4th Conference organized by the Sino-France Joint Laboratory for Invasive Forest Pests in Eurasia (IFOPE)

Planning of the 2023 IFOPE Events

Dr. Juan SHI

18th Jan 2023, BFU

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1. Joint Research Program and Capacity Building
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1. Joint Research Program and Capacity Building

➢1.1 Inter-governmental project under the National Key Research and Development Plan of the 14th Five-Year Plan

Study on ecological adaptability, early monitoring, warning and control technology of forestry alien invasive species in Sino-France Eurasia.

“政府间国际科技创新合作”重点专项
2022 年度第一批项目申报指南

1.2 中国和法国联合实验室合作项目

合作协议：《中华人民共和国政府和法兰西共和国政府间科技合作协定》《中法第十四届科技合作联委会会议纪要》。

领域方向：卫生健康、农业、人工智能、先进材料、环境（包括气候变化）、空间、粒子物理等领域。

拟支持项目数：不超过 10 个。

共拟支持经费：4000 万元人民币。

其他要求：

（1）该项目面向 2021 年 1 月 1 日前已建立的中法联合实验室。

（2）项目实施周期一般为 3 年。

（3）申报单位应提供法方政府部门（如法国国家科研中心、法国农业食品与环境研究院、法国驻华使馆等）对该联合实验室合作已给予经费、项目、实物等物质支持的正式文件（需包括双方合作机构、联合实验室名称、法方政府部门对联合实验室合作提供的支持措施及联系人信息，文件模板下载链接：https://service.most.gov.cn/kjjh_tztg_all/zn/20211020.html）。此文件仅为项目申报材料，最终能否立项须待评审后确定。

（4）申报时应填写并提交中法联合实验室未来 3 年合作方案（下载链接：https://service.most.gov.cn/kjjh_tztg_all/zn/20211020.html），并提供双方实验室依托单位签署的关于共建联合实验室合作协议（协议签署日期须早于 2021 年 1 月 1 日）。合作各方对未来知识产权归属和成果转化收益归属有明确约定或意向性约定，且符合我国法律法规中相关条款（须附知识产权协议或意向性协议、备忘录、证明信或在中外合作协议中明确知识产权相关条款）。

（5）法方合作单位应为在法国注册 3 年以上的科研院所或高校，具有独立法人资格，运行管理规范，是本领域掌握相关优势资源的机构，具有较强的科技研发能力和条件，同中方项目申报单位有长期稳定合作基础。

Cooperation Agreement on Sino-France Joint Laboratory

Cooperation Project: Agreement on Science and Technology Cooperation between the Government of the People's Republic of China and the Government of the French Republic, and Minutes of the 14th Session of the Sino-France Joint Committee on Science and Technology Cooperation.

Fields: Health, agriculture, artificial intelligence, advanced materials, environment (including climate change), space, particle physics, etc.

Number of projects to be supported: no more than 10.

Total proposed support funds: 40 million RMB yuan.

Other requirements:

(1) The project is open to Sino-French joint laboratories established before January 1, 2021.

(2) The project implementation cycle is generally 3 years.

(3) The applicant should provide official documents of the funds, projects and material support provided to the joint.


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1. Joint Research Program and Capacity Building

- **1.1 Inter-governmental project under the National Key Research and Development Plan of the 14th Five-Year Plan**

  Study on ecological adaptability, early monitoring, warning and control technology of forestry alien invasive species in Sino-France Eurasia.

- **1.2 Joint application for EU Projects and project funding for joint international laboratories by Ministry of Technology and Ministry of Education of China, as well as National Natural Science Foundation of China**

1. Joint Research Program and Capicity Building

➢ 1.3 Disciplinary Innovation Talent Introduction Program for Higher Education Institutions

Innovation and intelligent introduction base on early monitoring, risk assessment, invasion tracing and ecological control technologies for forest invasive species

- The project relies on the **IFOPE**, and the Key Laboratory of Forest Cultivation and Protection of the Ministry of Education, and the Beijing Key Laboratory of Forest Pest Control.
- There are 10 personnel with senior professional titles and 3 domestic personnel with intermediate professional titles, including 6 invited personnel from the French side.

1. Joint Research Program and Capacity Building

➢ Disciplinary Innovation Talent Introduction Program for Higher Education Institutions

Topic	Plan Task Contents
Invasion potential assessment and risk assessment	Establishment of Sino-French "Sentinel Tree"
	Invasion potential assessment
	Global database of invasive alien species information
Early monitoring	Pheromone trapping
	Remote sensing monitoring
	Coupled remote monitoring and early warning
Rapid detection and tracing of invasive species	Rapid detection and traceability
	Ecological adaptability analysis
Ecological regulation technology	Integration of emergency prevention and control technologies
	Ecological regulation and restoration technology
	Joint prevention and control throughout the whole process

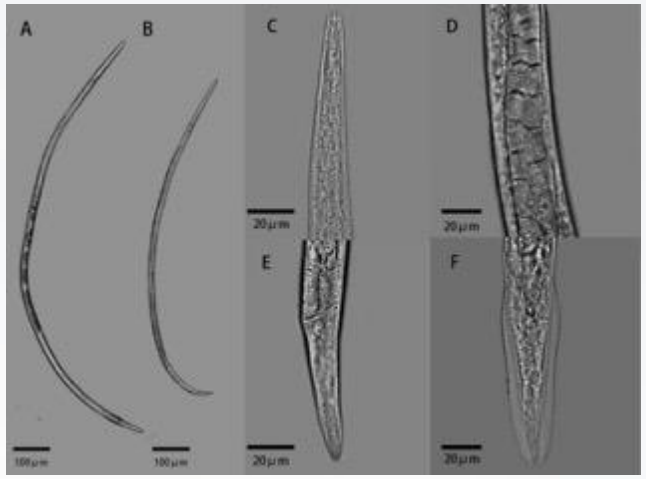
2. Joint Research Works

- **Experiment on Multi-effect Longhorned Beetle Attractant Trapping .**
- **Experiments on the control of *Sirex* spp. by nematode *Deladenus* spp.**
- **Experiments on the population diversity of *Hylurgus ligniperda* .**

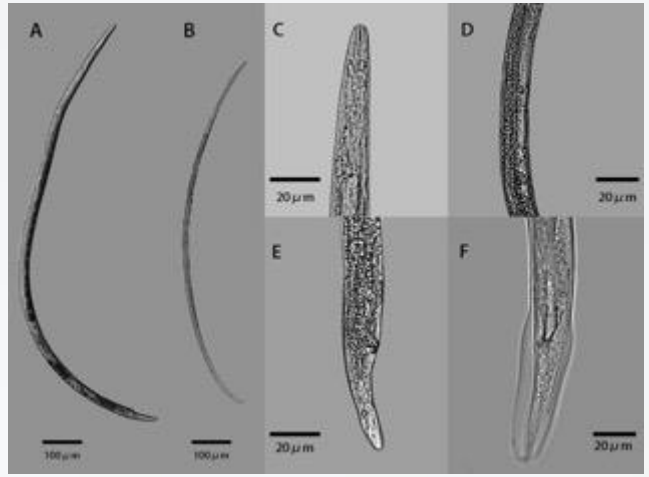
Two *Deladenus* species isolated from *Sirex noctilio* in China

We collected and dissected *Sirex noctilio* in three provinces where *S.noctilio* distributed in Inner Mongolia, Heilongjiang and Jilin. Then we identified the nematode isolated from *S. noctilio* by means of morphology and molecular biology

There are Two *Deladenus* species isolated from these region: *D. siricidicola*, the classic biological control agent of *S.noctilio* on a global scale, and *D. nitobei*, a nematode species found to have parasitic ability on *S. noctilio* for the first time.

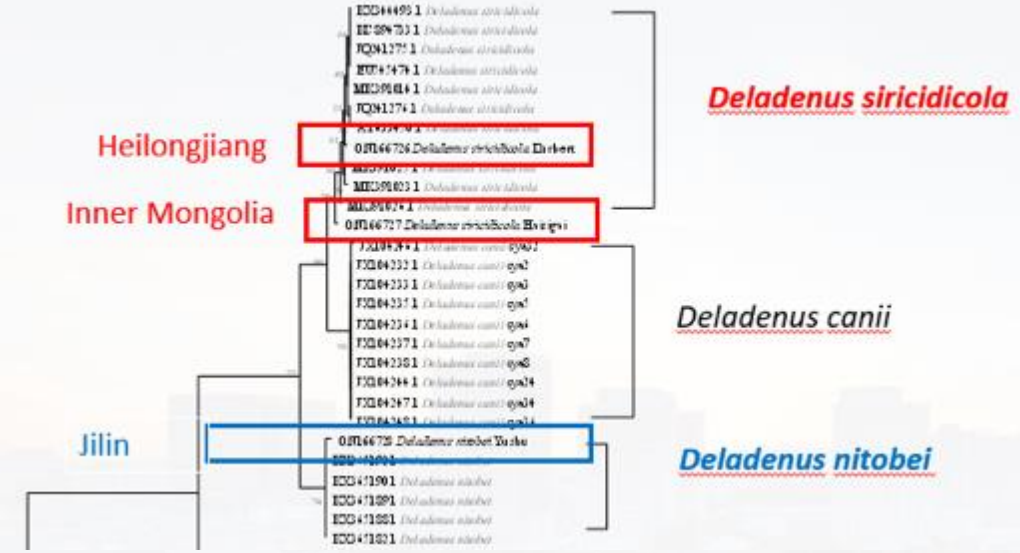


Deladenus siricidicola n. sp



Deladenus nitobei n. sp

Note： A. Female; B. Male; C. Head region; D. Ovary; E. Vulval; F. Spicules



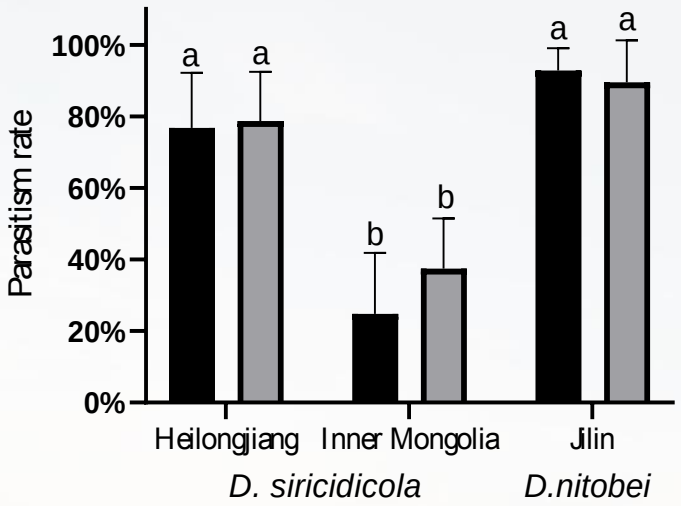
Molecular phylogenetic analysis of the mtCOI gene region sequence of parasitic nematodes in *S. noctilio*

Two *Deladenus* species isolated from *Sirex noctilio* in China

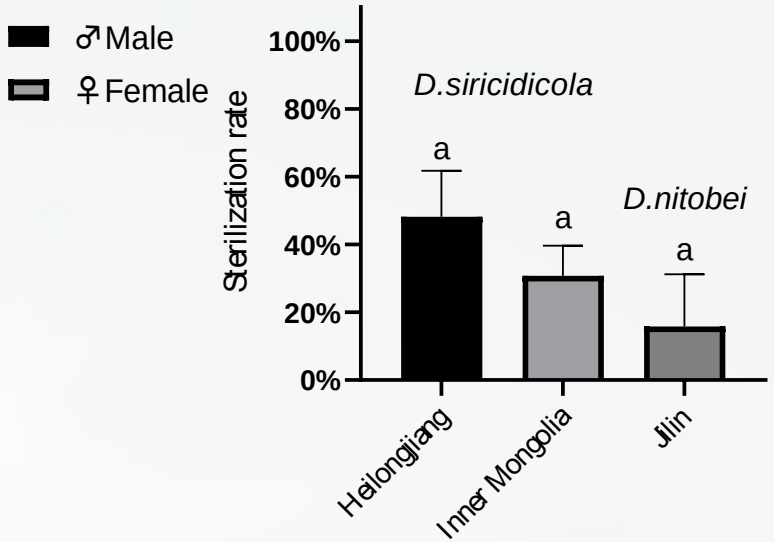
In the investigation, both nematodes species were found to have parasitic ability and showed sterilization effect on *S. noctilio*.

Based on the stronger parasitic ability of *D. nitobei*, its sterilization ability is not significantly different from that of *D. siricidicola*.

We believe that *D. nitobei* can be used as a biological control agent for *S. noctilio*. And it can work with *D. siricidicola* to control *S. noctilio*.



Parasitic rate of nematode to *S.noctilio*



Sterilization rate of nematode to *S. noctilio* female

D. nitobei that destroyed egg of *S.noctilio*

Two *Deladenus* species isolated from *Sirex noctilio* in China

Due to the unsatisfactory performance of the culture scheme based on potato glucose agar medium(PDA) and *Amylostereum areolatum* in cultivating nematodes, a new cultivation scheme based on *Pinus sylvestris* var. *mongolica* powder and some essential nutrients, such as biotin and cholesterol was developed and applied to the cultivation of nematodes.

We found that this new wood flour culture medium could make nematodes parasitized in *S. noctilio* show stronger reproductive ability.

Reproduction of *D.nitobei* on PDA

Reproduction of *D.nitobei* on the new culture medium

3. Joint Publication

We have jointly published more than 20 papers on the aspect of invasive species.

- Including 《Annual Review of Entomology》.

Sun X., Tao J., Roques A., Luo Y. Invasion History of *Sirex noctilio* Based on *COI* Sequence: The First Six Years in China. Insects, 2020, 11(2): 111.

Wang Y., Harrison R.L., Shi J. Effects of Rearing Density on Developmental Traits of Two Different Biotypes of the Gypsy Moth, *Lymantria Dispar* L., from China and the USA. Insects, 2021, 12(2): 175.

Roques A., Shi J., Auger-Rozenberg M.A., Ren L., Augustin S., Luo Y. Are Invasive Patterns of Non-native Insects Related to Woody Plants Differing Between Europe and China? Frontiers in Forests and Global Change, 2020, 2: 91.

Melody A. Keena, and Juan Shi. Effects of Temperature on First Instar Lymantria (Lepidoptera: Erebidae) Survival and Development With and Without Food. Environmental Entomology, 48(3), 2019, 655 ~ 666.

Zuo Y., Kurenshchikov D.K., Yu J., Zou Y., Wang Y., Wang Y., Shi J. Microsatellite and morphological analyses reveal unexpected diversity in Lymantria dispar in China. Forests, 2019, 10(12): 1100.

Gao C., Ren L., Wang M., Wang Z., Fu N., Wang H., Wang X., Ao T., Du W., Zheng Z., Li H., Shi. Proteo-Transcriptomic Characterization of *Sirex nitobei*(Hymenoptera: Siricidae) Venom. Toxins, 2021, 13(8): 562.

Wang M., Fu N., Gao C., Wang L., Ren L., Luo Y. Multilocus Genotyping and Intergenic Spacer Single Nucleotide Polymorphisms of *Amylostereumareolatum* (Russulales: Amylostereaceae) Symbionts of Native and Non-Native *Sirex* Species[J]. Journal of Fungi, 2021, 7(12): 1065.

Gao T., Shi J. The Potential Global Distribution of *Sirex juvencus* (Hymenoptera: Siricidae) under Near Current and Future Climatic Conditions as Predicted by the Maximum Entropy Model. Insects, 2021, 12(3): 222.

Gao T., Xu Q., Liu Y., Zhao J., Shi J. Predicting the Potential Geographic Distribution of *Sirex nitobei* in China under Climate Change Using Maximum Entropy Model. Forests, 2021, 12(2): 151.

Sun X., Xu Q., Luo Y. A Maximum Entropy Model Predicts the Potential Geographic Distribution of *Sirex noctilio*. Forests, 2020, 11(2): 175.

Wang L., Li C., Shi J., Li C., Li J., Ren L., Luo Y. Incidental Fungi in Host Trees Disrupt the Development of *Sirex noctilio* (Hymenoptera: Siricidae) Symbiotic Fungus and Larvae. Journal of economic entomology, 2020, 113(2): 832-838.

Liu Y., Shi J. Predicting the potential global geographical distribution of two *Icerya* species under climate change. Forests, 2020, 11(6): 684.

Wang M., Wang L., Fu N., Gao C., Ao T., Ren L., Luo Y. Comparison of Wing, Ovipositor, and Cornus Morphologies between *Sirex noctilio* and *Sirex nitobei* Using Geometric Morphometrics. Insects, 2020, 11(2): 84.

Fu N., Wang M., Wang L., Luo Y., Ren L. Genome Sequencing and Analysis of the Fungal Symbiont of *Sirex noctilio*, *Amylostereumareolatum*: Revealing the Biology of Fungus-Insect Mutualism. Mycosphere, 2020, 5(3): e00301-20.

Qin Z., Shi J. Feasibility of Species Origin Traceability by Hydrogen Stable Isotopes: Sample Case of *Lymantria dispar* L. (Lepidoptera: Erebidae). Forests, 2020, 11(11): 1209.

Fu N., Li J., Wang M., Ren L., Luo Y. Genes Identification, Molecular Docking and Dynamics Simulation Analysis of Laccases from *Amylostereumareolatum* Provides Molecular Basis of Laccase Bound to Lignin. International journal of molecular sciences, 2020, 21(22): 8845.

Li C., Wang L., Li J., Gao C., Luo Y., Ren L. Thermal survival limits of larvae and adults of *Sirex noctilio* (Hymenoptera: Siricidae) in China. Plos one, 2019, 14(6): e0218888.

Xu Q., Sun X., Lu P., Luo Y., Shi J. Volatile profiles of three tree species in the northeastern China and associated effects on *Sirex noctilio* activity. Journal of Plant Interactions, 2019, 14(1): 334-339.

Liu Y.J., Gao B.T., Ren L.L., Zong S.X., Ze S.Z., Luo Y.Q. Niche-based relationship between sympatric bark living insect pests and tree vigor decline of *Pinus yunnanensis*. Journal of Applied Entomology, 2019, 143(10): 1161-1171.

Wang L., Ren L., Li C., Gao C., Liu X., Wang M., Luo Y. Effects of endophytic fungi diversity in different coniferous species on the colonization of *Sirex noctilio* (Hymenoptera: Siricidae). Scientific reports, 2019, 9(1): 1-11.

3. Joint Publication

2023 plan, so far

1. **Worldwide tests of generic attractants, a promising tool for early detection of non-native cerambycid species. NeoBiota. Accepted.**
2. **Pine wilt disease in Northeast and Northwest China: a comprehensive risk review. (**Qinwang Xu, Xuejiao Zhang, Jiaxing Li, Jiaru Ren, Lili Ren, and Youqing Luo**)**
3. **Seven mitochondrial genomes of Tribe Hylurgini (Coleopotera: Curculionidae: Scolytinae) in Eurasia and their phylogenetic analysis. (**Na An; Yuan Yuan； Lili Ren; Alain Roques; You-qing Luo **)**
4. **Screening and assessment of global forest insect pests based on horizon scanning (**Qinwang Xu ; Qiang Xu ; Shiroma Sathyapala ; Lili Ren ; Alain Roques ; Youqing Luo)
5. **Checklist and introduction characteristics of invasive insect pests in forest and grassland ecosystems of the Chinese mainland** (Qinwang Xu ; Lili Ren ; Juan Shi ; Shiroma Sathyapala ; Alain Roques ; Youqing Luo)
6. **Study on intestinal microbe differences of *Hylurgus ligniperd* in different geographic populations based on metagenomic sequencing technology** （Zha shi Bao， Alain Roquens, Juan Shi,Youqing Luo）

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4. Exchange of personnel

1. Joint supervision of PhD thesis.
2. Staff/researcher exchanges.
3. The summer course to undergraduates and postgraduates of BFU.

Dr. Geraldine

2019.09

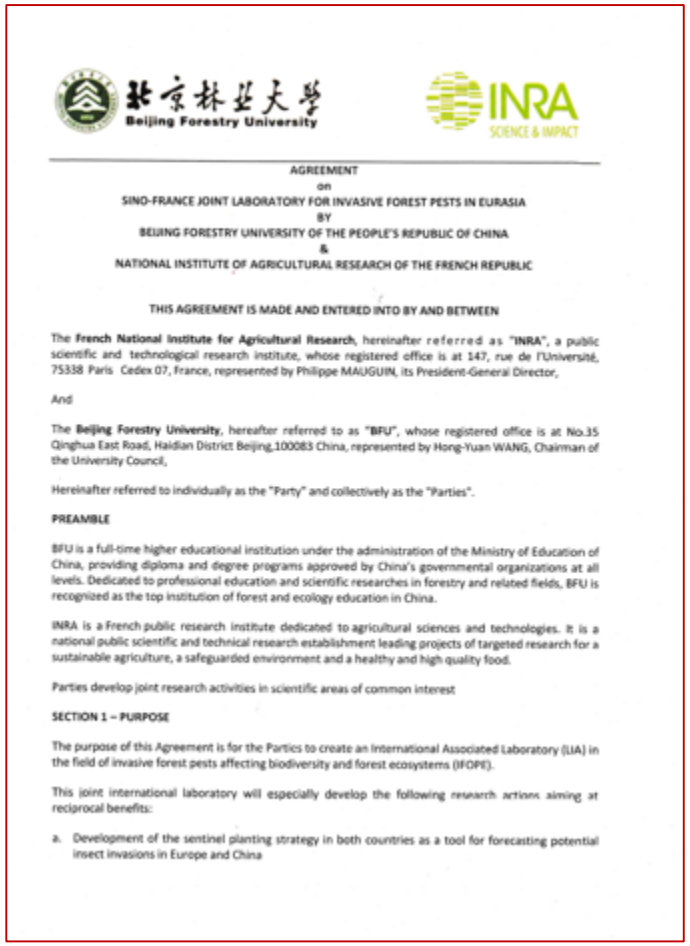
- INRAE URZF研究员，奥尔良大学教授，Geraldine博士应Juan博士的邀请，为BFU的本科生和研究生开设了一门名为“入侵生物学”的暑期课程。
- Researcher of INRAE URZF, professor of Orleans University,
- Dr. Geraldine invited by Dr. Juan and taught a summer course named with “Invasive Biology” to undergraduates and postgraduates of BFU.

4. Exchange of personnel

1. Joint supervision of PhD thesis.
2. Staff/researcher exchanges.
3. The summer course to undergraduates and postgraduates of BFU.
4. 2023 Workshop Organized by Sino-France Joint Laboratory for Invasive Forest Pests in Eurasia (off- line).

5. Extended of the Agreement

1. Document Preparing
2. Administration Application



北京林业大学 Beijing Forestry University

INRA SCIENCE & IMPACT

AGREEMENT
on
SINO-FRANCE JOINT LABORATORY FOR INVASIVE FOREST PESTS IN EURASIA
BY
BEIJING FORESTRY UNIVERSITY OF THE PEOPLE'S REPUBLIC OF CHINA
&
NATIONAL INSTITUTE OF AGRICULTURAL RESEARCH OF THE FRENCH REPUBLIC

THIS AGREEMENT IS MADE AND ENTERED INTO BY AND BETWEEN

The **French National Institute for Agricultural Research**, hereinafter referred as "**INRA**", a public scientific and technological research institute, whose registered office is at 147, rue de l'Université, 75338 Paris Cedex 07, France, represented by Philippe MAUGUIN, its President-General Director,

And

The **Beijing Forestry University**, hereafter referred to as "**BFU**", whose registered office is at No.35 Qinghua East Road, Haidian District Beijing,100083 China, represented by Hong-Yuan WANG, Chairman of the University Council,

Hereinafter referred to individually as the "Party" and collectively as the "Parties".

PREAMBLE

BFU is a full-time higher educational institution under the administration of the Ministry of Education of China, providing diploma and degree programs approved by China's governmental organizations at all levels. Dedicated to professional education and scientific researches in forestry and related fields, BFU is recognized as the top institution of forest and ecology education in China.

INRA is a French public research institute dedicated to agricultural sciences and technologies. It is a national public scientific and technical research establishment leading projects of targeted research for a sustainable agriculture, a safeguarded environment and a healthy and high quality food.

Parties develop joint research activities in scientific areas of common interest

SECTION 1 – PURPOSE

The purpose of this Agreement is for the Parties to create an International Associated Laboratory (LIA) in the field of invasive forest pests affecting biodiversity and forest ecosystems (IFOPE).

This joint international laboratory will especially develop the following research actions aiming at reciprocal benefits:

a. Development of the sentinel planting strategy in both countries as a tool for forecasting potential insect invasions in Europe and China

In case any provision in this agreement shall be held invalid, illegal or unenforceable, the validity, legality and enforceability of the remaining provisions shall not in any way be affected or impaired thereby.

SECTION 21 – FINAL PROVISION

This Contract contains 21 articles, 1 signature page, and the following annexes: Exhibit 1 - Scientific project, and Exhibit 2 - Work plan and funding.

Taken together these documents constitute an original.

IN WITNESS WHEREOF, the Parties have executed and signed this Agreement in two originals in English.

For Beijing Forestry University	For the French National Institute for Agricultural Research
Hong-Yuan Wang Chairman of the University Council	Philippe Mauguin President- General Director
Date: 2018.10.15	Date:

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谢 谢

Thanks for your listening!