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Highlight

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ANSO Highlight is to share the new ideas, methodologies, datasets and technologies of sustainability research by summarizing the latest progress and achievements of scientific projects funded by ANSO and ANSO partners. Through this publication, we would like to stimulate active collaboration and communication among ANSO members and partners.

Research on Ecological Security Assessment and Countermeasures along the China-Mongolia-Russia Corridor in the Belt and Road Region

Summary

Research on Ecological Security Assessment and Countermeasures along the China-Mongolia-Russia Corridor (CMRC) in the Belt and Road Region is a joint cooperative research project launched by the ANSO in January 2020. The project is led and funded by the International Society of Zoological Sciences (ISZS), cooperating with the Institute of Zoology of the Chinese Academy of Sciences (IOZ/CAS), International Alliance of Protected Areas (IAPA) and its related protected area member organizations (including China, Russia, Mongolia, and Kazakhstan) and relevant institutions of the Russian, Mongolian, and Kazakhstan Academy of Sciences.

Period: January 1, 2020-December 31, 2022
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➔ P2-P6

Investigation and Monitoring of Agricultural and Forestry Pests in the Interior of Central Asia

Summary

“Investigation and monitoring of agricultural and forestry pests in the interior of Central Asia” is a joint cooperative research project launched by the ANSO in January 2020. The project is led by the Institute of Zoology, Chinese Academy of Sciences, cooperating with Xinjiang Normal University and relevant institutions of the Uzbekistan, Kazakhstan, Tajikistan Academy of Sciences and Ministry of agriculture and environmental protection of Turkmenistan.

Period: January 1, 2020 - December 31, 2022
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➔ P7-P12

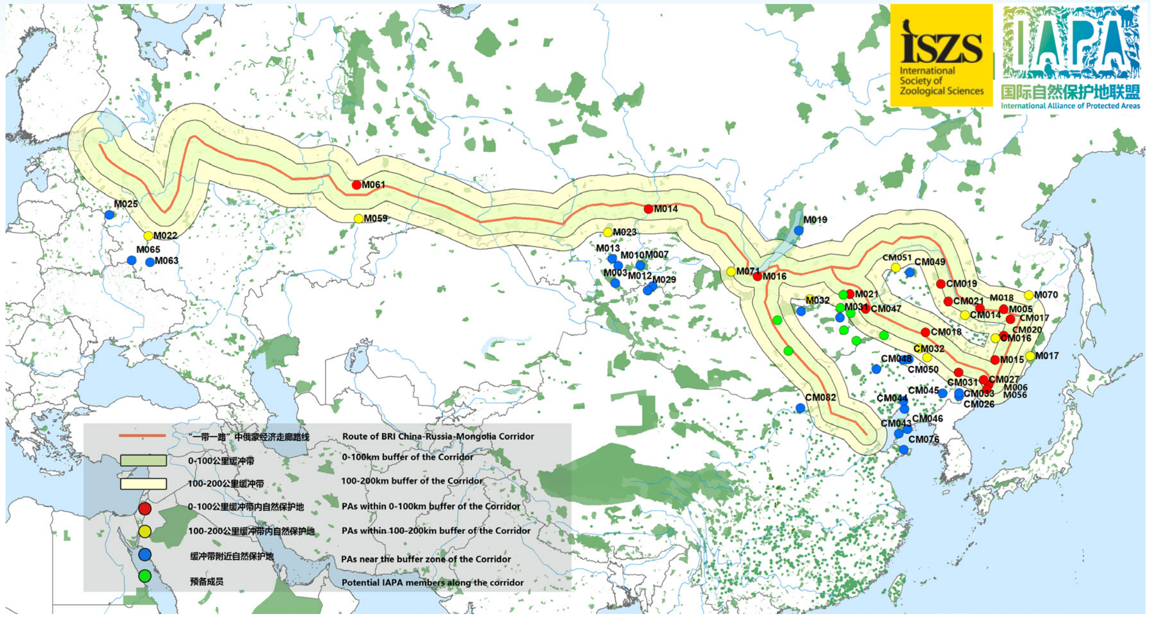
Research on Ecological Security Assessment and Countermeasures along the China-Mongolia-Russia Corridor in the Belt and Road Region

Objectives

The CMRC Project is to carry out ecological monitoring and biosafety assessment research along the China-Mongolia-Russia Corridor in the Belt and Road (B&R) region. It aims to provide the scientific basis for ecological environment protection and cooperation of countries and regions in the B&R. It will improve local ecological monitoring capabilities, promote the development philosophy and spirit of the Belt and Road Initiative (BRI) and encouraging B&R green development.

Research Contents

The project will complete the collection of historical information and survey the status of large mammals, birds, small mammals and their relevant diseases in key areas of the CMRC, establish the ecological baseline information database, develop the ecological monitoring standards and assessment system of the CMRC, analyze the potential impact of major B&R projects on its ecological environment and ecological risks, and propose ecological conservation and risk prevention countermeasures and recommendations.


ISZS
International Society of Zoological Sciences
IAPA
国际自然保护地联盟
International Alliance of Protected Areas
M025
M061
M059
M022
M065
M063
M014
M023
M013
M010
M007
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M056
CM033
CM026
CM082
CM045
CM044
CM043
CM046
CM076
"一带一路"中俄蒙经济走廊路线 Route of BRI China-Russia-Mongolia Corridor
0-100公里缓冲带 0-100km buffer of the Corridor
100-200公里缓冲带 100-200km buffer of the Corridor
0-100公里缓冲带内自然保护地 PAs within 0-100km buffer of the Corridor
100-200公里缓冲带内自然保护地 PAs within 100-200km buffer of the Corridor
缓冲带附近自然保护地 PAs near the buffer zone of the Corridor
预备成员 Potential IAPA members along the corridor

国家 Country		Code	成员单位	Organization
🟥	俄罗斯 Russia	M005	巴斯塔克国家自然保护区	Bastak State Nature Reserve
🟥		M006	豹地国家公园	Land of the Leopard National Park
🟥		M014	斯托比国家保护区	Stolby National Reserve
🟥		M015	汗凯斯基国家自然生物圈保护区	Khankaiskiy State Nature Biosphere Reserve
🟥		M016	贝加尔湖国家自然生物圈保护区	Baikal'skiy State Nature Biosphere Reserve
🟥		M018	兴安斯基国家自然保护区	Khingansky State Nature Reserve
🟥		M021	达尔斯基国家自然生物圈保护区	Daursky State Nature Biosphere Reserve
🟥		M056	远东海洋国家生物圈自然保护区	Far Eastern Marine State Biosphere Nature Reserve
🟥		M061	斯维尔德洛夫斯克生物圈保护区	Visimskiy Biosphere Reserve
🟨		M011	索霍恩丁斯基国家自然生物圈保护区	Sokhondinsky State Nature Biosphere Reserve
🟨		M017	锡霍特阿林国家自然生物圈保护区	Sikhote-Alin State Nature Biosphere Reserve
🟨		M022	乌格拉国家公园	Ugra National Park
🟨		M023	库兹涅茨克山国家自然保护区	Kuznetskiy Alatau State Nature Reserve
🟨		M059	塔伽纳依国家公园	Taganay National Park
🟨		M070	扎波维德诺耶·普里阿穆里国家级自然保护区	State Natural Protected Areas in Zapovednoye Priamurie
🟨		M061	斯维尔德洛夫斯克生物圈保护区	Visimskiy Biosphere Reserve
🟨		M071	汤金斯基国家公园	Tunkinsky National Park
🟦		M013	赛卢根姆斯基国家公园	Sailugenmskiy National Park
🟦		M019	巴古辛斯基国家自然生物圈保护区	Barguzinsky State Nature Biosphere Reserve
🟦		M025	斯摩棱斯克国家公园	Smolensk Lakeland National Park
🟦		M063	中央黑钙土生物圈保护区	Central Chernozem Nature Biosphere Reserve
🟦		M010	哈卡斯基国家自然生物圈保护区	Khakassky State Nature Biosphere Reserve
🟦		M007	萨亚诺·舒申斯基国家自然生物圈保护区	Sayano-Shushenskiy State Nature Biosphere Reserve
🟦		M003	阿尔泰斯基国家生物圈自然保护区	Altaiskiy State Nature Biosphere Reserve
🟦		M012	乌布逊乌尔斯卡亚科特洛维纳国家自然生物圈保护区	Ubsunurskaya Kotlovina State Nature Biosphere Reserve
🟦		M065	尼鲁索·德斯尼亚斯科·波莱西生物圈保护区	Nerusso-Desnianskoe-Polesie Biosphere Reserve

🟦	蒙古国 Mongolia	M031	东方省国家特别保护地	Dornod State Special Protected Areas
🟦		M032	鄂嫩巴勒吉国家公园	Onon-Balj National Park
🟦		M029	乌布苏流域特殊保护地	Uvs Basin Specially Protected Areas
🟩		*	伊赫纳特自然保护区	Ikh Nart Nature Reserve
🟩		*	特勒吉国家公园	Gorkhi-Terelj National Park
🟩		*	维林博格德自然保护区	Choiriin Bogd Nature Reserve
🟩		*	伊赫加兹林丘卢自然保护区	Ikh Gazriin Chuluu Nature Reserve
🟩		*	博格德汗特别保护区	Bogdkhan Special Protected Areas
🟩		*	胡斯泰国家公园	Khustai National Park
🟩		*	"图吉因纳尔斯"自然纪念碑	"Tujiin nars" Natural Monument
🟩		*	努姆鲁格特别保护区	Numrug Special Protected Areas

国家 Country		Code	成员单位	Organization
🟥	中国 China	CM017	黑龙江八岔岛国家级自然会保护区	Heilongjiang Bacha Island National Nature Reserve
🟥		CM018	黑龙江扎龙国家级自然保护区	Heilongjiang Zhalong National Nature Reserve
🟥		CM019	黑龙江中央站黑嘴松鸡国家级自然保护区	Heilongjiang Central Station Spotted Capercaillie National Nature Reserve
🟥		CM020	黑龙江挠力河国家级自然保护区	Heilongjiang Naoli Rever National Nature Reserve
🟥		CM021	黑龙江胜山国家级自然保护区	Heilongjiang Shengshan National Nature Reserve
🟥		CM027	吉林汪清国家级自然保护区	Jilin Wangqing National Nature Reserve
🟥		CM030	吉林省黄泥河国家级自然保护区	Jilin Huangni River National Nature Reserve
🟥		CM047	内蒙古呼伦湖国家级自然保护区	Inner Mongolia Hulun Lake National Nature Reserve
🟨		CM051	内蒙古额尔古纳国家级自然保护区	Inner Mongolia Erguna National Nature Reserve
🟨		CM014	黑龙江翠北湿地国家级自然保护区	Heilongjiang Cuibei Wetland Provincial Nature Reserve
🟨		CM015	黑龙江丰林国家级自然保护区	Heilongjiang Fenglin National Nature Reserve
🟨		CM016	黑龙江宝清七星河国家级自然会保护区	Heilongjiang Baoqing Qixinghe National Nature Reserve
🟨		CM028	吉林查干湖国家级自然保护区	Jilin Chagan Lake National Nature Reserve
🟨		CM029	吉林莫莫格国家级自然保护区	Jilin Momoge National Nature Reserve
🟦		CM026	吉林长白山国家级自然保护区	Jilin Changbai Mountain National Nature Reserve
🟦		CM032	吉林向海国家级自然保护区	Jilin Xianghai National Nature Reserve
🟦		CM033	吉林园池湿地国家级自然保护区	Jilin Yuanchi Wetland National Nature Reserve
🟦		CM049	内蒙古大兴安岭汗马国家级自然保护区	Inner Mongolia Da Hinggan Ling Hanma National Nature Reserve
🟦		CM050	内蒙古科尔沁国家级自然保护区	Inner Mongolia Horqin National Nature Reserve
🟦		CM031	吉林省哈泥国家级自然保护区	Jilin Hani National Nature Reserve
🟦		CM082	内蒙古大青山国家级自然保护区	Inner Mongolia Daqingshan National Nature Reserve
🟦		CM043	辽宁蛇岛老铁山国家级自然保护区	Liaoning Snake Island-Laotieshan National Nature Reserve
🟦		CM044	辽宁辽河口国家级自然保护区	Liaoning Liaohekou National Nature Reserve
🟦		CM045	辽宁医巫闾山国家级自然保护区	Liaoning Yiwulvshan National Nature Reserve
🟦		CM046	大连城山头海滨地貌国家级自然保护区	Dalian Chengshantou Coastal Landform National Nature Reserve
🟦		CM048	内蒙古赛罕乌拉国家级自然保护区	Inner Mongolia Saihan Wula National Nature Reserve
🟦		CM076	山东昆嵛山国家级自然保护区	Shandong Kunyushan Naitional Reserve

Project Site: China-Mongolia-Russia Corridor of *BRI*

China-Mongolia-Russia Corridor
CMRC

Main Progress

Established a preliminary ecological security cooperation network along the China-Mongolia-Russia Corridor. There are 64 protected areas (PAs), and 12 scientific research institutions are included in the network, which strengthened the communication among trans-boundary PAs.

Held five international workshops and training meetings to promote communication, cooperation and related monitoring technology sharing among the countries.

Established preliminary ecological baseline databases of the CMRC region, collected relevant information on the project area, especially the temporal and spatial data of 25 key species, and provided the basis for compiling the Ecological, Social and Development Report of the China-Mongolia-Russia Corridor.

Carried out a field survey in Inner Mongolia and surrounding grasslands for animal species distributed along the China-Mongolia-Russia Corridor. These works have provided a large amount of first-hand information.

Compiled three reports with recommendations on three aspects along the China-Mongolia-Russia Corridor: ecological security, trans-boundary cooperation among PAs, and biological disaster prevention and control.

Highlights

Established a regional ecological information database of the China-Mongolia-Russia Corridor, compiled recommendation reports on ecological security to promote trans-boundary conservation and biological disaster prevention and control.

A symposium on the theme of Research on Ecological Security Assessment and Countermeasures along the China-Mongolia-Russia Corridor in the Belt and Road Region was held on 20 September 2020 in Changbai Mountain with over 190 onsite and over 100 online participants. The symposium promoted the implementation of the CMRC project.

Future Plans

Establish and improve an ecological monitoring system, formulate a specification of cooperation in ecological monitoring, and establish monitoring capacity.

Continue to promote exchanges and cooperation among transnational nature reserves and hold international symposiums and training meetings.

Carry out data collection, develop transnational field work, establish basic database of ecological information of the CMRC region.

Submit suggestions of ecological security and risk prevention to government departments of the four countries (China, Russia, Mongolia and Kazakhstan).

regional ecological
information database
ecological security
trans-boundary conservation and
biological disaster prevention and control

Publication

Article: From ecological barrier to biosafety -- Taking the cross-border cooperation between China, Mongolia and Russia as an example. ZHANG Zhibin, XIE Yan. Man and biosphere, 2021 (127) 67-71.

ANSO Innovation Development Report. XIE Yan, JIANG Guangshun, ZHANG Lixun, BI Junhuai, LI Weidong, LIU Songtao. Countermeasures and Recommendations for Transboundary Cooperation on Protected Areas along Northern Border of China. The B&R Innovative Development Report. Beijing: Science Press of China, 2021, 201-208.

Research report: Report on Ecology, Society and Development of China Mongolia Russia Economic Corridor. LI Xinhai, XIE Yan, WAN Xinru, Yansanjav Adiya, Gansukh Sukhchuluun, Viatcheslav Rozhnov, Valery Neronov, ZHOU Tingting, SHI Jinsong.

Consultation report: Implementation plan for the construction project of Balhu Gazelle Autonomous Region Nature Reserve in Inner Mongolia. BI Junhuai.

Consultation report: Inner Mongolia Plague Gerbils Epidemic Analysis Report. JU Cheng, WAN Xinru, ZHANG Zhibin.

ANSO project meetings

Photos of field work in Inner Mongolia

Article
ANSO
Innovation Development
Report
Consultation
report
Research
report

Principal Investigator

ZHANG Zhibin, Professor

ZHANG Zhibin is a Professor from the Institute of Zoology, Chinese Academy of Sciences (CAS). He obtained the B.S. degree of Zoology in the Lanzhou University in 1984, and the Ph.D degree of Animal Ecology, CAS in 1989. He was elected as the foreign member of Norwegian Academy of Science and Letters in 2014, and member of Academy of Europe (Academia Europaea) in 2017. He is now the President of International Society of Zoological Sciences (ISZS) and Editor-in-Chief of Integrative Zoology.

His research interests focus on studying impacts of global change on population and community dynamics of animals and their interactions with plants and microbes by integrating the ecological studies from local to global scale, and from monotonic to non-monotonic regimes.

Investigation and Monitoring of Agricultural and Forestry Pests in the Interior of Central Asia

Objectives

As an important region of the Belt and Road Initiative, Central Asia has a very close relationship with China. The biota is both similar to and different from that of China, which has a significant impact on our country's neighboring biosafety and foreign economic and trade cooperation. Relying on the Belt and Road Animal Resources and Sustainable Utilization Alliance, this project aims to organize a targeted survey of agricultural and forestry pest resources, to determine the composition and fauna of agricultural and forestry pests in the hinterland of Central Asia, and to develop a database of agricultural and forestry pests in this area. The project will also build a rapid species identification platform based on DNA barcode technology, as well as a monitoring network for important pests. The project aims further to export targeted “green” prevention and control equipment and products, to organize relevant professional knowledge and special technical training meetings to encourage young scientists and technology teams dedicated to the monitoring and prevention of pests in agriculture and forestry, and to attract leading scholars to China for exchange visits and cooperative research, in order to build a cooperative research network for monitoring agricultural and forestry pest in Central Asian.

Methodology

We conduct pest resources surveys in partner countries, collect specimens and integrate sample information, establish a Central Asian agricultural and forestry pest database and a DNA barcode standard sequence library to achieve rapid identification of species; build up a pest monitoring network to provide a basis for formulating control strategies. The Chinese side will provide green prevention and control technologies and comprehensive management optimization measures for partner countries, and conduct professional technical training, academic exchanges and personnel training in various fields, such as specimen collection, species identification, and pest monitoring methods.

Main progress

Through a field survey of agricultural pest resources, more than 12,000 specimens of various agricultural pests have been collected; 17,000 specimens have been systematically sorted, and 1,680 DNA barcode sequences of more than 160 pest species have been obtained. The Central Asia Agriculture Pest specimen library, the basic database of pest species of the Belt and Road Region and the rapid identification platform of DNA barcode have been initially established. The Chinese and English versions of the e-book "Agricultural Pests in the B&R Region in Central and East Asia" has been compiled. A monitoring network composed of equipment and products based on the suction tower, entomological radar, sex attractants, etc. has been built, and part of the monitoring data has become an important basis for forecasting, field prevention and control of cross-border migratory locusts on the border between China and Kazakhstan. Operating procedures for monitoring, prevention and control equipment have been provided for three major pests for organic vegetables, greenhouse crops, and fruit trees, as well as lists and instructions for the three major categories of green prevention and control products. A Chinese-English bilingual agricultural pest information platform (Insect Pest Information Platform, http://www.insectpestip.net) was built. Information on the management of 406 species of pest in 83 families and 8 orders can be accessed at any time. Training services have been provided on the use of green prevention and control products and equipment, as well as corresponding English standards and operating instructions for cooperating countries.

12000
specimens of
various agricultural pests

17000

160
pest species

1680
DNA
barcode sequences

Agricultural Insect Information Platform

Highlights

More than 12,000 new specimens of various agricultural pests were collected; 17,000 specimens were systematically sorted, and 1,680 DNA barcode sequences of more than 160 pests were obtained; a specimen library of agricultural pests in Central Asia, a basic species database, and a rapid identification platform of DNA barcodes were established; and "Agricultural Insect Information Platform" in both Chinese and English has been built, providing information on 406 species of agricultural pests distributed in the Belt and Road of Central and Eastern Asia; 3 sets of integrated technologies for the prevention and monitoring of organic vegetables, greenhouse crops, and fruit tree pests and 4 green technology operating procedures have been formed; product lists and instructions for use have been developed; training has been provided for young scientists in partner countries, of whom currently 7 students are studying in China.

Future Plan

We plan to guide collaborators to carry out online resource survey specimen sorting and identification remotely in their own country; to continue to obtain important pest DNA barcode sequences, and further to improve the rapid identification system; to improve the monitoring system for migratory insects based on suction trap and insect radar; and to carry out timely biological control of important lepidopteran pests in the experimental bases selected by the partner countries based on the monitoring results of sex attractants. We also will continue to instruct foreign students from the partner countries to carry out scientific research and training, particularly for young technical scientists for foreign countries mainly through online methods.

Publication and IP

Book:
CY Jiang, RZ Zhang. 2020. Insects and spiders in Uzbekistan. Wuhan: Hubei Science and Technology Press. 2020139834 978-7-5352-9555-2

E-Book: (Chinese and English bilingual)
Institute of Zoology, Chinese Academy of Sciences, Fujian Agriculture and Forestry University. 2021. Agricultural insect pests in the Belt and Road areas in East-Central Asia.

J Chen, ZX Li, LY Jiang, GX Qiao*. 2021. *Glyphochaitophorus*, a new genus of Chaitophorinae (Hemiptera: Aphididae) from China. Zootaxa, 4975(3): 581–591.

TY Liu, J Chen, * LY Jiang, GX Qiao*. 2020. Phylogeny and species reassessment of *Hyalopterus* (Aphididae, Aphidinae). Zool. Scripta, 49: 755–767.

P He, J Chen, HZ Kong, L Cai, GX Qiao*. 2021. Important supporting role of biological specimen in biodiversity conservation and research. Bulletin of the Chinese Academy of Sciences, 36(4): 425-435.
Invention patent:

A method for counting insect granuloviruses, 2020, ZL201810390398.2, applicants: H Zhang, QL Qin, L Miao, Q Meng, X Li , JH Zhang, GL Zhou, HT Wang, FF Fang, ZQ Feng, XZ Chen.

Invention patent: (applied)
Detection method and Kit for Microsporidium locust by real-time quantitative PCR, 2020, Xinjiang: CN106967834A, special applicants: HX Hu, R Ji, H Wang, TS Fan, F Yu, XH Duan.

Utility model patent:
A wind-suction trap for trapping small pests, 2020, ZL201922158911.8, applicants: JH Zhang, L Miao, HY Li, QL Qin, HT Wang, H Zhang, X Li, GL Zhou, Q Meng.

Software copyright:
DNA barcoding local visualization comparison system V1.0, 2020, 2020SR1920278, applicant: XC Zhu.

农业有害昆虫信息平台
Insect Pest Information Platform in East-Central Asia

The Insect Pest Information Platform (IPIP) (www.insectpestip.net/) is a product of a key international collaboration project on insect pest monitoring and control supported by the Ministry of Science & Techonoly of China (2017-2020). The project includes partners from China, Mongolia, Kasakhstan and Kyrgyzstan. The IPIP aims to provide services in retrieving regional pest species information, releasing pest monitoring data from suction traps, and disseminating pest control approaches in the Belt and Road areas in East-Central Asia.

IPIP Architecture

Home	Key information of the website and the project
Pest	Retrieval of pest information Taxonomic tree of pests Search based on key words
Suction trap	Suction trap information Pest monitoring data and insecticide resistance data
Output	Hand books, papers and other files Dissemination of pest control approaches
About	Background of the project and collaboration institutions Progress of the project
News	Meetings, field works, and other progress
显示中文	Bilingual: Chinese and English

http://www.insectpestip.net/

Alliance of International Science Organizations（ANSO-CR-KP-2020-04）

Agricultural insect pests in
the Belt and Road areas
in East-Central Asia

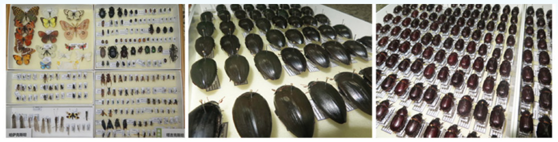
Institute of Zoology, Chinese Academy of Sciences
Fujian Agriculture and Forestry University

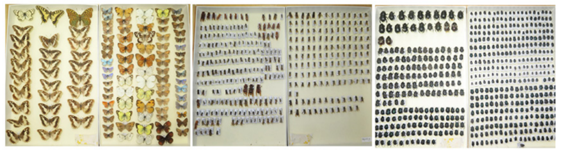
乌兹别克斯坦昆虫与蜘蛛

INSECTS AND SPIDERS
IN UZBEKISTAN

姜春燕 张润志◎著

Figure 1 Monograph, Electric Book and Information Platform


Insect specimens from Kazakhstan


Insect specimens from Tajikistan

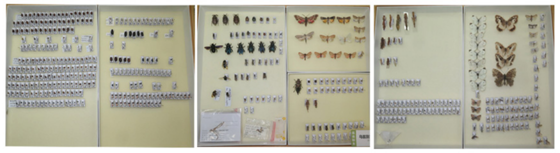

Insect specimens from Uzbekistan

Figure 2 Insect specimens after sorting and preparing (partial)

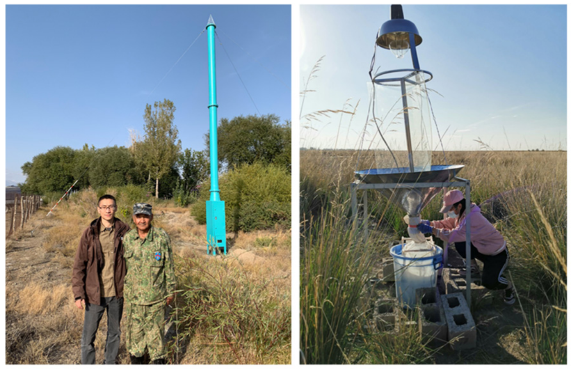

Suction Trap in Kazakhstan
Insect trap lamps in the China-Kazakhstan border area

Figure 4 Monitoring equipments in the field

Figure 3 Surveys in the field and preparing the specimens

Principal Investigator

QIAO Ge-Xia, Professor

Prof. QIAO engages in evolution and ecology of biological diversity and complexity of biological interactions of aphids and other organisms, as well as ecology and control of aphid pests, and focuses on the collection and management of animal specimen resources. She leads teams in Central Asia and Northeast Asia to survey pests in agriculture and forestry, build pest monitoring networks, provide biological control technologies, and conduct technical training for young talents. She is a Committee Member of the Association of Asia-Pacific Entomological Society, Member of Major Systematic Entomology Facilities, President of the 9th International Symposium on Aphids, and Standing Member of The Entomological Society of China, etc. Her awards include National Science Fund for Distinguished Young Scholars, National Outstanding Scientific and Technological Workers, Top Ten Outstanding Women Award of Chinese Academy of Sciences, and Zhou Yao Entomological Taxonomy Fund Award (first prize) etc.

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