 - 12:45	Meeting Session 5: Trapping pests for monitoring and control
	Oral Presentations
12:45 - 14:00	Lunch break
14:00 - 15:30	Meeting Session 6: Phenology, hosts and mutualists of forest pests
	Oral Presentations
15:30 - 16:00	Coffee break

16:00 - 17:15	**Meeting Session 7: International impact of forest pests and pathogens**
	Oral Presentations
17:30 - 18:15	**Business Meeting**

Wednesday, 13 September 2017 – Field Trip

08:30	**"Meet the Greek Gods", Excursion in Mount Olympus**

Thursday, 14 September 2017 – Joint Meeting

09:00 - 11:00	**Meeting Session 8: Getting global: invasive pests and pathogens**
	Oral Presentations
11:00 - 11:30	**Coffee break**
11:30 - 12:30	**Meeting Session 9: Sampling and diagnostic tools for forest pests**
	Oral Presentations
12:30 - 13:00	**Poster Presentations**
	Poster Presentations
13:00 - 14:15	**Lunch break**
14:15 - 15:45	**Meeting Session 10: Bark beetles: epidemiology and expansion**
	Oral Presentations
19:30	**Dinner/ Greek Night Tavern**

Friday, 15 September 2017 – Joint Meeting & Departures

10:00 - 11:00	**Meeting Session 11: Biological control and management of forest pests**
	Oral Presentations
11:00 - 12:00	**Closing Ceremony**

Detailed Programme

Sunday, 10 September 2017 – Arrivals

19:30	**"Ouzo & Meze" Ice Breaker Dinner (optional)**

Monday, 11 September 2017 – Joint Meeting

08:30 – 09:45	**Registration**
09:45 – 10:30	**Opening Ceremony**
10:30 – 12:00	**Keynote Speech & Meeting Session**
	Moderators: **Jean-Claude Gregoire, Brian Aukema**
10:30 – 11:00	**INTERPRETING MECHANISMS AND ROLES OF TREE DEFENSE IN SYSTEMS CHARACTERIZED BY THRESHOLDS AND CROSS–SCALE INTERACTIONS** Keynote Speaker **Prof. Kenneth F. Raffa** *Dept. Entomology, Vilas Distinguished Achievement / Douglas D. Sorenson, University of Wisconsin–Madison – United States*
11:00 - 12:00	**Meeting Session 1: Forest pests and climate change**
	Moderators: **Jean-Claude Gregoire, Brian Aukema**
11:00 – 11:15	**USING GENETICS, CHEMISTRY, AND TREE RINGS IN TANDEM TO DETECT ADAPTATION TO CLIMATE CHANGE AND RESISTANCE TO BARK BEETLES** **Diana L. Six** - *The University of Montana, United States*
11:15 - 11:30	**INVESTIGATING THE POTENTIAL EFFECTS OF A WARMING CLIMATE ON INSECT PEST POPULATIONS ASSOCIATED WITH SITKA SPRUCE IN THE UK** **David T. Williams** - *Forest Research, United Kigdom*
11:30 - 11:45	**NICHE SHIFT INDUCED BY ALLOCHRONIC SPECIATION: IMPLICATIONS FOR FORECASTING THE RESPONSE OF THE PINE PROCESSIONARY MOTH TO GLOBAL CHANGE** **Martin Godefroid** - *Institut National de la Recherche Agronomique, France*
11:45 - 12:00	**CLIMATIC INFLUENCES ON TREE-KILLING BARK BEETLES: A COMPARISON OF NORTH AMERICAN AND EUROPEAN SPECIES** **Barbara Bentz** - *USDA Forest Service, Rocky Mountain Research Station, United States*
12:00 – 13:15	**Lunch Break**

Monday, 11 September 2017

13:15 – 14:45	**Meeting Session 2: Environmental factors influencing forest pests**
	Moderators: **Martin Godefroid, Åke Lindelow**
13:15 - 13:30	**PREDISPOSITION TO DECLINE: PREDICTING AOD OCCURENCE WITH ENVIRONMENTAL FACTORS** **Nathan Brown** - *Rothamsted Research, United Kingdom*
13:30 – 13:45	**MOUNTAIN PINE BEETLE AS A THREAT TO EASTERN PINE FORESTS OF NORTH AMERICA** **Brian Aukema** - *University of Minnesota, United States*
13:45 - 14:00	**INFESTATION RISK OF PINE BY BARK BEETLES ALONG ELEVATIONAL GRADIENTS** **Beat Wermelinger** - *Swiss Federal Institute WSL, Switzerland*
14:00 - 14:15	**EVALUATING GYPSY MOTH LARVAL MOVEMENT POTENTIAL AND EFFECTIVE BARRIERS LIMITING THEIR MOVEMENT** **Jacob T. Wittman** - *University of Minnesota, Department of Entomology, United States*
14:15 - 14:30	**IMPLICATING WINTER TEMPERATURES IN THE SPATIAL SYNCHRONY OF LARCH CASEBEARER** **Samuel J. Fahrner** - *University of Minnesota, Twin Cities, United States*
14:30 - 14:45	**MODELING NORWAY SPRUCE STAND VULNERABILITY TO IPS TYPOGRAPHUS DAMAGE IN THE BOREAL ZONE UTILIZING ENVIRONMENTAL FACTORS** **Minna Blomqvist** - *University of Helsinki, Finland*
14:45 - 15:15	**Posters Presentation**
	FIRST REPORT OF *XYLEBORUS MONOGRAPHUS* AND *XYLEBORINUS SAXESENII* (COLEOPTERA: CURCULIONIDAE: SCOLYTINAE) FROM TUNISIAN CORK OAK FORESTS **Amani Bellahirech** - *National Research Institute of Rural Engineering, Water and Forests, Tunisia*
	RESPONSE OF THE INVASIVE OAK PROCESSIONARY MOTH TO ONGOING CLIMATE CHANGE **Martin Godefroid** – *Institut National de la Recherche Agronomique, France*
	A FIRST ATTEMPT TO RECORD THE NATIVE PARASITOID ASSEMBLAGE OF *DRYOCOSMUS KURIPHILUS* (HYMENOPTERA, CYNIPIDAE) IN GREECE **George Memtsas** - *Aristotle University of Thessaloniki, Greece*
	***PITYOGENES CHALCOGRAPHUS* OUTBREAKS IN SLOVAKIA DURING 42 YEARS OF EVIDENCE** **Andrej Gubka** - *National Forest Centre Zvolen, Slovakia*

	OPHIOSTOMATOID FUNGI ASSOCIATED WITH BARK AND AMBROSIA BEETLES ON ENGLISH OAK IN POLAND **Magdalena Kacprzyk** - *University of Agriculture in Krakow, Poland*
	THE EFFECT OF THESSALONIKI'S SUBURBAN FOREST ON THE POPULATIONS AND BIODIVERSITY OF BUTTERFLIES IN THE CITY'S PARKS **Sofia Karaindrou** - *Aristotle University of Thessaloniki, Greece*
	***LONSDALEA QUERCINA* SUBSP. *POPULI* SUBSP. NOV. A NEW BACTERIA CANKER ON HYBRID POPLARS IN HUNGARY** **András Koltay** - *NARIC Forest Research Institute, Hungary*
	CHANGE IN THE COMPOSITION OF MONOTERPENES FOR EUROPEAN SPRUCE ATTACKED BARK BEETLES **Anton Kovalev** - *Krasnoyarsk Scientific Center, Russian Academy of Science, Russian Federation*
	REU-FIS: A NEW VOLUNTARY NETWORK ON FOREST INVASIVE SPECIES **Ferenc Lakatos** - *University of Sopron, Hungary*
15:15 - 15:45	**Coffee Break**
15:45 - 17:30	**Meeting Session 3: Monitoring of forest pests: chemical ecology and control**
	Moderators: **Ferenc Lakatos, Timothy Paine**
15:45 - 16:00	**MONITORING *HYLOBIUS ABIETIS* (COL., CURCULIONIDAE) IN AUSTRIA** **Rudolf Wegensteiner** - *Department of Forest- and Soil Sciences, Austria*
16:00 - 16:15	**INSECTICIDES ARE PHASED OUT IN SWEDISH FORESTRY – PHYSICAL PROTECTION OF SEEDLINGS TAKES OVER** **Göran Nordlander** - *Department of Ecology, Swedish University of Agricultural Sciences, Sweden*
16:15 - 16:30	**ARTIFICIALLY INDUCED DEFENCES AGAINST PINE WEEVIL DAMAGE** **Frauke Fedderwitz** - *Department of Ecology, Swedish University of Agricultural Sciences, Sweden*
16:30 - 16:45	**THE GOOD, THE BAD, AND THE SMELLY: USING *ALLOCHTHONOUS KAIROMONES* AS AN INSECTICIDE-FREE OPTION IN BARK BEETLE MANAGEMENT** **Christiane Helbig** - *Technische Universität Dresden, Institute of Silviculture and Forest Protection, Chair of Forest Protection, Germany*
16:45 - 17:00	**COLLECTIVE SCANNING OF THE LAND, A REQUISITE FOR GROUP FORAGERS** **Jean-Claude Grégoire** - *Université Libre de Bruxelles, Belgium*

17:00 - 17:15	**DEVELOPMENT OF SPRUCE STAND PROTECTION WITH ANTI-ATTRACTANTS DURING BARK BEETLE OUTBREAKS IN MOSCOW REGION AND NW SLOVAKIA: POINT AND LINEAR DISPENSERS** **Rastislav Jakuš** - *Institute of Forest Ecology, Slovak Academy of Sciences, Slovakia*
17:15 - 17:30	**ATTRACTANTS FOR HYLASTES ATER AND *HYLURGUS LIGNIPERDA* – WHAT ARE WE MISSING?** **Eckehard Brockerhoff** - *Scion (New Zealand Forest Research Institute), New Zealand*

Tuesday, 12 September 2017 – Joint Meeting

09:00 – 10:45	**Keynote Speech & Meeting Session**
	Moderators: **Christian Stauffer, Jean Berube**
09:00 – 09:30	**USING POPULATION GENETICS AND GENOMIC APPROACHES TO DECIPHER THE RECENT HISTORY OF FOREST PEST INSECTS: INVASIONS, EXPANSIONS, AND MORE** Keynote Speaker **Dr. Carole Kerdelhué** *Research Director, INRA Centre de Biologie pour la Gestion des Populations (CBGP), Campus International de Baillarguet, Montferrier sur Lez – France*
09:30 - 10:45	**Meeting Session 4: Expansion and genetics of forests pests and pathogens**
	Moderators:
09:30 – 09:45	**BARK BEETLES EXPANDING NORTHWARD AND INTO NEW HABITATS IN EUROPE** **Bjørn Økland** - *Norwegian Institute of Bioeconomy Research, Norway*
09:45 - 10:00	**RANGE SHIFT AND LOCAL EXTINCTION OF DENDROCTONUS FRONTALIS POPULATIONS IN THE SOUTHERN UNITED STATES** **Fred Stephen** - *University of Arkansas, United States*
10:00 - 10:15	**RAD SEQUENCING HELPS TO UNRAVEL THE PHYLOGEOGRAPHY OF *PITYOGENES CHALCOGRAPHUS*** **Martin Schebeck** - *BOKU, University of Natural Resources and Life Sciences Vienna, Department of Forest and Soil Sciences, Austria*
10:15 - 10:30	**A PHYLOGEOGRAPHIC APPROACH TO TRACE THE INVASION PATHWAYS OF THE HIGHLY INVASIVE BOX TREE MOTH, *CYDALIMA PERSPECTALIS*, IN EUROPE** **Audrey Bras** - *INRA, France*
10:30 -10:45	***DIPLODIA SAPINEA*: A SURPRISINGLY LOW GENETIC DIVERSITY IN THE WESTERN BALKANS** **Milica Zlatković** - *Institute of Lowland Forestry and Environment, Serbia*

10:45 – 11:30	**Coffee Break & Family Photo**
11:30 – 12:45	**Meeting Session 5: Trapping pests for monitoring and control**
	Moderators: **Beat Wermelinger, Juan Corley**
11:30 – 11:45	**IMPACT OF INTERCEPT TRAP DEPLOYMENT AND DESIGN FACTORS ON THE CAPTURE OF LONGHORNED BEETLES (COLEOPTERA: CERAMBYCIDAE)** **Jeremy Allison** - *Canadian Forest Service, Canada*
11:45 - 12:00	**MASS TRAPPING EXTRACTION OF *MONOCHAMUS GALLOPROVINCIALIS* OLIVIER (COL.: CERAMBYCIDAE) IN TWO DENSITY DIFFERENT POPULATIONS** **Juan A. Pajares Alonso** - *Sustainable Forest Research Institute, University of Valladolid, Spain*
12:00 - 12:15	***IPS DUPLICATUS* AND TRAP TREES** **Miloš Knížek** - *Forestry and Game Management Research Institute, Czech Republic*
12:15 - 12:30	**USING A DIVERSITY OF TRAP HEIGHT, COLOR, AND LURES INCREASES SPECIES RICHNESS IN SURVEY TRAPS FOR WOOD BORING BEETLES** **Jon Sweeney** - *Natural Resources Canada, Canadian Forest Service, Canada*
12:30 -12:45	**METHODOLOGY OF COMPARATIVE TRAPPING USING BARK BEETLE TRAPS AND ATTRACTANTS** **Michael Müller** - *Technische Universität Dresden, Institute of Silviculture and Forest Protection, Chair of Forest Protection, Germany*
12:45 – 14:00	**Lunch Break**
14:00 - 15:30	**Meeting Session 6: Phenology, hosts and mutualists of forest pests**
	Moderators: **Wojciech Grodzki, Dilzara Aghayeva**
14:00 - 14:15	**TRENDS IN THE FLIGHT PHENOLOGY AND FLUCTUATION OF THE *HELICOVERPA ARMIGERA* (HBN) POPULATION IN HUNGARY** **Levente Szőcs** - *NARIC Forest Research Institute, Hungary*
14:15 - 14:30	***MONOCHAMUS GALLOPROVINCIALIS* EMERGENCE PHENOLOGY ACROSS THE IBERIAN PENINSULA** **Juan A. Pajares Alonso** - *Sustainable Forest Research Institute, University of Valladolid, Spain*
14:30 -14:45	**OVERWINTERING SUCCESS AND COLD TOLERANCE IN THE DOUBLE-SPINED BARK BEETLE, IPS DUPLICATUS (SAHLB.)** **Markéta Davidkova** - *Institute of Entomology, Biology Centre AS CR, Czech Republic*
14:45 - 15:00	**UNLIKELY PARTNERS: BARK BEETLES, OPHIOSTOMATOID (BLUESTAIN) FUNGI, AND SUBTERRANEAN TERMITES** **John Riggins** - *Mississippi State University, United States*

15:00 - 15:15	**PHENOLOGICAL CHANGES IN THE PINE PROCESSIONARY MOTH: POSSIBLE CAUSES, CONSEQUENCES AND UP-AND-COMING MONITORING METHODS** **Jérôme Rousselet** - *INRA – URZF, France*
15:15 - 15:30	**WIDESPREAD DISTRIBUTION OF TRYPODENDRON LAEVE IN THE CARPATHIAN MOUNTAINS (ROMANIA)** **Duduman Mihai-Leonard** - *Stefan cel Mare University of Suceava, Forestry Faculty, Romania*
15:30 -16:00	**Coffee Break**
16:00 - 17:15	**Meeting Session 7: International impact of forest pests and pathogens**
	Moderators: **Andrew Liebhold, Rudolf Wegensteiner**
16:00 - 16:15	*CRYPHONECTRIA PARASITICA* **IN AZERBAIJAN: CURRENT DEVELOPMENT OF THE SITUATION** **Dilzara N. Aghayeva** - *Institute of Botany, Azerbaijan National Academy of Sciences, Azerbaijan*
16:15 - 16:30	**OUTBREAK DYNAMICS OF THE WOODWASP SIREX NOCTILIO: UNRAVELLING DRIVERS THAT MAY HELP IMPROVE PEST MANAGEMENT IN PINE PLANTATIONS** **Juan C. Corley** - *CONICET/INTA, Argentina*
16:30 - 16:45	**EXAMINING THE ROLE OF AGRILUS BIGUTTATUS IN ACUTE OAK DECLINE THROUGH STUDIES ON WOUND CLOSURE AND DENDROCHRONOLOGY** **Katy Reed** - *Forest Research and Harper Adams University, United Kingdom*
16:45 -17:00	**DOTHISTROMA NEEDLE BLIGHT IN NATURAL FORESTS OF CORSICAN PINE IN LA SILA MASSIF, CALABRIA, ITALY** **Luisa Ghelardini** - *Department of Agrifood Production and Environmental Sciences, University of Florence, Italy*
17:00 - 17:15	**A DNA BARCODE REFERENCE LIBRARY OF LEAF MINING INSECTS COLONIZING WOODY PLANTS FOR FAST AND ACCURATE IDENTIFICATION OF FOREST PESTS IN ASIAN RUSSIA** **Natalia Kirichenko** - *Sukachev Institute of Forest SB RAS, Federal Research Center "Krasnoyarsk Science Center SB RAS", Russia*
17:30 - 18:15	**Business Meeting**

Wednesday, 13 September 2017 – Field Trip

08:30	**"Meet the Greek Gods", Excursion in Mount Olympus**

Thursday, 14 September 2017 – Joint Meeting	
09:00 – 11:00	**Meeting Session 8: Getting global: invasive pests and pathogens**
	Moderators: **Luisa Ghelardini, Eckehard Brockerhoff**
09:00 – 09:15	**SIMULATION SITES FOR THE DETECTION OF THE ASIAN LONGHORNED BEETLE AND CONTAINER SURVEY FOR THE EARLY DETECTION OF INVASIVE ALIEN SPECIES** **Lucie Gagné** - *Canadian Food Inspection Agency, Canada*
09:15 - 09:30	**RAPID SPREAD AND UNEXPECTED OUTBREAKS OF THE OAK LACE BUG *(CORYTHUCHA ARCUATA)* IN SOUTH EASTERN EUROPE** **György Csóka** - *NARIC Forest Research Institute, Hungary*
09:30 - 09:45	**INVASIVE AMBROSIA BEETLES IN CALIFORNIA NATIVE AND URBAN FORESTS** **Timothy Paine** - *Bartın University, Turkey*
09:45 - 10:00	**REGIONAL IMPACTS OF THE EMERALD ASH BORER INVASION IN THE USA** **Andrew M. Liebhold** - *US Forest Service Northern Research Station, United States*
10:00 - 10:15	**LESSONS FROM THE INVASIVE INSECTS IN CENTRAL-EUROPEAN FORESTS** **Ferenc Lakatos** - *University of Sopron, Hungary*
10:15 - 10:30	**SINGLE INTRODUCTION EVENT OF AN AMBROSIA BEETLE AND ITS FUNGAL SYMBIONT THREATEN ENTIRE PLANT FAMILY IN NORTH AMERICA** **John Riggins** - *Mississippi State University, United States*
10:30 - 10:45	**PHEROMONE ECOLOGY OF THE EMERALD ASH BORER** **Krista Ryall** - *Canadian Forest Service, Canada*
10:45 -11:00	**DO THIS, NOT THAT: FOREST HEALTH AND INVASIVE SPECIES COMMUNICATION STRATEGIES FOR MULTIPLE AUDIENCES** **David Coyle** - *Southern Regional Extension Forestry and the University of Georgia, United States*
11:00 – 11:30	**Coffee Break**
11:30 – 12:30	**Meeting Session 9: Sampling and diagnostic tools for forest pests**
	Moderators: **Martin Schroeder, Jon Sweeney**
11:30 – 11:45	**DETECTION OF EMERGING FUNGAL FOREST PATHOGENS USING NEXT GENERATION SEQUENCING METHODS** **Jean A. Bérubé** - *Canadian Forest Service, Natural Resources Canada, Canada*
11:45 - 12:00	**A MOLECULAR TOOL FOR YOUR BACKPACK: IN-FIELD EARLY DETECTION OF LAUREL WILT USING LAMP** **Caterina Villari** - *Warnell School of Forestry & Natural Resources, University of Georgia, United States*

Thursday, 14 September 2017

12:00 -12:15	**SELF-INFECTION OF PINE WOOD NEMATODE VECTOR *MONOCHAMUS GALLOPROVINCIALIS* WITH ENTOMOPATHOGENIC FUNGUS *BEAUVERIA PSEUDOBASSIANA* FOR BIOLOGICAL CONTROL** **Alberto Sacristán Velasco** - *Universidad de Valladolid, Spain*
12:15 -12:30	**EFFICIENT SAMPLING OF SAPROXYLIC BEETLES IN URBAN HOLLOW TREES – BALANCING BETWEEN VANDALISM AND AMOUNT OF WOOD MOULD** **Elina Peuhu** - *University of Helsinki, Department of Forest Sciences, Finland*
12:30 – 13:00	**Posters Presentation**
	OUTBREAK OF BARK BEETLES IN ODERSKE MOUNTAINS (CENTRAL EUROPE) – INFLUENCE OF CHANGING ENVIRONMENT **Roman Modlinger** - *Czech University of Life Sciences Prague, Faculty of Forestry and Wood Sciences, Czech Republic*
	A FIRST INSIGHT INTO THE PHYLOGEOGRAPHY OF *THAUMETOPOEA WILKINSONI* IN CRETE **Dimitrios Petsopoulos** - *Aristotle University of Thessaloniki, Greece*
	THE APENNINE AS SOURCE OF HAPLOTYPE DIVERSITY IN THE SPRUCE BARK BEETLE *PITYOGENES CHALCOGRAPHUS* **Christian Stauffer** - *Department of Forest and Soil Sciences, Boku, University of Natural Resources and Life Sciences, Austria*
	OCCURENCE OF THE PATHOGEN *LARSSONIELLA DUPLICATI* IN THE INDIGENOUS AND NEW OUTBREAK AREAS OF *IPS DUPLICATUS* IN EUROPE **Hana Vanická** - *Czech University of Life Sciences Prague, Czech Republic*
	THE SPREAD OF *XYLOSANDRUS GERMANUS* WITHIN EUROPE AND SLOVAKIA OVER THE LAST 15 YEARS **Juraj Galko** - *National Forest Centre, Forest Protection Service, Slovakia*
	PRELIMINARY SURVEY ON THE BIOLOGICAL CYCLE OF *CAPPARIMYIA SAVASTANI (MARTELLI) (DIPTERA: TEPHRITIDAE)* IN DIFFERENT PLANTS OF CRETE ISLAND, GREECE **Antonios Tampakis** - *Democritus University of Thrace, Greece*
	THE MEAN INDIVIDUAL BIOMASS INDEX OF CARABID BEETLES IN RELATION TO DEADWOOD STRUCTURE AND SOIL BIOCHEMICAL PROPERTIES **Magdalena Kacprzyk** - *University of Agriculture in Krakow, Poland*
	DENDROCTONUS MICANS (KUGELANN, 1794) ON NON-NATIVE SPRUCES IN SLOVAKIA **Christo Nikolov** - *National Forest Centre, Forest Protection Service Banská Štiavnica, Slovakia*

	GENETIC PATTERNS IN THE RANGE EXPANSION OF PINE PROCESSIONARY MOTH IN NORTHERN FRANCE **Jérôme Rousselet** - *URZF-INRA, France*
13:00 – 14:15	**Lunch Break**
14:15 - 15:45	**Meeting Session 10: Bark beetles: epidemiology and expansion**
	Moderators: **Miloš Knížek, Massimo Faccoli**
14:15 - 14:30	**SPRUCE BARK BEETLE EPIDEMIOLOGY AFTER STORM DAMAGE IN TWO DIFFERENTLY MANAGED FOREST DISTRICTS** **Beat Forster** - *Swiss Federal Research Institute WSL, Switzerland*
14:30 -14:45	**COLONIZATION DENSITY – A MAJOR FACTOR INFLUENCING OUTBREAK DYNAMICS OF THE SPRUCE BARK BEETLE *IPS TYPOGRAPHUS*** **Martin Schroeder** - *Swedish University of Agricultural Sciences, Sweden*
14:45 -15:00	**BARK BEETLE MANAGEMENT AT THE NEWLY-ESTABLISHED BLACK FOREST NATIONAL PARK (NP)** **Horst Delb** - *Forest Research Institute Baden-Wuerttemberg, Germany*
15:00 - 15:15	***IPS CEMBRAE* – ESTABLISHMENT AND SPREAD IN SWEDEN – A LIFE ON THE MARGIN?** **Åke Lindelöw** - *Department of Ecology, Swedish University of Agricultural Sciences, Sweden*
15:15 - 15:30	**BARK BEETLE OUTBREAKS IN THE TATRA MTS: ANALYSIS AND OBSERVATIONS ON THREE OUTBREAKS IN 25 YEARS** **Pavel Mezei** - *Institute of Forest Ecology, Slovakia*
15:30 - 15:45	**BARK BEETLE COLONIZATION OF A PINE ISLAND IN THE GREAT PLAINS OF NORTH AMERICA** **Kevin Chase** - *University of Minnesota, United States*
19:30	**Dinner / Greek Night Tavern**

Friday, 15 September 2017 – Joint Meeting & Departures

10:00 - 11:00	**Meeting Session 11: Biological control and management of forest pests**
	Moderators: **Horst Delb, David Coyle**
10:00 - 10:15	**SPRUCE BUDWORM PEST MANAGEMENT AS A CONSERVATION TOOL FOR CRITICAL HABITATS AND ECOLOGICAL INTEGRITY OF FOREST WATERSHEDS** **Michael Stastny** - *Canadian Forest Service, Natural Resources Canada, Canada*
10:15 - 10:30	**EFFICACY CONTROL OF *CLOSTERA ANASTOMOSIS* L. CATERPILLARS IN POSTDORMANCY PHASE.** **Corina Duduman** - *Stefan cel Mare University of Suceava, Forestry Faculty, Romania*
10:30 - 10:45	**INFLUENCE OF POST-WINDTHROW FOREST MANAGEMENT ON BEETLE-INDUCED TREE MORTALITY IN SURROUNDING INTERVENTION AND NON-INTERVENTION ZONES** **Mária Havašová** - *Slovak Academy of Sciences, Slovakia*
10:45 - 11:00	**FOREST PROTECTION VS. NATURE CONSERVATION: THE CASE OF LARCH, LARCH BARK BEETLE *IPS CEMBRAE* HEER AND THE BLACKGAME TETRAO TETRIX L.** **Wojciech Grodzki** - *Forest Research Institute, Poland*
11:00 - 12:00	**Closing Ceremony**

Committees

Organizing and Scientific Committee

Leader

Dr Dimitrios N. Avtzis
Forest Research Institute,
Hellenic Agricultural Organization Demeter
Greece

Members

Dr David R. Coyle
Forest Health and Invasive Species Program
Southern Regional Extension Forestry
University of Georgia
Athens, Georgia, USA

Prof. Massimo Faccoli
Department of Agronomy, Food, Natural Resources, Animals and the Environment
University of Padua,
Viale dell'Università
Legnaro (PD), Italy

Dr Miloš Knížek
Forestry and Game Management Research Institute
Jiloviste – Strnady, Prague
Czech Republic

Dr Andrew Liebhold
Northern Research Station
USDA Forest Service
Morgantown, USA

Dr Alberto Santini
Institute for Sustainable Plant Protection - CNR
Italy

Prof. Rudolf Wegensteiner
Institute of Forest Entomology Forest Pathology and Forest Protection (IFFF)
Vienna, Austria

Keynote Speakers

Carole Kerdelhué

Research Director - INRA
Centre de Biologie pour la Gestion des Populations (CBGP)
Campus International de Baillarguet
Montferrier sur Lez
France

Using population genetics and genomic approaches to decipher the recent history of forest pest insects: invasions, expansions, and more

Kenneth F. Raffa

Professor of Forest Entomology
Vilas Distinguished Achievement / Sorenson Professor
University of Wisconsin-Madison
United States

Interpreting mechanisms and roles of tree defense in systems characterized by thresholds and cross-scale interactions

About Forest Research Institute (FRI)

HELLENIC MINISTRY OF RURAL DEVELOPMENT AND FOOD
HELLENIC AGRICULTURAL ORGANIZATION "DEMETER"

The **Hellenic Agricultural Organization Demeter** ("HAO Demeter"), **Directorate - General for Agricultural Research** (former National Agricultural Research Foundation- NAGREF) is the Organization's body charged to promote the national agricultural research in Greece. It has the ability and the capacity of high research quality due to its well-equipped laboratories and its field infrastructure that functions by well-educated and highly trained staff. Moreover, it supports and coordinates initiatives for development as suggested by the Ministry of Rural Development and Food, the Ministry of Environment, Energy and Climate Change, the agricultural cooperatives, product distributors, producer groups etc. New scientific knowledge and technical innovations are directed towards creating a dynamic and competitive agriculture that is friendly to the environment and capable to serve the best interest of humans. (www.elgo.gr).

The Forest Research Institute (FRI) is one of the Institutes of HAO Demeter. It was established in 1961 and is a multidisciplinary Institute covering through research, consultation and special studies, all branches of Forestry. Its mission is **the understanding, restoration, and sustainable management of terrestrial ecosystems such as forests and rangelands and to maintain and enhance plant and wildlife resources for the benefit of people and the nature.** (www.fri.gr)

Meeting Secretariat

PROFESSIONAL CONGRESS ORGANISER FOR IUFRO GREECE 2017

ARTION
conferences & events

E-mail: iufro@artion.com.gr
Tel.: +30 2310 257804, +30 2310 272275

Meeting Director: Despina Amarantidou
Delegates & Accommodation: Vicky Giotopoulou
Scientific Programme: Chara Ignatiadou, Kelly Angelaki
Sponsorship: Marianna Georgitseli
E-Marketing: Prodromos Nikolaidis
Communications & Publications: Maria Kantziari

Useful Information

Official Language
The official language of the Meeting is English.

Venue and Dates
The **Joint Meeting of IUFRO's WP 7.03.05 & WP 7.03.10 11-15 September 2017** is being held at the Technical Chamber of Greece / Section of Central Macedonia at 49 Megalou Alexandrou Avenue in Thessaloniki, Greece

Conference Dates: 11-15 September 2017

Local Transportation

City Buses
Thessaloniki Bus Lines are operated by the Organization of Urban Transportation of Thessaloniki – "OASTH".
Pre-printed regular tickets may be purchased at OASTH ticket selling booths, at 1200 points of sale throughout the metropolitan area of Thessaloniki, or at ticket vending machines on-board buses.

- Regular fare – single trip tickets issued by ticket machines on-board buses cost 0.10€ more than their nominal value, e.g. pre-printed regular tickets cost 1.00€ while regular tickets issued on board cost 1.10 €.
- Longer duration tickets for up to 2 uses are valid for 2 trips to and from any direction and any bus route within 70 minutes from the time they are issued (if they are issued inside the bus) or from their first validation (if they are pre-printed, like the tickets illustrated).
- Two-trip 70-minutes tickets issued by ticket machines on-board buses cost 0.10€ more than their nominal value, e.g. pre-printed regular tickets cost 1.20 €, while regular tickets issued on board cost 1.30 €.

Detailed information on ticket options, bus routes and timetables is available at:
www.oasth.gr

Taxi Service
Taxi service in Thessaloniki is plentiful and economic. Taxis can easily be found everywhere in the city, the city airport, port and railway station. They are blue-white. Taxis are available at most hotels or can easily be ordered by hotel reception staff. Taxi companies operate 24-hour call centers, ready to receive your order or make an advance booking for you. Should you wish to order a radio taxi, please call the following number: +30 2310866866.
Minimum taxi fare is 3,50 €.
A taxi will cost around 5 € for a city centre transfer and around 20 € from and to the airport.
A double fare is applicable after midnight from 24:00 to 05:00.
It is important to know that in Greece it is common for taxi drivers to stop and pick other people as well while you are in the taxi (this applies only in case you pick up the taxi from the street and not if you order it).

Time Zone
The time zone in Greece is GMT +2.

Language
Greek is the official language but English is widely spoken.

Currency
The Greek currency is euro (€). Credit cards are widely used in most establishments.

Most currencies and traveler's cheques can easily be changed either at banks, hotels or money-changers with some handling charges.

Weather in September

A city of 300 days of sunshine. Every season in Thessaloniki can be enjoyable to the utmost. Typical Mediterranean climate with mild winters and warm summers. The weather in September ranges from min. 15°C to max. 27°C. Throughout September, the most common forms of precipitation are thunderstorms, moderate rain, and light rain. We advise you to wear light clothes and have always a light jacket or sweater with you, especially in the evening.

Power Supply

The standard current in Greece is 220 Volts at 50 Hz. Plugs are European standard with two round pins.

Name Badge

Your personal badge is your entrance ticket to all sessions. Please remember always to wear your badge.

First Aid

In case of emergency, please contact the Meeting Secretariat.

Useful phone numbers

Police* 100
Ambulance* 166
Fire* 199
Emergency phone** 112
Phone book information* 11888
Tourist police station (+30) 2310554870, (+30) 2310554871

*It refers to a local number and can be used only from a local phone.
**It refers to a European number. After a recorded message in English and Greek, an operator receives the call in English, French or Greek, puts the caller through to the necessary service, and assists with interpretation, if necessary.

Registration & Information desk, Meeting Secretariat

Operating hours:

Monday, 11 September 2017	08:30 - 17:30
Tuesday, 12 September 2017	08:30 - 17:30
Wednesday, 13 September 2017	Field Trip 08:30
Thursday, 14 September 2017	08:30 - 16:30
Friday, 15 September 2017	09:30 - 12:00

Information on Conference Social Events and Tours are available at desks. Tickets to the optional social events and tours can be booked there.

E-mail: iufro@artion.com.gr

Tel: (+30) 2310257804 (direct line), (+30) 2310272275

Internet Facilities

Wi-Fi connection is provided at the Meeting premises.

Meeting Social Events

Opening Ceremony	Monday 11 September 2017	09:45	
Closing Ceremony	Friday 15 September 2017	11:00	

Optional Social Events

"Ouzo & Meze" Ice Breaker Dinner	Sunday 10 September 2017	19:30	Price: €15
Dinner/ Greek Night (tavern)	Thursday 14 September 2017	19:30	Price: €25

Field Trip

"Meet the Greek Gods", Excursion in Mount Olympus

(lunch and dinner are included)

Price: *€75*
Date: *Wednesday, 13 September 2017*
Time of Departure: *08:30*

This tour will take you to the footsteps of Mt. Olympus; also known as the "home of Gods". We will first visit Dion, the religious center of the Macedonians, where the mythical 12 Olympic Gods were worshipped. During the tour we will visit the Archeological Park and the Archeological Museum of Dion, one of the biggest archaeological sites in Greece. The ancient city was sacred to the ancient Macedonians and Alexander the Great used to make here sacrifices to the Gods, before starting a new campaign to conquer the world. Later on, we will arrive in the village of Litochoro, where we will take a mild guided walk. A chance to breathe the fresh mountain air, admire the natural beauty, whilst walking through unspoiled forest of the Ainipeas Valley. We will then have time to enjoy our coffee or ouzo in a traditional local café. Returning to Litochoro, we will have the time for an optional lunch break and for a walk around the picturesque village. Early in the evening, we will return to Thessaloniki.

Cultural Programme

Thessaloniki City Tour: 2.300 Ages of History
(official guide included)

Price: *€45*
Date: *Monday, 11 September 2017*

Explore a history of 2.300 years through a city tour in Thessaloniki. Wandering through the city, it is worthwhile to pass through the Byzantine Walls and have a panoramic view of Thessaloniki from the Trigonion or Chain Tower located at the northeast of the city; visit Agios Dimitrios church (5th c. AD) a splendid basilica dedicated to the patron saint and protector of the city. There one can meet stunning Byzantine mosaics and the Crypt, where the saint met a martyr's death by the Roman soldiers. In the end of the tour, our guide will lead you to the Archaeological or the Museum of Byzantine Culture of Thessaloniki.

Vergina – Veria – Naoussa
(coffee included)

Price: *€65*
Date: *Tuesday, 12 September 2017*

The archaeological museum of the royal Tombs in Vergina testifies the culture of the Macedonian Kingdom. The discovery of the tomb of Philip II, in 1977, was hailed as one of the greatest archaeological finds of the century. Rich and impressive artifacts were unearthed and can be viewed there along with the tombs themselves and the amazing frescoes, rare samples of painting from antiquity. Veria is our next stop, a picturesque town with a unique landscape and architecture. We will drive through the city, see St. Paul's Altar, the traditional Jewish quarter of Barbouta and take a rest and enjoy a coffee at a traditional café and walk for a while through the lovely streets of the city, full of old Byzantine churches and unique historical monuments.

We will then take the coach to Naoussa, one of the most well-known wine producing regions in Greece, where we will enjoy a rich lunch in a taverna, in a relaxing natural environment.

Swim in Halkidiki Blue Waters!
(lunch included)

Price: *€70*
Date: *Thursday, 14 September 2017*

Shaped like Poseidon's trident and sticking out into the Aegean Sea, Halkidiki is a treat for visitors. Lush green forests that reach right down to the beach; golden sunlight reflected in the turquoise waters; a traditional style with a rich gastronomic and cultural heritage. Endless coves, unique architectural sites, perfectly preserved Christian monument and a host of unexplored treasures all add their own rich touch to the unique canvas that is Halkidiki. Among this blend of blue and green, there are several summer resorts on the beaches of all three fingers where other minor towns and villages are located. For your daily trip, we are taking you either to an exotic beach bar, either to spend some private time, relax or have fun.

Live, Learn & Love Thessaloniki

With an ideal location, Thessaloniki can become the basis for discovering the unique beauty of Northern Greece. Cultural treasures of global interest, religious pilgrimages, nature, crystal beaches and various activities are waiting for you and even within walking distance from the city. Organised private tours are available to the Conference participants by ARTION Conferences & Events. Please ask for the designated brochure of Tours in Private at the Information Desk.

The New Thessaloniki Seafront stretches from the Royal Theater to the Thessaloniki Concert Hall. It is a distance of 3.5 kilometers, which, once you add the 1.5 km from the White Tower to the Port, give us a total of 5 kilometer of seafront with great variety in scenery. You are more than welcome to enjoy it with a 45-minute walk or a shorter run alongside the sea and the seafront's parks.

The City

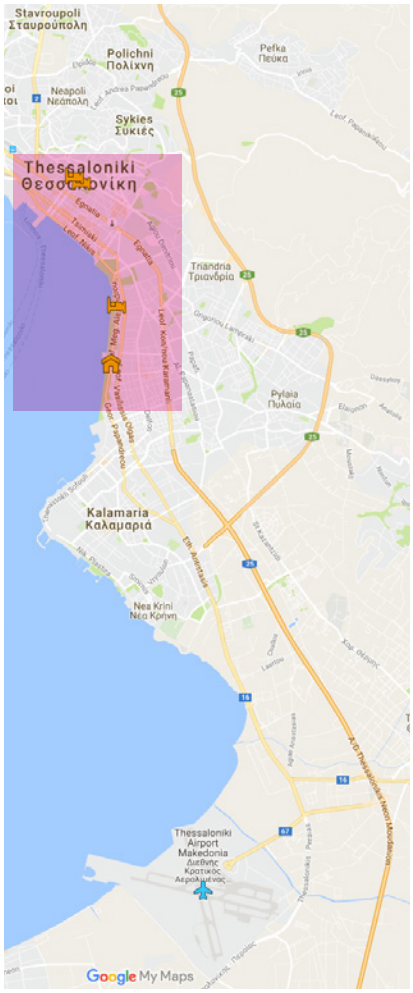
The city was founded in 315 BC by Cassander, in honor of his wife Thessaloniki, sister of Alexander the Great. Since then, and due to its strategic position, Thessaloniki has been a commercial and cultural crossroad that brought together people and ideas from all over the world. The signs of this uninterrupted urban activity for more than 2,300 years are evident in each corner of the city. Nowadays, Thessaloniki is a big, modern city, with a population of around one million, and an important administrative and financial center of the Balkans. The warm and vibrant city life is largely influenced by the Aristotle University of Thessaloniki; the largest university in Greece, with more than 72,000 undergraduate and 8,000 postgraduate students. Thessaloniki is surrounded by places of great natural and historic beauty such as Olympus National Park, Vergina, where the Royal tomb of Philip II, father of Alexander the Great was found, the autonomous Mouth Athos, which is forbidden to women and children, and Halkidiki with its beautiful sandy beaches.

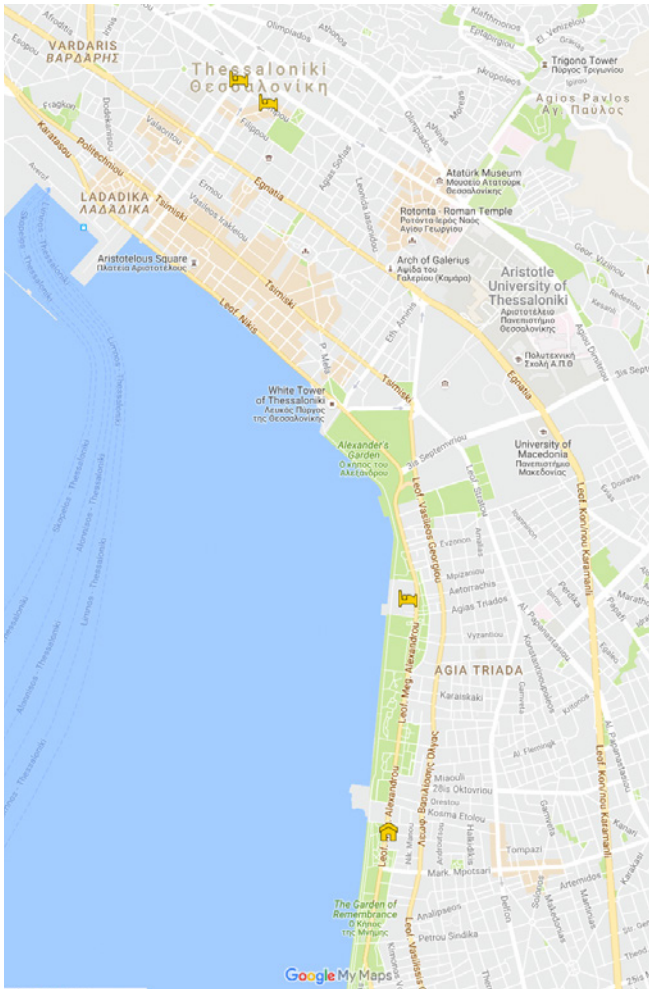
People & Life

Thessaloniki is a popular destination. You will certainly enjoy a pleasant and interesting stay in the city. People are friendly and happy to help with any questions. The atmosphere is unique during the day in the commercial and shopping centre, but especially during the evening, in the wide variety of bars, restaurants and theatres for entertainment. Thessaloniki is renowned for its unique location, along the Thermaikos Gulf, its sunsets, its long history, its monuments and museums as well as its distinguished cuisine.

Thessaloniki
Many stories, one heart
www.thessaloniki.travel

Thessaloniki Map





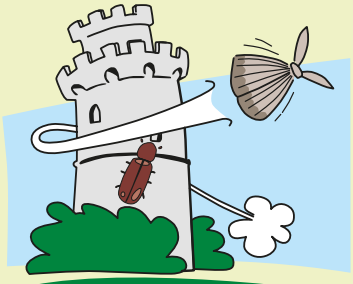
Map data ©2016 Google

Points of Interest

- Thessaloniki Airport Makedonia
- TECHNICAL CHAMBER OF GREECE
- Makedonia Palace Hotel
- Hotel Olympia
- Park Hotel

You can access this map at
http://tiny.cc/iufrogr
or using the QR Code on the right

Oral Presentations



Forest Insects and Pathogens in a Changing Environment: Ecology, Monitoring & Genetics

Joint Meeting of IUFRO WPs

7.03.05 "Ecology and management of bark and wood boring insects"
7.03.10 "Methodology of forest insect and disease survey"

11-15 SEPTEMBER 2017
THESSALONIKI • GREECE

TECHNICAL CHAMBER OF GREECE /
SECTION OF CENTRAL MACEDONIA

WWW.IUFROGREECE2017.COM
#IUFROGREECE2017

Oral

CRYPHONECTRIA PARASITICA IN AZERBAIJAN: CURRENT DEVELOPMENT OF SITUATION

D.N. Aghayeva[1], D. Rigling[2], V.M. Alizade[1], P. Bartolini[3], A.L. Pepori[3], G. Della Rocca[3], N. Luchi[3], A. Santini[3], R. Danti[3], B.E. Maserti[3]

[1] *Institute of Botany, Azerbaijan National Academy of Sciences, Baku, Azerbaijan*
[2] *Swiss Federal Research Institute for Forest, Snow, and Landscape Research (WSL), Birmensdorf, Switzerland*
[3] *Institute for Sustainable Plant Protection (CNR-IPSP), Florence Unit, Italy*

KEYWORDS: Blight, invasive fungus, mating types, population, VC types.

Azerbaijan is a country with small forest areas among which chestnut is one of the main deciduous trees that plays crucial role in formation natural and planted forests. A number of fungal and insect associates threaten the tree, one of which is invasive chestnut blight fungus *Cryphonectria parasitica*. Disease was reported in the country in 2008. Study of the fungus population carried out in seven districts in 2015 revealed a low genetic diversity of fungus. It was found out the dominant vc-type do not belong to any of the known EU vc-types and the microsatellite analysis also revealed similar pattern [1]. In 2016 investigation was continued in three selected districts, to follow the current situation of fungus. Twenty bark pieces with *C. parasitica* stromata taken from three districts were examined under a dissecting microscope. Samples with conidioma prevailed than those with perithecia. Fungus was isolated and incubated on PDA. Fungal genomic DNA was extracted from fresh mycelium and was amplified using the primers ITS1 and ITS4 [2]. Morphological evaluation of the colonies and molecular analyses both confirmed the presence of *C. parasitica*. Further investigations will be performed to evaluate the whether these isolates are hypovirulent or not, assessing the presence of dsRNA viruses by using Real-Time PCR.

Oral

IMPACT OF INTERCEPT TRAP DEPLOYMENT AND DESIGN FACTORS ON THE CAPTURE OF LONGHORNED BEETLES (COLEOPTERA: CERAMBYCIDAE)

J.D. Allison[1,2], **B.L. Strom**[3], **M.C. Bouwer**[1,2], **O. Gil**[4]

[1] *Canadian Forest Service, Natural Resources, Sault Ste Marie, Ontario, Canada*
[2] *Forestry and Agricultural Biotechnology Institute, University of Pretoria, South Africa*
[3] *USDA-FS, Southern Research Station, Canada*
[4] *São Paulo State University, Jaboticabal Campus, São Paulo, Brazil*

KEYWORDS: Cerambycidae, intercept trap, *Monochamus spp*, survey and detection.

The success of insect detection and monitoring programs is affected by many variables, some of which are under program control and many others that are not. Primary to program success is knowledge about how and why trap effectiveness varies among target taxa and habitat. Currently, decisions about trap type and deployment location are informed by experience and/or research results, which may or may not have wide applicability amongst taxa. Our study objectives are to: 1) measure the impact of environmental variability on the number of individuals captured amongst target taxa of longhorned beetles (Coleoptera: Cerambycidae) using short transects running perpendicular to forest edges extending from canopied forests into clearings; 2) examine the impact of silhouette on intercept trap performance using clear, white and black panel intercept traps; and 3) using a walk-in flight-tunnel and CO2 as a surrogate gas for pheromone, characterize differences in plume structure among different intercept trap designs. Analyses of the results of these trials are ongoing but preliminary results suggest that the effect of trap habitat varies with species, black panel traps outperform clear and white panel traps and black multiple-funnel traps, and that plume structure differs among intercept trap designs.

Oral

MOUNTAIN PINE BEETLE AS A THREAT TO EASTERN PINE FORESTS OF NORTH AMERICA

B.H. Aukema, R.C. Venette, M.D. Abrahamson, D.W. Rosenberger

The mountain pine beetle, *Dendroctonus ponderosae* Hopkins, is an aggressive bark beetle native to western North America. Because it is a generalist on most pines and exerts biome-level influences at outbreak scales, range expansion or accidental introductions pose significant threats to pine forests and plantations of eastern North America. There are three routes by which the insect could arrive to eastern North America: through infested wood products, Aeolian dispersal across the Great Plains, or through a pine corridor of the Canadian boreal forest. We exposed logs of common pine species present in pine forests of eastern North America to mountain pine beetles in the insect's native range to gauge potential susceptibility and suitability to this herbivore. We found that constitutive defenses pose no barrier to colonization and development of mountain pine beetles in novel hosts. However, developmental asynchrony in these hosts could pose a number of unique challenges to host procurement and development.

Oral

CLIMATIC INFLUENCES ON TREE-KILLING BARK BEETLES: A COMPARISON OF NORTH AMERICAN AND EUROPEAN SPECIES

B. Bentz[1], A.M. Jönsson[2], M. Schroeder[3], A. Weed[4]
[1] *USDA Forest Service Rocky Mountain Research Station, Logan, Utah, United States*
[2] *Department of Physical Geography and Ecosystem Science, Lund University, Lund, Sweden*
[3] *Department of Ecology, The Swedish University of Agricultural Sciences, Uppsala, Sweden*
[4] *USGS National Park Service, Woodstock, Vermont, United States*

KEYWORDS: Bark beetle, climate change, Dendroctonus, Ips, model.

An alarmingly large number of recent tree mortality events are a consequence of globally increasing temperatures that not only directly influence tree mortality, but also influence tree-killing bark beetles. Tree-killing bark beetles that require live phloem tissue for reproduction have evolved strategies and traits that often result in irruptive population dynamics and landscape-scale tree mortality. Because many life history traits that contribute to irruptive population behavior are temperature dependent, climate change will continue to cause significant alterations in bark beetle population dynamics, both positive and negative. To adequately manage future forests in a changing climate, knowledge of potential bark beetle impacts will be required. Mechanistic phenology models that describe the influence of temperature on voltinism and other measures of population success have been developed for several species that cause significant forest impacts in pine and spruce forests including the North American species *Dendroctonus ponderosae*, and *Ips typographus* a native of European forests. We discuss and compare evolved life history traits of these species. Using climate change projections of temperature to run the phenology models, we describe the potential future impact of changing temperatures on population success and invasive potential.

Oral

DETECTION OF EMERGING FUNGAL FOREST PATHOGENS USING NEXT GENERATION SEQUENCING METHODS

J. Bérubé[1], **P. Gagné**[1], **J. Dubé**[1]
[1] *Canadian Forest Service, Natural Ressources Canada, Quebec, Canada*

Urban trees are often the first target of forest invasive alien pests due to their proximity to transport nodes, ports, storage yards and tree nursery retailers. Early detection of emerging diseases, after introduction but before their establishment, is often difficult due to their inconspicuous nature and thus represents an important risk to Canadian forests. We developed an early warning method based on Illumina Next Generation Sequencing to detect new potential alien fungal pests. We made 143 aerial spore collections in 2 Canadian urban centers and surrounding regions, sequenced the PCR-amplified fungal nuclear ribosomal internal transcribed spacer (ITS) DNA present to reveal fungal diversity. We obtained 13 million DNA reads which showed after bioinformatics analysis to represent more than 5,000 fungal OTUs, our proxies for fungal species. Nearly all these fungi were generally cosmopolitan fungi and represented no added risk to Canadian forests. However, spores of two fungal species on the unwanted forest pathogen list were detected. They have not yet caused tree diseases and their potential impact will be discussed. This method is not target limited but wide scope, an efficient screening tool that is also cost-effective.

Oral

MODELING NORWAY SPRUCE STAND VULNERABILITY TO *IPS TYPOGRAPHUS* DAMAGE IN THE BOREAL ZONE UTILIZING ENVIRONMENTAL FACTORS

M. Blomqvist[1], **M. Kosunen**[1], **M. Starr**[1], **T. Kantola**[2], **M. Holopainen**[1], **P. Lyytikäinen-Saarenmaa**[1]
[1] *Department Of Forest Sciences, University Of Helsinki, Helsinki, Finland*
[2] *Knowledge Engineering Laboratory, Department Of Entomology, Texas A&M University, College Station, Texas, United States*

KEYWORDS: European spruce bark beetle, soil, stand characteristics, topography.

Ips typographus infestations have become more common in Finnish forests during recent years. The pest threatens especially stands dominated by mature and over mature Norway spruce (*Picea abies*). Weather is one of the most important factors affecting the population growth of *I. typographus*, but other abiotic and biotic factors can also promote *I. typographus* infestations. Soil and topographical characteristics have an impact on tree health and resistance against *I. typographus* attack. Being able to predict *I. typographus* outbreaks using such predisposing environmental characteristics would therefore be useful. The aim of this study was to detect the most important tree, soil and topographical factors explaining damage caused by *I. typographus*. The study area was located in southern Finland, where *I. typographus* has killed spruces since 2010. Tree and stand-wise characteristics were measured and soil samples collected from 48 plots to determine soil C and N contents, C/N ratio and texture class. In addition, topographical factors were derived from a Digital Elevation Model and GIS analysis. The degree of *I. typographus* damage on the study plots was classified based on visually detected tree-wise symptoms i.e. discoloration, defoliation and resin flow. Preliminary results showed that environmental factors successfully explained the level of damage. The model could be used to assess the risk of *I. typographus* outbreaks in spruce stands in the boreal zone.

Oral

A PHYLOGEOGRAPHIC APPROACH TO TRACE THE INVASION PATHWAYS OF THE HIGHLY INVASIVE BOX TREE MOTH, *CYDALIMA PERSPECTALIS,* IN EUROPE

A. Bras[1], D.N. Avtzis[2], M. Kenis[3], G.Vétek[4], A. Roques[1], J.Rousselet[1], M-A. Auger-Rozenberg[1]
[1] *INRA UR633 Zoologie Forestière, Orléans, France*
[2] *Forest Research Institute, Hellenic Agricultural Organization Demeter, Vassilika, Thessaloniki, Greece*
[3] *CABI, Delémont, Switzerland*
[4] *Szent István University, Budapest, Hungary*

KEYWORDS: Invasive insect, multiple introductions, ornamental plant trade, phylogeography.

Ornamental plant trade is a major pathway for alien phytophagous insects entering Europe, with an ever increasing number of these species originating from Asia. A notorious example is the box tree moth, *Cydalima perspectalis,* which was first recorded in 2007 in Germany. Since then, it quickly spread across Europe causing a lot of damage on *Buxus* plants in urban and forest areas. The trade of ornamental box plants between China and Europe has been hypothesized as the invasion pathway of the insect while the trade between European countries could explain its fast expansion. To disentangle the invasive pathways, samples of *C. perspectalis* were collected in the native range of China and Korea and so far in 22 invaded countries. A portion of the mitochondrial genes COI and COII has been sequenced from individuals of both areas. In Asia, our preliminary analysis revealed a total of 9 haplotypes. In Europe, 5 haplotypes were found so far in the invasive populations sampled. The development of microsatellite markers are in process. Though preliminary, our results suggest a Chinese origin but need to be improved to define precisely the potential donor regions. In Europe, the geographically structured genetic diversity suggests multiple introductions events. Nevertheless, a wider sampling in Asia and the use of microsatellite markers will help to better understand the invasion pathways of this pest as well as its rapid spread into Europe.

Oral

ATTRACTANTS FOR *HYLASTES ATER* AND *HYLURGUS LIGNIPERDA* – WHAT ARE WE MISSING?

E.G. Brockerhoff[1], **J. Kerr**[1], **S. Pawson**[1], **H. Jactel**[2]
[1] *Scion (New Zealand Forest Research Institute), Christchurch, New Zealand*
[2] *INRA, Cestas, France*

KEYWORDS: Ethanol, host volatiles, monoterpenes, pheromones, trapping.

Saproxylic bark beetles typically don't produce pheromones, and primary host plant attractants are mainly used as lures for trapping studies for population monitoring or detection. For pine bark beetles, alpha-pinene and ethanol are most widely used as attractants in conjunction with flight intercept traps. However, the effectiveness of this lure differs considerably among species. For example, compared with unbaited black panel traps, alpha-pinene plus ethanol increased trap catch of *H. ligniperda* ca. 200-fold but only 6-fold for *H. ater*. In another study, we determined that *H. ligniperda* responds to certain aggregation pheromones of other bark beetle species; however, to our knowledge, this does not appear to be the case for *H. ater*. We observed that visual cues (i.e., trap shape and colour) also play an important role in attraction, and there are significant trap color, attractant, and color × attractant effects. But despite a substantial research effort, there is still no highly effective lure available for *H. ater*. In this presentation we will summarise our knowledge to date and hope to stimulate a discussion and new collaborative research on how to improve trapping of *H. ater* and similar bark beetles that appear not to use pheromones.

Oral

PREDISPOSITION TO DECLINE: PREDICTING AOD OCCURENCE WITH ENVIRONMENTAL FACTORS

N. Brown[1], E. Vanguelova[2], S. Broadmeadow[2], S.R. Parnell[3], S. Denman[2]
[1] *Rothamsted Research, Harpenden, United Kingdom*
[2] *Forest Research, Alice Holt Lodge, Farnham, United Kingdom*
[3] *University of Salford, Manchester, United Kingdom*

KEYWORDS: Agrilus, drought, forest decline, pollutant deposition, soils.

In the UK, Acute Oak Decline (AOD) has caused much concern, due to its distinctive symptoms and its potential to impact oak species that form the largest component of native broadleaf woodland. Affected trees have lesions in the phloem caused by necrogenic bacteria. Lesions are associated with both external stem "bleeding" and galleries of the two-spotted oak bupresid (*Agrilus biguttatus*).

Decline complexes involve multiple biotic and abiotic factors, which combine to reduce host vigor. In order to investigate forest Decline, it is necessary to take a systems approach by considering biotic agents and in addition their interactions with environmental factors that may initially predispose host trees. Here, we test the extent to which AOD is influenced by environmental predisposition factors traditionally associated with oak decline. These are often factors that reduce water availability.

During 2013 and 2014 extensive surveys were undertaken, which systematically visited oak woodlands across England and Wales. More than 500 locations have been used to assess relationships with soil type, climatic factors and pollutant deposition, notably atmospheric nitrogen, using logistic regression GAM models. This spatial study re-emphasises the importance of predisposition factors in decline syndromes and has guided on-going investigations at site and tree levels.

Oral

BARK BEETLE COLONIZATION OF A PINE ISLAND IN THE GREAT PLAINS OF NORTH AMERICA

K.D. Chase[1], **M.D. Abrahamson**[2], **A.K. Ambourn**[2], **R.C. Venette**[3], **B.H. Aukema**[1]
[1] *Dept. of Entomology, University of Minnesota, St. Paul, Minnesota, United States*
[2] *Minnesota Department of Agriculture, St. Paul, Minnesota, United States*
[3] *USDA Forest Service Northern Research Station, St. Paul, Minnesota, United States*

KEYWORDS: Biogeography, long-distance dispersal, predators, range expansion.

When humans modify an environment, an opportunity exists for some species to expand their distribution. In the Sandhills of central Nebraska, a coniferous pine forest comprised of species native to eastern and western North America was hand-planted 315 km from the nearest natural forest in 1902. This forest provides a unique opportunity to investigate how a large isolated patch of habitat drives community composition of bark beetles and their predators as well as range expansion. We compared community composition of bark beetles associated with pine trees between Nebraska, the Black Hills of South Dakota and Minnesota pine forests. We sampled bark beetles and their predators with funnel-traps paired with semiochemicals associated with the bark beetles *Ips pini* Say, *I. grandicollis* Eichoff, and *Dendroctonus ponderosae* Hopkins. We hypothesized that the bark beetle community composition of the Nebraska pine forest more closely resembles the Black Hills forest than the Minnesota pine forests due to its proximity and the westward directionality of trade winds across the Great Plains. We report results from our first year of studies and discuss how isolated habitats can serve as range expansion "stepping stones" through a landscape, which may provide a pathway for tree-killing bark beetles like *Dendroctonus ponderosae* to reach novel areas.

Oral

DO THIS, NOT THAT: FOREST HEALTH AND INVASIVE SPECIES COMMUNICATION STRATEGIES FOR MULTIPLE AUDIENCES

D.R. Coyle
Southern Regional Extension Forestry & the University of Georgia, Athens, Georgia, United States

KEYWORDS: Bark beetles, climate change, outreach, pathology, social media.

Forestry is an integral component of many economies worldwide, and forest health and invasive species are universally recognized as two of the most important factors contributing to forest productivity, fire resilience, and ecosystem stability. Unfortunately, many forestry agencies have limited personnel with formal forest health training, and "on-the-ground" foresters may not have received any formal or informal training on insect, fungal, or plant pests in forests during their studies. The Southern Regional Extension Forestry – Forest Health and Invasive Species program educates forestry professionals and landowners in the southeastern United States. Since its inception in 2015, several educational methods and strategies have been used to varying degrees of success. Pros and cons of in-person trainings, social media, and electronic versus hardcopy resources will be discussed, as well as how to craft an educational forest health message to different audiences. Targeted education strategies can lead to much greater impact and knowledge retention rates.

Oral

RAPID SPREAD AND UNEXPECTED OUTBREAKS OF THE OAK LACE BUG (*CORYTHUCHA ARCUATA*) IN SOUTH EASTERN EUROPE

G. Csóka[1], B. Hrasovec[2], A. Hirka[1], M. Csepelényi[1], D. Matosevic[3], M. Glavendekic[4], M. Jurc[5], D. Jurc[6,5], S. Mutun[7], Y.I. Gninenko[8], M. Zubrik[9]

[1] *NARIC Forest Research Institute, Department of Forest Protection, Mátrafüred, Hungary*
[2] *University of Zagreb, Department of Forest Protection and Wildlife Management, Zagreb, Croatia*
[3] *Croatian Forest Research Institute, Division for Forest Protection, Jastrebarsko, Croatia*
[4] *University of Belgrade, Faculty of Forestry, Department of Landscape Architecture, Belgrade, Serbia*
[5] *University of Ljubljana, Biotechnical Faculty, Department for Forestry and Renewable Forest Resources, Ljubljana, Slovenia*
[6] *Slovenian Forestry Institute, Department for Forest Protection, Ljubljana, Slovenia*
[7] *Abant Izzet Baysal University, Faculty of Science and Arts, Department of Biology, Bolu, Turkey*
[8] *All-Russian Research Institute for Silviculture and Mechanization of Forestry, Forest Protection Department, Pushkino, Russia*
[9] *National Forest Centre, Forest Research Institute, Department of Forest Protection, Zvolen, Slovakia*

KEYWORDS: *Corythucha Arcuata,* host plants, invasive alien species, outbreak, *Quercus*.

The North American oak lace bug was first discovered in Europe in 2000 (North Italy). Three years later it was found in Turkey (2003), than in Switzerland (2005), in Bulgaria, Croatia, Hungary (2013), Serbia (2014), in Slovenia and Rumania (2016). The rate of spread significantly accelerated in recent years, its northern boundary reaching North Hungary by the end of 2016. Further spread into other European countries is expected. During 2016, severe outbreaks affecting thousands of hectares of oak forests (mainly *Q. robur*) were recorded in Hungary, Croatia, Serbia and also in Russia (Krasnodar region). Severe infestations caused intensive premature discolouration and early leaf and acorn abscission already in July/August last year. Relatively harsh climatic conditions during the winter 2016/2017 have not caused significant mortality within the overwintering populations in SE Hungary, Eastern Croatia and in Belgrade surrounding (Serbia). High abundance of lace bug populations in SE European countries resulted in unexpected host shifts. Many host data not formerly known have been recorded. Summarising the knowledge collected about this species in the recent decade and its impact in Turkey and SE Europe we predict further area expansion and increasing importance of the oak lace bug in the European oak forests.

Oral

OVERWINTERING SUCCESS AND COLD TOLERANCE IN THE DOUBLE-SPINED BARK BEETLE, *IPS DUPLICATUS* (SAHLB.)

M. Davidkova[1,2], **L. Perfollová**[2], **P. Doležal**[1,2]
[1] *Institute of Entomology, Biology Centre AS CR, České Budějovice, Czech Republic*
[2] *Faculty of Science, University of South Bohemia, České Budějovice, Czech Republic*

KEYWORDS: Bark beetle, double-spined, microhabitat, overwintering, supercooling point.

The overwintering success of adults of the double-spinned bark beetle, *Ips duplicatus* (Sahlb.) was studied at three localities in North Moravia and three localities in West Bohemia. Present study brings detailed analysis of changes in cold tolerance before and during harsh season. Its influence as well as the influence of microhabitat (in soil litter vs. under the bark of standing trees) on winter survival during two consequent cold seasons is discussed. Under natural conditions, most *Ips duplicatus* adults hibernate in the soil litter. The lower lethal temperature corresponds well to the supercooling point (SCP) measured in the laboratory. The SCP of adults increased from -14 °C in October to -16 -20 °C during winter months. The highest levels of SCP were recorded in April and ranged between -10 -13 °C.

The percentage of surviving beetles was relatively high ranging from 20 -70 % regardless of microhabitat type and elevation. Outdoor experiments proved the tendency of prediapause and diapause adults to emerge from infested trees and search for suitable microhabitats in soil litter, where snow layer provides insulation from low winter temperatures.

Acknowledgements

This research was supported by project 04/2014 provided by Forests of the Czech Republic, state enterprises. Student participation on the IUFRO meeting was financed by the Grant Agency of University of South Bohemia.

Oral

BARK BEETLE MANAGEMENT AT THE NEWLY-ESTABLISHED BLACK FOREST NATIONAL PARK (NP)

H. Delb[1], **R. John**[1], **S. Sonnemann**[1]
[1] *Forest Research Institute of Baden-Wuerttemberg, Freiburg, Germany*

The NP, located in the southwest of Germany, was established in 2014. The most prevalent tree species within the park is *Picea abies*. Thus the park is at high risk of tree mortality attributed to *Ips typographus*, one of the most important forest insect pests in Europe. Outbreaks are triggered by disturbances such as heavy snowfall, windstorms or severe drought that provide beetles with abundant host material. Warm and dry weather conditions exacerbate outbreaks by improving the beetles' development and survival, and by further weakening host trees. Outbreaks have profound impacts on local economies, and the ecological goods and services provided by forests.

Concerns abound regarding the potential for populations to increase in unmanaged areas of the 10,000-ha NP without intervention, and negatively impact adjacent ownerships. Furthermore, the frequency and severity of outbreaks are expected to increase as a result of anthropogenic-induced climate change elevating risks associated with the lack of management within the park. This why a buffer zone was demarcated where intensive pest management is permitted and implemented.

The prevailing pest management strategy implemented at the NP, starting with an extensive monitoring system and ending with an in depth review of the intensive control methods used will be presented.

Oral

EFFICACY CONTROL OF *CLOSTERA ANASTOMOSIS* L. CATERPILLARS IN POSTDORMANCY PHASE

M.L. Duduman[1], D. Lupaștean[1], C. Duduman[1], Ș.I. Pînzanu[1], A. Ilașcă[1], I.C. Dănilă[1]
[1] *"Stefan cel Mare" University of Suceava, Forestry Faculty, Suceava, Romania*

KEYWORDS: *Clostera Anastomosis,* control, postdormancy phase.

Clostera anastomosis is one of the most important species that causes damage to poplar and willow trees in Eurasia region. So far, there were numerous studies made to control this defoliator. They followed the control of this pest over the larvae feeding period. In present study, we investigated the possibility of controlling this pest, in postdormancy phase of caterpillars. There made two experiments in lab and in field, in order to test the efficacy of 5 insecticides [Proteus (thiacloprid + deltamethrin), Ovipron (horticultural oil), Nuprid (imidacloprid), Confidor (imidacloprid) and Karate Zeon (lambda-cyhalothrin)], sprayed on the stems colonized with overwintering larvae nests. The treatment efficacy was assessed based on the survival rate of larvae after chemical spraying. The most efficient insecticide was Confidor, causing mortality of the 90.2 ± 1.8% of the larvae, in lab conditions. In field conditions, Confidor caused the decrease of the larvae population with 78.2 ± 7.4% for clone AF2 and with 92.9 ± 6.4% for clone AF8 and Karate Zeon caused 100% mortality. It is a matter of course that this control method will have lower environmental impact due to both the application moment and high control of the sprayed area. Successful might be trapping the overwintering larvae in sticky barriers.

Oral

WIDESPREAD DISTRIBUTION OF *TRYPODENDRON LAEVE* IN THE CARPATHIAN MOUNTAINS (ROMANIA)

N. Olenici[1], M.L. Duduman[2], G. Isaia[3], V. Olenici[1]
[1] *National Institute for Research and Development in Forestry, Campulung Moldovenesc, Romania*
[2] *Forestry Faculty, "Stefan cel Mare" University of Suceava, Suceava, Romania*
[3] *Faculty of Silviculture and Forest Engineering,"Transilvania" University of Brasov, Brasov, Romania*

KEYWORDS: Carpathian Mountains, distribution, *Trypodendron laeve,* Romania.

Trypodendron laeve is a species of ambrosia beetles much less known than the other three *Trypodendron* species occurring in Europe, and its status (native or alien) in Central Europe has been a subject of debate over the past two decades. In Romania, the species was discovered in 2008 and the aim of the research presented in this paper was to investigate its distribution in the Carpathians, mainly at high altitudes (> 800 m), in tree stands with Norway spruce. Panel intercept traps baited with synthetic pheromone for *Trypodendron lineatum* were used in the spring of 2015 in 30 locations and adults of this species were caught in 19 of them. Additional observations were made within some experiments using similar baits and beetles of *T. laeve* were caught in 4 other locations. Everywhere this species was caught together with the striped ambrosia beetles and in some places along with *T. domesticum* and *T. signatum*, but in all cases, the captures of *T. laeve* were much lower than those of *T. lineatum*. The widespread distribution of *T. laeve* at high altitudes, far away from commercial routes, supports the hypothesis of a native, mountain species in Central Europe.

Oral

IMPLICATING WINTER TEMPERATURES IN THE SPATIAL SYNCHRONY OF LARCH CASEBEARER

S.J. Fahrner[1], **B.H. Aukema**[1]
[1] *Department of Entomology, University of Minnesota, Saint Paul, United States*

KEYWORDS: Climate change, invasive, spatial synchrony.

Larch casebearer *Coleophora laricella* Hübner (Lepidoptera: Coleophoridae) is an invasive defoliator native to Europe. Since 2000, after decades of successful importation biological control, large scale defoliation has been mapped via aerial surveys in geographically isolated stands of eastern and western larch in the United States. We sought to determine whether climatic variables such as minimum winter temperatures or patterns of precipitation were associated with enhanced larch casebearer activity at a national level. We quantified the spatial synchrony of defoliation from 1997-2016 within and between eastern larch forests of Minnesota, U.S.A and western larch forests of Oregon and Washington, U.S.A. The spatial synchrony of minimum temperatures in select months (October-July, 1997-2016) and precipitation patterns in select months (March-June, 1997-2016) was also quantified. We found that defoliation is synchronous up to 330 km within and up to 2,240 km between eastern and western larch forests. Minimum temperatures for all months except February were positively correlated at the same scales as defoliation (> 2300 km), while no consistent patterns emerged from monthly precipitation data. Our findings suggest that the resurgence of larch casebearer may be facilitated by regional changes in both winter and summer temperatures.

Oral

ARTIFICIALLY INDUCED DEFENCES AGAINST PINE WEEVIL DAMAGE

F. Fedderwitz[1], **N. Björklund**[1], **G. Nordlander**[1]
[1] *Department of Ecology, Swedish University of Agricultural Sciences, Uppsala, Sweden*

KEYWORDS: Feeding preferences, management strategies, plant growth, plant-insect interaction.

The pine weevil (*Hylobius abietis*) is one of the economically most important forest pest insect in Europe. Adult weevils feed on the bark of young conifers planted on clear-cuts and can thereby cause plant mortality rates of almost 90 %. By applying an exogenous elicitor, such as methyl jasmonate (MeJA), the plant defenses can be induced before the pine weevil attack. Thus the plants are better prepared when an attack happens. We have tested this approach in both laboratory and field studies. In general, artificially induced seedlings have less pine weevil damages and thereby a better survival rate. Plant growth is, however, reduced by applying MeJA. Integrating MeJA treatments into plant nursery schemes could generate possibilities to turn this "negative" effect of the treatment into an advantage. Nowadays conifer plant nurseries in Sweden use "long nights" to stop plant growth and initiate plant processes for frost tolerance before winter storage. Long nights – covering the plants with dark fabrics during 8 hours – is a logistic challenge for plant nurseries and treatment with MeJA might be a chance to solve two problems with one treatment.

Oral

SPRUCE BARK BEETLE EPIDEMIOLOGY AFTER STORM DAMAGE IN TWO DIFFERENTLY MANAGED FOREST DISTRICTS

B. Forster
Swiss Federal Research Institute WSL, Birmensdorf, Switzerland

In Central Europe, winter storm "Lothar" of December 1999 produced millions of cubic meters of windthrown timber, highly attractive for the European spruce bark beetle *Ips typographus* (L.), pullulating in the following years. The management of the storm areas and the subsequently attacked standing spruce was a big challenge for the forest owners. In Switzerland, different strategies arose about the management of damaged stands. In some forest districts, windthrown timber and bark beetle attacked trees where thoroughly cleared in a traditional way; in other districts, ecological, logistical and financial reasons led to several uncleared storm areas and infestation spots.

In two neighboring forest districts in Switzerland, quite different strategies were applied in the damaged stands. This was a unique chance to document the epidemiology of *Ips typographus* in a case study over several years. In the district with thoroughly cleared infestations, the subsequent beetle attacks on standing trees were much lower and the *Ips typographus* population pullulated shorter than in the other district with less interventions. The effectiveness of the phytosanitary measures could be impressively documented, even under conditions after a heavy natural disturbance.

Oral

SIMULATION SITES FOR THE DETECTION OF THE ASIAN LONGHORNED BEETLE AND CONTAINER SURVEY FOR THE EARLY DETECTION OF INVASIVE ALIEN SPECIES

L. Gagné[1], T. Kimoto[1], J. Turgeon[2]
[1] *Canadian Food Inspection Agency, Montreal, Canada*
[2] *Insect Biology & Ecology, Natural Resources Canada, Canada*

KEYWORDS: ALB simulated sites, Asian longhorned beetle, container survey, detection, invasive species.

Two different detection projects will be explained. The container survey and the *Anoplophora glabripennis* simulation sites.

Container survey. The objective of the container survey is the detection of invasive alien wood-boring insects at high-risk sites by rearing them from logs acquired through municipal hazard tree removal programs. Currently, the Canadian Food Inspection Agency (CFIA) conducts semiochemical-based surveys to detect invasive alien bark beetles and wood borers. However, numerous insects either do not respond to the lures used in these surveys or do not rely on long-range chemicals to locate conspecifics or host trees. Therefore, rearing bark beetles and wood boring insects from infested logs is a more generalized approach to detection, as it does not exclude insects that do not respond to specific lures.

Asian longhorned beetle (ALB) simulated sites. The CFIA is setting training sites with simulated signs of an ALB attack on maples in various locations in Canada. These sites are used to train survey staff and partners. Signage is placed next to the replicated infestation to provide the public with information on ALB and to identify the area as a simulation site only. The method used to create those sites was developed by the Canadian Forest Service.

Oral

DOTHISTROMA NEEDLE BLIGHT IN NATURAL FORESTS OF CORSICAN PINE IN LA SILA MASSIF, CALABRIA, ITALY

L. Ghelardini[1,2], **F. Loria**[1], **C. Aglietti**[1,2], **G. Marchi**[1], **P. Capretti**[1]
[1] *Department of Agrifood Production and Environmental Sciences, University of Florence, Firenze, Italy*
[2] *Institute for Sustainable Plant Protection, Italian National Research Council, Sesto Florentino, Italy*

KEYWORDS: Emerging forest disease, *Pinus nigra laricio*, quarantine fungal pathogens, red band needle blight.

Widespread crown damages such as discoloration, crown transparency, and reduction of needle size were observed in spring 2017 in Corsican pine (*Pinus nigra laricio*) stands in La Sila Massif, Calabria, Italy. Yellow to red bands surrounding brown-black fruiting bodies were present on needles. A fungus with morphological characters resembling those of *Dothistroma* spp. was isolated by plating conidial suspensions unto MEA. Sequencing of the ITS gene region and of the Elongation Factor1 gene confirmed that the isolates belong to *Dothistroma septosporum*, a listed quarantine organism in Europe that is the causal agent of Red Band Needle Blight. The pathogen had been reported in 1970 in Italy on introduced Pinus radiata trees about 100 km apart from the current location. The present report is instead on native Corsican pine, which is the most common conifer species in the area and a host that has proved to be extremely susceptible to red band needle blight. Susceptible host species and conducive climatic conditions in the area, which is characterized by frequent rainfall, high relative humidity and increasingly mild temperature, might favor a severe disease outbreak.

Oral

NICHE SHIFT INDUCED BY ALLOCHRONIC SPECIATION: IMPLICATIONS FOR FORECASTING THE RESPONSE OF THE PINE PROCESSIONARY MOTH TO GLOBAL CHANGE

M. Godefroid[1], S. Rocha[2], H. Santos[3], M.R. Paiva[3], C. Burban[4], C. Kerdelhué[1], M. Branco[2], J.Y. Rasplus[1], J.P. Rossi[1]
[1] Institut National de la Recherche Agronomique, CBGP, Montferrier-sur-Lez, France
[2] Instituto Superior de Agronomia, Lisboa, Portugal
[3] Unversidade Nova de Lisboa, Caparica, Portugal
[4] Institut National de la Recherche Agronomique, BIOGECO, Cestas, France

KEYWORDS: Allochronic global warming, MigClim, phenology, speciation, *Thaumetopoea pityocampa*.

This study explores the existence of a potential climatic niche divergence between two sympatric allochronic populations of the pine processionary moth *Thaumetopoea pityocampa* (PPM) in Portugal. Whereas larval development of typical PPM populations usually occurs in the autumn-winter, the larvae of a newly discovered population referred to as the "summer population" (SP) develop in the spring-summer. The SP was discovered for the first time in 1997 in the coastal regions of Portugal, and its distribution was restricted to few squared kilometers. Since then, the SP has expanded its range into new parts of Portugal warranting the need of accurate estimations of its potential spread for the design of management strategies. We thus thoroughly depicted the geographic range of the SP and fitted species distribution models to explore the response of this atypical population to climate and predict its potential spread. Our results demonstrate that the phenological shift experienced by the SP led to climatic constraints that prevent this population from filling the realized niche of the typical PPM populations. Most of Portugal and the Mediterranean basin are predicted as climatically unsuitable for SP long-term establishment. The bioclimatic models predict that the SP could be seriously endangered by ongoing climate change.

Oral

COLLECTIVE SCANNING OF THE LAND, A REQUISITE FOR GROUP FORAGERS

J.-C. Grégoire[1], J. Depireux[1], P. Bonato[1], J.-M. Molenberg[1,2], M. Gilbert[1,3,4]
[1] *Biological Control and Spatial Ecology Lab, Université Libre de Bruxelles, Belgium*
[2] *Research Unit of Landscape Ecology and Plant Production Systems, Université Libre de Bruxelles, Belgium*
[3] *Spatial Epidemiology Lab, Université Libre de Bruxelles, Belgium*
[4] *Fonds National de la Recherche Scientifique (FNRS-FRS), Belgium*

KEYWORDS: Dispersal, *IPS Typographus,* mass-foraging.

At all population levels, *Ips typographus* needs to find suitable hosts, under the form of either felled trees on which any beetle could establish, or standing, living trees that need to be mass-attacked.

In 2005-2006, large network of pheromone traps were established in Southern Belgium (Wallonia), in order to analyse the global land coverage of the beetles as well as the factors influencing local densities. 460 traps were deployed over 2,500 km^2 in 2005 (0.04 to 0.07 traps/km^2), and 410 traps over 3,250 ha in 2006 (0.08 to 0.2 traps/km^2). 324,000 and 124,000 Ips typographus were caught in 2005 and 2006, respectively. Spruce coverage was also measured using different approaches, as well as potential sources or sinks for *I. typographus* (attacked trees, piles of logs, sawmills). The overwhelming majority of traps caught beetles. Spruce coverage positively influenced catches on both years. In 2006, only one single trap did not capture any beetle over the whole year. Overall, the spatial relationships and the spatial structure of the populations appeared very weak, probably because of the large dispersal capacity of the beetles. Host finding success is likely to be increased by this wide spatial coverage.

Oral

FOREST PROTECTION VS. NATURE CONSERVATION: THE CASE OF LARCH, LARCH BARK BEETLE *IPS CEMBRAE* HEER AND THE BLACKGAME *TETRAO TETRIX* L.

W. Grodzki
Forest Research Institute in Sękocin Stary, Department of Mountain Forests in Kraków, Kraków, Poland

KEYWORDS: Bark beetles, protected species, reforestation.

In the last two decades of 20th century the Norway spruce stands in the Sudetes were affected by forest decline, resulting in total deforestation of large areas on high elevations. During the next years efforts were done to restore forest cover on those areas. One of few tree species able to grow in such conditions was larch that gave a first cover for soils. The resulting young stands with very high share of larch were vulnerable to abiotic damage. After some wind- and snow damage, a local outbreak of the larch bark beetle *Ips cembrae* started; the mortality of infested larches occurs until present. The blackgame *Tetrao tetrix*, a rare and protected bird, occurs in the same area. The status of this species, whose environmental preferences fit into the features of reforested areas, is the reason of establishment of protection zones, in which human intervention is restricted or very limited. Facing the need of reforestation due to water and soil protection purposes, there is a conflict between two different goals of high importance. The aim of the presentation is to discuss the above case study as an example of such conflicts occurring frequently in mountain forests.

Oral

SOCIO-ECONOMIC ANALYSIS OF PEST EFFECTS OF CHESTNUT GALL WASP, *DRYOCOSMUS KURIPHILUS* YASUMATSU (HYMENOPTERA: CYNIPIDAE) IN THE YALOVA AND BURSA REGIONS IN TURKEY

E. Güngör[1], **G. Şen**[2], **S. Şerit**[1]
[1] *Bartin University, Bartin, Turkey*
[2] *Kstamonu University, Kastamonu, Turkey*

KEYWORDS*:* Analysis, Analytical Hierarchy Process (AHP), chestnut gall wasp, socio-economic participations, Turkey.

Chestnut gall wasp *Dryocosmus kuriphilus* Yasumatsu (Hymenoptera: Cynipidae), an important insect pest of chestnut, was determined in 2014 in the Yalova and Bursa districts in Turkey. It is expected that reach the invasion probably started in all the Turkish chestnut forests in a very near future. In this study, it is aimed to raise awareness against this pest which is a serious threat for the forests of Europe and Turkey, to raise awareness of the society (public institutions and organizations and local people) and to develop effective strategies for struggle. For this purpose, places where widespread chestnut is found in Yalova province will be determined and a sufficient number of people will be surveyed statistically from the local public, public institutions and non-governmental organizations based on the participation principle in order to create awareness about the related pest. The questionnaire will examine the socio-economic impacts of the chestnut gall wasp in the forests with questions prepared in accordance with the Analytical Hierarchy Process (AHP) technique. The evaluation of the obtained from statistical results will be developed strategies that will form the basis for the Chestnut Gall Wasp Action Plan to be prepared by the General Directorate of Forestry (GDF). In this context, qualified measures can be taken against the pests of Chestnut Gales, which are widespread in World and European level, and economic losses will be minimized.

Oral

INFLUENCE OF POST-WINDTHROW FOREST MANAGEMENT ON BEETLE-INDUCED TREE MORTALITY IN SURROUNDING INTERVENTION AND NON-INTERVENTION ZONES

M. Havašová[1], P. Mezei[1], E. Kočická[2], C. Nikolov[3], R. Jakuš[1,4]

[1] *Institute of Forest Ecology, Slovak Academy of Sciences, Zvolen, Slovakia*

[2] *UNESCO-Chair for Ecological Awareness and Sustainable Development, Faculty of Ecology and Environmental Sciences, Zvolen, Slovakia*

[3] *National Forest Centre, Zvolen, Slovakia*

[4] *Department of Forest Protection and Entomology, Faculty of Forestry and Wood Sciences, Czech University of Life Sciences, Prague, Czech Republic*

KEYWORDS: Beetle outbreak, disturbance, *Ips Typographus L.,* remote sensing, salvage logging.

The coupled effect of the windthrow disturbance and bark beetle outbreaks in the protected areas raise concerns about the transfer of beetle-induced tree mortality to surrounding managed forests. The TANAP National park (High Tatra Mts., Slovakia) is an amalgam of neighboring zones with non-intervention and intervention and type of forest management. Over the past decade, the area suffered from extensive windthrow and subsequent beetle outbreak.

We visually interpreted the yearly stack of the aerial photography to detect windthrown areas, logging, and bark beetle infestations from 2004 to 2009. We analyzed the influence of the unclearing in non-intervention, and salvage logging in intervention zone on beetle infestations in surrounding buffers (≤500 m) within four years after the windthrow. We found lower rates of beetle infestations in proximity to salvage logged site (1.2±4%); then to uncleared sites (10±11%, $p<0.05$, Kruskal-Wallis test). The rate of beetle infestations surrounding salvage-logged sites increased with the proximity to uncleared windthrow.

We conclude that to mitigate the risk of beetle outbreak in managed forests, the sanitary management should prioritize the pest controls in yet unaffected forests surrounding cleared locations within 500 m from the uncleared windthrow.

Oral

THE GOOD, THE BAD, AND THE SMELLY: USING ALLOCHTHONOUS KAIROMONES AS AN INSECTICIDE-FREE OPTION IN BARK BEETLE MANAGEMENT

C. Helbig[1], **M. Müller**[1], **M. Wehnert**[2]
[1] *Technische Universität Dresden, Institute Of Silviculture and Forest Protection, Tharandt, Germany*
[2] *Ostdeutsche Gesellschaft Für Forstplanung mbH, Kesselsdorf, Germany*

KEYWORDS: Allochthonous, bark beetles, Kairomones, semiochemicals.

Due to their ability to cause severe damage to forests, bark beetles have been a focus of forest entomology research for decades. Climate change now poses a new threat as it can intensify bark beetle spread, survival, fecundity, invasiveness, and aggressiveness. However, existing chemical options for bark beetle management can have negative non-target effects and/or are prohibited in some areas. Currently, there is a need to find new environmentally friendly biotechnological methods for monitoring and controlling bark beetle populations.

One option is manipulating semiochemicals that bark beetles and their antagonists use to communicate and to locate their respective hosts. We have conducted experiments using slot traps and trap logs to study the effects of applying kairomones in habitats where they do not occur naturally.

Our data suggests that using Allochthonous Kairomones can be a successful strategy for bark beetle management by: 1) preventing bark beetle infestations by repelling introductions, and 2) reducing established bark beetle densities by attracting antagonists. Enhancing the natural feedback mechanisms exhibited by this method is expected to minimize the negative effects of insecticide use, promote forest biodiversity, and improve the adaptability of forests to climate change.

Oral

DEVELOPMENT OF SPRUCE STAND PROTECTION WITH ANTI-ATTRACTANTS DURING BARK BEETLE OUTBREAKS IN MOSCOW REGION AND NW SLOVAKIA: POINT AND LINEAR DISPENSERS

R. Jakuš[1], A. Gurtsev[2], V. Plentev[3], J. Jankuvova[1], M. Blaženec[1]
[1] *Institute of Forest Protection, Zvolen, Slovakia*
[2] *Institute of Forest Science of Russian Academy of Sciences, Moscow, Russia*
[3] *LLC "FOREST Station", Moscow, Russia*

We have done series of pilot tests and experiments with the use of point and linear dispensers of anti-attractant for spruce stand protection in the Moscow region and in NW Slovakia during the period 2012 – 2014. I) the pilot tests in 2012 and 2013 in Moscow region were based on existing technology and methods developed for conditions of Central Europe. We used a point source experimental dispenser, IT Rep (Fytofarm, s.r.o.). The active compounds were verbenone and NHV (non-host volatiles). The results of the experiments were unclear. The main problem was that the experimental methods were developed for homogenous spruce monocultures in Central Europe. In the Moscow region, the spruce forests are heterogeneous. Experiment with no use of pheromone trap barriers has shown a significant switch effect. II) In 2014, we developed a new linear dispenser. We have tested the linear dispenser in conditions of NW Slovakia with promising results. III) We have also performed special experiment with testing of linear dispenser influences to catches to traps on insecticide screened spruces. There was strong effect of linear dispensers. There was also an interesting additional result from traps on screened spruces that caught a high percentage of males.

Oral

A DNA BARCODE REFERENCE LIBRARY OF LEAF MINING INSECTS COLONIZING WOODY PLANTS FOR FAST AND ACCURATE IDENTIFICATION OF FOREST PESTS IN ASIAN RUSSIA

N. Kirichenko[1,2], **C. Lopez-Vaamonde**[3,4]

[1] *Sukachev Institute of Forest SB RAS, Federal Research Center «Krasnoyarsk Science Center SB RAS», Krasnoyarsk, Russian Federation*

[2] *Siberian Federal University, Krasnoyarsk, Russian Federation*

[3] *INRA Institut National de la Recherche Agronomique, URZF, Orléans, France*

[4] *Institut de Recherche sur la Biologie de l'Insecte, Université François-Rabelais de Tours, UFR Sciences et Techniques, Tours, France*

KEYWORDS: Asian Russia, DNA barcoding campaign, leaf miners.

Accurate taxonomic identification of insect pests is vital for effective plant protection measures. DNA barcoding, i.e. use of a standardized sequence of the COI gene of mitDNA, is an important tool for plant protection making it possible to identify insects rapidly and accurately even based on their juvenile forms (which commonly have least characters for morphological diagnostics). DNA barcoding is particularly useful to delineate species in hyperdiverse groups from poorly known areas of the world.

Leaf miners is a vast group of minute insects from the orders Lepidoptera, Coleoptera, Hymenoptera and Diptera, with a number of known agricultural, ornamental and forest pests. This group remains poorly studied in Asian Russia. Since 2008 we have been collecting leaf mines and measuring their abundance on native and alien woody plants in botanical gardens, urban and wild plantations along a trasect across Asian Russia, from Tyumen in the west to Vladivostok in the east. Here we will present results of the on-going DNA barcoding campaign of leaf mining species attacking woody plants in this part of Russia, highlight taxonomic problems and discuss practical application of the obtained data.

This study has been partially supported by Russian foundation for basic research (grant No 15-29-02645).

Oral

IPS DUPLICATUS AND TRAP TREES

M. Knížek[1], **J. Lubojacký**[2], **J. Liška**[1]
[1] *Forestry and Game Management Research Institute, Jíloviště, Czech Republic*
[2] *Forestry and Game Management Research Institute, Frýdek-Místek, Czech Republic*

KEYWORDS: Bark beetle, forest protection, *Ips Duplicatus,* spruce.

Enormously high volume of bark beetle infested wood was recorded in Czechia in 2016. *Ips duplicatus* belongs to the complex of bark beetle species attacking spruce. It infests standing trees preferably. New generation develops rather quickly and leaves the tree often before color changes of the tree crown. Ordinarily, trap trees are used among protection methods against bark beetles in spruce stands in Czechia. Attractiveness of different trap trees variants were tested against *Ips duplicatus* on localities with long term high population density of the species and evaluated after the first flight period. The results showed that trap trees infestation density (regardless of trap tree variant) was very low, if any, even though the population density of *Ips duplicatus* was very high in the areas. Our study confirmed previous results of similar studies of other researchers: *Ips duplicatus* does not infest laying wood and utilization of trap trees is not effective for this bark beetle species.

Oral

LESSONS FROM THE INVASIVE INSECTS IN CENTRAL-EUROPEAN FORESTS

F. Lakatos, M. Molnár, K. Tuba, V. Tóth
Faculty of Forestry, Institute of Silviculture and Forest Protection, University of Sopron, Sopron, Hungary

KEYWORDS: Climate change, introduction, invasive insects, range expansion.

In natural ecosystems like forests, the introduction of non-native species can cause problems for forest health, nature conservation, public health and the economy. Arthropods, particularly insects, make up the majority of the introduced terrestrial animals.

Non-native insects show a strong affinity for woody plants found in forests, woodlands, orchards, and urban green spaces. There is link between these locations and the major pathways of invasive insects, which include, among others, wood packaging materials and planting stock.

After the species establishes itself, its distribution can be linked to its biological characteristics (e.g. number of generation) and to environmental conditions. Beyond that, climate change-induced range expansion of insect species can also result in the appearance of new species. All of the above-mentioned effects can be observed in central European forests. This combination of human-assisted migration coupled with the natural range expansion of insects and the effects of climate change appears in some unique cases; these cases could prove to be instructive for other species as well.

The presentation gives an overview of recent trends in central European forests and offers some ideas about how the impact of invasive species may be predicted, assessed, and reduced.

Oral

REGIONAL IMPACTS OF THE EMERALD ASH BORER INVASION IN THE USA

A.M. Liebhold[1], **W.D. Koenig**[2], **R.S. Morin**[3]
[1] *US Forest Service Northern Research Station, Morgantown, United States*
[2] *Laboratory of Ornithology, Cornell University, Ithaca, New York, United States*
[3] *US Forest Service Northern Research Station, Newtown Square, Pennsylvania, United States*

KEYWORDS: *Agrilus planipennis,* biological invasion, inventory data, Insectivorous birds, tree mortality.

As a result of the lack of host resistance, invading populations of the emerald ash borer, *Agrilus planipennis,* have caused extensive mortality of ash species in the eastern USA. We used regional forest inventory data to quantify trends in ash mortality rate and volume per hectare relative to the year of initial emerald ash borer detection. Results indicate that the annual ash mortality rate increases by as much as 2.7 % per year after initial detection of the pest in a county. Corresponding decreases in ash volume continue for several more years until most live ash is killed. Invading ash borer populations have also caused a marked numerical increase in insectivorous birds that prey upon them. We documented changes in five species of woodpeckers and the white-breasted nuthatch, *Sitta Canadensis*, using North American Breeding Bird Survey data for breeding season estimates and Audubon Christmas Bird Counts for winter season estimates. We found evidence for relatively modest and variable effects of EAB invasion on the populations of these birds during the breeding season, but highly significant numerical increases during the winter that in several cases appeared to be increasing as the EAB invasion has progressed. Our results confirm that the EAB invasion is resulting in increased populations of several insectivorous birds, primarily during the winter. These results document the profound impact of this invading species on N. American forest ecosystems.

Oral

IPS CEMBRAE – ESTABLISHMENT AND SPREAD IN SWEDEN – A LIFE ON THE MARGIN?

Å. Lindelöw[1], M. Schroeder[1], G. Isacsson[2], H-P. Ravn[3]
[1] *Swedish University of Agricultural Sciences, Department of Ecology, Uppsala, Sweden*
[2] *Gunnar Isacsson, The Swedish Forest Agency, Hässleholm, Sweden*
[3] *Hans Peter Ravn, University of Copenhagen, Department of Geosciences and Natural Resource Management, Frederiksberg C., Denmark*

Ips cembrae (Coleoptera, Curculionidae) is a bark beetle species, native to central Europe and mainly use larch (*Larix*) as host tree. Dead and weakened trees are colonised for reproduction. During the last century, *I. cembrae* has spread, often brought into new areas in larch timber and is now widely distributed in Europe and sometimes causes tree mortality. In 2011, one pheromone trap was placed in each of 22 larch stands scattered in southern Sweden. 18 individuals of *I. cembrae* were caught in two nearby sites. Galleries found in dead larch trees indicated a presence at least already in 2009. Subsequent trapping during 2012-2016 aiming to follow the spread and establishment, resulted in a yearly catch of a few hundreds of individuals in a few trapping sites out of about twenty, indicating a low number of individuals and a slow spread in the landscape. Larch stands are small and scattered, providing few suitable trees for breeding to maintain local populations. Immigration of dispersing adults from nearby Denmark aided by prevailing westerly winds might be an alternative explanation for the spatial pattern of trapped beetles. The distribution of *I. cembrae* is discussed in relation to dispersal and level of resources needed for reproduction and survival.

MONOCHAMUS GALLOPROVINCIALIS EMERGENCE PHENOLOGY ACROSS THE IBERIAN PENINSULA

H. Mas[1], J. Pajares[2], E. Husillos-Sánchez[2], R. Hernández[3], I. Etxebeste[4]

[1] *VAERSA-Generalitat ValencianA, Quart de Poblet, Valencia, Spain*

[2] *Instituto Universitario de Investigación en Gestión Forestal Sostenible (IUFGS) – Universidad de Valladolid – CIFOR – INIA, Palencia, Spain*

[3] *Laboratorio de Sanidad Forestal en Mora de Rubielos, Gobierno de Aragón, Teruel, Spain*

[4] *Department of Ecology, Swedish University of Agricultural Sciences, Uppsala, Sweden*

KEYWORDS: Bursaphelenchus xylophilus, cerambycidae, degree-day, Pinus.

Primary transmission of Pine Wood Nematode, *Bursaphelenchus xylophilus* (Nematoda; Aphelenchoididae), one of the main threats to conifers in Europe, occurs during the initial weeks after the emergence of *Monochamus galloprovincialis* (Col., Cerambycidae), so far, the only known European vector. Previously, Portuguese researchers have shown that using lower and upper developmental threshold temperatures estimated in lab studies (12.2 and 33.5ºC respectively) an accumulation of 822 degree-days would be required for the median emergence to occur in the Setubal Peninsula (Portugal).The analysis of the emergence pattern of *M. galloprovincialis* registered in twelve series between 2010 and 2014 at different locations of the Iberian Peninsula showed that the phenology and the thermic requirement of the vector of the Pine Wood Nematode departs greatly from the proposed Portuguese model. Median emergences at warm regions occurred by mid-June, while at milder areas it was registered during the first half of July. Beyond reported differences in Iberian *M. galloprovincialis* populations, the results revealed that autumn temperatures might have a crucial role in the composition of hibernating larval stages. The results suggest that actions directed towards the early detection and management of the invasive Pine Wood Nematode, might require adjustments to local *M. galloprovincialis* emergence dynamics.

Oral

BARK BEETLE OUTBREAKS IN THE TATRA MTS: ANALYSIS AND OBSERVATIONS ON THREE OUTBREAKS IN 25 YEARS

P. Mezei[1], M. Havašová[1], J. Škvarenina[3], M. Blaženec[1], R. Jakuš[1,2]
[1] *Institute of Forest Ecology, Slovak Academy of Sciences, Zvolen, Slovak Republic*
[2] *Department of Forest Protection and Game Management, Faculty of Forestry and Wood Sciences, Czech University of Life Sciences, Praha 6-Suchdol, Czech Republic*
[3] *Faculty of Forestry, Technical University, Zvolen, Slovak Republic*

KEYWORDS: Bark beetle, disturbance, Norway spruce, spatio-temporal pattern, wind.

Norway spruce forests (*Picea abies*) of the Tatra National park in Central Europe have been subject to unprecedented tree mortality caused by windstorms and infestations of the Eurasian spruce bark beetle (*Ips typographus*). In an area of about 70,000 ha, three bark beetle outbreaks have taken place. The first outbreak started in 1994 in the North of the Tatras, followed by a second outbreak after 2002. On the south, an outbreak has been initialised after a big windthrow event in 2004.

In the north, both outbreaks were analysed as a one 26 time series of tree mortality in connection to meteorological data. Windstorms and maximum temperature sums were the most important predictors of insect- induced tree mortality. The National park buffer zone management has been analysed in a 10-year time series as well.

On the south, we analysed an outbreak where bark beetles are attacking standing trees even after more than 10 years from the initial wind disturbance. We were using remote sensing techniques to assess bark beetle-caused tree mortality, forestry databases, DEM and meteorological data to assess spatio-temporal conditions for bark beetle population dynamics assessed in the PHENIPS bark beetle phenology model.

Oral

METHODOLOGY OF COMPARATIVE TRAPPING USING BARK BEETLE TRAPS AND ATTRACTANTS

M. Müller[1], C.E. Helbig[1], M. Wehnert[2]
[1] *Technische Universität Dresden, Institute Of Silviculture and Forest Protection, Chair of Forest Protection, Tharandt, Germany*
[2] *Ostdeutsche Gesellschaft Für Forstplanung mbH, Kesselsdorf, Germany*

KEYWORDS: Attractants, bark beetle, bark beetles, bark beetle traps.

Studying bark beetles using bark beetle traps and attractants is an established method in forest health research. Comparative methods for field studies are required to develop and evaluate monitoring and attract-and-kill techniques for forest use.

However, special conditions have to be considered for these studies: (1) unknown bark beetle population sizes, and (2) spatially and temporally fluctuating population densities and other population parameters. Absolute numbers of insects captured in different trap types or with different attractants which were set up at great distances or which were not recorded simultaneously are therefore not suitable for comparative studies.

We suggest using the so-called Island Method with different trap types or different attractants set up in a circular way (= island) as close as possible but as distant as necessary. This method allows capturing insects out of the same population, while simultaneously avoiding interactions with adjacent traps or attractants. Data analysis and evaluation are discussed with regard to the problem of pseudoreplication.

Oral

INSECTICIDES ARE PHASED OUT IN SWEDISH FORESTRY – PHYSICAL PROTECTION OF SEEDLINGS TAKES OVER

G. Nordlander
Department of Ecology, Swedish University of Agricultural Sciences (SLU), Uppsala, Sweden

KEYWORDS: Conifer seedling, *Hylobius abietis*, pest management, pine weevil, reforestation.

In Swedish forestry, the use of insecticides is practically restricted to protection of conifer seedlings against the pine weevil, *Hylobius abietis*. About 350 million seedlings are planted annually in Sweden, of which 150 million are provided protective treatment. Until recently this meant prophylactic insecticide treatment. Since 2010, however, non-chemical protection methods are gradually replacing insecticides for seedling protection. The new methods involve various coatings on the stem, physically protecting the seedlings from bark-chewing insects. The non-chemical methods are now used for half of the protected seedlings, and within a few years insecticides are judged to be largely phased out in Swedish forestry. Factors crucial for this development are:

1) For several years the Swedish forestry sector funded research conducted within the Swedish *Hylobius* Research Program. This research contributed significantly to the development of new non-chemical protection methods, and also to adjustments in forest management reducing the risk of weevil damage.

2) By taking the lead and investing in the new protection methods a few forest companies were able to demonstrate the feasibility of large-scale production and practical use of stem coatings.

3) The Swedish FSC pushed the issue of abandoning insecticides and established a successful process for reaching this goal.

Oral

BARK BEETLES EXPANDING NORTHWARD AND INTO NEW HABITATS IN EUROPE

B. Økland[1], **S. Neuvonen**[2], **M. Schroeder**[3]
[1] *Norwegian Institute of Bioeconomy Research, As, Norway*
[2] *Natural Resources Institute Finland, Helsinki, Finland*
[3] *Swedish University of Agricultural Sciences, Uppsala, Sweden*

Large-scale bark beetle outbreaks in northern conifer forests have already demonstrated huge impacts on forest economy, ecosystems and carbon dynamics. In North America, a historically unprecedented outbreak of the mountain pine beetle has expanded north- and eastwards beyond its historical range, and has reached epidemic levels in areas of northern British Columbia previously thought to be unsuitable for beetle survival. In Europe, the vast northern spruce forests have been spared from bark beetle outbreaks in the past, but here we review some recent observations and research results indicating that this may be undergoing change. For example, monitoring data of the most serious tree-killing bark beetle in Europe, *Ips typographus*, show a several-fold increase of the populations in its northern range during warm years. In the extensive spruce forests of northern Fennoscandia and Russia, a new phenomenon of tree-killing episodes by I. typographus has occurred in the last decade. Northern localities with one beetle generation per year in the past are now having more often two. Also other bark beetle species in the genus Ips have demonstrated a fast northward expansion in Europe, including one species contributing in bark beetle outbreaks of I. typographus in Central and Southern Europe.

Oral

TECHNICAL AND ECONOMIC ANALYSIS OF THE HAZARDS OF PINE BAG INSECT (*THAUMETOPOEA PITYOCAMPA* SCHIFF) IN THE TURKISH RED PINE (*PINUS BRUTIA* TEN.) AFFORESTATION IN TURKEY (BARTIN CASE STUDY)

H.B. Özel[1], **E. Güngör**[1]
[1] *University of Bartın, Faculty of Forestry, Department of Forest Engineering, Bartın-Turkey*

KEYWORDS: Afforestation, economic analysis, pine bag ınsect, survival percentage, technical analysis, turkish red pine.

Turkish Red Pine (*Pinus brutia* Ten.) is widely used in industrial plantation studies in many areas outside the natural distribution area because of its rapid growing species and wide geographical distribution. However, these networking efforts are under the influence of numerous biotic and abiotic hazards with the effect of changing environmental conditions. At the beginning of these harms is the pine bag insect. In this context, the technical and economical dimensions of the damage caused by the pine bag insect in the afforestation areas established in Bartın-Karaçaydere and Gözpınarı regions in different years will be made. In this context, some growth characteristics will be determined in the sample plots of 20 x 20 m from the afforestation areas, especially the survival percentage of seedlings. Utilizing the data obtained from the trial sites, it will be tried to determine the economic dimension of damages caused by the insects.

Oral

MASS TRAPPING EXTRACTION OF *MONOCHAMUS GALLOPROVINCIALIS* OLIVIER (COL.: CERAMBYCIDAE) IN TWO DENSITY DIFFERENT POPULATIONS

E. Sánchez-Husillos[1], **I. Etxebeste**[1,2], **J. Pajares**[1]
[1] *Sustainable Forest Management Institute, University of Valladolid, Palencia, Spain*
[2] *Department of Plant Production and Protection, Arkaute, Spain*

KEYWORDS: Pine wilt disease, pine wood nematode, pest management.

Monochamus galloprovincialis is the vector in Europe of *Bursaphelenchus xylophilus*, the pine wood nematode causing the pine wilt disease (PWD). An effective trapping system for these beetles has been developed, raising the possibility of applying mass-trapping methods to lower beetle populations in PWD-affected areas. To evaluate the effectiveness of this tactic, three sets of experiments were carried out in 2010, 2013 and 2014. The release of laboratory reared beetles in 2010 showed that capture–mark–recapture (CMR) procedures were appropriate to population abundance after Jolly–Seber model. In 2013, four trap densities were tested in six 36 ha plots. The local beetle population was estimated to a moderate density of 82 individuals per hectare. Evaluated trapping densities removed 4.66%, 20.50%, 33.33% and 59.80% of *M. galloprovincialis* population at 0.02, 0.11, 0.25 and 0.44 traps/ha, respectively. Experiment in 2014 tested trap densities of 0.11, 0.44 and 1 traps/ha in nine 9 ha plots. Local beetle density was this time estimated at roughly 11 beetles/ha. Removal of 19.3%, 67.4% and 85% of beetle population was obtained by trapping densities respectively. These results suggest that mass trapping may substantially reduce *M. galloprovincialis* abundance and this represents a very promising management method for PWD-affected areas.

Oral

INVASIVE AMBROSIA BEETLES IN CALIFORNIA NATIVE AND URBAN FORESTS

T.D. Paine[1], **M.E. Jones**[1], **J.N. Kabashima**[2]
[1] *Department of Entomology, University of California, Riverside, California, United States*
[2] *University of California Cooperative Extension, Orange County, Irvine, California, United States*

Invasive Ambrosia beetles have the potential to have tremendous impact on native and urban forests in the adventive habitats. The Polyphagous Shot Hole Borer (Coleoptera: Curculionidae: Scolytinae), *Euwallacea* sp. near *fornicatus*, is an ambrosia beetle native to Asia that has been introduced into Israel, California, and South Africa. The beetle maintains a symbiotic relationship with three species of fungi that it vectors between host trees by carrying spores within a mandibular mycangium. These ambrosial fungi are inoculated into host trees and are the sole nutritional source for the adults and the larvae. Unfortunately for forest and resource managers, one of the fungi, *Fusarium euwallaceae*, is a moderately virulent pathogen and is responsible for causing a dieback disease in susceptible hosts. High levels of infestation of susceptible host trees have resulted in high levels of mortality. The host currently recognized host range for the beetle-fungus complex includes more than 200 tree species that can be attacked by the beetle, more than 100 species that can support growth of the fungus, and 49 species that can be used as a reproductive host by the beetles. Many of these reproductive hosts are important agricultural crops, components of the California urban forest, or components of native riparian forest communities. Management is currently focused on monitoring using visual inspections or trapping, sanitation using solarization or chipping, and direct control using contact or systemic insecticides. Future management approaches will include planting resistant or unsuitable host trees and biological control. As more information about the biology and ecology of the insect-fungus complex is developed, it may be possible to develop strategies for limiting spread within and among regions of the world with Mediterranean climates.

Oral

EFFICIENT SAMPLING OF SAPROXYLIC BEETLES IN URBAN HOLLOW TREES – BALANCING BETWEEN VANDALISM AND AMOUNT OF WOOD MOULD

E. Peuhu[1], **J. Siitonen**[2]
[1] *Department of Forest Sciences, University of Helsinki, Finland*
[2] *Natural Resources Institute Finland (LUKE), Helsinki, Finland*

KEYWORDS: Beetles, hollow trees, sampling, trapping, urban biodiversity.

Sampling of insects is a fundamental need for many studies concerning population levels and community structure of species in different habitats. Even though many trap types and other sampling methods have been well designed and widely used, they may need an update particularly in special conditions, such as in urban areas. In this study, we compared the efficiency of window, aluminium foil and pitfall traps for sampling the saproxylic beetle species living in hollow urban trees. We chose altogether fifteen large broad-leaved trees in three parks within the Helsinki metropolitan area, Finland. To avoid a potential vandalism the traps, two traps of each type in a tree, were placed inside the hollows. Window and aluminium foil traps caught the highest number of saproxylics, had the most similar species assemblage and were the most efficient ones when also the time spent on separating insects from the samples was taken into account. Our analysis suggests that the efficient sampling of saproxylic beetles in hollow urban trees could be done with only one trap type, placed on the wall of a hollow. In addition the smaller samples could be prioritized when only limited resources are available. These results should be taken into consideration when ever trapping insects inside hollow trees.

Oral

EXAMINING THE ROLE OF *AGRILUS BIGUTTATUS* IN ACUTE OAK DECLINE THROUGH STUDIES ON WOUND CLOSURE AND DENDROCHRONOLOGY

K. Reed[1,2], S. Denman[1], J. Forster[1], N. Brown[3], S.R. Leather[2], D.J.G. Inward[1]
[1] *Forest Research, Centre for Ecosystems, Society and Biosecurity, Alice Holt Lodge, Farnham, Surrey, United Kingdom*
[2] *Crop And Environment Sciences, Harper Adams University, Edgmond, Newport, Shropshire, United Kingdom*
[3] *Rothamsted Research, Harpenden, United Kingdom*

KEYWORDS: Acute Oak Decline, buprestidae, dendrochronology, wound response.

Acute Oak Decline (AOD) currently affects thousands of trees in the UK. Although the larval galleries of *Agrilus biguttatus* are reportedly found in proximity to 99% of AOD bark lesions, it appears to complete its development on only one third of affected trees, suggesting the influence of host resistance. To quantify the stage at which trees become suitable for beetle development, experiments were carried out at three monitored AOD sites, on trees across seven categories of decline, including asymptomatic of AOD (with no exit holes), continuously symptomatic for a number of years, newly symptomatic, and in remission, with and without exit holes. Trees were mechanically wounded, and percentage wound closure was measured, as a proxy for host vigour, at four time-points over two years. Wound closure varied by AOD category, and was related to beetle exit holes, although an inconsistent relationship across measuring dates indicates that host resistance may not be the only factor inhibiting development on symptomatic trees. The annual growth increment of the trees was also measured, to determine the chronology of the syndrome, and whether the trees exhibited differences in annual growth (and possible predisposition) before the onset of AOD symptoms, and colonisation by the beetle.

Oral

UNLIKELY PARTNERS: BARK BEETLES, OPHIOSTOMATOID (BLUESTAIN) FUNGI, AND SUBTERRANEAN TERMITES

J. Riggins[1], **N. Clay**[2], **C. Siegert**[3], **J. Tang**[4]

[1] *Department of Biochemistry, Molecular Biology, Entomology and Plant Pathology, Mississippi State University, Starkville, United States*

[2] *School of Biological Sciences, Louisiana Tech University, United States*

[3] *Department of Forestry, Forest and Wildlife Research Center, Mississippi State University, United States*

[4] *USDA Forest Service, Forest Products Laboratory, Durability And Wood Protection, Starkville, Mississippi, United States*

KEYWORDS: Bark beetles, biological interactions, decomposition, ophiostomatoid fungi, subterranean termites.

Trophic interactions between forest insects and fungi are widespread, yet almost unknown beyond one trophic level. Subterranean termites and bark beetles, despite their vast differences, share complex interactions with fungi, ranging from mutualistic to antagonistic. Furthermore, bark beetles and subterranean termites are respectively the Keystone herbivore and decomposer of trees in many forest ecosystems, yet how bark beetles and their associated fungi subsequently impact the brown food web is mostly unknown. We investigated the relationship between subterranean termites and ophiostomatoid "bluestain" fungi in bark beetle deadwood as a potential mechanism to explain observed rapid termite colonization of bark beetle attacked trees. We measured subterranean termite frequency, and the subsequent trophic cascade of decomposers in logs artificially inoculated with bluestain fungi vs. unstained control logs. Subterranean termites consumed bluestained wood up to 57% more rapidly than negative controls, and were 4X more frequent in bluestained logs versus negative controls. Furthermore, termite presence was associated with lower fungal diversity in deadwood, and subsequent treatment differences among C:N in underlying soils. Together, these findings suggest that trophic interactions mediated by fungal associates of bark beetles and subterranean termites may be previously unknown and important drivers of wood decomposition in some forest ecosystems.

Oral

SINGLE INTRODUCTION EVENT OF AN AMBROSIA BEETLE AND ITS FUNGAL SYMBIONT THREATEN ENTIRE PLANT FAMILY IN NORTH AMERICA

J. Riggins[1], **M. Hughes**[2], **A. Cognato**[3], **F. Koch**[4], **J. Smith**[5]

[1] *Department of Biochemistry, Molecular Biology, Entomology and Plant Pathology, Mississippi State University, Starkville, United States*

[2] *College of Tropical Agriculture and Human Resources, University of Hawaii at Mānoa, Hilo, United States*

[3] *Department of Entomology, Michigan State University, East Lansing, United States*

[4] *Southern Research Station, USDA Forest Service, Eastern Forest Environmental Threat Assessment Center, Research Triangle Park, United States*

[5] *School of Forest Resources and Conservation, University of Florida, Gainesville,United States*

KEYWORDS: Ambrosia beetle, biological invasion, lauraceae, laurel wilt.

Laurel wilt is an invasive non-native tree disease in the southeastern United States that involves naïve hosts in the Lauraceae, an introduced vector (*Xyleborus glabratus*) and pathogen symbiont (*Raffaelea lauricola*). USDA Forest Service Forest Inventory and Analysis data were used to estimate that over 300 million redbay trees (*Persea borbonia*), or >1/3 of the pre-invasion population, have succumbed to the disease since the early 2000s. In addition, every native North American shrub and tree species in the Lauraceae Family that has been tested, including the commercially important avocado (*Persea americana*), are susceptible and threatened in the Western Hemisphere. Genetic markers were used to test the hypothesis that the vector and pathogen entered North America as a single introduction. With a portion of the cytochrome oxidase I gene, a single *X. glabratus* haplotype was detected in the USA. Similarly, amplified fragment length polymorphisms indicated that 54 of 57 examined *R. lauricola* isolates were of a single clonal genotype; only minor variation was detected in three polymorphic isolates. It is proposed that a single founding event is responsible for the laurel wilt epidemic in the United States, which threatens an entire native plant family.

Oral

PHENOLOGICAL CHANGES IN THE PINE PROCESSIONARY MOTH: POSSIBLE CAUSES, CONSEQUENCES AND UP-AND-COMING MONITORING METHODS

J. Rousselet[1], M. Laparie[1], C. Robinet[1], A. Roques[1], A. Bernard[1], C. Kerdelhué[2], J.P. Rossi[2], M. Buradino[3], L. Bocheva[4], G. Zaemdzhikova[5], M. Georgieva[5], G. Tsankov[5], G. Georgiev[5], P. Mirchev[5]

[1] *Unité de Recherche de Zoologie Forestière, Institut National de la Recherche Agronomique, Orléans, France*

[2] *Centre de Biologie et de Gestion des Populations, Institut National de la Recherche Agronomique, Montferrier-Sur-Lez, France*

[3] *Unité Expérimentale Entomologie et Forêt Méditerranéenne, Institut National de LIa Recherche Agronomique, Avignon, France*

[4] *National Institute of Meteorology and Hydrology, Bulgarian Academy of Sciences, Department of Meteorology, Sofia, Bulgaria*

[5] *Forest Research Institute, Bulgarian Academy of Sciences, Department of Forest Entomology, Phytopathology and Game Fauna, Sofia, Bulgaria*

KEYWORDS: Automated traps, climate change, phenology, pest monitoring, *Thaumetopoea pityocampa*.

Global temperature has increased by 0.85 °C between 1880 and 2012, with an acceleration during the last decades. Ecological consequences already observed include demographic, distributional and phenological changes, especially in ectothermic species. The pine processionary moth, *Thaumetopoea pityocampa*, is emblematic because it is one of the few examples for which a causal relationship between climate change and range expansion has been demonstrated. Additionally, its phenology is becoming more and more unpredictable due to an increasing variability within and among regions. One of the most striking changes is the co-occurrence of early (before winter) and typical (after winter) pupation processions in some areas, prolonging and increasing risks of exposure to the larvae that are urticating for humans, pets and cattle. Moreover, changes in flight phenology are also expected to occur, especially under peculiar permissive climates, possibly explaining pest management failures in some locations. So far, standardized monitoring data at large spatial and fine temporal scales were lacking but innovative methods are going to be tested in France and Bulgaria. We will review the phenological variations occurring over the distribution range, their possible causes and consequences, and the monitoring improvements and technical advances that will allow to address these issues.

Oral

PHEROMONE ECOLOGY OF THE EMERALD ASH BORER

K. Ryall[1], **P. Silk**[2]
[1] *Natural Resources Canada, Great Lakes Forestry Centre, Sault Ste Marie, Canada*
[2] *Natural Resources Canada, Atlantic Forestry Centre, South Fredericton, Canada*

KEYWORDS: *Agrilus*, buprestid, *Fraxinus,* invasive, pheromone.

The emerald ash borer, *Agrilus planipennis* (Coleoptera: Buprestidae), is a devastating invasive insect pest causing extensive levels of mortality to ash trees in its introduced range in North America. Our research has demonstrated the biological activity of a volatile female-produced pheromone, the first evidence of a pheromone in any of the Buprestidae. In addition, our research has demonstrated biological activity of a saturated analog of the sex pheromone, highlighting the apparent plasticity in response of adults to the pheromone and its analog. Ongoing work is exploring potential biological activity of additional analog structures. Finally, our research has explored the optimal deployment of this macrocyclic lactone pheromone for use in early detection and monitoring surveys, involving trap placement and addition of lures containing host ash volatiles.

Oral

SELF-INFECTION OF PINE WOOD NEMATODE VECTOR *MONOCHAMUS GALLOPROVINCIALIS* WITH ENTOMOPATHOGENIC FUNGUS *BEAUVERIA PSEUDOBASSIANA* FOR BIOLOGICAL CONTROL

A. Sacristán[1], M. Fernández-Bravo[2], E. Quesada-Moragas[2], J. Pajares[1]
[1] *Sustainable Forest Management Institute. University of Valladolid-CIFOR INIA, Palencia, Spain*
[2] *Departmemt of Agricultural and Forestry Sciences, ETSIAM, University of Cordoba, Campus de Rabanales, Córdoba, Spain*

Pine Wood Nematode *Bursaphelenchus xylophilus* causes Pine Wilt Disease (PWD), resulting in widespread tree mortality. This quarantine organism is necessarily vectored by long horn *Monochamus* spp. beetles. PWD management through control of the insect vectors has been proposed. Recently, the high potential of entomopathogenic fungus *Beauveria pseudobassiana* for the biological control of *M. galloprovincialis,* the only known vector of the disease in Europe, has been shown.

Several experiments were carried out aiming to develop a practical method to spread this biological control agent within the beetle population by self-dissemination tactics. Multiple funnel trap collection cups were provided with screened bottoms to effectively reduce by-catch of non-targeted beetles by 73%. Two self-release devices attached to the trap collection cups were field tested and resulted 100% effective in allowing escape of trapped *M. galloprovincialis* adults. These devices were further developed to serve for the self-infection purpose. Two *B. pseudobassiana* concentrations, [10^9] and [10^{10}] conidia/g in talc powder, were assayed in two self-infection devices in the laboratory. Complete mortality occurred after 9-10 days and 15-19 days for each dosage respectively. Survival time averaged was 6,2 days and 10,2 days for the high and low dosage respectively. Further studies testing horizontal transmission of self-infected beetles would extend these result.

Oral

RAD SEQUENCING HELPS TO UNRAVEL THE PHYLOGEOGRAPHY OF *PITYOGENES CHALCOGRAPHUS*

M. Schebeck[1], E.J. Dowle[2], D.N. Avtzis[3], C. Bertheau[4], H. Schuler[1], J.L. Feder[5], G.J. Ragland[1], C. Stauffer[1]
[1] *Department of Forest and Soil Sciences, BOKU, University of Natural Resources and Life Sciences, Vienna, Austria*
[2] *Department of Integrative Biology, University of Colorado Denver, United States*
[3] *Hellenic Agricultural Organization – Demeter, Forest Research Institute, Athens, Greece*
[4] *Laboratoire Chrono-environnement, University of Franche-Comté, Besançon, France*
[5] *Department of Biological Sciences, University of Notre Dame, IN, United States*

KEYWORDS: Bark beetle, ddRADSeq, glacial refugia, ice ages, phylogeography.

Present distribution and genetic structure of organisms were shaped by past climatic oscillations, e.g., changes in temperature during the Pleistocene. During the last glacial maximum Europe was covered by a thick ice shield in northern regions and high elevation areas, and survival was only possible in glacial refugia. The spruce bark beetle, *Pityogenes chalcographus*, is an insect with a life cycle closely associated with its main host tree Norway spruce. It is hypothesized that both species shared the same glacial refugia. Postglacial warming led to a range expansion and recolonization of Europe.

We reassessed the glacial and postglacial history of *P. chalcographus* by studying individuals from a huge part of the beetle's range. We applied ddRADSeq to disentangle the present genetic population structure and to infer glacial and postglacial processes. We confirmed and re-evaluated three glacial refugia in the Apennine-Dinaric region, in the Carpathian Mountains and in the Russian plain. Present genetic structure was strongly influenced by secondary contact during warm periods and the insect's reproductive and dispersal behavior. Population structure analyses revealed a high level of gene flow across populations leading to a shallow genetic structure and a low level of population differentiation.

Oral

COLONIZATION DENSITY – A MAJOR FACTOR INFLUENCING OUTBREAK DYNAMICS OF THE SPRUCE BARK BEETLE *IPS TYPOGRAPHUS*

M. Schroeder[1], **S. Kärvemo**[2], **J. Knape**[1]
[1] *Department of Ecology, Swedish University of Agricultural Sciences, Uppsala, Sweden*
[2] *Department of Ecology and Genetics, Uppsala University, Sweden*

KEYWORDS: Colonization density, *IPS typographus,* local population size, reproductive success, tree diameter.

Tree-killing bark beetles are among the most important disturbance factors in conifer forests. Bark beetle performance within colonized trees can be expected to strongly influence outbreak progression. However, few studies have investigated this. We took bark samples each autumn in multiple stands from trees colonized by the Eurasian spruce bark beetle *Ips typographus* (Col., Curculionidae) during an entire outbreak triggered by a storm. Colonization density (maternal gallery densities), reproductive success (daughters per mother) and densities of enemy larvae were recorded for storm-felled and beetle-killed trees. The colonization density was much lower in storm-felled trees (the first two summers) than in killed trees (second - seventh summer). There was a large between-year variation in colonization density in killed trees. Tree diameter (positive relationship) and local population size (positive) significantly affected colonization density in killed trees. The reproductive success was much higher in storm-felled than in killed trees. The reproductive success was influenced by colonization density (negative), tree diameter (positive) and local population size (negative). A high reproductive success in storm-felled trees, caused by a low colonization density, triggered the outbreak. The low reproductive success at the end of the outbreak, caused by a high colonization density, contributed to outbreak collapse.

Oral

USING GENETICS, CHEMISTRY, AND TREE RINGS IN TANDEM TO DETECT ADAPTATION TO CLIMATE CHANGE AND RESISTANCE TO BARK BEETLES

D.L. Six[1], **C. Vergobbi**[1]
[1] *Department of Ecosystem and Conservation Sciences, University of Montana, Missoula, MT, United States*

KEYWORDS: Dendrochronology, *Dendroctonus*, ISSR, monoterpene, *Pinus*.

Even in pine forests hard hit by mountain pine beetle (*Dendroctonus ponderosae*), some living mature trees typically remain. We are investigating whether 'survivor' trees possess different genotypes and phenotypes from those selected by beetles and whether survival is related to (1) differences in vigor (and defenses) or (2) differences in chemical profiles altering recognition or acceptance by the beetle. In this study, we are using tree ring-climate analyses, resin flow measurements, phloem defensive chemistry, and ISSR (Inter Simple Sequence Repeats) DNA profiles to compare survivors, controls (living trees just below the acceptable diameter for beetle), and beetle-selected trees in outbreak stands of lodgepole, whitebark and ponderosa pine. Initial dendrograms generated using ISSR data from lodgepole and whitebark pines cluster survivors separately from the vast majority of controls indicating survivors are genetically distinct. Preliminary comparisons of tree rings in cores from survivor and beetle-killed whitebark pine of similar diameter collected from the same stands indicate beetle-selected trees have experienced reduced growth rates in recent years. Chemical analyses are in progress and will be reported. Ultimately, we hope to develop a better understanding of the capacity of pine forests to adapt to a changing climate including increasing pressure from bark beetles.

Oral

SPRUCE BUDWORM PEST MANAGEMENT AS A CONSERVATION TOOL FOR CRITICAL HABITATS AND ECOLOGICAL INTEGRITY OF FOREST WATERSHEDS

M. Stastny[1], E. Skokan-Emilson[2], D. Kreutzweiser[2], R. Johns[1], S. Heard[3], V. Martel[4], M. Gray[3,5], K. Kidd[3,5], L. Venier[2], T. Linnansaari[3]

[1] *Atlantic Forestry Centre, Canadian Forest Service, Fredericton, Canada*
[2] *Great Lakes Forestry Centre, Canadian Forest Service, Fredericton, Canada*
[3] *University of New Brunswick, Fredericton, Canada*
[4] *Laurentian Forestry Centre, Canadian Forest Service, Fredericton, Canada*
[5] *Canadian Rivers Institute, Fredericton, Canada*

KEYWORDS: Ecosystem functioning, insect outbreak, riparian, spruce budworm, stream.

As the foremost insect disturbance in eastern North America, outbreaks of spruce budworm (SBW; *Choristoneura fumiferana*) necessitate large-scale pest management efforts. Control strategies involving aerial insecticide application can help prevent or mitigate ecosystem impacts of SBW; however, while adverse effects of insecticides have been comprehensively evaluated, the ecological risk assessment of no intervention has not been explored empirically. As SBW outbreaks alter canopy cover in forest watersheds, significant cascading impacts can be expected on a range of ecosystem services and indicators, including stream temperature and hydrology, water chemistry, erosion and sedimentation, benthic invertebrates, leaf litter decomposition, C and N subsidies, and nutrient cycling. In turn, these changes can impact cold-water fish habitat, including Atlantic salmon, and riparian bird communities. This ongoing multidisciplinary project aims to experimentally assess the impacts of SBW defoliation on upland and riparian forests in northern New Brunswick, Canada, by employing a paired design of forest watersheds (appr. 1000 ha each) that compares those aerially treated with Btk and tebufenozide and those experiencing no intervention during SBW outbreak. Monitoring of stream and riparian ecosystem function over 3-5 years of experimental treatments will provide the first empirical evaluation of the ecological benefits of pest management in critical habitats.

Oral

RANGE SHIFT AND LOCAL EXTINCTION OF *DENDROCTONUS FRONTALIS* POPULATIONS IN THE SOUTHERN UNITED STATES

F. M. Stephen[1], **L.D. Galligan**[1], **S.R. Clarke**[2], **J.M. Guldin**[3]
[1] *Department of Entomology, University of Arkansas, Fayetteville, United States*
[2] *USDA Forest Service, Forest Health Protection, Lufkin, Texas, United States*
[3] *USDA Forest Service, Southern Research Station, Hot Springs, Arkansa, United States*

KEYWORDS: Database, Dendroctonus frontalis, population regulation.

Historically, population levels of *Dendroctonus frontalis,* the southern pine beetle (SPB), have fluctuated in pine stands across the South. To better understand causes of these changes we sampled within-tree SPB populations for 15 years (1975-1997) across five states, including 47 plots, and totalling 762 trees. This produced what is arguably the largest and most detailed database for tree-level populations of SPB, and its natural enemies. Two major events, one at the northeastern edge of SPB range and another west of the Mississippi River, illustrate major shifts in SPB populations. On one hand, there has been unusual colonization and outbreaks of SPB in New Jersey and on Long Island, New York occurring in the last 15 years. However, infestations (and SPB detection) west of the Mississippi River have been absent since 1998. We discuss our SPB data and present a hypothesis that may help explain its local extinction in the western part of its range.

Oral

USING A DIVERSITY OF TRAP HEIGHT, COLOR, AND LURES INCREASES SPECIES RICHNESS IN SURVEY TRAPS FOR WOOD BORING BEETLES

J. Sweeney[1], P. Silk[1], R. Webster[1], L. Flaherty[2], G. Pohl[3], C. Hughes[1], K. Van Rooyen[1], P. Mayo[1], J.M. Gutowski[4], T. Mokrzycki[5], D. Miller[6], K. Ryall[7], M. Qingfan[8], L. Yan[8], J. Francese[9]

[1] Natural Resources Canada, Canadian Forest Service, Atlantic Forestry Centre, Fredericton, Canada
[2] McEwen University, Edmonton, Alberta, Canada
[3] Natural Resources Canada, Canadian Forest Service, Northern Forestry Centre, Edmonton AB, Canada
[4] Forest Research Institute, Białowieża, Poland
[5] Department of Forest Protection and Ecology, Warsaw University of Life Science, Warsaw, Poland
[6] Southern Research Station, USDA Forest Service, Athens, GA, United States
[7] Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre, Sault Ste. Marie, ON, Canada
[8] Forestry College of Beihua University, Jilin, China
[9] USDA APHIS PPQ, Otis Laboratory, Buzzards Bay, Massachusetts, United States

KEYWORDS: Lures, trap color, trap height, survey, wood borers.

Early detection of established invasive species is critical for their effective eradication, containment, or management. Bark- and wood boring beetles continue to be moved intercontinentally in solid wood packaging in spite of international phytosanitary regulatory policies, and some species may become established invasive pests in new habitats. Data from field experiments in North America, Europe, and northeast China show that trap lure, trap height and trap color significantly affect the composition and abundance of species of Cerambycidae, Buprestidae, and Scolytinae captured in traps. Green traps detected more buprestid species than did black or purple traps whereas trap color had little effect on Scolytinae detection. Traps in the canopy detected more buprestids than those in the understory but the reverse was true for Scolytinae. Trap color and height significantly affected detection of many species in each family, e.g., green canopy traps were most effective for some species and black understory traps most effective for others. Overall, our data suggest that efficacy of trapping surveys for surveillance of exotic bark- and wood boring beetles would be improved by using a diversity of trap colors, heights, and lures.

Oral

TRENDS IN THE FLIGHT PHENOLOGY AND FLUCTUATION OF THE *HELICOVERPA ARMIGERA* (HBN) POPULATION IN HUNGARY

L. Szőcs[1], L. Gimesi[2], Z. Pödör[3], A. Hirka[1], G. Csóka[1]
[1] *NARIC Forest Research Institute, Department of Forest Protection, Mátrafüred, Hungary*
[2] *University of Pécs, Institute of Mathematics and Informatics, Pécs, Hungary*
[3] *University of Sopron, Institute of Informatics and Economy, Sopron, Hungary*

KEYWORDS: Climate dependence, flight phenology, *Helicoverpa armigera*.

There is ample information concerning the direct and indirect effects of climate change on insects. While global trade helps their spread, climate change may facilitate the establishment and the further population increase of the non-native species. In case of migratory moths (as well as of birds), these effects can be even more definite. Recent studies, made in UK, show a northward expansion of some migratory Lepidoptera, and the phenomenon can be correlated with temperature increase, causing temporal changes in arrival date, establishment, abundance, voltinism, phenology, etc.

Before the 1980s *Helicoverpa armigera* (Lepidoptera: Noctuidae) was a rare migrant occasionally occurring in Central Europe. After this time, it has become a more and more significant pest of various agricultural crops (maize, sunflower, tomato, flowers, etc.), and also in young forest plantations (black locust, hybrid poplars, oaks).

By analysing a 30-years (1986-2015) period of forestry light trap catching data, we are able to confirm the growing abundances of the populations and an expansion of the period of the light trap catches within a year. While peak abundances of the moth can be experienced more often in droughty years, warm winters facilitate the successful overwintering of the species in Hungary. As weather conditions are becoming more suitable (as the climate scenarios predict), damage caused by *H. armigera* are likely to occur more often, begin earlier and last longer.

Oral

A MOLECULAR TOOL FOR YOUR BACKPACK: IN-FIELD EARLY DETECTION OF LAUREL WILT USING LAMP

C. Villari[1], N.J. Workman[1], S.W. Fraedrich[2]
[1] *D. B. Warnell School of Forestry & Natural Resources, University of Georgia, Athens, Georgia, United States*
[2] *USDA Forest Service, Southern Research Station, Athens, Georgia, United States*

KEYWORDS: In field early detection, LAMP, laurel wilt, molecular diagnosis, *Raffaelea lauricola*.

Laurel wilt, caused by the invasive fungus *Raffaelea lauricola*, is a highly destructive disease vectored by the redbay ambrosia beetle, and currently decimating native lauraceous species, such as redbay, sassafras and avocado, throughout southeastern USA. Management of laurel wilt has proven particularly challenging, and current efforts are mainly focused on early detection/rapid removal and limiting the impact of the disease. However, for these strategies to be successful, reliable and timely detection methods are needed. The goal of this project is to develop a loop-mediated isothermal amplification (LAMP)-based assay that would allow forest health monitoring agencies and orchard managers to perform early detection of *R. lauricola* directly in the field, without having to rely on external laboratories. LAMP meets all the major technical and economic requirements for successful in-field implementation by non-technical users. Moreover, this assay is highly sensitive, and potentially able to detect the pathogen in asymptomatic tissues, or on insect vectors. Pathogen-specific primer sets were designed and reactions are being optimized for use with crude DNA extracts on portable devices. Next steps will be to evaluate the assay under field conditions and train monitoring personnel. Implementation of this assay can facilitate a successful integrated management program for laurel wilt.

Oral

MONITORING *HYLOBIUS ABIETIS* (COL., CURCULIONIDAE) IN AUSTRIA

R. Wegensteiner[1], S. Strobl[2], A. Kummer[3], J. Pennerstorfer[1]
[1] *University of Natural Resources and Life Sciences, Gregor Mendel Vienna, Austria*
[2] *District Forestry Inspection Feldkirchen, Carinthia, Austria*
[3] *Austrian Research Centre for Forests Ossiach, Carinthia, Austria*

KEYWORDS: Large pine weevil, prevalence.

Control of *H. abietis* is still unsolved. However, beetle monitoring is important to estimate their phenology and prevalence.

Adult *H. abietis* were attracted to bark traps on a mountainous area, Gerlitzen, in Carinthia (Austria) within two time periods (in the years 2005 to 2007 and 2011 to 2015). The positions of the locations were variable in different years but always with south-east, east or south aspect (in altitudes between 620m to 1580m). Different numbers of bark traps were used depending on the size of the experimental sites (five to six).

Within these eight years 9,868 beetles were collected in total. Beetle swarming to bark traps started at mid to end of April or beginning of May. The last beetles were collected in some years at the end of October. The number of caught beetles varied a lot within the years depending on site conditions and on duration of offering fresh bark traps from 13 to 99 beetles per bark trap spot.

Promising results of lab experiments provoked some preliminary field experiments testing the entomopathogenic fungus *Beauveria bassiana* against *H. abietis* using different formulations.

Oral

INFESTATION RISK OF PINE BY BARK BEETLES ALONG ELEVATIONAL GRADIENTS

B. Wermelinger[1], **M. Gossner**[1]
[1] *Swiss Federal Institute WSL, Birmensdorf, Switzerland*

KEYWORDS: Antagonists, bark beetles, pine, resistance.

Tree infestation risk and probability of subsequent mortality depend on the interactions between herbivore population density, bottom-up regulation by plant defense and top-down control by natural enemies and pathogens. These complex interrelations are likely to be affected by climate change. As a surrogate for climate variation, we used six elevational gradients in pine forests in inner Alpine valleys of Switzerland and Italy. At three elevations of each gradient we measured resin flow and colonization densities of bark beetles and their natural enemies on a total of 130 trees. Despite high variations in resin flow between individual trees, the exudation rate was higher at low than at high elevations. Since resin duct density did not differ between elevations the higher resin flow at low elevations was attributed to a temperature-driven effect of viscosity. While the density of bark beetles reared from harvested trees did not change with elevation, predators and parasitoids were less abundant at higher sites. Thus, the ratio between antagonists and bark beetles decreased with increasing elevation. Possible consequences are discussed in view to climate change.

Oral

INVESTIGATING THE POTENTIAL EFFECTS OF A WARMING CLIMATE ON INSECT PEST POPULATIONS ASSOCIATED WITH SITKA SPRUCE IN THE UK

D.T. Williams
Forest Research, Alice Holt Lodge, Farnham, Surrey, United Kingdom

KEYWORDS: Bark-beetles, climate, insects, Sitka.

Current climate change projections for the UK suggest that the climate will become warmer and considerably more variable in the future, which will have significant impacts on UK forests and the insect pests associated with them. Changes in climate patterns are likely to alter the population dynamics of insect pests associated with Sitka spruce, the UK's most widely planted conifer tree species, potentially leading to more frequent outbreak events.

The current study is investigating how insect pests associated with Sitka spruce might respond to a warmer climate by establishing experimental plots, and sampling for insects, along elevational gradients (temperature gradients) in two predominantly Sitka spruce plantations in Wales. The project aims to investigate whether insect pests associated with Sitka spruce are likely to respond to a warming climate, and what aspects of their life histories are they capable of modifying in the event that their environment becomes more favourable.

Initial findings following three years of insect sampling are demonstrating that key insect pests like the green spruce aphid (*Elatobium abietinum*), bark beetles, sawflies and Lepidoptera (e.g. *epinotia* spp), will benefit from a warming climate, since significantly higher numbers are observed at low elevation plots when compared to high elevation plots.

Oral

EVALUATING GYPSY MOTH LARVAL MOVEMENT POTENTIAL AND EFFECTIVE BARRIERS LIMITING THEIR MOVEMENT

J.T. Wittman[1], **P. Chaloux**[2], **S.W. Myers**[3], **B. Aukema**[1]
[1] *University of Minnesota, Department of Entomology, St. Paul, Minnesota, United States*
[2] *USDA-APHIS, Riverdale, Maryland, United States*
[3] *USDA-APHIS, Buzzards Bay, Maryland, United States*

KEYWORDS: Dispersal, gypsy moth, invasion ecology, *Lymantria dispar*, trade.

The gypsy moth (*Lymantria dispar*) is an invasive moth in North America capable of feeding on over 300 species of plants. During outbreak phases, *L. dispar* can defoliate large swathes of hardwood forests. Since the moth's introduction, it has expanded throughout the northeastern United States into the eastern provinces of Canada. This range expansion has been largely due to the movement of egg masses by humans, especially on wood products. To reduce the spread rate of the gypsy moth, federal and state quarantines restrict the movement of regulated products. One measure taken to reduce the spread of *L. dispar* is to require a buffer zone free of any vegetation surrounding log decks or wood piles. Common regulatory practice establishes this buffer zone with a radius of 100 feet. In the summers of 2016 and 2017, we studied the long distance movement capabilities of late instar gypsy moth larvae to evaluate whether this buffer zone practice is sufficient to prevent larvae from pupating near wood products, emerging, and laying eggs on wood products.

Oral

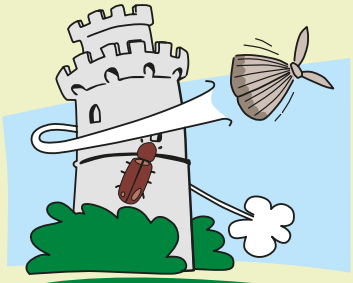
DIPLODIA SAPINEA: A SURPRISINGLY LOW GENETIC DIVERSITY IN THE WESTERN BALKANS

M. Zlatković[1], M.J. Wingfield[2], F. Jami[2], B. Slippers[3]
[1] *Institute of Lowland Forestry and Environment, University of Novi Sad, Serbia*
[2] *Department of Microbiology and Plant Pathology, Forestry and Agricultural Biotechnology Institute (FABI), University of Pretoria, South Africa*
[3] *Department of Genetics, FABI, University of Pretoria, South Africa*

KEYWORDS: Botryosphaeriales, haplotype, microsatellite, network population genetics.

Diplodia sapinea (syn. *Sphaeropsis sapinea*) is a well-known pathogen of coniferous trees in many parts of the world, including in the Western Balkans region. The aims of this study were to determine genetic diversity and gene flow between different populations of *D. sapinea* from Serbia and Montenegro. This was achieved using DNA sequence data of the internal transcribed spacer (ITS) rDNA, translation elongation factor 1-alpha (TEF 1-α) and microsatellite markers. The relationship between isolates of *D. sapinea* from different hosts was considered using populations from *Cedrus* spp. and *Pinus* spp. The relationships between isolates from environmentally different regions included populations from the Continental (CR) and Mediterranean (MR) regions, separated by Dinaric Alps. *Diplodia sapinea* was shown to have low genetic and genotypic diversity, with the latter values ranging from 3.5 to 13.5 % for different populations. All genotypes of *D. sapinea* found on *Pinus* spp. were also present on *Cedrus* spp. The CR and MR populations of *D. sapinea* were partly differentiated from each other and three genotypes and two haplotypes were shared between the two regions. The low genetic diversity of *D. sapinea* on non-native trees, and comparison of populations from other regions of the world, suggests that this species has most likely been introduced into Western Balkans. Such introduction would most likely be through the movement of infected yet asymptomatic ornamental plants (i.e. *C. atlantica*).

Poster Presentations



Forest Insects and Pathogens in a Changing Environment: Ecology, Monitoring & Genetics

Joint Meeting of IUFRO WPs

7.03.05 "Ecology and management of bark and wood boring insects"
7.03.10 "Methodology of forest insect and disease survey"

11-15 SEPTEMBER 2017
THESSALONIKI • GREECE

TECHNICAL CHAMBER OF GREECE /
SECTION OF CENTRAL MACEDONIA

WWW.IUFROGREECE2017.COM
#IUFROGREECE2017

E-Poster

FIRST REPORT OF *XYLEBORUS MONOGRAPHUS* AND *XYLEBORINUS SAXESENII* (COLEOPTERA: CURCULIONIDAE: SCOLYTINAE) FROM TUNISIAN CORK OAK FORESTS

A. Bellahirech[1], **F. Nóbrega**[2], **P. Naves**[2], **M.L. Ben Jamâa**[1]
[1] *National Research Institute of Rural Engineering, Water and Forests, Ariana, Tunisia*
[2] *National Institute for Agriculture and Veterinary Research, Quinta do Marquês, Portugal*

KEYWORDS: Cork oak, cytochrome oxidase i, Tunisia, *xyleborus* sp., *xyleborinus* sp.

Cork oak is found in southwestern Europe and northern Africa (Morocco, Algeria and Tunisia). Different pests and diseases affect this tree, with some important regional differences. For instance, the pinhole borer *Platypus cylindrus* is a major pest in the Iberian Peninsula, although is not a relevant pest in Tunisia. While studying the infestation of pinhole borer in cork oak forests of Tunisia, insects of *Xyleborus* and *Xyleborinus* genus were captured. Sampling was carried out during 2012 in four cork oak stands (Ain Beya, Ain Sarouia, Belif and Mzara). One symptomatic tree from each stand was randomly selected, cut and sectioned. The logs were installed in the laboratory in fabric tissue covers. Emerging insects were subjected to morphological and molecular identification. Morphological characterization revealed 20 insects of *Xyleborus* sp. and 53 of *Xyleborinus* sp.. The assessment of molecular identification of samples was conducted on ten specimens, using the mitochondrial gene cytochrome oxidase I (COI) sequences. Multiple alignment analysis of partial COI sequences revealed two species, namely *Xyleborus monographus* and *Xyleborinus sexesenii*. These ambrosia beetles have not been reported attacking cork oak in Tunisia, and should be futurely monitored as they can be associated with pathogenic fungi and therefore contribute to tree decline.

E-Poster

ASCOMYCETOUS PATHOGENIC FUNGI OF THE MAPLE (*ACER* L.) TREES FROM UZBEKISTAN

Y.S. Gafforov
Laboratory of Mycology, Institute of Botany and Zoology, Academy of Sciences of the Republic of Uzbekistan, Tashkent, Uzbekistan

KEYWORDS: Central Asia, maple tree, plant pathogens.

Ascomycetous plant pathogenic fungi infect conifers and angiosperms, with a high proportion of species growing on monocots. These fungi have a world-wide distribution and are known as serious diseases of forest trees. Several different kinds of ascomycetous fungi will cause cankers and leaf spots on maple trees. Field trips to Mountain forest of Uzbekistan were undertaken in 2016 and ascomycetous microfungi were collected from maple trees in the mountain forests. The following pathogen species were identified: *Phyllosticta acerina* Allesch, (on leaves of *Acer pubescens* Franch), *Ph. platanoides* Sacc. (on leaves of *Acer* sp.). *Septoria acerella* Sacc. (on leaves of *Acer regelii* Pax.), *Cytospora* sp. (Pers.) Rabenh. (on branches of *Acer pubescens*), *Rhytism acerinum* (Pers.) Fr. (on leaves of *Acer pubescens*), *Melasmia aceris-trifidi* Sawada (on leaves of *Acer tataricum* subsp. *semenovii* (Regel & Herder) A.E. Murray., *A. pubescens*), *Melasmia punctata* Sacc. & Roum. (on leaves of *Acer platanoides* subsp. *turkestanicum* (Pax) P.C. DeJong.), *Marssonina truncatula* (Sacc.) Magnus, (on leaves of *Acer platanoides* subsp. *turkestanicum*), *Cylindrosporium aceris* Kuhnh.-Lord. & J.P. Barry (on live leaves of *Acer* sp.), *Leucostoma persoonii* (Nitschke) Höhn. (on *Acer tataricum* subsp. *semenovii*). This work was supported by Committee for coordination science and technology development under the Cabinet of Ministers of Uzbekistan (Project No. P3-2014-0830174425).

E-Poster

THE SPREAD OF *XYLOSANDRUS GERMANUS* WITHIN EUROPE AND SLOVAKIA OVER THE LAST 15 YEARS

J. Galko[1], M. Dzurenko[2], C. Nikolov[1], P. Zach[2], J. Vakula[1], A. Gubka[1], S. Rell[1], A. Kunca[1], M. Zúbrik[1]
[1] National Forest Centre, Forest Protection Service, Banská Štiavnica, Slovakia
[2] Slovak Academy of Sciences, Institute of Forest Ecology, Zvolen, Slovakia

KEYWORDS: Ambrosia beetles, ethanol, invasive species, Scolytinae, *Xylosandrus germanus*.

The black timber bark beetle (*Xylosandrus germanus* Blandford) (Coleoptera: Curculionidae, Scolytinae) is native to Eastern Asia. It has a host range, with over 200 plant species. Adults and larvae feed on ambrosia fungi, specifically *Ambrosiella hartigii* Batra, exhibiting a symbiotic relationship. In the United States, was first recorded in New York in 1932, and in Europe in 1951 near Darmstadt in Germany. Over the last 15 years the spread of *X. germanus* has accelerated within the colonized area in Europe, highly likely due to climate change, development of timber trade or other factors. In Slovakia, Central Europe, *X. germanus* was first recorded in 2010. Herein, we present the results of the study of the spread and distribution of *X. germanus*. The catches of *X. germanus* in 58 ethanol baited traps set in timber yards indicated the fast spread of the species across Slovakia between 2010 and 2016. Additional catches of *X. germanus* in 48 ethanol baited traps set along a vertical gradient of the West Carpathians in Slovakia in 2016 showed that *X. germanus* occurred frequently and abundantly in oak forests in lowlands as well as in oak, beech and Norway spruce forests in hilly and/or submountain areas up to 1000 m a.s.l.. We recorded only one generation of *X. germanus* in a year regardless of altitude. Since 2013 *X. germanus* has been considered a frequent technical pest causing surface damage to timber. The study was supported by the projects APVV 14-0567 and VEGA 2-0052-15.

E-Poster

RESPONSE OF THE INVASIVE OAK PROCESSIONARY MOTH TO ONGOING CLIMATE CHANGE

M. Godefroid[1], **N. Meurisse**[2], **C. Kerdelhué**[1], **J.P. Rossi**[1]
[1] *Institut National de la Recherche Agronomique, CBGP, Montferrier-sur-Lez, France*
[2] *Scion, Rotorua, New Zealand*

KEYWORDS: Global change, oak processionary moth, maxent, *Thaumetopoea processionea*.

The design of cost-efficient and environment-friendly management strategies against invasive species relies on accurate estimations of their potential distribution. The oak processionary moth (OPM) *Thaumetopoea processionea* is a Lepidoptera responsible for serious damages to oak trees as well as severe allergic reactions to humans and animals. This species, native from mainland Europe and the Middle East, was accidentally introduced with imported oak trees into the United Kingdom (UK) in the early 21st century and is currently expanding its range into northern parts of the Netherlands. We aim to assess the potential distribution of the OPM in Europe with a special emphasis to the UK under current and future climate conditions. We compiled records on OPM occurrences and fitted bioclimatic MaxEnt models. High climate matching was observed between the historical native range of the OPM and the recently invaded regions of the UK. Models suggest that the recent range expansion of the OPM into northern parts of the Netherlands could have been induced by ongoing climate change. Models predict that many parts of northern Europe where the OPM does not occur (e.g. central UK, Wales, Ireland, Scotland, Scandinavia) could become climatically suitable by 2050, warranting the need for management strategies.

E-Poster

PITYOGENES CHALCOGRAPHUS OUTBREAKS IN SLOVAKIA DURING 42 YEARS OF EVIDENCE

A. Gubka[1], **C. Nikolov**[1], **J. Vakula**[1], **J. Galko**[1], **A. Kunca**[1], **M. Zúbrik**[1]
[1] *National Forest Centre Zvolen, Slovakia*

KEYWORDS: *Pitiogenes chalcographus*, outbreak, bark beetles, windstorm.

Forest managers in Slovakia are obligatory to administrate every year an evidence about forest pests and other harmful agents in forests. Based on this detailed evidence we have data about occurrence of biotic, abiotic and anthropogenic factors affecting our forests since 1973. *Pityogenes chalcographus* belongs among the most dangerous bark beetle species in spruce forests. During the last years, its importance has increased and starts to cause significant damages mainly on young spruce forests. The main objective was to find the main factors which influenced population of *Pityogenes chalcographus* between the years 1973-2014. The most important factors affecting population of this pest are windstorms, drought and also population dynamic of European spruce bark beetle. But there are also other aspects like changes of political system, dissolution of Czechoslovakia or implementation of new law about nature protection.

E-Poster

OPHIOSTOMATOID FUNGI ASSOCIATED WITH BARK AND AMBROSIA BEETLES ON ENGLISH OAK IN POLAND

R. Jankowiak[1], M. Kacprzyk[2], P. Bilański[2], P. Wieczorek[1]

[1] *Institute of Forest Ecosystem Protection, Department of Forest Pathology, Mycology and Tree Physiology, University of Agriculture in Krakow, Poland*

[2] *Institute of Forest Ecosystem Protection, Department of Forest Protection, Entomology and Forest Climatology, University of Agriculture in Krakow, Poland*

KEYWORDS: Ambrosia beetles, bark beetles, *Ophiostoma*, *Quercus robur*, *Sporothrix*.

Bark and ambrosia beetles are known to be associated with ophiostomatoid fungi. However, very little is known about fungal associates of bark and ambrosia beetles that colonize English oaks in Europe. The aim of this study was to investigate the species spectrum and abundance of ophiostomatoid fungi associated with five beetle species: *Dryocoetes villosus*, *Scolytus intricatus*, *Xyleborus monographus*, *X. dispar* and *X. saxesenii*. Fungi were isolated from field-collected beetles and galleries at three oak stands in Poland. Isolates were identified based on morphology and DNA sequence comparison for four gene regions (ITS, LSU, ß-tubulin, EF-1α). In total 19 ophiostomatoid fungi were found to be associated with oak-infesting bark and ambrosia beetles. *Ophiostoma quercus* and *Sporothrix* cf. *fusiformis* were most frequently isolated. *Sporothrix eucastaneae* and *S.* cf. *foliorum* were also relatively common. Rare components of the ophiostomatoid mycobiota of oak-infesting beetles included *Graphilbum fragrans*, *Grosmannia olivacea*, *Leptographium* sp. 1, *Leptographium* sp. 2, *O. grandicarpum*, *O.* cf. *grandicarpum*, *O.* cf. *karelicum*, *O.* cf. *minus*, *O. novo-ulmi*, *O. piceae*, *O.* cf. *sparsiannulatum*, *S. prolifera* and *S. inflata*. *Ambrosiella hartigii* and *Raffaelea sulphurea* were occasionally isolated from *X. dispar* and *X. saxesenii*, respectively. Frequency of these fungi varied depending on the beetle species.

E-Poster

THE MEAN INDIVIDUAL BIOMASS INDEX OF CARABID BEETLES IN RELATION TO DEADWOOD STRUCTURE AND SOIL BIOCHEMICAL PROPERTIES

M. Kacprzyk[1], **E. Błońska**[2], **T. Wojas**[1]

[1] *Institute of Forest Ecosystem Protection, Department of Forest Protection, Entomology and Forest Climatology, University of Agriculture in Krakow, Poland*

[2] *Institute of Forest Ecology and Silviculture, Department of Forest Soil Science, University of Agriculture in Krakow, Poland*

KEYWORDS: Dead trees, decomposition, epigeic beetles, enzyme activities.

In four study plots located in Silver fir and Scots pine stands of Magura National Park (southeast Poland) the volume and quality structure of dead lying and standing trees, stumps as well as the occurrence of Carabid beetles were investigated. The influence of selected biochemical properties of the soils on the abundance and the mean individual biomass of epigeal carabids was also analyzed.

It has been proven that the volume of deadwood decreases with its quantity increases, together with elevation above sea level. Totally 13 species of Carabid beetles (n=200) from Abax, Carabus, Molops and Pterostichus genera were captured. Rare epigeal carabid species in the fauna of Poland, such as *Carabus linnei* and *Abax scheupeli* were reported, with the second one as the most numerous insect species not recorded in this region so far. The altitude and tree species composition of the stands had an essential impact on the number of Carabidae individulas and species captured, as well as the mean individual biomass index. It was discovered that the mean individual biomass of Carabidae increased with the rise of dehydrogenase activity, ph value and the carbon content in the soil of the stands.

E-Poster

THE EFFECT OF THESSALONIKI'S SUBURBAN FOREST ON THE POPULATIONS AND BIODIVERSITY OF BUTTERFLIES IN THE CITY'S PARKS

S. Karaindrou[1], **E. Georgiadou**[1], **D.N. Avtzis**[2]

[1] *Aristotle University of Thessaloniki - Faculty of Agriculture, Forestry and Natural Environment, Department of Forestry and Natural Environment, Thessaloniki, Greece*

[2] *Forest Research Institute, Hellenic Agricultural Organization Demeter, Thessaloniki, Greece*

KEYWORDS: Biodiversity, butterfly communities, lepidoptera, suburban forest.

Thessaloniki's suburban forest, known as Kedrinos Lofos, extends along the hills that surround the northern part of the city forming a green zone within the urban landscape. The forest's main role is protective; however, the anti-flooding and anticorrosion properties are not the only contributions to the city. Kedrinos Lofos is an undisputed biodiversity source for flora and fauna, something that increases its aesthetic value. In this study, we studied the butterfly communities within city parks in order to unveil the role of suburban forest in the species and their abundance. For this purpose six parks of the municipal district of Thessaloniki and seven of the municipal district of Pavlos Melas were selected. The size, vegetation coverage and pollution levels were also taken into consideration. Samplings followed a modified protocol of Pollard line transects lasting 30 minutes each. After ten sampling periods 15 species were documented in the municipal district of Thessaloniki and 11 in the municipal district of Pavlos Melas. Populations exhibited statistically significant differences something that is reflected even on the biodiversity indices.

E-Poster

PRELIMINARY SURVEY ON THE BIOLOGICAL CYCLE OF *CAPPARIMYIA SAVASTANI (MARTELLI) (DIPTERA: TEPHRITIDAE)* IN DIFFERENT PLANTS OF CRETE ISLAND, GREECE

P.P. Karanikola[1], E.I. Leivadara[1], I. Vontas[2], M.I. Vasilaki[3], A. Tampakis[3]

[1] *Department of Forestry and Management of the Environment and Natural Resources, Democritus University of Thrace, Orestiada, Greece*

[2] *Pesticide Science Laboratory, Department of Crop Science, Agricultural University of Athens, Greece*

[3] *Department of Agriculture School of Agriculture, Food and Nutrition Technological and Educational Institute of Crete, Heraklion, Greece*

[4] *Department of Forestry and Natural Environment, Aristotle University of Thessaloniki, Greece*

KEYWORDS: *Capparimyia savastani,* duration of living, size of the eggs flying period.

*Capparimyia savastani*is a small tephritid fly with typical glossy black thoracic markings and a wing pattern similar to that of the Mediterranean fruit fly *Ceratitis capitata*. The caper fly *C. savastani* is the only species of the genus present outside the Afrotropical Region. The species is widely distributed in several countries of the Mediterranean basin. The first record of *C. savastan* in Greece was made on edible flower buds of wild and cultivated caper plants (*Capparis sp*.) on Milos Island. There was no other observation of the specific insect till now on other plants and there is a gap of knowledge in the biological cycle of this insect. The aim of the present research is to make a first attempt to record information about the biological cycle of the insect. More specifically, on different plant species (*Vitis vinifera, Olea europaea, Ceratonia siliqua, Rosmarinus officinalis*, *Origanum vulgare etc.)* in the region Vouton of Heraklion, Crete, McPhail traps with 2-Aminoacetophenone, a substance that attracts insects were used and the data about the flying period, the life duration in the laboratory and the size of the eggs were recorded.

LONSDALEA QUERCINA SUBSP. *POPULI* SUBSP. NOV. A NEW BACTERIA CANKER ON HYBRID POPLARS IN HUNGARY

A. Koltay[1], **T. Tóth**[2], **T. Lakatos**[2]
[1] *NARIC, Forest Research Institute Hungary, Gödöllő, Hungary*
[2] *NARIC, Fruit Culture Research Institute, Gödöllő, Hungary*

KEYWORDS: Bacteria canker, hybrid poplars, *Lonsdalea quercina, Populi*, subsp.

Different type of hybrid poplars is widely planted in Hungary. A special symptom has been detected in young hybrid poplar stands in the central part of Hungary since 2009. The extent of the disease varies significantly, sometimes reaching 70-80%, but on average it is 10-30%. The bark of the symptomatic trees is vertically cracked, and sticky, white and later brown-coloured foamy mucus bleeds out from the wounds of the stem.

In 2011 we were able to isolate bacterium species, which was abundant in every sample, so presumably the cause of the symptoms. Later, we could induce the special symptoms artificially using this bacterial strain. The bacterium belongs to the species *Lonsdalea quercina* (former names: *Brenneria quercina*, *Erwinia quercina*), but has some special differences compared to *L. quercina*. The *Lonsdalea quercina* subsp. *populi* subsp. nov bacteria, which was identified beyond Hungary only in two countries, China (2006) and Spain (2002), but the origin of bacteria has been unknown until now.

Symptoms were observed on the fields only on 3 hybrid poplar clones (*I-214, Koltay, Pannonia*) in Hungary so far, but we could artificially infect more poplar clones in vivo in a nursery garden.

E-Poster

CHANGE IN THE COMPOSITION OF MONOTERPENES FOR EUROPEAN SPRUCE ATTACKED BARK BEETLES

A.V. Kovalev[1], **P. Mezei**[2], **R. Jakuš**[2], **S.R. Loskutov**[3], **A.A. Aniskina**[3], **T.M. Ovchinnikova**[3], **V.G. Soukhovolsky**[1,3]
[1] *Krasnoyarsk Scientific Center, Russian Academy of Science (Siberian Branch), Krasnoyarsk, Russian Federation*
[2] *Institute of Forest Ecology, Slovak Academy of Sciences, Zvolen, Slovak Republic*
[3] *V. N. Sukachev Institute of Forest, Russian Academy of Science (Siberian Branch), Krasnoyarsk, Russian Federation*

KEYWORDS: Bark beetles, monoterpenes, population outbreak.

During the population outbreak of bark beetles a strong damage of fodder plants takes place. The composition of chemicals in woody tissue is also changing. It is assumed that the bark beetle selects trees for attack and oviposition, focusing on the odor generated by secondary metabolites (monoterpenes). A comparative analysis of the monoterpenes concentration in the mountain forests of the Upper Tatras (Slovakia) at the end of August was used for the *picea abies*, damaged by the European spruce bark beetle (*Ips typographus*). To investigate the chemical composition of the cambial tissue, drill cores of trunks were taken at chest height. A qualitative determination of the component composition of the samples was carried out in a chromatography-mass spectrometer. In the studied samples, the ratio of the resin components (terpenes) was evaluated. The most significant changes were found in group of monoterpenes. To assess the relationship between the composition of monoterpenes and the attractiveness of trees for pests, it is suggested to use the characteristics of the Zipf-Pareto-Mandelbrot rank distribution for describing the concentration and composition of monoterpenes. According to the results of the analysis, the parameters of rank distribution significantly different between pest-attacked trees and control group. It is important to know whether changes in the composition of monoterpenes are an attractive factor for the bark beetles, or whether these changes have occurred due to damage to the tree by a pest. To answer this question, it is necessary to measure the composition of monoterpenes in trees that will be attacked by insects. It is possible that such measurements should be taken on the borders of the population outbreak zone.

REU-FIS: A NEW VOLUNTARY NETWORK ON FOREST INVASIVE SPECIES

F. Lakatos[1], H.N. Inhaizer[1], N. Winkler-Ráthonyi[2], S. Sathyapala[3]

[1] University of Sopron, Faculty of Forestry, Institute of Silviculture and Forest Protection, Sopron, Hungary
[2] FAO, Regional Office for Europe and Central Asia, Budapest, Hungary
[3] FAO, Forestry Department, Rome, Italy

KEYWORDS: Forest ecosystems, international cooperation, invasive species.

Forests in Europe and Central Asia are under increased threats, posed by the movement and spread of invasive species. Combatting them is hampered by lack of information and wider awareness. There is a need for a network or "platform" where scientists, forest managers and policy-makers could share information and experiences, and coordinate activities and programmes on forest invasive species across the region. Goal of the Forest Invasive Species Network for Europe and Central Asia (REUFIS) is to arouse attention to existing tools and structures aimed at combatting forest invasive species, and to exchange knowledge and information on the topic. Aims are in particular:

-Information sharing and awareness raising. The network should allow for sharing best practices, and coordinating activities on forest invasive species, and furthermore for raising awareness on the eradication, control and management of forest invasive species, and also encourage the publication of research results, and early detection and monitoring strategies.

-Facilitate collaboration and cooperation and strengthen national capacities. Possible international and regional organizations partners include the FAO International Plant Protection Convention (IPPC), the European and Mediterranean Plant Protection Organization (EPPO). At national level knowledge might be enhanced on dealing with forest invasive species, managing forest pests, through providing decision-makers with baseline data for informed decisions.

-Support compliance with phytosanitary standards and provide policy advice on movement of forest invasive species.

E-Poster

A FIRST ATTEMPT TO RECORD THE NATIVE PARASITOID ASSEMBLAGE OF *DRYOCOSMUS KURIPHILUS* (HYMENOPTERA, CYNIPIDAE) IN GREECE

G.I. Memtsas[1], **G. Melika**[2], **G.T. Tziros**[3], **D. Petsopoulos**[4], **D.N. Avtzis**[3]

[1] *School of Biology, Faculty of Science, Aristotle University of Thessaloniki, Greece*
[2] *National Food Chain Safety Office, Directorate of Plant Protection, Soil Conservation and Agri-environment, Plant Health and Molecular Biology Laboratory, Budapest, Hungary*
[3] *Laboratory of Forest Entomology, Forest Research Institute, Hellenic Agricultural Organization Demeter, Thessaloniki, Greece*
[4] *School of Forestry and Natural Environment, Faculty of Agriculture, Forestry and Natural Environment, Aristotle University of Thessaloniki, Greece*

KEYWORDS: *Dryocosmus kuriphilus, Gnomoniopsis castanea,* parasitoid assemblage.

The Asian chestnut gall wasp *Dryocosmus kuriphilus* Yasumatsu (Hymenoptera, Cynipidae) is an invasive species in chestnut forests and orchards in many parts of the world. In Greece, it has been recorded for the first time in 2014 in Northern Greece and since then it has been found in at least ten more areas. In this study, in a first attempt to assess the native parasitoid assemblage, galls were collected from chestnut trees with symptoms in seven localities. The level of parasitism was higher in natural stands than in orchards and the parasitoids extracted were identified morphologically revealing the occurrence of five native hymenoptera species, one of which, to our knowledge, is a new record. Moreover, the fungus *Gnomoniopsis castanea* was isolated from galls showing necrosis and was correlated with dead *D. kuriphilus* individuals. Future research will include sampling in more locations as the introduction of this invasive species is in progress. On the other hand, we plan to carry out phylogeographic analyses of the most common parasitoids.

OUTBREAK OF BARK BEETLES IN ODERSKÉ MOUNTAINS (CENTRAL EUROPE) – INFLUENCE OF CHANGING ENVIRONMENT

R. Modlinger[1], **R. Jakuš**[1], **P. Surový**[1]
[1] *Czech University of Life Sciences Prague, Faculty of Forestry and Wood Sciences, Prague, Czech Republic*

Forest stands in the Oderské Mountains have going through the worst crisis in health status since 2003, which resulted in mass breakup of forest stands in this area. Start of this unfavourable development was the windbreak in 2002, which was continued to drought period. After this period was population density of *Ips typographus* increased and the like this was increased the population of *Ips duplicatus*. In the last five years were prepicitation in this area very low and the situation has worsened in the vegetation period 2015, when the meteorological condition had fatal influence to health status of the tree. Situation in Oderské Mountain is moreover complicated the presence of the *Armillaria* sp., which is almost ubiquitous. In the spring 2017 were observed number of anomalous phenomena – mass attack of adults of *I. typographus* for maturation feeding, laying eggs from female after overwintering and the strong attack from *Tetropium castaneum* to staying trees. Management of affected stands is very complicated due to limited efficacy of the classical protected measurement (great attraction of standing trees, presence of *I. duplicatus*). Main aims of the research in the next time are – calibration of the early detection method of the attack from bark beetles using drons and the possibility of the spatial separation affected stands using bariers of anti-antactants.

E-Poster

A FIRST INSIGHT INTO THE PHYLOGEOGRAPHY OF *THAUMETOPOEA WILKINSONI* IN CRETE

D. Petsopoulos[1], G.I. Memtsas[2], R. Leblois[3], L. Sauné[3], K. Ipekdal[4], F.A. Aravanopoulos[1], C. Kerdelhué[3], D.N. Avtzis[5]

[1] *School of Forestry and Natural Environment, Faculty of Agriculture, Forestry and Natural Environment, Aristotle University of Thessaloniki, Greece*

[2] *School of Biology, Faculty of Science, Aristotle University of Thessaloniki, Greece*

[3] *INRA, UMR CBGP (INRA/IRD/CIRAD/Montpellier Supagro), Montferrier sur Lez, France*

[4] *Ahi Evran University, Department of Biology, Bagbasi, Kirsehir, Turkey*

[5] *Laboratory of Forest Entomology, Forest Research Institute, Hellenic Agricultural Organization Demeter, Vassilika, Thessaloniki, Greece*

KEYWORDS: Intraspecific divergence, microsatellites, mtDNA, Thaumetopoea wilkinsoni, pine processionary moth.

The complex of pine processionary moths *Thaumetopoea pityocampa* and *T. wilkinsoni* (Lepidoptera, Notodontidae) includes probably the most damaging needle feeding insects of the Mediterranean region, infesting mainly pine species. Though *T. pityocampa* has been extensively studied, few investigations focused solely on *T. wilkinsoni*. Our study aimed at resolving the phylogeography of *T. wilkinsoni* in the island of Crete. A total of 89 individuals were sampled from seven populations along the horizontal axis of the island. The moths were screened for both nuclear (14 microsatellite loci) and mitochondrial (a 756bp fragment from the COI gene) markers. The results obtained from both markers were congruent, suggesting a clear diversification between west (Chania & Rethimno) and East/Central populations (Lasithi & Hraklion). The convergence between the different markers suggests that the diversification observed is likely due to a geographical barrier, which inhibited gene flow between central/eastern and western populations. This scenario is further supported by the geological history of Crete, which did not have its current configuration, but emerged from the merging of 2-4 "paleo-islands" that likely facilitated the contemporary diversification of *T. wilkinsoni* lineages.

E-Poster

GENETIC PATTERNS IN THE RANGE EXPANSION OF PINE PROCESSIONARY MOTH IN NORTHERN FRANCE

M. Simonato[1], L. Sauné[2], C. Courtin[1], C. Kerdelhué[2], J. Rousselet[1]
[1] *URZFINRA, Orleans Cedex 2, France*
[2] *CBGPINRA, MontferriersurLez, France*

KEYWORDS: Forest pest, population genetics, range expansion.

Several studies have showed how climate change is affecting both distributional range and phenology of numerous insect species. Range expansion of different insect pests can be enhanced by human mediated dispersal with the settlement of new suitable areas far from the native range. In particular, inter- and intra- continental ornamental plant trade seems to play a key role in the dispersal. The pine processionary moth, *Thaumetopoea pityocampa*, is one of the main pest attacking pine forests in southern Europe. This species showed in the last decades a range expansion due to the recent climate changes. The spread of the moth seems to be also enhanced by both accidental human transportation linked to ornamental tree trade, and host tree distribution outside forests. In this study we analyzed the genetic variability of pine processionary moth populations in the front expansion edge as well as in other areas of the native range, using 24 microsatellite loci. The main expansion patterns were outlined in relation to the host plant distribution and other environmental factors.

E-Poster

THE APENNINE AS SOURCE OF HAPLOTYPE DIVERSITY IN THE SPRUCE BARK BEETLE *PITYOGENES CHALCOGRAPHUS*

M. Schebeck[1], B. Einramhof[1], D.N. Avtzis[2], H. Schuler[1], S. Krumböck[1], M. Faccoli[3], A. Battisti[3], C. Stauffer[1], C. Bertheau[4]

[1] *Department of Forest and Soil Sciences, Boku, University of Natural Resources and Life Sciences, Vienna, Austria*
[2] *Forest Research Institute, Hellenic Agricultural Organization Demeter, Vassilika, Thessaloniki, Greece*
[3] *Department of Agronomy, Food, Natural Resources, Animals and the Environment, University of Padua, Italy*
[4] *UMR CNRS-UFC 6249 Chrono-Environnement, Université de Franche Comte, Montbéliard, France*

KEYWORDS: Apennine, phylogeography, pityogenes chalcographus, refugial areas, six-spined spruce bark beetle.

The six-spined spruce bark beetle, *Pityogenes chalcographus*, is a widely distributed spruce pest in Europe. Since the 1970s, *P. chalcographus* has been a study object in European forest entomology as populations revealed unidirectional crossing incompatibilities and morphological differences, separating *P. chalcographus* into a Northeastern and a Central European group. European phylogeographic studies analyzing in total 934 specimens of 44 populations confirmed this hypothesis showing the presence of three major mitochondrial clades with clade III consisting of four subgroups. Clade II and the subclades IIIb and IIIc were predominately found in the Apennine region.

Here, the genetic structure based on a part of the mitochondrial COI gene of 96 individuals from the Apennine and 96 individuals from Central Europe was re-investigated. In this analysis, clade IIIc with five haplotypes was confirmed to be detected only in the Apennines whereas clade IIIb with eight haplotypes and clade II with one haplotype were also found in Central Europe. Thus, we confirm the hypothesis that the Apennine was an important glacial refugial area where *P. chalcographus* survived unfavorable conditions on its host tree *Picea abies*.

E-Poster

DENDROCTONUS MICANS (KUGELANN, 1794) ON NON-NATIVE SPRUCES IN SLOVAKIA

J. Vakula[1], A. Gubka[1], J. Galko[1], A. Kunca[1], M. Zúbrik[1], S. Rell[1], C. Nikolov[1]
[1] *National Forest Centre, Forest Protection Service, Banská Štiavnica, Slovakia*

KEYWORDS: Bark beetle, greening, pest, Picea orientalis.

In 2015, we recorded the first attack of the great spruce bark beetle *Dendroctonus micans* on non-native *Picea orientalis* and *Picea pungens* in Slovakia. Totally 204 trees of 10 species were observed in order to determine the infestations of *D. micans*. To our knowledge this is the first published work on infestation of *D. micans* on non-native spruce species in Slovakia and the first recorded attacks on *P. orientalis* in Central Europe. Infested trees were discovered and determined in urban areas. We found that *D. micans* preferred *P. orientalis* over *P. pungens* and other coniferous trees. In Slovakia, natural occurrence of *D. micans* on *Picea abies* is concentrated in spruce stands at higher elevations. From 2 infested *P. orientalis* and 1 infested *P. pungens*, 352 adults of *D. micans* (average 40 beetles/1 m2 bark) and 22 adults of *Tetropium fuscum* (F.) emerged. From predators, 17 adults of *Thanasimus formicarius* L., 1 *Rhizophagus grandis* Gyllenhal, and 9 *Phaeostigma notata* F. were recorded. From parasitoids, 20 adults of Ichneumonoidea and 21 adults of Chalcidoidea were recorded. Ichneumonoidea were emerging from *P. orientalis* and Chalcidoidea were emerging from *P. pungens*. The results showed that the abundance of natural enemies was at low levels.

E-Poster

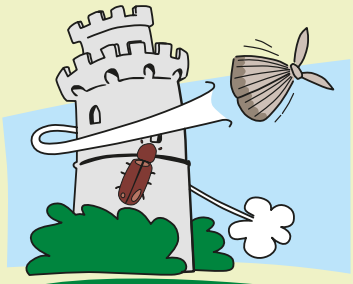
OCCURENCE OF THE PATHOGEN *LARSSONIELLA DUPLICATI* IN THE INDIGENOUS AND NEW OUTBREAK AREAS OF *IPS DUPLICATUS* IN EUROPE

H. Vanická[1], K. Lukášová[1], S. Zimová[1], Å. Lindelöw[2], M. Kacprzyk[3], M.L. Duduman[3], J. Holuša[1]
[1] *Czech University of Life Sciences Prague, Czech Republic*
[2] *Swedish University of Agricultural Sciences, SLU Fakturamottagning, Uppsala, Sweden*
[3] *University of Agriculture in Krakow, Poland*
[4] *Stefan cel Mare, University of Suaceava, Romania*

KEYWORDS: Distribution, *Ips duplicatus, Larssoniella duplicati*, microsporidia, pheromone traps.

The microsporidium, *Larssoniella duplicati* is specific for the double-spined spruce bark beetle *Ips duplicatus* (Coleoptera, Curculionidae, Scolytinae). The microsporidium that infects the midgut muscularis, the Malpighian tubules, and the ovaries of adult *I. duplicatus,* was detected at localities in Sweden, Poland, Czech Republic and Romania and the data were compared. Average infection level of this pathogen was 16 %. Infection levels among groups of localities from these countries were not statistically significant. The infection level of *L. duplicati* did not differ between males and females. The relatively stable infection of *L. duplicati* suggests that the pathogen is chronic.

Index



Forest Insects and Pathogens in a Changing Environment: Ecology, Monitoring & Genetics

Joint Meeting of IUFRO WPs

7.03.05 "Ecology and management of bark and wood boring insects"
7.03.10 "Methodology of forest insect and disease survey"

11-15 SEPTEMBER 2017
THESSALONIKI • GREECE

TECHNICAL CHAMBER OF GREECE /
SECTION OF CENTRAL MACEDONIA

WWW.IUFROGREECE2017.COM
#IUFROGREECE2017

A

B

C

D

E

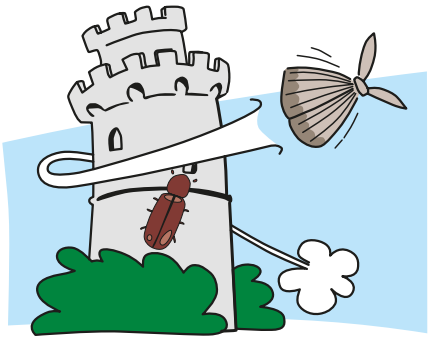
F

G

W

Y

Z



ARTION
conferences & events

www.artion.com.gr

Professional Congress Organiser
for Joint Meeting of IUFRO's 7.03.05 & 7.03.10
E. iufro@artion.com.gr
T. +30 2310 257804 (direct line), +30 2310 272275