GERMAN-CHINESE WORKSHOP ON PREVENTION AND CONTROL OF SPOTTED WING DROSOPHILA

2015 German-Chinese Agricultural Center (DCZ) Foreign Economic Exchange Center (FECC)

Final report compiled and edited by Dr. Marco Roelcke, DCZ
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Executive summary

- In June 2015, the German-Chinese Agricultural Center (DCZ) conducted a workshop on the prevention and control of the Spotted Wing Vinegar Fly (*Drosophila suzukii*, 斑翅果蝇).
- The Workshop took place on June 16 and 17, 2015 in the premises of the DCZ in Beijing.
- Six German and seven Chinese invited experts gave presentations and about 40 Chinese and German participants discussed strategies to reduce fruit infestations and harvest losses for fruit and wine growers.
- The workshop results were summarized in a joint Final Declaration which was jointly devised and adopted by all discussion participants.
- Future joint research topics were defined, comprising Short-term, partly urgent, control measures, as well as Longer-term requirements for further research.
- From June 18-20, a three-day excursion to Yunnan Province took place, with visits to a Red Bayberry (*Myrica rubra*) plantation and a vineyard for table grape production, as well as a scientific seminar at the Yunnan Agricultural University.
- The participants of the workshop agreed that this workshop was very successful as a platform to exchange the actual knowledge about *Drosophila suzukii* and to define further important research topics.
- The Workshop constituted the first major activity of the German-Chinese Agricultural Center, and at the same time the first concrete activity in the field of agricultural research cooperation of the DCZ.
German-Chinese Workshop on Prevention and Control of Spotted Wing Drosophila

中德斑翅果蝇防控研讨会议程

Short report

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Braunschweig-Beijing, July 7, 2015

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Background and previous history, Problems in Europe and Germany

The spotted wing Drosophila (Drosophila suzukii, Matsumura, 1931), also known as cherry vinegar fly, originates in Asia and was first described in Japan. It belongs to the vinegar flies (Diptera: Fam. Drosophilidae). Typical trait of the male insects is a dark spot at the tip of the wings (Figure on p. 1). It has developed into an enormous threat for European fruit and wine production in only a few years. In contrast to other species of the same genus it attacks healthy fruit, possesses a very wide array of host plants and an enormous multiplying capacity. In Europe the spotted wing Drosophila was first observed in 2008 in Spain and Italy; in Germany it was first confirmed in late summer 2011 in Bavaria, Rhenania-Palatinate and Baden-Württemberg. In the meantime the species is nearly ubiquitously distributed in Western and Central Europe, has already caused great damage and has had an enormous economic impact. In the year 2014, following a relatively mild winter and frequent rainfall throughout the year, the damage in many regions of Germany was in parts extremely serious. In the meantime the spotted wing Drosophila now constitutes an existential threat for many cultivated fruit species. Moreover, it also attacks early-ripening red grape varieties in Germany.

Need for extension services of German fruit growing and winemaking industries

Currently, there is a very great need for consulting and advice on the part of the German fruit growing and winemaking industries. On a national basis in Germany, the "Spotted wing drosophila working group" for several years has been serving as a platform for information and knowledge exchange and for the coordination of the need for action as well as of treatment strategies, in close coordination between German Federal institutions, research and State Ministries. The plant protection services of the German States are providing a timely and region-specific consulting service for the farmers concerned including information on infestation occurrence and on control measures in the various crops. In the Division Plant Protection of the German Federal Ministry of Food and Agriculture (BMEL) regular expert talks on the "National Control Strategy on Spotted wing Drosophila" are held.

One approach in basic as well as applied research is to find out more about how to deal with a crop pest in its region of origin. A delegation of experts from the Julius Kühn-Institut (JKI, Federal Research Centre for Cultivated Plants) travelled to Japan in April 2015, in order to get an idea of possible prevention and control measures against the pest in its home region (East Asia), of natural antagonists such as parasitoids, etc.

Preparation, Institutional involvement

During the visit to Germany by the Chinese Minister of Agriculture, Mr. Han, Changfu as part of the third Sino-German government consultations in October 2014, the German Minister of Agriculture Dr. Christian Schmidt mentioned the strong interest on the German side in a scientific exchange on the topic of spotted wing Drosophila. This was based on an original idea by the Division Plant Protection of BMEL. Since the Chinese side possesses long-term experience, the German side expressed its wish on an exchange with the Chinese Ministry of Agriculture (MOA) in the field of control of spotted wing Drosophila. In order to initiate such an exchange, the Chinese side therefore suggested to carry out a joint workshop on prevention and control of spotted wing Drosophila.
On the occasion of the opening of the German-Chinese Agricultural Center (DCZ) by the German Minister of Agriculture Schmidt and his Chinese colleague Minister Han on March 23, 2015, an important framework was created in order to further deepen bilateral research and cooperation. Both sides stressed the close cooperation between Germany and China in the field of agricultural research. The expert meeting on an improved control of the fruit crop pest spotted wing Drosophila planned for summer of 2015 was explicitly mentioned.

In early April 2015, the German and Chinese Permanent Directors of the German-Chinese Agricultural Center (DCZ) decided to hold this German-Chinese Workshop at the DCZ, both as first major activity of the Agricultural Center, as well as first concrete activity in the field of agricultural research cooperation.

The Department of International Cooperation of the Chinese Ministry of Agriculture (MOA) was the leading institution of the workshop and had already started with the relevant planning since December 2014. The National Agricultural Technology Extension and Service Center (NATESC) in Beijing was the executing agency. Operationally, the Workshop was organized by the two implementing agencies of the DCZ, the German Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and the Foreign Economic Cooperation Center (FECC) of MOA.

**Questions and Aims**

The aims of the workshop were on one hand a German-Chinese exchange on occurrence and control of spotted wing Drosophila, the discussion of prevention and abatement measures, and the visit of concrete case examples, on the other hand the elaboration of short-term measures for the consulting services, as well as the definition of longer-term research needs in view of possible future research collaborations.

**Workshop participants and time plan**

The Workshop took place on June 16 and 17, 2015, in two conference rooms of the Zhong-Ou Hotel, in which the FECC and the DCZ are also located. Welcome addresses during the official opening ceremony were delivered by Mrs. Martine Püster, Counsellor for Food and Agriculture at the Embassy of the Federal Republic of Germany, and by Dr. Chen, Youquan, Deputy Director-General, Department of Crop Production, Ministry of Agriculture, P.R.China.

On part of the German BMEL the decision had been taken to organize this workshop mainly on an expert level. Besides two scientists from the JKI, four experts from the plant protection services of the German Federal States were contacted. A total of six experts were invited as speakers on the German side (see Appendix). The German delegation was led by Mrs. Dr. Heidrun Vogt, Institute for Plant Protection in Fruit Crops and Viticulture, Julius Kühn-Institut (JKI) Federal Research Centre for Cultivated Plants), Dossenheim, Germany.

On the Chinese side led by Dr. Yang, Puyun, Director of the Division of Pest Control, National Agro-Technical Extension and Service Centre (NATESC) of MOA, seven experts, from the NATESC, the Chinese Academy of Agricultural Sciences (CAAS), as well as from several Chinese agricultural universities and agricultural research academies took part as speakers.

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1 For detailed program and list of participants see Annex
Moreover, several other officials from the Chinese Ministry of Agriculture (MOA) as well as representatives and observers from Chinese institutions such as the NATESC of MOA, the FECC of MOA and the DCZ took part during the opening ceremony of the workshop. Furthermore, three representatives of German agro-industry, as well as a representative of the German Agricultural Society (DLG) were present.

On the first day two simultaneous interpreters, and the second day a consecutive interpreter, were hired.

The scientific talks during the first day were 20 min. in length + 5 min. discussion each and were grouped along scientific topics, with German and Chinese speakers in alternating order. A broad range of topics were dealt with, from the rapid invasion of spotted wing Drosophila and its occurrence on host plants, its biology, the infestation and damage extent in fruit production, integrated as well as biological control measures, abatement concepts/strategies, situation in wine growing regions, biology and control of further fruit crop damaging flies, in particular the fruit flies ("peacock flies") belonging to the fly family Tephritidae in Asia, sterile insect technology (SIT), Chinese quarantine measures for in- and export of fruit, etc.

The second day was dedicated to an internal discussion on a future and deepened cooperation. Based on the excellent understanding the participants had reached both on a scientific and on a personal level on the previous day, the broad discussion amongst all experts present was very effective and yielded good results. The German and Chinese experts jointly drafted a Final Declaration, in which their further cooperation was delineated. Hereby short-term, in some
cases even urgent measures and longer-term research requirements were distinguished. The contents of the Declaration are given under “Results”

From June 18-20, a three-day excursion to the SW Chinese province of Yunnan, situated 1,000 to 2,000 m.a.s.l. at the transition between southern subtropics and tropics took place. It was organized and supervised by the Yunnan Agricultural University (YAU) in Kunming. A tour to Shiping County, 280 km S of the provincial capital Kunming was organized under the support of the leaders of the local agricultural and plant protection bureaus. The Red Bayberry, *Myrica rubra*, Chinese *yang mei*, has been cultivated in Shiping since the 1990s, with the planted area nowadays amounting to more than 8,000 hectares. The fruit trees have been strongly infested with *Drosophila suzukii* since the 2000s.

The major highlight was the visit of a *Myrica* plantation in the morning of June 19, in which a multitude of experiments are being carried out by the YAU. Shortly after completion of the *Myrica* harvest, infested fruits (by larval stages) were visited. The methods carried out for mass trapping with baits based on mixtures of brown sugar, vinegar, white wine, fruit pulp of ripe fruits and water, partly amended with an insecticide, as well as hygiene measures, post-harvest management in the plantations, etc., were discussed.
Subsequently, a vineyard for table grape production was visited. The black grape variety, *hei ti*, has never been found to be infested by *Drosophila suzukii* according to the farmer. This may possibly be due to a thicker peel of the grapes of this Chinese table grape variety. However, Chinese scientists confirmed this missing infestation for grape varieties grown in other locations in China as well.

In the morning of June 20 a visit to the College of Environmental Sciences at YAU in Kunming, with its laboratories for the identification of bioactive substances from plants and for the chemical ecology and environmental behaviour of pesticides (Prof. Ye, Min), took place. This was followed by a scientific seminar at the Plant Protection College, during which post-docs, PhD students and Master students of Prof. Xiao, Chun presented their ongoing research work. The German experts were impressed by the scientific quality of the presentations and a lively exchange took place. Additionally, meetings with the Vice President of Yunnan Agricultural University, Professor Ge, Changrong, as well as with the directors of the College of Plant Protection and the Department of International Cooperation and Exchange, took place.

**Results**

The workshop results were summarized in a joint Final Declaration which was jointly devised and adopted by all discussion participants of Day 2. The participants of the workshop agreed that this workshop was very successful as a platform to exchange the actual knowledge about *Drosophila suzukii* and to define further important research topics. These comprised the following (subsequently only the principle topics are listed):

a) **Short-term, partly urgent, control measures**: Technical methods, chemical control and biocontrol methods, mass-trapping, mutual dialogue on the extension services, exchange available information materials, possible Sino-German workshop in Germany in 2016.

b) **Longer-term requirements for further research**: Biology of *Drosophila suzukii*, topics as a base for the development of IPM technologies, biological control via identification, investigation and application techniques of natural antagonists in China and in Germany, ongoing knowledge transfer between science, extension service and growers, establishment of IPM demonstration fields, further technologies such as mass-trapping, sterile insect technology (SIT), as well as post-harvest-management.
In order to address these issues and to achieve quick progress, new projects need to be started in both countries (for personnel exchange and for research). The participants moreover agreed to continue the knowledge exchange by organizing future meetings and circular letters. It was stated that the envisaged cooperation within the framework of the German-Chinese (Sino-German) Agricultural Center (DCZ) will be without prejudice to the national competencies and administrative scopes of the respective (relevant) authorities in the two countries. Hereby each other’s intellectual property rights are respected.

The Final Declaration was subsequently also forwarded to both Ministries.

Scientific outlook

Due to the very specific topic and the urgency of the situation the German and Chinese workshop participants quickly reached a very close exchange on technical topics. This still persists after the workshop, with mutual exchange and sending of respective brochures, scientific publications as well as exchange of information on practical details in situ, etc. Several of the participating Chinese scientists from YAU and the Chinese Academy of Agricultural Sciences (CAAS) are also involved in the DROPSA Project funded by the European Union Seventh Framework Programme, which besides 21 EU partners also includes the JKI Institute for National and International Plant Health in Braunschweig. In the framework of this project a visit of Chinese scientists to Europe and Germany is also planned.

On occasion of the International Plant Protection Congress (IPPC) in August 2015 in Berlin the JKI together with international colleagues has organized two sections with a total of 12 presentations as well as a workshop on spotted wing Drosophila. A number of scientists from China, amongst them from the China Agricultural University (CAU) will participate in the IPPC.

Outcome in view of the DCZ

The German-Chinese Workshop on Prevention and Control of Spotted Wing Drosophila constituted the first major activity of the German-Chinese Agricultural Center, and at the same time the first concrete activity in the field of agricultural research cooperation of the DCZ. The workshop therefore fully complied with the goals of the DCZ, which is enhancing the cooperation between Germany and China in the agricultural field. A broad range of tasks has intentionally been conceived for the DCZ, allowing it to take up initiatives from sectoral policy, research, economy, extension and agricultural practice. The DCZ is able to allocate funds for smaller studies and bringing together experts for seminars or study tours. The DCZ is eager to transmit suggestions, such as those expressed in the Final Workshop Declaration to a higher sector policy level.

The workshop was the first major event for the responsible persons of the DCZ, who expressed their satisfaction about its great success. Cooperation amongst the partners during the preparation of the workshop, which occurred under great time pressure, as well during its implementation was excellent throughout. Both the Chinese and the German sides have made their respective personal and financial contributions in a spirit based on partnership.
Acknowledgements

We herewith thank all those involved on the German and Chinese sides, in particular the German BMEL and the Chinese MOA for their initiative and the selection of the experts, the GIZ, the NATESTC and the FECC for the very smooth organization as well as the scientists of both countries involved for their excellent scientific preparation and coordination of the contents of their presentations, which made this workshop successful and productive.

Appendix

Workshop Programme

Participants List
Deutsch-Chinesischer Workshop zur Abwehr und Bekämpfung der
Kirschessigfliege

Kurzbericht

Verfasser: Dr. Marco Roelcke, Conrad Graf von Hoyos
Braunschweig-Peking, 08. Juli 2015

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Beratungsbedarf der deutschen Obstwirtschaft und des Weinbaus


Vorbereitung, beteiligte Institutionen

Während des Deutschland-Besuchs des chinesischen Landwirtschaftsministers Herrn Han, Changfu anlässlich der Deutsch-Chinesischen Regierungskonsultationen im Oktober 2014 erwähnte der deutsche Landwirtschaftsminister Dr. Christian Schmidt das starke Interesse der deutschen Seite an einem wissenschaftlichen Austausch zum Thema Kirschessigfliege. Der Anstoß hierfür entstammte aus dem Referat Pflanzenschutz im BMEL. Da die chinesische Seite über langjährige Erfahrungen verfügt, wünschte sich die deutsche Seite einen Austausch mit dem chinesischen Landwirtschaftsministerium im Bereich der Bekämpfung der Kirschessigfliege. Um einen solchen Austausch anzustoßen, schlug die chinesische Seite
daraufhin vor, einen gemeinsamen Workshop zur Abwehr und Bekämpfung der Kirschessigfliege durchzuführen.


Anfang April 2015 wurde dann von den deutschen und chinesischen Permanenten Direktoren des Deutsch-Chinesischen Agrarzentrums (DCZ) beschlossen, den deutsch-chinesischen Workshop am DCZ abzuhalten, gleichermaßen als erste grössere Aktivität des Agrarzentrums und als erste konkrete Aktivität im Bereich der Agrarforschungskooperation.


**Fragestellungen und Ziele**

Ziele des Workshops waren zum einen der deutsch-chinesische Austausch zum Auftreten und zur Abwehr der Kirschessigfliege, die Diskussion über Vorbeugungs- und Bekämpfungsmaßnahmen und die Besichtigung von konkreten Fallbeispielen, zum anderen die Herausarbeitung von kurzfristigen Maßnahmen für die Beratung, sowie die Definition von längerfristigem Forschungsbedarf im Hinblick auf mögliche zukünftige Kooperationen.

**Workshop-Teilnehmer und Ablauf**


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1 Das ausführliche Programm und die Liste der Teilnehmer befinden sich im Anhang.
Auf chinesischer Seite nahmen unter Leitung von Dr. Yang, Puyun, Director of the Division of Pest Control, National Agro-Technical Extension and Service Centre (NATESC) des MOA sieben Experten, vom NATESC des MOA, der Chinese Academy of Agricultural Sciences (CAAS), sowie aus mehreren chinesischen Agraruniversitäten und landwirtschaftlichen Forschungsakademien als Vortragende teil:


Am ersten Tag waren zwei Simultandolmetscherinnen, an zweiten Tag eine Konsekutivdolmetscherin im Einsatz.

Die wissenschaftlichen Vorträge am ersten Tag umfassten jeweils 20 Min. + 5 Min. Diskussion und waren fachlich nach Themen angeordnet, wobei sich jeweils ein/e deutsche/r und ein/e chinesische/r Sprecher/in abwechselten. Ein breites Spektrum an Themen wurde behandelt, von der Ausbreitung der Kirschessigfliege und ihrem Auftreten auf Wirtspflanzen, ihrer Biologie, dem Befall und wirtschaftlichen Schaden, integrierte sowie biologische Bekämpfungsmaßnahmen, Bekämpfungskonzepte und -strategien, Situation im Weinbau, Biologie und Bekämpfung weiterer an Obst schädlichen Fliegen, nämlich Bohrfliegen (Fam. Tephritidae) in
Asien, Sterile Insektentechnik (SIT), chinesische Quarantänemaßnahmen bei Ein- und Ausfuhr von Obst, etc.

Der zweite Tag war der internen Diskussion über eine weitere und vertiefte Zusammenarbeit gewidmet. Der Vortag hatte eine hervorragende fachliche und persönliche Verständigung gezeigt, so dass nun eine breite Diskussion aller anwesenden Experten sehr zielführend verlief. Die deutschen und chinesischen Experten/innen und Teilnehmer/innen entwarfen gemeinsam eine Abschlusserklärung, in der die weitere Zusammenarbeit skizziert wurde. Dabei wurde zwischen kurzfristigen, z.T. sogar dringenden Maßnahmen, und längerfristigem Forschungsbedarf unterschieden. Zu den Inhalten der Erklärung, siehe unter „Ergebnisse“.


Ergebnisse

Die Ergebnisse des Workshops wurden in einer gemeinsamen Abschlusserklärung zusammengefasst, welche von allen Teilnehmern der Diskussion am 2. Tag mitentwickelt und verabschiedet worden ist. Die Teilnehmer stimten überein, dass dieser Workshop eine ausgezeichnete Plattform darstellte, um sich über den gegenwärtigen Wissensstand zu Drosophila suzukii auszutauschen und weitere wichtige Forschungsthemen zu definieren. Diese umfassen im Einzelnen (nachfolgend sind nur die Oberthemen aufgeführt):

a) **Kurzfristige, zum Teil dringende, Bekämpfungsmaßnahmen:** Technologische Methoden, chemische und biologische Verfahren, Massenfang, gemeinsamer Dialog über die Beratungssysteme, Austausch von Infomaterialien, möglicher Workshop in Deutschland im Jahr 2016.

b) **Längerfristiger Forschungsbedarf:** Biologie von Drosophila suzukii, Grundlagen für die Entwicklung von Technologien des Integrierten Pflanzenschutzes (IPM), biologische Regulierung durch die Identifizierung, Prüfung und Anwendung wirtsspezifischer natürlicher Antagonisten in China und in Deutschland, Wissenstransfer zwischen Wissenschaft, Beratung und Anbau, Einrichtung von IPM-Demonstrationsflächen, weitere Technologien wie Massenfang, Sterile Insekten technik (SIT), sowie Nachernte-Management.

Um auf diese Fragen einzugehen und um schnelle Fortschritte zu erzielen, ist es notwendig, neue Projekte in beiden Ländern zu initiieren (Experten austausch sowie im Bereich Forschung). Die Teilnehmer kamen darüber hinaus überein, den Wissensaustausch durch die Organisation zukünftiger Treffen und Rundbriefe fortzusetzen. Es wurde festgehalten, dass die geplante Kooperation im Rahmen des Deutsch-Chinesischen Agrarzentrums (DCZ) die nationalen Kompetenzen und verwaltungsmäßigen Aufgabenbereiche der entsprechenden zuständigen Stellen beider Länder nicht berühren wird. Hierbei werden auch die gegenseitigen intellektuellen Urheberrechte respektiert.

Die Abschlusserklärung wurde im Anschluss auch an die beiden Ministerien weitergeleitet.

Fachlicher Ausblick

Aufgrund der sehr spezifischen Thematik und der Dringlichkeit der Situation gelangten die deutschen und chinesischen Workshop-Teilnehmer sehr schnell zu einem engen fachlichen Austausch. Dieser besteht auch nach dem Workshop weiter fort, mit beiderseitiger Versendung von entsprechenden Broschüren, wissenschaftlichen Veröffentlichungen, sowie Austausch von Informationen über praktische Details zu Maßnahmen im Felde, etc. Einige der am Workshop teilnehmenden chinesischen Wissenschaftler von der YAU sowie der Chinese Academy of Agricultural Sciences CAAS nehmen am DROPSA-Projekt im 7. EU-Forschungsrahmenprogramm (FP7) teil, an welchem neben 21 EU-Partnern auch das JKI Institut für nationale und internationale Angelegenheiten der Pflanzengesundheit in Braunschweig beteiligt ist. Im Rahmen dieses Vorhabens ist in Kürze auch der Besuch chinesischer Wissenschaftler in Europa und Deutschland vorgesehen.

Auf dem International Plant Protection Congress (IPPC) im August 2015 in Berlin hat das JKI gemeinsam mit internationalen Kollegen zwei Sektionen mit insgesamt 12 Vorträgen sowie
einen Workshop zur Kirschessigfliege organisiert. Von chinesischer Seite wird eine Reihe von Wissenschaftlern, u.a. von der China Agricultural University (CAU) am IPPC teilnehmen.

**Einordnung in die Arbeit des DCZ**

Der deutsch-chinesische Workshop zur Abwehr und Bekämpfung der Kirschessigfliege war die erste größere Aktivität des Deutsch-Chinesischen Agrarzentrums und zugleich die erste konkrete Aktivität im Bereich der Agrarforschungskooperation des DCZ. Damit entsprach der Workshop den Zielen des DCZ, das sich zur Aufgabe gesetzt hat, die Zusammenarbeit zwischen Deutschland und China im Agrarsektor zu fördern. Das Aufgabenspektrum des DCZ ist bewusst breit angelegt, um Initiativen aus der Sektorpolitik, Forschung, Wirtschaft, Beratung und Praxis aufzunehmen. Das DCZ hat Mittel für kleinere Studien und um Fachleute im Rahmen von Seminaren oder Studienreisen zusammenzubringen. Anregungen, wie sie z.B. in der Abschlusserklärung formuliert wurden, trägt das DCZ gerne weiter auf die fachpolitische Ebene.

Der Workshop war für die Verantwortlichen des DCZ die erste größere Maßnahme und entsprechend zufrieden sind sie über den großen Erfolg. Die Zusammenarbeit während der Vorbereitung, die unter erheblichem Zeitdruck erfolgen musste und während der Durchführung klappte hervorragend. Die chinesische und die deutsche Seite haben im partnerschaftlichen Geist, ihre personellen und finanziellen Beiträge geleistet.

**Danksagung**

Gedankt wird hiermit allen Beteiligten auf deutscher und chinesischer Seite, insbesondere dem BMEL und dem MOA für die Initiative und Auswahl der Experten, der GIZ, dem NATESC und dem FECC für die reibungslose Organisation sowie den beteiligten Wissenschaftlerinnen und Wissenschaftlern beider Länder für die sehr gute fachliche Vorbereitung und inhaltliche Abstimmung ihrer Präsentationen, welche diesen Workshop zu einem Erfolg werden ließen.

**Anhang**

Workshop-Programm

Liste der Teilnehmer
关于中德斑翅果蝇防控研讨会情况的报告

为落实习近平主席 2014 年 3 月 28 日访问德国期间两国政府签署的《德意志联邦共和国联邦食品与农业部与中华人民共和国农业部关于在华共建中德农业中心的框架协议》，经中德两国农业部批准同意，中德农业中心（DCZ）于 2015 年 6 月 16-17 日在京组织召开了中德斑翅果蝇防控研讨会。本次会议高效、务实、成果丰硕，现将有关情况报告如下：

一、会议基本情况

中德斑翅果蝇防控研讨会在北京中欧宾馆举行，一共有 38 位中外专家、代表出席。会议旨在交流斑翅果蝇防控技术与方法，探讨开展合作研究的可能性。与会代表均为两国斑翅果蝇研究领域的顶级专家，学术水平高，极具权威性。通过专题报告交流与合作项目讨论的形式，7 位中方专家和 6 位德方专家交替进行专题研究报告和互动，草签了合作意向，研讨会达到预期目标，取得圆满成功。

二、会议主要成果

中德农业中心成功的举办了此次研讨会，为双方交流斑翅果蝇防控政策和技术，确定下一步拟开展的重点领域提供了一个很好的平台。本次研讨会取得如下成果：

（一）充分和有效发挥中德农业中心平台作用，便于双方进一
步加强开展农业领域国际交流与合作。

（二）双方就合作内容达成共识，草签了协议。内容包括：近期双方拟开展的7项重点工作，划定了20项斑翅果蝇防控研究课题。

（三）双方斑翅果蝇防控领域同行专家第一次进行对话，开展交流与合作。通过研讨会和考察等活动，进一步加深了双方科学工作者之间的了解，增进了友谊。

（四）参会各专家和代表对本次研讨会成功举办获益匪浅，并希望中德农业中心继续组织类似活动。

三、后续工作建议

与会中外专家认为，在中德农业中心合作框架之下，通过设立中德政府间科技合作项目，组织双方科技及管理人员，系统性地开展斑翅果蝇成灾机制与防控技术研究，对保护农业生产生态安全、促进农产品国际贸易具有重大意义。

根据会议讨论，建议双方开展如下合作项目：

（一）斑翅果蝇种群动态及气候-寄主-害虫-天敌互作分化研究，明确斑翅果蝇成灾机制。

（二）斑翅果蝇生物学、生态学研究。

（三）斑翅果蝇监测技术研究。

（四）天敌资源调查、人工繁殖及应用研究。

（五）高效引诱剂及应用技术研究。

（六）高效、安全杀虫剂筛选与应用研究。
附件. 关于中德斑翅果蝇防控研讨会情况的报告

一、背景介绍
自2008年以来，斑翅果蝇呈现全球性扩散，我国是该虫的原发地之一，近年来其危害引起我国政府有关部门高度关注。德国自2011年起监测到该虫，现已扩散至全境，且于2014年爆发成灾。全球气候变化背景下，动植物区系的演变导致了斑翅果蝇的寄主植物格局、天敌及竞争者分布等在原产地（中国）和入侵地（德国）存在较大差异，这种差异所形成的气候-寄主-害虫-天敌的互作分化可能是斑翅果蝇在德国爆发的重要原因。德国以前没有该虫，对这种虫子基本没做什么研究，了解非常有限，在斑翅果蝇预防与控制方面的科学研究和技术储备均明显不足，而我国具有斑翅果蝇原发地的特点且在水果害虫入侵防控领域具有基础研究、应用技术和管理经验的优势。

2014年韩长赋部长访问德国期间，德方提出斑翅果蝇目前在德国危害较大，防控存在技术困难，了解到我国在防控实蝇方面有很好的经验和技术，希望与我部进行合作，借鉴我国的技术和经验，
控制该虫在德国蔓延和爆发。

为落实会谈精神，借助中德农业中心平台，推动中德在防治斑翅果蝇方面开展合作，两国农业部商定于2015年6月在京召开了中德斑翅果蝇防控研讨会。本次研讨会举办高效、务实、成果丰硕，中德双方专家都感受很深，获益匪浅。

二、基本情况

（一）研讨会情况

6月16日，外经中心在北京中欧宾馆召开了中德斑翅果蝇研讨会。我部有关司局及事业单位领导，德国联邦农业与食品部果树植保研究部门、4个联邦州农业植保部门等6位专家，及国内科研院校专家学者，共计38位代表参加了交流。部种植业管理司陈友权副司长与德国驻华使馆农业参赞蒲曼婷女士到会致辞。

陈有权副司长在致词中表示，我国政府高度重视农作物病虫害防治工作，全国已建立了一套以成虫诱杀技术为核心，集农业防治、物理防治、生物防治、化学防治于一体的综合防治技术体系，有效减少了化学农药用量，控制了斑翅果蝇危害，提高了农产品质量安全水平。他强调，中德双方开展斑翅果蝇防控技术和经验交流很有必要，加强务实合作，实现共同防控。蒲曼婷参赞在致辞中对外经中心与中德农业中心（DCZ）为本次会议所做的工作表示感谢，并简要回顾了DCZ与此次研讨会的背景情况，特别强调此次研讨会是中德两国农业部长商定的重点合作项目。
本次研讨会旨在交流和探讨各自的防控技术与方法，讨论开展合作研究的可能性。与会代表均为两国斑翅果蝇研究领域的顶级专家，学术水平高，极具权威性。研讨会通过专题报告交流与合作项目讨论的形式，7 位中方专家和 6 位德方专家交替进行专题学术报告，报告与讨论紧密结合，全程英语互动，最终双方草签了合作意向。研讨会达到预期目标，取得圆满成功。

（二）考察情况

德国专家代表团于 6 月 18-20 日，赴云南省石屏县进行斑翅果蝇技术与防治考察，并参观访问了云南农业大学植物保护学院斑翅果蝇研究组实验室。代表团首先对石屏县杨梅园进行了实地考察，该杨梅园系中德双方联合开展的斑翅果蝇防治研究示范项目，2013 年开始由云南农业大学植物保护学院肖春教授牵头组织实施。肖老师对该地区杨梅园斑翅果蝇发生情况及原因、综合防治方法、项目示范内容与方法等进行了现场讲述，双方围绕斑翅果蝇防治等方面进行了充分的讨论、交流。随后参观了当地的葡萄种植示范园，专家与农户面对面交流，并对种植技术、栽培管理和病虫害防治等问题进行了现场讨论。最后，代表团回到昆明，考察了云南农大学“农业生物多样性应用技术国家工程研究中心”，参观了该中心的仪器设备，听取了 4 位专家关于斑翅果蝇综合防控技术研究进展方面的报告，双方专家就相关技术研究与应用展开了热烈讨论。

三、主要成果
通过研讨和考察等活动，与会代表一致认为，此次研讨会非常成功，为双方交流斑翅果蝇防控政策和技术，确定下一步拟开展的重点领域，提供了一个很好的平台。主要有以下成果：

（一）充分和有效发挥中德农业中心平台作用，便于双方进一步加强开展农业科技交流。

（二）双方就合作内容达成共识，草签了协议。内容包括：近期双方拟开展的7项重点工作，划定了20项斑翅果蝇防控研究课题。

（三）双方斑翅果蝇防控领域同行业专家第一次进行对话，开展交流与合作。通过研讨会和考察等活动，进一步加深了双方科学工作者之间的了解，增进了友谊。

（四）参会各专家和代表对本次研讨会成功举办获益匪浅，并希望中德农业中心继续组织类似活动。

四、后续工作建议

为落实研讨会期间达成的中德双方农业合作意向，建议在两国开展新的有针对性项目，以便进行技术交流和开展合作研究。通过设立中德政府间科技合作项目，组织双方科技及管理人员，系统性地开展斑翅果蝇成灾机制与生态防控研究，对预防重大入侵灾害、保护农业生产和生态安全、促进农产品国际贸易具有重大意义。

（一）斑翅果蝇成灾机制研究

开展斑翅果蝇种群监测、寄主调查、预警体系及网络建设，明确不同生态地理区域中斑翅果蝇成灾机制。
（二）斑翅果蝇生物学生态学研究

开展斑翅果蝇生物学生态学研究，在此基础上研发人工饲料，建立斑翅果蝇实验种群，进行人工饲养。

（三）引诱与趋避技术研究

从驱避与引诱联合作用出发，对现有引诱剂的配方及使用技术进行改良和优化，并解决生产工艺等技术问题；提高引诱剂在不同寄主上的作用效果；研究引诱剂同其它诱杀（如色板、光波）、喷施化学农药等防治技术联用技术。

（四）天敌资源调查、人工繁殖及应用研究

调查斑翅果蝇的天敌，明确优势种；开展天敌优势种的生物学生态学及人工繁殖技术的研究；开展天敌释放、持续保护利用的技术措施研究。

筛选、评价防治斑翅果蝇的高效生防微生物（如白僵菌、线虫等），研究田间控制与流行致病作用及其影响因素，并进行应用技术开发。

（五）开展以环境友好型农药筛选及应用技术为主的应急性灭除斑翅果蝇技术的研究

筛选对天敌相对安全、毒性低、易降解的环境相容性好的农药品种，并完善施药方法，达到既高效消灭害虫又有效保护自然天敌的目的；同时开展斑翅果蝇抗药性监测，以控制害虫抗药性。

（六）构建斑翅果蝇综合无公害防治技术体系
根据斑翅果蝇发生与分布的地理区域规律，集成农业、物理、化学、生物等安全的防治技术措施和有效技术，在不同的生态区域因地制宜构建相应的持续治理技术体系；在综合生物防治、农业防治、物理防治、引诱剂杀灭和合理喷施农药防治等多种技术手段基础上大区域治理和有效持续控制斑翅果树实蝇。

（七）构建国家和地区防控斑翅果蝇的行动实施体系

在有关技术管理部门的指导和管理下，通过组织，形成斑翅果蝇防控工作网络，统一部署、统一规划、统一实施，达到持续有效控制该类害虫危害的目的。

（八）筹备明年在德国举办中德斑翅果蝇防控研讨会

双方一致认为，明年将继续在德国举办第二次中德斑翅果蝇研讨会，为此，应提早与有关部门及德方做好协商，确定明年研讨会举办地点、形式和方案，会议预算和出国计划。

中德农业中心是中德之间开展农业交流与合作的重要平台，在各方共同努力下，中心平台和运行机制逐步完善、内容日趋丰富、层次不断提高，得到两国农业同仁的高度关注和一致认可。本次中德斑翅果蝇研讨会的举办，是中德农业中心成立以来第一个合作项目，标志着中国与德国农业科教、经贸、技术合作迈入了一个新阶段。中德农业中心将密切跟踪有关中德农业合作的进展，在提供政策引导和扶植的同时，适时提供信息服务和支持和咨询服务，力争早日推动各项目进入实施阶段，以实际行动支持我国高校、科研机构成熟
的人才、技术、装备“走出去”。

特此报告。
German-Chinese Workshop on prevention and control of Spotted wing vinegar fly
*Drosophila suzukii*, June 16-20, 2015

Report from the German participants:
Dr. Heidrun Vogt, Dr. Annette Herz, Dr. Kirsten Köppler, Dr. Monique Frosch, Dr. Günter Hoos, Sandra Müller

Preface

The Asian vinegar fly species *Drosophila suzukii* (Spotted wing Drosophila or SWD) was first located in Germany in 2011. During the following years, it spread further over the country and in 2014 it appeared all over Germany. In the first years of its introduction to Germany, fruit infestations occurred predominantly in the southern and southwestern regions, mainly in blackberries, elderberry, blueberries and late raspberries. In 2014, most severe damages were reported all over Germany on a wide range of fruit crops, including cherries and in some grape varieties as well. Furthermore, many non-cultivated host plants were infested. On the part of the fruit and wine growers but also politics, the fast spread across the country and the dimension of damage led to strong apprehensions of crop losses in the future. An effective and sustainable pest management is still lacking due to the short time since arrival of *D. suzukii* and basic research on biology, population dynamics and host range is required.

Native in East Asia, *D. suzukii* is likewise a pest on a range of fruit crops in China, especially in bayberry (*Myrica rubra*) plantations. Since the last decade, some aspects of biology and ecology of *D. suzukii* have been intensively studied and pest management systems have been developed by Chinese research institutions.

The objective of the “German-Chinese Workshop on prevention and control of *D. suzukii*” was to exchange the state of the art in research and pest management in both countries, but also to determine research proposals for potential cooperation in the future.

1. Scientific sessions - June 16, 2015

The scientific workshop was held in the German-Chinese Agricultural Center (DCZ) at Beijing and included 13 contributions from Chinese and German scientists (detailed programme attached)

The workshop was opened by Dr. Chen Youquan, Deputy Director-General, Department of Crop Production of the Ministry of Agriculture (MOA) and Ms. Martine Püster, Counsellor for Food and Agriculture, German Embassy. A brief review was given ranging from the principal idea up to the successful formation of the German-Chinese Agriculture Center (DCZ) as a platform for intensive exchange between Chinese and German scientific institutions with the aim to set up and deepen collaborative research in agriculture and forestry. The workshop on *D. suzukii* is the first scientific activity of the DCZ that has been established in March 2015, one year after the Framework Agreement regarding the German-Sino Agricultural Center between the German Federal Ministry of Food and Agriculture (BMEL) and the Chinese Ministry of Agriculture (MOA) was signed.
The following scientific presentations considered biology and pest status of vinegar fly *D. suzukii* (Drosophilidae) and true fruit flies *Bactrocera* sp. (Tephritidae) on fruit crops in both countries and summarized current research efforts and strategies for pest management and measures to prevent accidental introduction through surveillance and quarantine.

True fruit flies of the genus *Bactrocera* sp. are major pests in fruit crops (citrus, mango and others) in China. In recent years an area-wide IPM program was introduced on more than 600 plantations with about 200 ha which is mainly based on careful monitoring, application of bait sprays (protein bait) and implementation of strict orchard sanitation. Most important was the dissemination of this IPM program to farmers via training, field schools and demonstration plots ([Dr. Yang Puyun, National Agro-Technical Extension and Service Centre (NATESC)](https://www.natesc.com.cn/)). To improve control methods for *B. minax* towards more eco-friendly strategies (especially more effective trapping), current research on behavioral and physiological aspects (feeding, mating, oviposition and diapause) of this fly was reported by [Prof. Niu Changying, Huazhong Agricultural University](https://www.hzu.edu.cn). Feasible methodology for SIT (sterile insect technique) as area-wide management strategy of *B. dorsalis* and *B. curcubitae* was presented by [Prof. Ji Qing’e, Fujian Agriculture and Forestry University](https://www.fjau.edu.cn). Mass rearing techniques, methods for sexing and sterilizing males as well as tools for their release in the orchards have been developed. Furthermore, the mass production and release of several parasitoids specialized on the egg, the larval and the pupal stage is already implemented in order to achieve an "area-wide integrated biocontrol". [Prof. Dr. Li Zihong, China Agricultural University](https://www.cau.edu.cn) gave an overview on
plant quarantine practice and phytosanitary techniques in China regarding prevention of entry and exit of fruit flies. Currently, there are 5 genera and 7 species under quarantine regulation for entry and domestic transportation in China, whereas three species (*B. dorsalis*, *B. curcubitae*, *D. suzukii*) are of concern regarding exportation. There exist 170 bilateral quarantine protocols on fruit export and import between China and other countries, e.g. on *D. suzukii* between New Zealand and Australia. Techniques for risk assessment (climatic modeling), quarantine treatments (heat treatment, cold storage, irradiation), surveillance (especially trapping) and identification (barcoding) are implemented or under development. Dr. Li stressed the need for more collaborative research on the invasion mechanisms of *D. suzukii*. Dr. Heidrun Vogt, JKI - Institute for Plant Protection in Fruit Crops and Viticulture, summarized the history of the rapid invasion of *D. suzukii* in Germany and presented current research findings on seasonal occurrence and dispersal behavior of this species within different natural habitats, cropping systems and also migration on the landscape level. Furthermore, current research topics regarding biology, (chemical) ecology and control strategies were addressed. Dr. Monica Frosch, Hessen Plant Protection Service, evaluated the damage risk for particular fruit crops (mainly sweet and sour cherries, raspberries and blackberries, black currants, other soft fruits) and wild host species (23 out of 46 tested species positive) in the German situation. Furthermore, she reported on damage extent and economic impact of the serious *D. suzukii* infestation in 2014, resulting in crop losses of up to 4 Million Euro in different fruit production areas. Sandra Müller, Chamber of Agriculture Northrhine-Westphalia, characterized in her talk the peculiarities of fruit growing in Germany (mainly small structured, high diverse production, partially protected in tunnels) and outlined the potential impact of *D. suzukii* on future cropping patterns taking into account high investment in protective measures (netting etc.), changing varieties and abandoning minor crops (e.g. elderberry). Dr. Günther Hoos, Rhineland-Palatinate Research and Service Centre for Rural Areas, summarized the particular situation in grape, where high losses due to *D. suzukii* infestation had been reported on several varieties in 2014. Damage on grape by *D.suzukii*, but also other factors led to the propagation of yeast, bacteria, the fast collapsing of the grape and the production of acetic acid which caused deterioration of wine. Color, degree of ripeness (sugar content), fruit damage (wasp, birds, powdery mildew, others) and splitting (heavy rain) could be identified as predisposing factors for *D. suzukii* attack and consequently, measures for prevention were developed and communicated to farmers. Dr. Kirsten Köppler, Center for Agricultural Technology (LTZ) Augustenberg, reported on current control strategies for *D. suzukii* implemented in Germany, including the relevant plant protection products and particular instructions for their application in the different crop systems in the framework of the "emergency use" authorization. Biotechnical solutions (mass trapping, netting, attract & kill strategies) are still not sufficiently effective and intensive research activities are needed for their optimization. Recommendations for fruit growers including harvesting, sanitation and pruning measures have been developed.

In China, *D. suzukii* has been reported as pest on cherries only very recently (presentation of Prof. Niu Changying, Huazhong Agricultural University). It is considered as minor pest and the main damage was observed in bayberry plantations in the Yunnan Province. Prof. Xiao Chun, Yunnan Agricultural University, informed in his talk about the problems caused by *D. suzukii* in bayberry plantations in Yunnan Province, Shiping County. In this area, *D. suzukii* became a serious pest,
reaching damage levels around 60% on fruits in early 2000’s when bayberry growing had peaked to more than 8000 ha. Comprehensive research activities by the Yunnan Agricultural University led to pest management, based on monitoring, mass-trapping, attract & kill with poisoned fruits, orchard sanitation and post-harvest spraying of chemical insecticides. Prof. Xiao is also involved into the DROPISA-project, funded by the EU, where new strategies based on chemical ecology and biocontrol should be developed. The aims and research objectives of this EU-funded project were presented in detail by Prof. Dr. Zhang Feng, MOA-CABI/CAAS with particular emphasis on the work conducted by CABI China. One focus is the comparison of D. suzukii populations from Beijing and Yunnan province concerning their population dynamics (peak in July in Beijing, no serious damage in cultivated fruits in this region), climatic preferences (Beijing population more cold tolerant), host range, including wild plants (Rosaceae are favorite hosts), chemical ecology and natural enemies. These research activities are tackled in close cooperation with CABI Switzerland, another partner within the DROPISA project. Dr. Annette Herz, JKI - Institute for Biological Control, reported on first results of biocontrol of D. suzukii, regarding the use of parasitoids and predators in Germany which accept this invasive insect as new host/prey. Resistance of D. suzukii against native parasitoids was observed, but several predatory species prey on accessible developmental stages (eggs, pupae, adults). Further investigations in cooperation with scientists from Japan (and hopefully also China in the future) on adapted natural enemies are underway, also regarding the search for effective pathogens like entomopathogenic fungi or viruses. In an additional talk, Prof. Yu Yi, Shandong Academy of Agricultural Sciences, informed on his research with regards to genetic diversity of D. suzukii populations from different origins in China and also abroad. Thereafter, D. suzukii occurs in 22 provinces of China with 32 haplotypes. Infection rate of Chinese populations with the endosymbiotic bacterium Wolbachia account to 40 to 80%. Samples of US and Korea showed lower genetic diversity and no infection by Wolbachia.

This comprehensive knowledge in science and technology presented during the previous sessions formed the basis for the following discussion, which was chaired by Dr. Vogt, Dr. Roelcke and Dr. Yang Puyun. Both countries had prepared suggestions for future research. There was a high agreement on the most important topics, which should be intensified in future cooperation and should be incorporated into the Joint Declaration of Intent for further Research and German-Chinese Cooperation to be elaborated on 17th of June.

2. Results and proposed research areas - Joint Declaration of Intent for further Research and German-Chinese Cooperation - June 17, 2015

The participants of the workshop agreed that this workshop has been very successful as a platform to exchange the actual knowledge about Drosophila suzukii and to define further important research topics. Based on the suggestions from both countries the day before, in the following discussion priorities were set and focus was given to short term steps as well as long term research needs, e.g. research on biology, the development of IPM programmes and biological control. Furthermore, a second Sino-German workshop on D. suzukii was suggested to take place in Germany in 2016. The results of the discussion were documented in the final joint declaration (s. Annex).
In order to address these issues and to achieve quick progress, new projects need to be started in both countries and the knowledge exchange shall be continued.

The participants also agreed to respect each other’s intellectual property rights and that the envisaged cooperation within the framework of the DCZ will be without prejudice to the national competencies and administrative scopes of the respective authorities in the two countries.

3. Technical visit of red bayberry (*Myrica rubra*) orchards and table grape vineyards in Shiping County, Yunnan Province- June 19, 2015

3.1 Red bayberry (*Myrica rubra*)

Red bayberry is the main fruit crop in Shiping County in the South-West Chinese province of Yunnan, situated 1,000 to 2,000 m.a.s.l. at the transition zone between southern subtropics and tropics, and 280 km south of the provincial capital Kunming. The orchards extend widely over the hills, forming a connected growing area. The fruit is harvested in May and June. The underground in the orchards is not covered and there are only few other plants around which could serve as host plants for *D. suzukii*, e.g. *Solanum nigrum*, *Phytolacca americana* and *Lantana camara* along the farm roads.

In the visited eight year old red bayberry orchard, the colleagues of Yunnan Agricultural University have performed field trials in mass trapping combined with short harvesting intervals and hygienic measures since several years. For monitoring, 1 trap/0.33 ha is installed, for the control of *D. suzukii* 75 traps/ha.
The bait used contains different ingredients (e.g. sugar, vinegar, wine, fruit pulp of ripe fruits and water), of which the composition is not yet published. Prof. Xiao Chun also mentioned the combination of the bait with a pheromone, but did not describe details. The bait is renewed every 3-4 days. Usually, all fallen fruit is removed from the orchard and the trees are picked completely, so that no overripe fruit remains in the orchard. At the date of our visit, these hygienic measures were not consequently implemented, which was explained by the low population level of *D. suzukii* in 2015, caused by high temperatures above 30 °C and very low humidity. We learned that there is no application of plant protection products on growing fruit, but post-harvest treatment of the plantation is undertaken by using spinosad, abamectin or imidacloprid.

During the dry season in Shiping County (December to May), no or only few numbers of *D. suzukii* are caught in monitoring traps. Most *D. suzukii* are trapped from July to September. This can be explained by the beginning of the rainy season in June, so subsequently the climatic conditions for the development and reproduction of *D. suzukii* grow optimal. In addition, there has been an extreme drought in SW China since several years which still continues. In combination with the relatively short ripening time of red bayberry (15-20 days from turning to red until harvest) and the low occurrence of other host plants, these facts might be an important reason for low *D. suzukii* populations and consequently low fruit damage. Unfortunately, the field trials of mass trapping did not include untreated control areas for comparison because of the risk of high financial loss. Nevertheless, we agreed that it is important to consider untreated control plots in order to allow a better validation of the gathered data and conclusive results of scientific value.

Since the climatic conditions, the landscape scenery and the kind of production are very different to German conditions, the experiences in pest management cannot be transferred directly, but are an important information to complement the state of knowledge of *D. suzukii*.

### 3.2 Table grape vineyard

Viticulture in China is in a phase of extremely dynamic development. According to the most recent OIV statistics, the People’s Republic has close to 800,000 hectares of vineyards, putting it in second place worldwide, after Spain. Whereas in the past grapevines were planted primarily with the aim of producing table grapes, there is a continuous trend towards increased use for the production of wine, particularly using the traditional European varieties. For climatic reasons, the wine-producing regions tend to be concentrated in the north of the country, while table grapes are also planted further south.
Surprisingly, there was no discussion during the meeting about problems in viticulture related to the spread of *Drosophila suzukii* in table grape vineyards. It must thus be assumed that the pest is not yet perceived as a problem in China in this type of agricultural environment.

Within the framework of the excursion, we visited a table grape producer cultivating approx. 400 mu (approx. 27 ha) of vineyards, which were planted with a red ('hei ti' domestic) and a white grape. The white grape variety was hong ti (American variety, judging by the taste this was a crossing with Vitis labrusca). The production area was situated in the valley close to the town Shiping. Harvest was in progress. The major part of the plantation is laid out in European style with cordon-type trellised vines, with a smaller section of pergola trellising, the farm is equipped with drip irrigation. Some sections were equipped with foil roofing, in order to accelerate the harvest date. To ensure even ripening, the grape bunches are wrapped in paper covers open at the bottom for ventilation purposes, which provide protection from rain and birds. The planting density of approx. 10,000 vines per hectare produces a yield of up to 30 t/ha.

According to the grower this grape variety is not susceptible to *D. suzukii* which has so far not been observed in this location. Aphids and *Scarabaenus saucer* are the most important animal pests. Chinese scientists confirmed that no damage due to *D. suzukii* has been observed for grape varieties in other regions of China either.

This could be attributed to the following reasons: the grape skins of the grape varieties planted here are relatively tough (a few grapes, which had not been harvested, could still be tested in this respect), the grapes are harvested at a point in time when aroma formation is still very weak, and there are no micro-splits in the grape skin which could encourage egg deposition.

In addition, the methods used in the vineyard do not encourage a build-up in the population of fruit-flies. There is hardly any ground cover between the rows of vines, the grape zone is extensively defoliated, and all grapes that cannot be utilized are removed from the vineyard after the harvest.

Conclusion: Because of the grape varieties cultivated here, the harvesting time in early summer as well as of the physiological maturity level of the grapes, one can only deduce strategies for procedures in German viticulture to a very limited degree.

- Grape bunches wrapped in paper, discarded grape (Photo G. Hoos) – Harvested grapes (Photo H. Vogt)
4. Visit of Yunnan Agricultural University (YAU) in Kunming, Yunnan - June 20, 2015

The last part of the stay in China was the visit of the Yunnan Agricultural University in Kunming. This university was founded in 1938 and has currently about 20,000 students. 72 staff members and about 920 students belong to the School of Plant Protection with 4 departments: Agricultural Entomology, Pesticide Sciences, Plant Pathology and Plant Quarantine. Initially Prof. Ye Min introduced the Laboratory of Pesticide, Environmental Behavior and Chemical Ecology with its main tasks and focus of research.

The second part of the visit was a scientific colloquium of Prof. Xiao Chun’s students, who work on pest organisms, especially on *D. suzukii*: In the 1st talk by Mrs. Liu Yan the first steps of the collection, extraction and analysis (GC-EAD) of volatiles of different ripening stages of cherries were presented. The main intention of this study was the development of a bioassay to analyse behavioral reactions on the identified volatiles (i.e. feeding, calling, mating, oviposition) of *D. suzukii*. This study was still at the beginning. The 2nd presentation of Mrs. Chen Xiao was about the demography and life table studies of *D. suzukii*: “Study on development of *Drosophila suzukii* at different temperatures”. An experimental population was held in the lab and different development stages were kept under various constant temperatures. It was shown that with increasing temperatures from 15 to 27°C the whole generation time (including pre-oviposition phase) decreased. The generation time was slightly prolonged at 30°C, but fitness of adults and developmental rate until adult stage decreased. At 35°C no larval hatch was observed. For the investigated population the average lower temperature threshold was 7.5 °C and the average upper temperature threshold was 26.3°C.

The next speaker, Mrs. Zhang Limin, presented data on the population dynamics of SWD in time and space including some trapping results of *D. suzukii* in the field. The main trap catches were observed in July and August and about 100 % of the trapped population was reached in December. Factors which influence population dynamics and the carrying capacity of a habitat/the environment were discussed. The following presentation described the “Occurrence regularity of fruit fly in *Myrica rubra* orchard and integrated control techniques” with a comparison of the different *Drosophila* and two other fruit fly species in the orchard and in *Myrica* fruits. *D. suzukii* was observed as the dominant species in the orchard and only *D. suzukii* and *D. melanogaster* were found in the fruits. It was shown that the variety, the fruit maturity of *Myrica rubra* as well as the climatic conditions influenced the infestation level.

The proposed integrated control measures were regular monitoring and control of fruit infestation, pruning and hygienic measures or postharvest treatments. Natural enemies of *D. suzukii* were also investigated in this study, but further research on it is needed. Until now four parasitoid species were found: *Ganaspis spec.*, *Leptopilina spec.*, *Trichopria drosophilae* and *Pachycerepoideus vindemniiae*.

In the last talk of this scientific session Dong Wenxia presented results of electro-physiological responses of several pest insects to plant volatiles. *D. suzukii* responded in a first electrantennogram to cis-hexen-1-ol.

All speakers have shown a high scientific level. The general results confirmed the experiences with *D. suzukii* which were made in Germany until now. The discussed questions and demonstrated
methods correspond with those in other research laboratories and working groups and collaborations and scientific exchange could lead to a more effective development of a sustainable and integrated control strategy of *D. suzukii*.

5. **Conclusive considerations on the actual situation in SWD management in fruit production in China and in Germany**

*Myrica rubra*, the Chinese or Red Bayberry, is certainly not the most important fruit crop in China in respect to the production volume, but it is of significant economical value especially in the provinces south of the Yangtze River. Production in China has increased dramatically over the last decade. In Shiping County, the planting area is of 8000 ha (production value = 220 m. €/year). Many efforts have been realized to control *D. suzukii* with different methods as described before. The measures taken are very labor intensive. Regarding this crop, this is of no problem as very good prices can be achieved especially at the beginning of the harvest period. During the harvesting period application of plant protection products does not occur on the *Myrica* trees in the province of Yunnan, but post-harvest treatment is recommended. The production is called “green food”, which is an intermediate standard between IPM, biocontrol and organic farming. As Prof. Xiao Chun stated, the quality of the fruits is very important and residues of plant protection products in the fruits are not accepted. The measures which are taken seem to suit well for the visited region. The original intensity of attack of 60% (in the year 2000) decreased to 1% nowadays. The reason for this reduction is not scientifically evident yet as the results of the monitoring in “treated” orchards could not be compared to “untreated” for the reasons mentioned before. Sanitation measures play certainly a big role for the reduction of *D. suzukii* populations. As mentioned before, the *Myrica* orchards form rather uniform extended plantation areas with no or very few other fruit species which could serve as host. In addition the recommended measures are presumably executed at the same time. The severe drought observed in the past years in a big part of South-West China might as well have been a natural factor for the reduction of the *D. suzukii* population. In grapes, *D. suzukii* seems to be of little significance. No information was given on the fly's impact on production of cherry and blueberry in China. Apparently some infestation has been observed locally in cherries. There was no information on the extent of the attack or on damages.
Despite its wide-spread distribution, *D. suzukii* does presently not seem to be of great economic importance on the entire fruit production in China. The reason for it could be the mentioned factors as climate, especially long dry periods, the presence of established natural enemies and the labor-intense control measures. Probably the cultivar may also have an influence. So far, there are more than 300 *Myrica* cultivars in China.

Because of many differences to the situation in Germany, such as host plant, huge uniform plantation area, short fruit season, labor intensive hygiene measures, climate and population dynamics of *D. suzukii* it is not possible to transfer the Chinese strategy applied in the *Myrica* plantations directly to German cropping systems. However, components of the management strategies, such as monitoring, hygienic measures, development of bait & kill techniques, safe integration of insecticides, intensive consultation of the farmers etc. are also followed in Germany.

Concerning the sanitation methods, in Germany these include pruning of the plants (i.e. plantations should be not too dense, but well ventilated). Especially for grapes defoliation around the ripening fruits is an option as *Drosophila* prefers to avoid bright sunlight and high temperatures. With regard to strict harvest of all fruits, especially infested ones and their elimination from the orchard, this is difficult to implement, as especially for soft fruits it is extremely labor intense and would lead to high additional costs and lower the profitability drastically.

Post harvest treatment is always recommended in China in order to drastically reduce the population. It remains uncertain whether this actually does affect the population of the following year as weather conditions during the following 10 months have significant effects on the development of the insect. Nevertheless appropriate trials should be conducted in Germany in order to generate reliable recommendations concerning the registration of and permission to use appropriate chemical substances.

Mass trapping has not revealed to be effective in Germany nor in other European countries up to now. It could delay the infestation in some cases, but would not prevent economical damages, especially under high population pressure. The German landscape scenario in many fruit production regions with small production plots and a mosaic of hosts habitats (cultivated and uncultivated) as well as refuge areas (hedges, forests) also is an issue, as it offers *D. suzukii* ideal survival and reproduction conditions and leads to steady reinfestation of cultivated crops.

Mass trapping or Bait & Kill (ideally Attract & Kill) might be options in future, but these methods need highly attractive and specific attractants. Prof. Xiao explained that they worked on their bait for 10 years and he still sees the need for optimization. It might also be necessary to adapt the mixtures with regard to the host fruit to be protected. Concerning pheromones, no pheromone production is known in *D. suzukii*, in contrast to the production of the pheromone cis-11-octadecenyl acetate (cVA) in the *Drosophila melanogaster* group, where it plays a role in sexual and social behaviors. According to recent findings, *D. suzukii* males, can still detect cVA inspite of reduced receptors, but the chemical functions as repellent, not as attractant. Hence, the search for attractants is focused on food and host fruit volatiles. On the other hand, repellents are searched for. Further strategies are listed in the Joint Declaration.

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Actually in both countries, SWD management is mainly based on technical methods (monitoring, sanitation, i.e. pruning, short picking intervals, as far as possible complete picking of ripe and rotten fruits, cooling of fruit as post harvest treatment) and integration of insecticides. In China mass trapping is used as described above, in Germany protecting the crops with nets is being investigated as an option for some crops, but it is very cost intensive.

6. General conclusion from the workshop and the excursion

The workshop acknowledged the complexity of the pest insect *D. suzukii*. Its damage potential is influenced by a series of factors such as climate, cropping structure, availability and diversity of host plants (cultivated and non-crop ones) in time and space, antagonists, landscape. While the growing conditions and the damage extent in China differ distinctly from those in Germany, the main research topics and the basic recommendations for control are quite similar.

Based on the excellent understanding of the participants both on scientific and personal level and the urgent need for intensified research to find solutions for the severe problems caused by *D. suzukii*, the participants established an intensive professional discussion and documented the main research needs as results from the workshop in a Joint Declaration (see Annex and paragraph 2). The knowledge exchange will be continued, e.g., by the exchange of scientific publications, leaflets and practical information. The start of new projects in both countries (for personnel exchange and for research) will need further discussions and efforts.

Some of the Chinese participants from the Yunnan Agricultural University and the Chinese Academy of Agricultural Sciences (CAAS) are involved in the DROPSA-Project in which also the JKI Institute for National and International Plant Health in Braunschweig takes part as one of the 21 EU-Partners. In the course of this project, a visit of Chinese experts to Europe and Germany is planned soon. Furthermore, some Chinese scientists from the China Agricultural University (CAU) in Beijing have participated in the International Plant Protection Congress (IPPC) in August 2015 in Berlin. Together with international colleagues, the JKI has organized two sections and a workshop on *D. suzukii* at the IPPC.

Acknowledgements

The workshop and the excursion were perfectly organized. We thank all involved institutions and persons, the German Federal Ministry of Agriculture (BMEL), the Chinese Ministry of Agriculture (MOA), the Embassy of the Federal Republic of Germany in Beijing, the German-Chinese Agricultural Center (DCZ), the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, the Foreign Economic Cooperation Center (FECC) and the National Agricultural Technology Extension and Service Center (NATESC).

We thank all involved Chinese colleagues and experts for the perfect organization, in particular Mr. Yu Ge and Mr. Xie Dongsheng of FECC and Dr. Yang Puyun of NATESC, and for the excellent scientific exchange, including the most valuable visit to the *Myrica rubra* fruit production area in
Shiping County, Yunnan Province and to the Yunnan Agricultural University in Kunming, under the perfect guidance of Prof. Xiao Chun, and last but not least for the overwhelming hospitality.

On the German side, we thank Mr. Conrad von Hoyos (DCZ) for the strong support. Special thanks go to Dr. Marco Roelcke (DCZ), who intensely helped us from the beginning in the organization of the journey, accompanied us the whole time, was a perfect interpreter to help us in the scientific communications as well as in all questions in daily life and gave us valuable insight in the Chinese culture. We appreciated very much his personal engagement and enthusiasm.

Annex

Results from the German-Chinese Workshop on Prevention and Control of Spotted Wing Drosophila – Joint Declaration of Intent for further Research and German-Chinese Cooperation

Detailed Program

List of Participants
Results from the German-Chinese Workshop on Prevention and Control of Spotted wing vinegar fly  
June 16 -20, 2015, Beijing

The participants of the workshop agree that this workshop was very successful as a platform to exchange the actual knowledge about *Drosophila suzukii* and to define further important research topics.

These are the following:

**Short-term steps ahead**

- **Technical methods**: List all methods in both countries already recommended to growers to reduce *Drosophila suzukii* population pressure and damages
- **Chemical control**: List the insecticides currently in use and the efficacy, including their details on their application, effects on the environment, compare MRL lists
- **Biocontrol**: Exchange of insect material to identify pathogenes (dried specimen), (parasitoids?)
- **Mass-trapping**: Exchange on existing methods and experiences
- **Mutual dialogue** on the extension services
- **Exchange** available publications, leaflets, practical information, website
- **Sino-German workshop** on D.*suzukii* in Germany in 2016?
1. Research on Biology

1.1 Research on life cycles & biological behaviors of *Drosophila suzukii*, including its host range, population dynamics and migration on landscape level in the main typical eco-zones and its distributions in China & Germany.

1.2 Research on its developmental biology, including the duration of different insect stages, the correlation between its developmental durations and environmental factors such as temperature & humidity etc..

1.3 Investigation on the ovarian development of females and related reproductive diapause.

1.4 Investigations on the correlations between its population dynamics and environmental factors such as temperature & humidity, latitude and altitude, etc. on major host crops.

1.5 Investigations & assessment of damages to major crops of economic importance, research on the economic threshold levels for taking control actions.

2. Research on topics as a base for the development of IPM technologies

2.1 Evaluate the effectiveness of current agricultural practices, such as field sanitation (complete harvest, short picking intervals, removal and treatment of dropped fruits, pruning methods, soil and green cover management, netting.....)

2.2 Evaluate the effectiveness of current olfactory luring technologies currently used in China

2.3 Chemical ecology: identify attractants or repellents to improve/develop optimized monitoring devices, attract & kill methods (traps, spot treatments) and push&pull strategies.

2.4 Investigate baits and improve effectiveness of traps

2.5 Research on host preference & host resistance with the objective to use repellent or trapping plants

2.6 Integrate and evaluate promising new and environmentally safe insecticides for IPM

2.7 Develop forecasting models, including thresholds
3. Research on biological control

3.1 Investigation & identification of natural antagonists (parasitoids, predators and pathogens), especially host-specific species in China and Germany.

3.2 Evaluate the effectiveness and host-specificity of the identified natural antagonists

3.3 Research on mass-producing and application techniques of the identified antagonists

3.4 Evaluation of the efficacy of the antagonists in the field

4. IPM transfer into practice

4.1 Ongoing knowledge transfer between science, extension service and growers:
   workshops, training courses, technical meetings, farmers field days, actual information via newsletter, e-mail alerts, SMS, (e.g., hortigate website...) , audio-visual material, etc.

4.2 If possible: Establish IPM demonstration fields and evaluate the economic, social & environmental appropriateness of the IPM technologies
Further technologies

**SIT:** Based on the experience of the successful implementation of SIT in the control of the tephritid fly *Bactrocera dorsalis* in China, SIT might be an option for controlling *D. suzukii*. This will need a lot of basic research and is a very cost-intensive method which requires a huge logistic effort and areawide management. Also, *D. suzukii* is a very difficult target due to its high reproduction rate and wide distribution. Research on this topic is optional.

**Mass-trapping:**
Essential in China! Carry out field trials on mass-trapping.

**Post harvest management:**
On the fruits (e.g. hydrocooling) and in the orchard (e.g. complete removal of the fruits)

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**Final remarks**

The envisaged cooperation within the framework of the German-Chinese (Sino-German) Agricultural Center (DCZ) will be without prejudice to the national competencies and administrative scopes of the respective (relevant) authorities in the two countries.

In order to address these issues and to achieve quick progress, new projects need to be started in both countries (for personnel exchange and for research).

The participants agree to continue the knowledge exchange by organizing future meetings and circular letters.

We respect each other’s intellectual property rights.

- **Group leader (German side):** Dr. Heidrun Vogt
- **Group leader (Chinese side):** Dr. Yang Puyun
- **DCZ (German side):** Mr. Conrad Graf von Hoyos
- **DCZ (Chinese side):** Mr. Yu Ge

Beijing, 2015-06-17
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<td></td>
<td>08:30 AM</td>
<td>Arrival German delegation</td>
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<td>Whole day</td>
<td>Arrival and registration</td>
<td>German-Chinese Agricultural Center (DCZ)</td>
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<td>June 15</td>
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<td></td>
<td>18:30-20:00</td>
<td>Dinner</td>
<td>German delegation, DCZ</td>
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<td>9:00-9:30</td>
<td>Opening ceremony</td>
<td>Dr. Chen Youquan, Deputy Director-General, Department of Crop Production (MOA)</td>
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<td>June 16</td>
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<td>中国农业部种植业管理司 陈友权副司长</td>
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<td>Ms. Martine Püster, Counsellor for Food and Agriculture at the Embassy of the Federal Republic of Germany</td>
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<td>德国驻华使馆农业参赞蒲曼婷女士</td>
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<td></td>
<td>9:30</td>
<td>Scientific morning session</td>
<td>Chairman: Dr. Marco Roelcke, TU Braunschweig</td>
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<td>Time</td>
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<tr>
<td>9:30-9:55</td>
<td>Rapid invasion of <em>Drosophila suzukii</em> in Germany, its seasonal phenology in cultivated crops and on landscape level</td>
<td>Ms. Dr. Heidrun Vogt, JKI-Institute of Plant Protection in Fruit Crops and Viticulture, Dossenheim</td>
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<tr>
<td>9:55-10:20</td>
<td>A case of successful area-wide IPM program for controlling <em>Bactrocera minax</em> in China</td>
<td>Dr. Yang Puyun, Director, Division of Pest Control, National Agro-Technical Extension and Service Centre (NATESC)</td>
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<td>10:20-10:40</td>
<td>Coffee/Tea Break</td>
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<td>10:40-11:05</td>
<td>Damage capability and damage extent in fruit production</td>
<td>Ms. Dr. Monique Frosch, Hessen Plant protection service, Wetzlar</td>
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<td>11:05-11:30</td>
<td>The entry and exit quarantine of fruit flies in China</td>
<td>Prof. Dr. Li Zhihong, China Agricultural University (CAU)</td>
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<td>11:30-11:55</td>
<td>Effects of <em>Drosophila suzukii</em> on fruit production and cropping patterns in Germany</td>
<td>Ms. Sandra Müller, Northrhine-Westfalia Plant protection service, Münster</td>
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<td>12:00-13:30</td>
<td>Lunch</td>
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<td>13:30</td>
<td>Scientific afternoon session</td>
<td>Session chairman: Dr. Yang Puyun</td>
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**Note:** The schedule includes talks on the rapid invasion of *Drosophila suzukii* in Germany, successful area-wide IPM program for controlling *Bactrocera minax*, damage capability and extent in fruit production, the entry and exit quarantine of fruit flies in China, and effects of *Drosophila suzukii* on fruit production and cropping patterns in Germany. The session also includes a lunch break and an afternoon scientific session.
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<tr>
<th>Time</th>
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| 13:30-13:55 | Advancements in ecology based integrated management of *Drosophila suzukii* in northern China | Prof. Dr. Zhang Feng  
MOA-CABI Joint Laboratory of Bio-safety, Chinese Academy of Agricultural Sciences (CAAS)  
张峰 研究员 主任  
中国农业科学院 CABI |
| 13:55-14:20 | *Drosophila suzukii* in German wine growing regions: State of the art and investigations to prevent economic damage | Dr. Günter Hoos, Rhineland-Palatinate Service Centre for Rural Zone, Neustadt an der Weinstrasse  
Günter Hoos 博士莱茵兰-普法尔茨州农村区域服务中心，魏因施特拉瑟的诺伊施塔特 |
| 14:20-14:45 | Experiences on the management of vinegar fly in Yunnan Province | Prof, Xiao, Chun. Yunnan Agricultural University, Kunming  
云南农业大学 肖春教授 |
| 14:45-15:10 | Control strategies against *Drosophila suzukii*: prospects and limits in fruit crops in Germany | Ms. Dr. Kirsten Köppler, Baden-Württemberg Centre for Agricultural Technology (LTZ) Augustenberg  
Kirsten Köppler 博士  
巴登符腾堡州农业技术中心，奥古斯滕堡 |
| 15:10-15:30 | Coffee/Tea Break 茶歇 |  |
| 15:30-15:55 | Research on biology and monitoring of *Bactrocera minax* in China | Prof. Niu Changying,  
Huazhong Agricultural University, Wuhan  
华中农业大学 牛长缨教授 |
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<tr>
<td>15:55-16:20</td>
<td>Biological control of <em>Drosophila suzukii</em> in Germany: Current status and future prospects</td>
<td>Ms. Dr. Annette Herz, JKI-Institute for Biological Control, Darmstadt</td>
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<td>德国斑翅果蝇的生物防治：现状和前景</td>
<td>Annette Herz 博士生物防治研究所，达姆施塔特</td>
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<td>16:20-16:45</td>
<td>Biological control and use of SIT technology in the management of fruit flies in China</td>
<td>Prof. Ji Ching 'e, Fujian Agriculture and Forestry University</td>
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<td>实蝇类害虫的生物防治和雄性不育控制害虫技术</td>
<td>福建农林大学 季清娥教授</td>
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<tr>
<td>16:45-17:10</td>
<td>Topic for discussion: Research questions and upcoming projects and collaborations</td>
<td>Dr. Heidrun Vogt and all members of the German delegation</td>
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<td>讨论话题：需要研究的课题和即将开展的项目与合作</td>
<td>Heidrun Vogt 博士和其它所有德国专家</td>
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<td>17:10-17:30</td>
<td>Open questions exchange and discussion</td>
<td>NATESC</td>
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<td>问题交流与讨论</td>
<td>全国农技中心</td>
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<td>Dinner</td>
<td>DCZ  NATESC</td>
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<td>晚餐</td>
<td>中德农业中心  全国农技中心</td>
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June 17

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<tr>
<td>9:00-10:30</td>
<td>Discussion and draft proposals for cooperation projects</td>
<td>NATESC</td>
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<td>讨论和起草合作项目</td>
<td>全国农技中心</td>
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<td>10:30-10:45</td>
<td>Coffee/Tea Break</td>
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<td>茶歇</td>
<td>全国农技中心</td>
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<td>10:45-12:15</td>
<td>Preparation of Joint Declaration of Intent</td>
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<td>准备合作意向</td>
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<td>12:15-13:15</td>
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<td>13:15-15:00</td>
<td>Final preparation of Joint Declaration of Intent</td>
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</tr>
<tr>
<td>15:00-19:00</td>
<td>Free time</td>
<td>German delegation, (DCZ)</td>
</tr>
<tr>
<td>19:00-21:00</td>
<td>Dinner</td>
<td>German delegation, DCZ</td>
</tr>
<tr>
<td>06:45 AM</td>
<td>Departure from Landmark Hotel</td>
<td></td>
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<tr>
<td>08:30 AM-11:55 AM</td>
<td>Flight Beijing-Kunming</td>
<td>Flight MU 5717</td>
</tr>
<tr>
<td>13:00</td>
<td>Lunch in Kunming</td>
<td>Yunnan Agricultural University</td>
</tr>
<tr>
<td>14:00-19:00</td>
<td>Transfer to Shiping County</td>
<td>DCZ, NATESC and German delegation</td>
</tr>
<tr>
<td>19:30-20:30</td>
<td>Dinner in Shiping County</td>
<td>Sheping County Deputy County Magistrate, Local agricultural and plant protection officials</td>
</tr>
<tr>
<td>08:00-11:00</td>
<td>Visit Red Bayberry (Myrica) orchard, laboratory and technical products</td>
<td>DCZ, NATESC and German delegation; Prof. Xiao, Chun; Head of Plant Protection Station</td>
</tr>
<tr>
<td>Time</td>
<td>Activity</td>
<td>Location</td>
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<tr>
<td>11:00-12:00</td>
<td>Lunch</td>
<td>Yunnan Agricultural University</td>
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<tr>
<td>12:30-17:30</td>
<td>Return to Kunming</td>
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<tr>
<td>18:30-19:30</td>
<td>Dinner</td>
<td>Yunnan Agricultural University</td>
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<td></td>
<td></td>
<td>云南农业大学</td>
</tr>
<tr>
<td>June 20</td>
<td>Visit laboratory of Yunnan Agricultural University</td>
<td>DCZ, NATESC and German delegation</td>
</tr>
<tr>
<td>08:30-11:30</td>
<td>Visit laboratory of Yunnan Agricultural University</td>
<td>中德农业中心、全国农技中心和德方代表团</td>
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<tr>
<td></td>
<td>Discussion and exchange, summary</td>
<td>中外交流和讨论、总结</td>
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<tr>
<td>11:30-12:30</td>
<td>Lunch</td>
<td>Yunnan Agricultural University</td>
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<td>云南农业大学</td>
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<tr>
<td>14:05 PM-17:15 PM</td>
<td>Flight Kunming-Beijing</td>
<td>Flight 航班 MU 5880</td>
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<tr>
<td>Ca. 19:00</td>
<td>Dinner near Capital Airport</td>
<td>German delegation 德国专家</td>
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<tr>
<td>June 21</td>
<td>Departure German delegation</td>
<td>德国专家回国</td>
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<tr>
<td>02:05 AM</td>
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<td>LH7323</td>
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<tr>
<td>Name</td>
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<tr>
<td>Ms. Martine Püster</td>
<td>Counsellor for Food and Agriculture at the Embassy of the Federal Republic of Germany</td>
<td></td>
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<tr>
<td>Dr. Yvonne Gall</td>
<td>Agriculture Counsellor Veterinary Affairs, Embassy of the Federal Republic of Germany</td>
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<tr>
<td>Dr. Heidrun Vogt</td>
<td>JKI, Institute of Plant Protection in Fruit Crops and Viticulture, Leader of subject area ‘Entomology in Fruit Growing’</td>
<td></td>
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<tr>
<td>Dr. Annette Herz</td>
<td>JKI, Institute for Biological Control, Teamleader of Laboratory 'Beneficial arthropods and Entomology'</td>
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<tr>
<td>Dr. Monique Frosch</td>
<td>Hessen, Regional council, Plant protection service, Deputy Director, Head of Diagnosis lab. Entomology, Nematology</td>
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<tr>
<td>Ms. Sandra Müller</td>
<td>Northrhine-Westfalia, Chamber of Agriculture, Plant protection service</td>
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<tr>
<td>Dr. Günter Hoos</td>
<td>Rhineland-Palatinate, Service Centre for Rural Zone (DLR) Rheinpfalz, Director</td>
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<tr>
<td>Dr. Kirsten Köppler</td>
<td>Baden-Württemberg, Centre for Agricultural Technology (LTZ) Augustenberg, Team leader ‘Plant protection in fruit-crops’</td>
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<tr>
<td>Mr. Conrad Hoyos</td>
<td>German-Chinese Agricultural Center DCZ</td>
<td></td>
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<tr>
<td>Dr. Marco Roelcke</td>
<td>Institute of Ecology, Technische Universität Braunschweig</td>
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<tr>
<td>Li Yingjuan</td>
<td>German-Chinese Agricultural Center DCZ</td>
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</tr>
<tr>
<td>姓名</td>
<td>单位</td>
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</tbody>
</table>
| 陈友权     | 农业部种植业管理司 副司长  
Deputy Director-General, Department of Crop Production, Ministry of Agriculture, P.R.China |
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| 王建强     | 农业部种植业管理司 处长  
Division Director, Department of Agricultural Planting Management, Ministry of Agriculture, P.R.China |
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| 24 | 吴瑞成  
Wu Ruicheng | 农业部对外经济合作中心 项目官员  
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| 25 | 张田雨  
Zhang Tianyu | 农业部对外经济合作中心 项目官员  
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| 27 | 肖春  
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Yunnan Agricultural University |
| 28 | 牛长缨  
Prof. Niu Changying | 华中农业大学 教授  
Huazhong Agricultural University |
| 29 | 季清娥  
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| 30 | 李志红  
Prof. Li Zhihong | 中国农业大学 教授  
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| 31 | 宋荣  
Song Rong | 先正达（中国）投资有限公司 植保产品研发高级经理  
Head Product Biology, Syngenta (China) Investment Co., Ltd. |
| 32 | 胡全胜  
Hu Quansheng | 拜耳作物科学公司 杀虫剂研发部总监  
Sr. Product Development Manager—Insecticide, Bayer Crop Science (China) Company Limited |
| 33 | 魏雨钊  
Wei Yuzhao | 拜耳作物科学公司 新业务拓展部总监  
Head of New Business Development, Bayer Crop Science (China) Company Limited |
| 34 | 张峰  
Zhang Feng | 国际应用生物技术研究中心 主任  
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| 35 | 张金平  
Zhang Jinping | 国际应用生物技术研究中心 博士  
Project Scientist, MOA-CABI Joint Lab for Bio-safety Institute of Plant Protection |
| 36 | 辛力  
Xin Li | 山东果树所 副所长  
Shandong Institute of Pomology |
| 37 | 孙瑞红  
Sun Ruihong | 山东果树所 植保室主任  
Shandong Institute of Pomology |
| 38 | 武海斌  
    | Wu Haibin   |
|-----|-------------|
|     | 山东果树所助理研究员  
    | Shandong Institute of Pomology |