

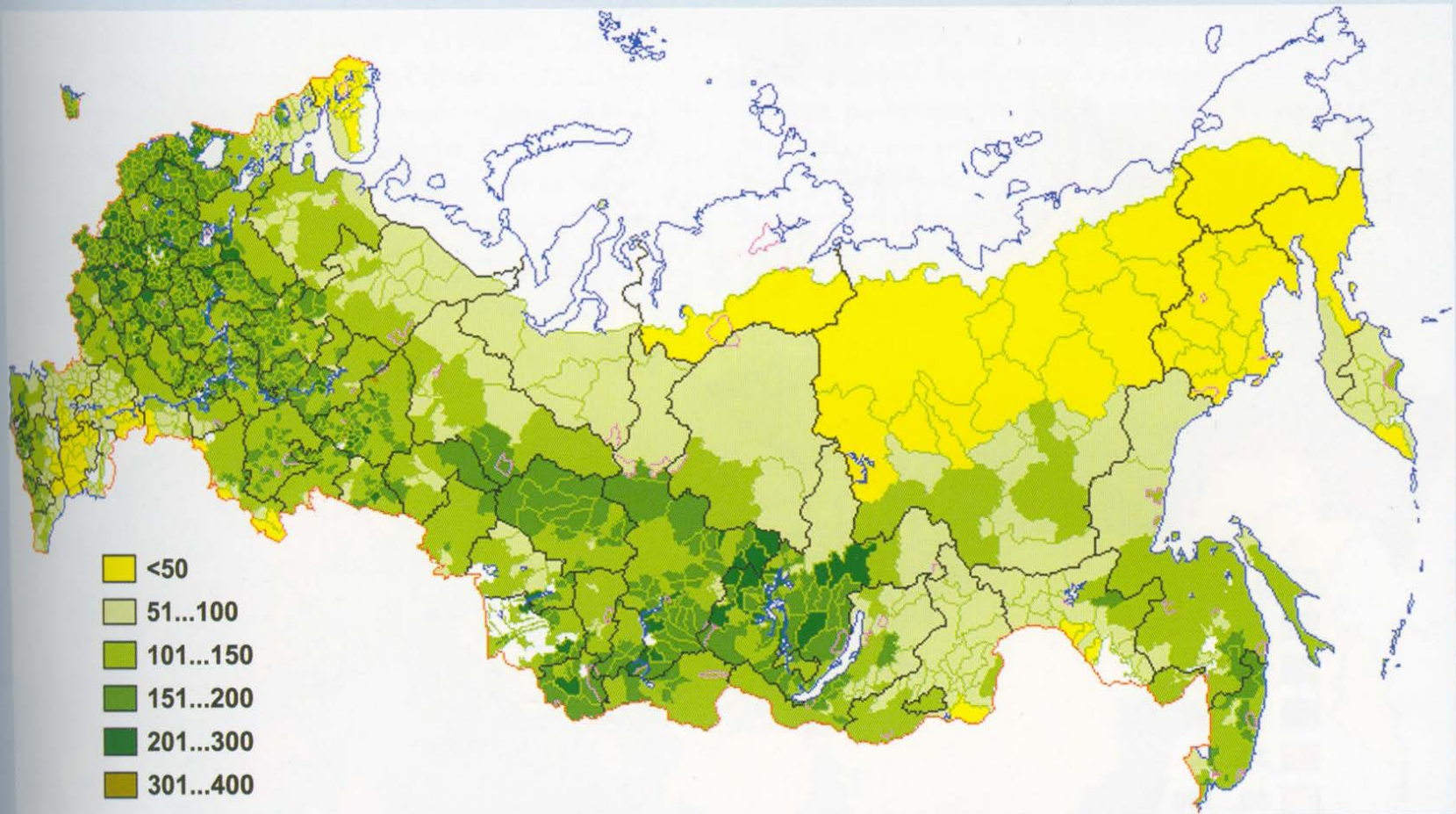
Recent Research on Quarantine Forest Pests in Russia

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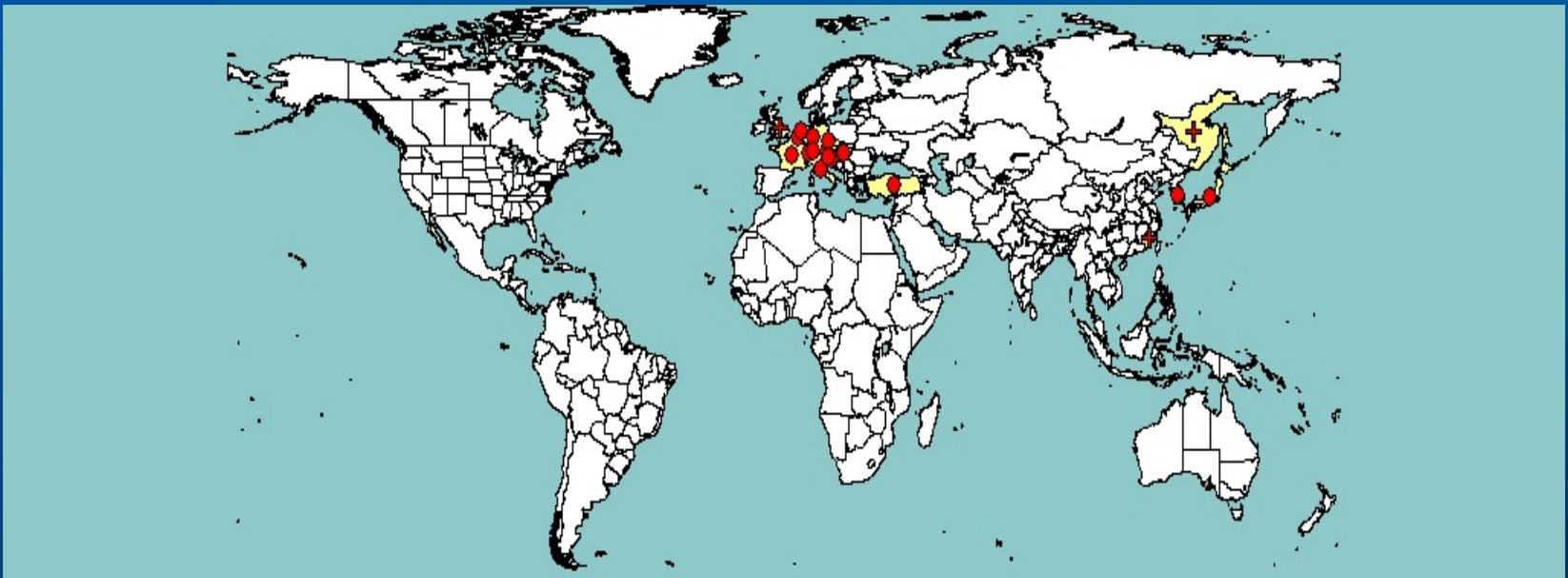
THE WOOD RESERVE IN RUSSIAN AREA (M³ / HECTARE)



About 20 species of forest pests were introduced in Russia for last 15 years.

The Box Tree Moth, *Cydalima perspectalis*

In 2006, the Box Tree Moth *Cydalima perspectalis* was first detected in Germany. Since then, the pest has been spreading throughout Europe. Currently, it is known to occur in Germany, France, Switzerland, Great Britain, Belgium, Austria, Italy, Hungary, Slovenia, Turkey and Georgia.



The Box Tree Moth, *Cydalima perspectalis*



- The pest was introduced into Russian Sochi area with circular-shaped European box, *Buxus sempervirens* L. from Italy in 2012. On September 22, 2012, larvae of the moth were first detected on the European box in a nursery used for temporary storage of plants for planting intended for landscape gardening in the main Olympic Village.

- 3rd generation of *Cydalima perspectalis* (Sochi, 22.10.2013 г.)

The Box Tree Moth, *Cydalima perspectalis*



- European box affected by the box tree moth (Sochi)

By the time of detection, the larvae had already significantly damaged several Buxus plants. The infested plants were treated with “Aktellik”. The treatment did not eliminate all the larvae which lead to further spread of *Cydalima perspectalis* onto urban plantings.

The Box Tree Moth, *Cydalima perspectalis*



Initial observations in Sochi region show that the pest produces 2-4 generations per year.

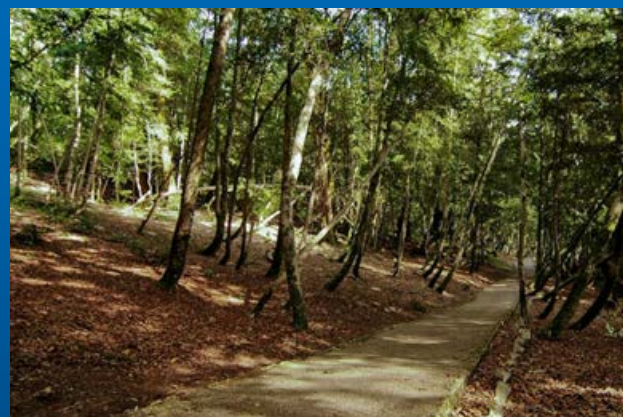
- *Cydalima perspectalis* , 3rd larva stage



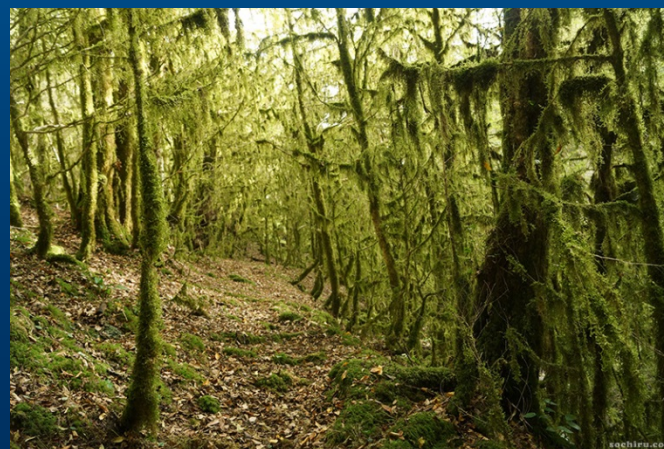
- Defoliation of *Buxus colchica* caused by *Cylindrocladum buxicola*. Guamskoe Valley rocks
- (October, 2013)

- In the Black Sea coastal region of the Caucasus, the moth may pose a serious threat to natural relic forest stands of *Buxus colchica*.

The Box Tree Moth, *Cydalima perspectalis*



Yew and boxwood
grove, Sochi (*Buxus
colchica*), 2015



WELCOME TO SOCHI



From 2007-2011, the following species were recorded in the Krasnodar Territory, the most southern region of Russia:

Gall midge, *Obolodiplosis robiniae*;

East Asian elm sawfly, *Aproceros leucopoda*;

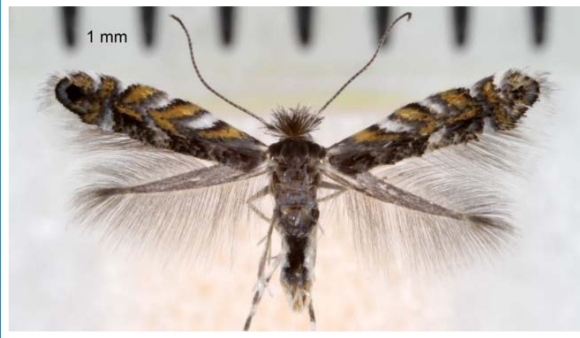
Locust digitate leaf miner, *Parectopa robinella*;

Locust leaf miner, *Phyllonorycter robiniella*.

Latid planthopper, *Metcalfa pruinosa*;



East Asian elm sawfly *Aproceros leucopoda* Takeuchi, 1939



Phyllonorycter robinella (Clemens, 1859) and *Parectopa robinella* Clemens, 1863



Gall midge *Obolodiplosis robiniae* (Haldeman, 1847);

Aproceros leucopoda (Takeuchi, 1939)



The most important of these introductions affects *Ulmus pumila* plantations where outbreak populations of the East Asian elm sawfly, *Aproceros leucopoda* (Takeuchi) has caused extensive defoliation of forest shelter belts along highways and railroads leading to the southern portions of European Russia.



Aproceros leucopoda (Takeuchi, 1939)



• Tree defoliation of *Ulmus pumila* along the federal highways and railroads leading to southern Russian



The flatid planthopper, *Metcalfa pruinosa* (Say, 1830)



The flatid planthopper, *Metcalfa pruinosa* (Say) is a widespread pest in both South and North America. It was first recorded in Russia the Krasnodar Territory in 2009. The first reported outbreaks of this insect were in forest plantations in 2010.



The flatid planthopper, *Metcalfa pruinosa* (Say)



From 2010 through 2011 the north-south infested range of this insect expanded in the Krasnodar Territory about 150 km and east to west over 10 km. This polyphagous species causes injury on many woody and herbaceous plants including: vines, bastard acacias, apple trees, elms, willows and corn. In southern cities within the Krasnodar Territory it was recorded on ash, maple, blackberry, cherry plum, vines and roses.

Rhynchophorus ferrugineus

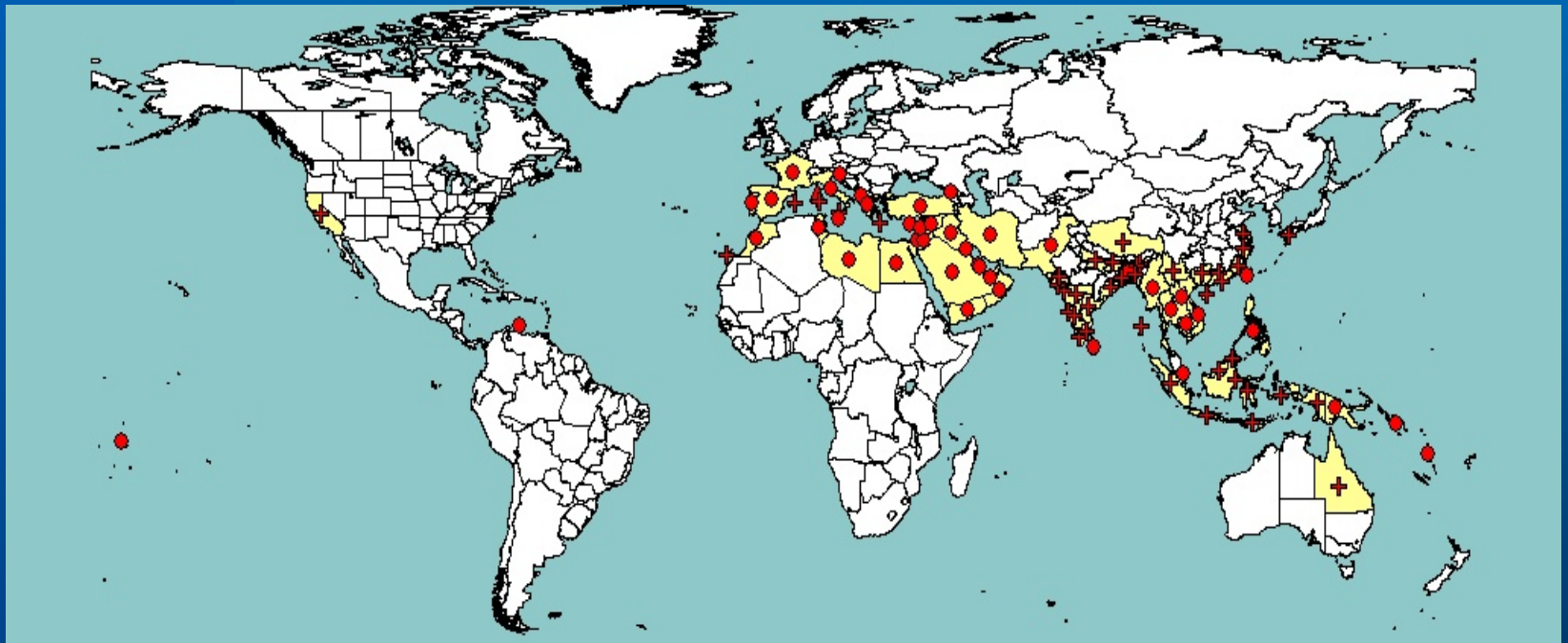
Sochi



Red palm weevil



Rhynchophorus ferrugineus



Rhynchophorus ferrugineus

Portugal, Estoril (2014)

Russia, Sochi





- Two species in particular are considered important forests pests and include a bark-beetle, *Polygraphus proximus* and a wood borer, Emerald ash borer, *Agrilus planipennis*.

Polygraphus proximus Blandford

- The native distribution of *Polygraphus proximus* (Blandford) is the Russian Far East. Recently significant damage caused by this forest pest on *Abies balsamea* has been observed in Krasnoyarsk Territory. However, damage caused by this bark beetle species has also been recorded in other Russia regions as well.



Polygraphus proximus Blandford: *new
invasive species*

- **Distribution:**

- Southern part of the Russian Far East,

- Japan and North China.

-

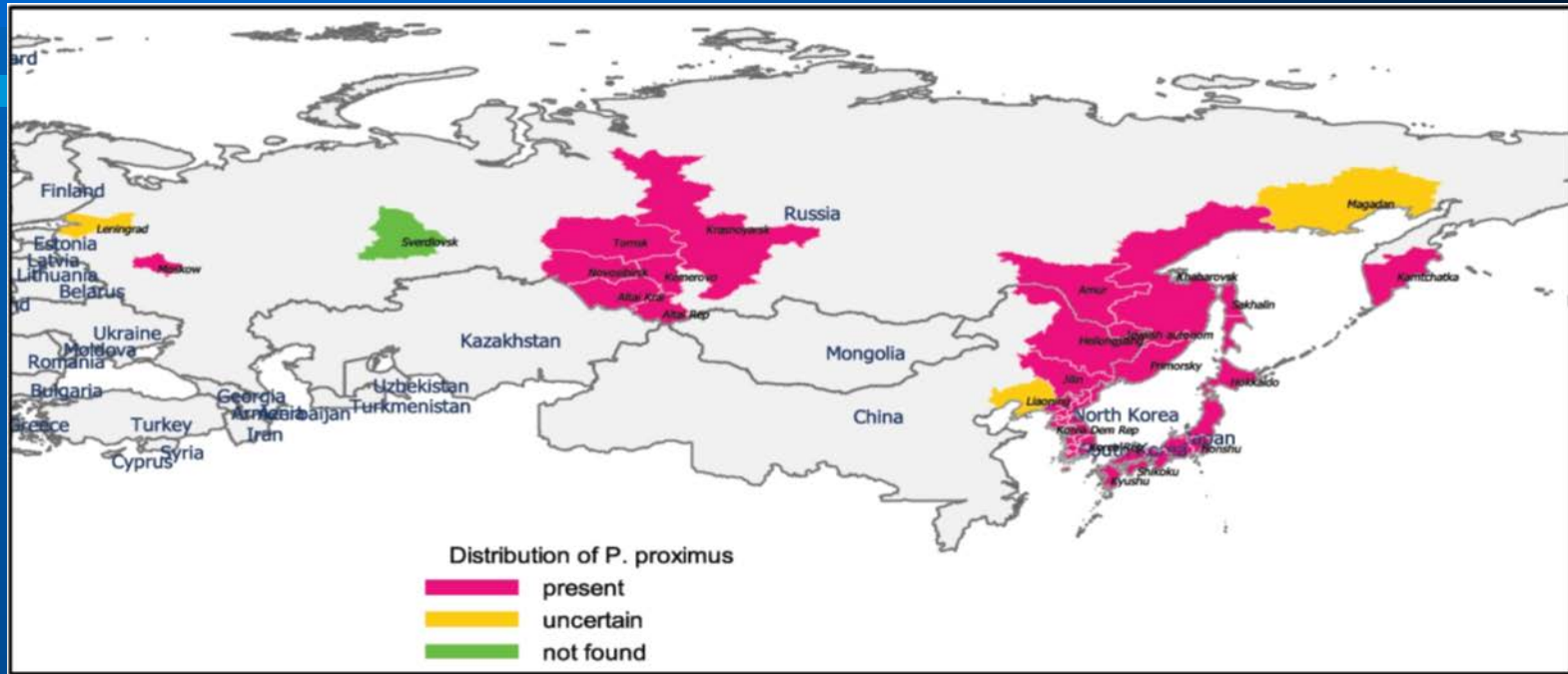
- **Host plants:**

-

- *Abies* and other conifers,

- including *Pinus koraiensis*

Polygraphus proximus: new invasive species



Distribution of *P. proximus* in Russia
(EPPO)

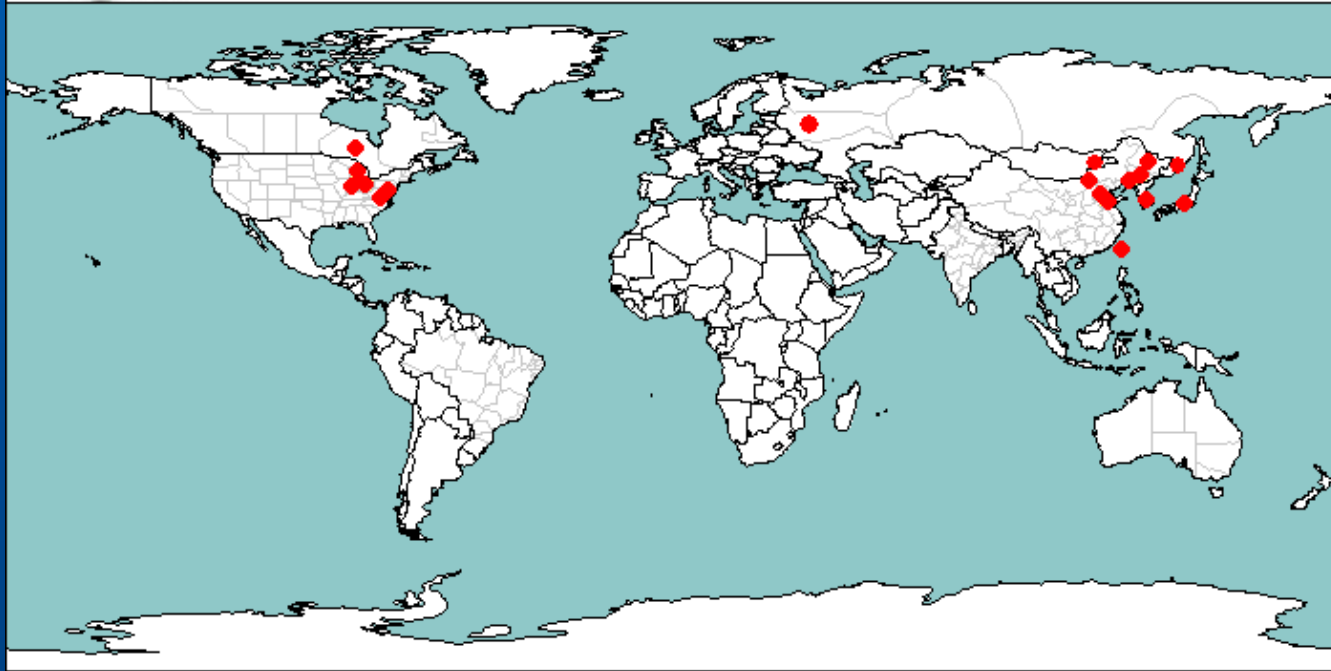
Polygraphus proximus

It entered European Russia where it intensively attacks *Abies sibirica*, *A. balsamea*, *Picea abies* in European Russia (Moscow region) and *A. sibirica* in Central Siberia (Krasnoyarsk Territory)



Emerald Ash Borer *Agrilus planipennis*: Geographical distribution (EPPO)

Карта распространения *Agrilus planipennis*
(по ЕОЗР, 2006, с изменениями и дополнениями)

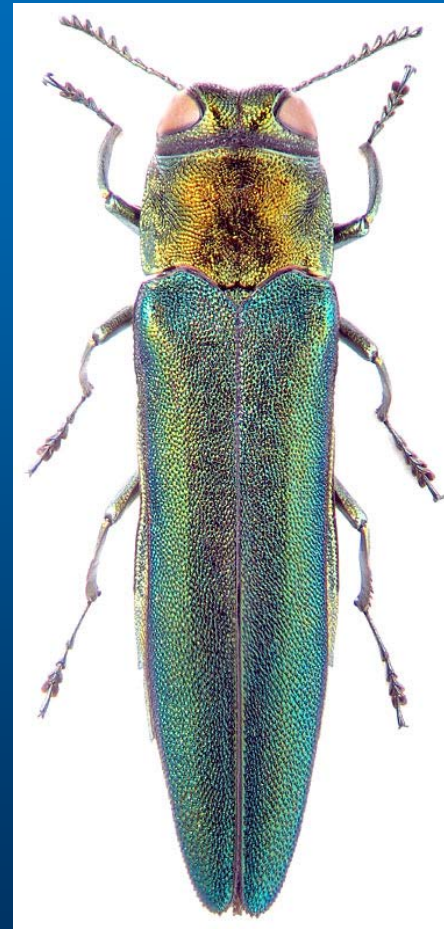


Emerald Ash Borer *Agrilus planipennis*

- **Geographical distribution:**
-
- **Asia:** North-eastern China, Japan, the Republic of Korea, Mongolia, Russia (Far East) and Taiwan
- **Russia** (Russian Far East, introduced to Moscow area)
- **North America:** Introduced to Canada and the USA

Emerald Ash Borer (EAB) *Agrilus planipennis* Fairmaire

- This species is supposed to have been introduced to Moscow area from China with packing material.



Emerald ash borer *Agrilus planipennis*



EAB's preferred
▪ hosts are North
American species of
Fraxinus which are
frequently included
in city gardening
design projects.



Emerald Ash Borer *Agrilus planipennis*

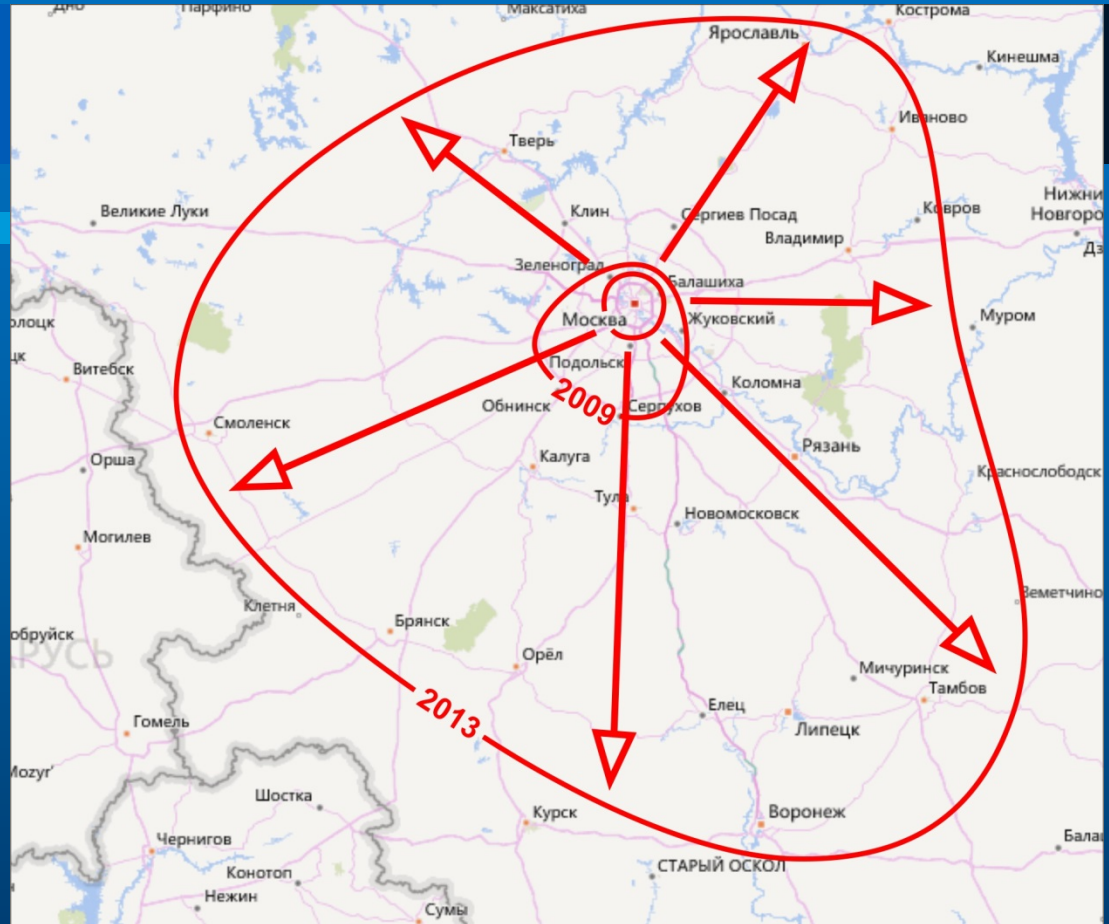


- EAB attacks only *Fraxinus pennsylvanica*, *F. americana* and *F. excelsior* ash trees in the parks and forest belt along roads and railways in Moscow region.

Emerald Ash Borer *Agrilus planipennis*

Areas of possible
spread of the EAB
in Russia (in
yellow).

Outbreak (in red).
Natural spread (in
green).



The Pine Wood Nematode

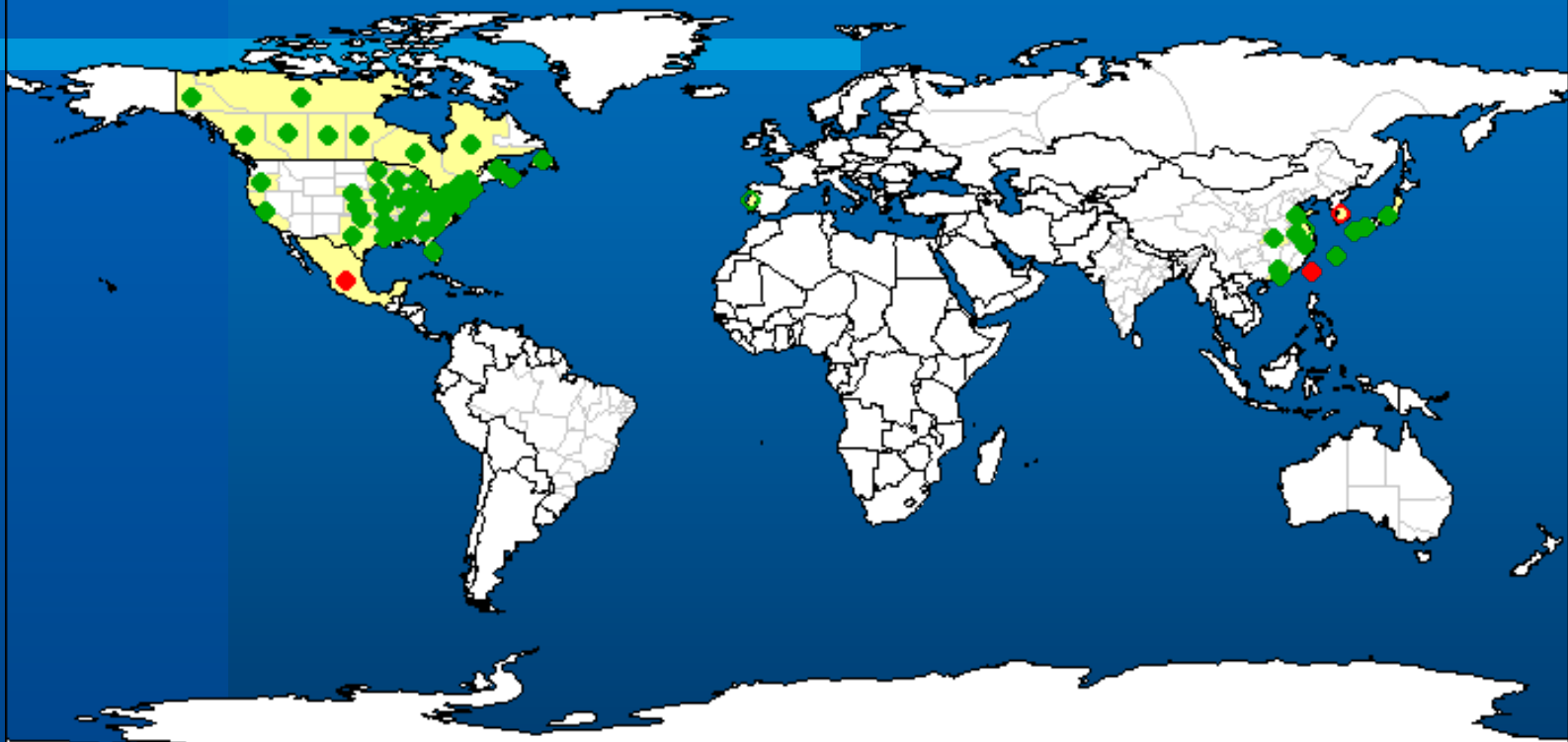


- Pine wilt disease (PWD), caused by the pinewood nematode (PWN) *Bursaphelenchus xylophilus*, has severely damaged susceptible conifers in Asian and European forests.

- If the PWN were introduced into the country, and became widespread there, it is estimated that annual costs could range from 1.3 to 3.7 billion US dollars a year. Similar damage will also be true for Europe in the case of PWN spread and lack of control.



Bursaphelenchus xylophilus



National record



Present



Present only in some areas

Subnational record



Present



Present only in some areas



Places of survey (2010-2015) and founding of *Bursaphelenchus mucronatus* in Russia



Main goal

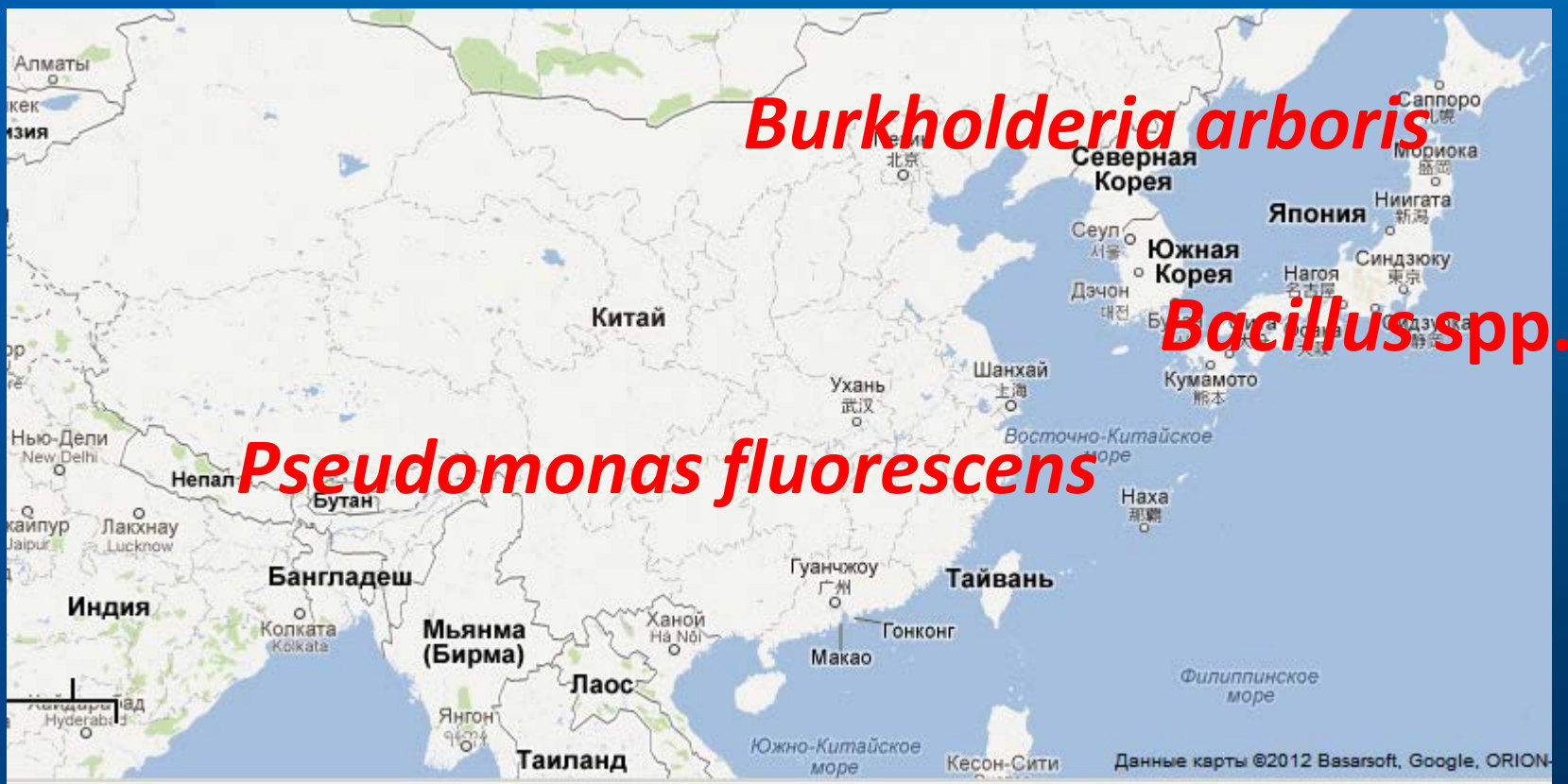
- What factors affect to pathogenicity of *B. xylophilus* and *B. mucronatus* and
- can *B. mucronatus* populations induce pine wilt disease, such as occurs for *B. xylophilus*?

Main goal

- What factors affect to pathogenicity of *B.xylophilus* and *B. mucronatus* and can *B.mucronatus* populations induce pine wilt disease, i.e. as occurs for *B.xylophilus*?
- The most likely factors affecting *B.xylophilus* pathogenicity include: biological characters of the nematode species, and host plant and climate.

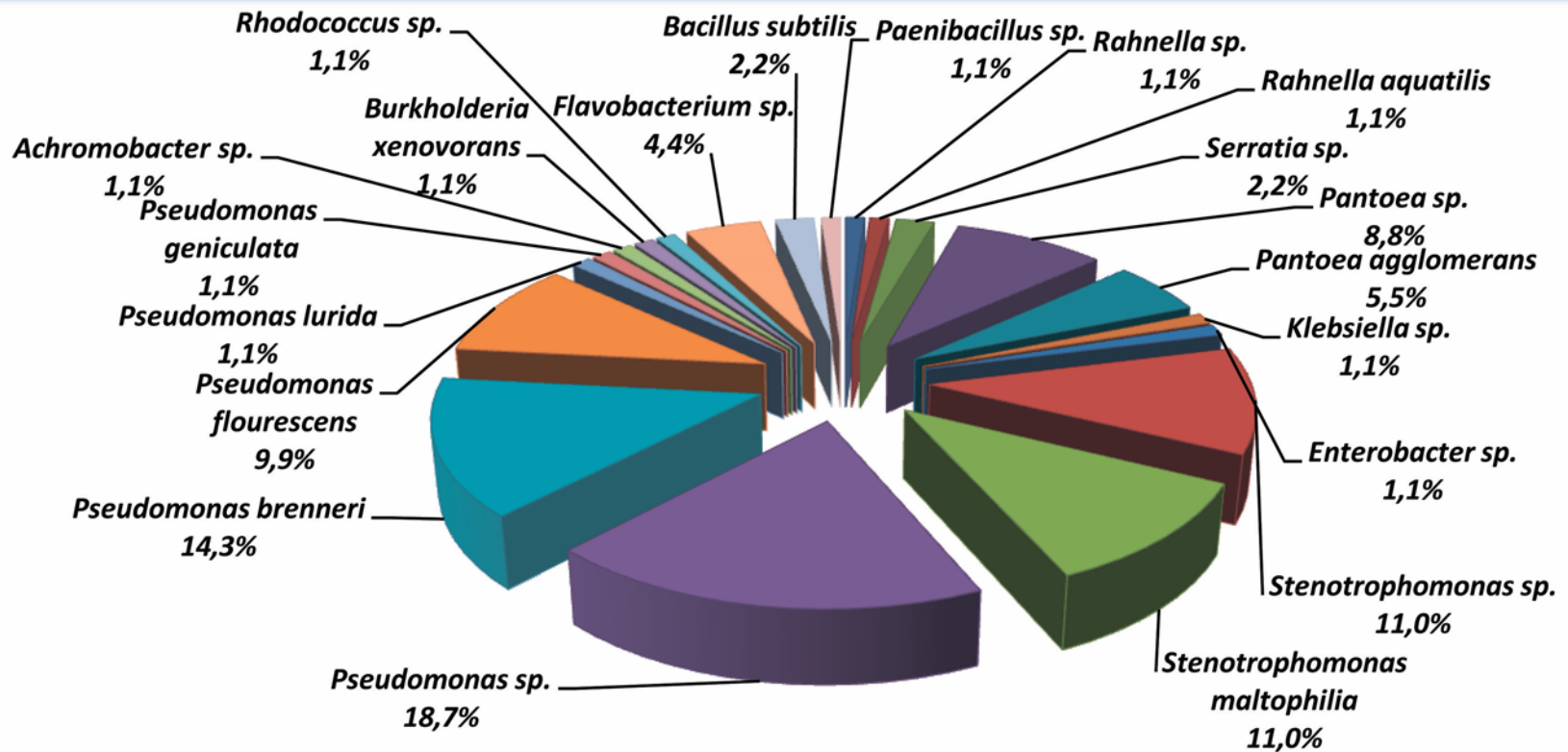
- **Recent research (2000-2010) that has been done in China and South Korea showed that the Pine Wilt Disease of conifers are induced by complex of pathogenic bacteria and the PWN that the nematode carries (Zhao et al., 2009; Kwon et al., 2010; Wu et al. 2013 and others).**

Бактерии-доминанты в проявлениях вилта в регионах мира



Twenty species of bacteria belonging to nine families and 9 genus were isolated from the nematodes and identified

Bacteria associated with wood-inhabiting *Bursaphelenchus mucronatus* nematodes



Бактерии-симбионты нематод *Bursaphelenchus mucronatus*

Bacteria associated with wood-inhabiting *Bursaphelenchus mucronatus* nematodes

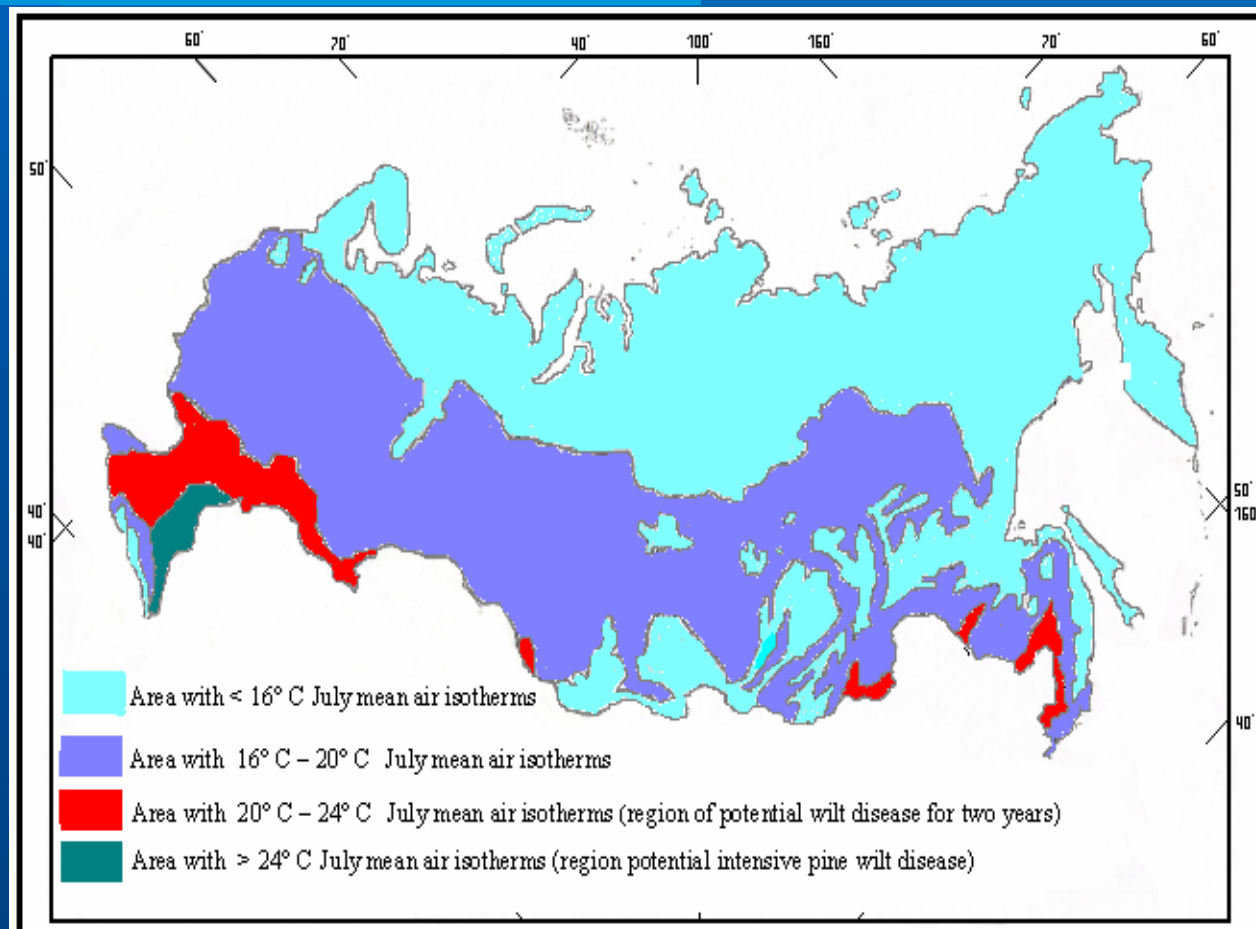
- **Twenty species of bacteria belonging to nine families** *Enterobacteriaceae*, *Xanthomonadaceae*, *Pseudomonadaceae*, *Burkholderiaceae*, *Rhizobiaceae*, *Nocardiaceae*, *Flavobacteriaceae*, *Bacillaceae*, *Raenibacillaceae* were isolated from the nematodes and identified.
- Из 24 изолятов нематод *B. mucronatus* выделено 20 видов бактерий относящихся к 5 классам и 9 семействам.
- Наиболее часто встречались бактерии рода *Pseudomonas* (44%). Идентифицировано 5 видов бактерий этого рода.

Associated bacteria were studied in the **dauerlarva stage** of *B. mucronatus* nematodes isolated from the longhorn beetle *Monochamus urussovi* Fisch. Here too *Pseudomonas fluorescens* species were extracted from this larva stage of *B. mucronatus* .

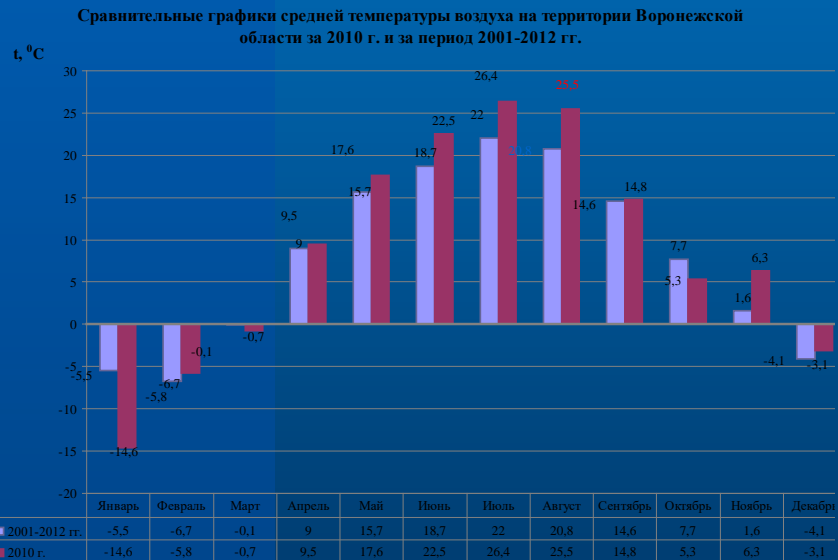


На значительной части территории средняя июльская температура составляет 20 C и выше.

There are large areas within Russia where the mean July temperature higher exceeds 20 C.



Thus, we can make an assumption that in 2010, *B.mucronatus* nematodes and symbiotic bacteria of *P. fluorescens* caused the death of some pine forests in areas where the mean air temperature in European Russia was 26.4 C in June and 25.5C in August.



WOOD PACKAGING MATERIALS AS A SOURCE OF HARMFUL PEST INTRODUCTION

Informational and educational film

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VNIKR.RU

