



## Subject | Minutes of the 2nd iPLANTA Conference

### iPLANTA COST Action CA15223 RNAi: THE FUTURE OF CROSS TALK

#### Focus on RNAi Technology (WG1) and Applications (WG2)

14-16.02.2018

Faculty of Biology, Adam Mickiewicz University

Poznań, Poland

#### 0. - Introduction

Experts from 25 countries involved in the iPlanta COST network were invited to present and discuss the state of the art focused on RNAi technology (WG1) and the application of RNAi technology in GM plants (WG2), among the other issues such as biosafety, socio-economics and communication on RNAi. We extended the invitation to the Polish scientists and stakeholders to attend the iPlanta Satellite meeting (Polish node), sponsored by the KNOW program. iPlanta COST Action Management Committee delegates were also invited to participate in the MC meeting that was held at 16th February.

#### 1. Welcome to participants to the satellite meeting “RNAi Research in Poland”

The satellite meeting aimed to disseminate the Action by the Polish experts and at some time to promote the research made in Poland in this domain. The participants were welcomed by Prof. Bruno Mezzetti, Chair of the Action, and by Dr. Jorge Paiva, Polish delegate to the MC of the iPlanta COST action, Prof. Zofia Szweykowska-Kulińska Director of the Institute of Molecular Biology and Biotechnology of the Department of Biology of the Adam Mickiewicz University, also an expert of iPLANTA COST Action. Prof. Bruno Mezzetti presented the iPlanta Cost Action to the participants, followed by the presentation of the Satellite Meeting and invitation of the participants to the 2<sup>nd</sup> iPlanta Cost conference, by Dr. Paiva. Finally, Prof. Zofia Szweykowska-Kulińska opened the satellite meeting.

#### 2. Outcome of the Satellite meeting “RNAi Research in Poland”

*Satellite meeting was focus on the “New aspects on miRNA biogenesis and applications” (Poland contribution)*

The satellite meeting was organized into two sessions, each one with four oral communications. New aspects of miRNA biogenesis were presented. miRNA are small RNA molecules that down-regulate (silence) their specific target RNAs. It was also an opportunity to learn about the development of chemical inducible gene silencing as a tool for precise understanding of plant development by precise modulation of transcript accumulation in specific organs in Arabidopsis. This system is proposed as an alternative to classical studies based on knockout or 35S-driven amiRNA lines. An interesting example was presented how sense and antisense sequence from the same gene are implicated in the regulation of seed dormancy in Arabidopsis: The discovery of a long non-coding RNA transcript that was transcribed from the opposite



strand of *DEG1* gene, crucial for the regulation of seed dormancy in *A. thaliana*. It was shown that this long non-coding transcript silenced *DEG1* gene. Moreover, *DEG1* was also shown to contribute to seed dormancy in agro-economic plants.

### **3. Welcome to 2nd iPlanta Conference iPLANTA COST Action CA15223 “RNAi: the future of cross talk”, Focus on RNAi Technology (WG1) and Applications (WG2)**

The 2<sup>nd</sup> iPlanta Conference started by welcoming the participants. At the opening session by Prof. Bruno Mezzetti, Chair of the Action, and prof. dr hab. Przemysław Wojtaszek, Dean of the Faculty of Biology of AMU welcomed the participants and congratulated the high number of attendees present in the lecture hall. Dr. Jorge Paiva and Prof. Zofia Szweykowska-Kulińska also welcomed the participants and explained the program schedule of the conference. Then Prof. Zofia Szweykowska-Kulińska invited the participants for the first International Invited Lecture given by Dr Andrzej Wierzbicki (University of Michigan, Department of Molecular, Cellular and Developmental Biology, Ann Arbor, MI 48109, USA) on the “Mechanisms of RNA-Directed DNA Methylation”

### **4. Outcome of the IPLANTA Conference (16/02/2017 – Full day)**

#### **WG1 and WG 2 – Technology and applications of RNAi**

*The WG1 and WG2 were organized into 5 sessions, and 21 communications were selected for oral presentations.*

The first invited keynote speaker, ANDRZEJ T. WIERZBICKI, addressed the issue of the mechanisms of RNA-directed DNA methylation and thus gene silencing exhibited by long non-coding RNAs produced by specialized RNA polymerase POLV. Overall, the exiting knowledge about the mechanisms of RNA-directed DNA methylation provide a strong support for non-coding transcripts that act as key factors controlling the structure of chromatin, and thus accessibility of genes for expression.

Different methods were presented for the comparison of the establishment of RNA silencing in plants. Data on efficiency of RNAi in barley were presented. Generally siRNA-based specific gene silencing of agro-economical important genes is more efficient than amiRNA approaches. Data were also provided on the constructions of viral-like particles based on cytoplasmic polyhedral virus for efficient delivery of double-stranded RNA in insects.

RNAi has shown to be a feasible strategy to silence brassinosteroid regulator genes in barley, to control plum pox virus gene in plums, to be used against Colorado potato beetle, and in strawberry to silence the rapid alkalisation factors (RALF) family genes that affect flowering and flower structure. It was proved that the siRNA having one or two mismatches to retrotransposon loci, still work as efficient silencers of retrotransposons and retro-elements.

RNAi and new genome editing technologies (CRISP/CAS9) were compared and discussed. The advantages of RNAi were highlighted by the fact that RNAi may silence only partially the activity of a given gene, and thus provides a good tool in the case of essential genes.



Dr. HAILING JIN ((Department of Plant Pathology and Microbiology, Center for Plant Cell Biology, Institute for Integrative Genome, Biology, University of California, Riverside, CA 92521), the second invited keynote speaker at this iPlanta Cost Conference presented data on the cross talk between sRNAs derived from infectious fungus *Botrytis cinerea* and host plant (*Arabidopsis thaliana*). Plant derived sRNAs were transferred from the host plant to the fungal cells, and targeted botrytis DICER 1 and DICER 2, inhibiting the generations of sRNA effectors to suppress grey mould disease. On the other hand *B. cinerea* sRNAs were transferred to host plant and suppressed the host immunity genes for successful infection. New results on miRNA biogenesis regulation in plants were also provided.

During the conference the cutting edge approaches of RNAi application via spraying of double stranded RNA directly on plants were highlighted. Different examples where this new technology was experimentally applied were presented, for example in barley as a cereal model, *Arabidopsis* against pathogenic fungi, and or in potato against Colorado beetle.

### **WG 3 - RNAi and Biosafety**

*One session was dedicated to the safety issues of RNAi technology, and 5 communications were selected for oral presentations.*

In the biosafety session the current regulatory environment for RNAi plants in the EU, and how to design food safety assessment approaches for RNAi –modified plants and derived products were presented. New challenges for the authorization of the use of sprayable RNAi based plant protection products were also discussed.

The participants were also informed that there will be soon available the most comprehensive database on RNAi literature to support the environmental risk assessment of RNAi-based GM plants. In the same line, the importance of field trials databases as important tools to explore the future development of RNAi/NBTs applications in plants was debated.

### **WG4 and WG5 – Socio-economic issues and communication on RNAi**

*One session was dedicated to the socio-economic and communication of RNAi technology, and 6 communications were selected for oral presentations.*

An example was presented, how RNAi technology could be a hope to control rice blast - the biggest issue for European rice cultivation. One important point of the discussion was the stakeholders and public perception, and acceptance of GM and RNAi technologies in Europe. From the social sciences perspective, the GM debate it is not a GM debate because it is related to other issues that are not related to scientific issues. That is why a careful and adequate strategic communication for research plan should be developed to maximise the impact of this technologies at different stakeholder levels and public at large.

## **5. Promoting the iPlanta COST action at young research level**



6. A special session was dedicated to the presentations of first year of short term scientific mission in the frame of the Cost Action 15223: developing synergies, competences and skills om RNAi.

**7. Poster sessions**

Twenty six posters were presented during the satellite meeting and the iPlanta Conference. At least two breaks dedicated for the presentation of the posters were included in the program, enabling the participants to discuss the results that were presented.

**8. Other information about the conference**

The 2nd Conference COST Action iPlanta was held at the Faculty of Biology of Adam Mickiewicz University, Poznań, Poland from 14th to 16th February 2018, in collaboration with the KNOW program of this Faculty. The conference brought together 101 experts from 25 European countries. Poland, Italy and Germany were the countries with highest rate of participation, with 44, 13, and 7 participants respectively (Figure 4). The program KNOW contributed largely to strong presence of Polish participants, as 36 of the Polish participants were invited in the frames of this program. Gender balance was taking in account of the invitation of the participants. Nevertheless, the final balance showed 42% of women (Figure 4).

The book of abstracts can be found at the iPlanta Web site: <http://iplanta.univpm.it/>

The 2nd iplanta conference informação can be also found at dedicate conference website:

<http://iplanta2018.home.amu.edu.pl/>



Figure 1 – The iPlanta2018 Conference website

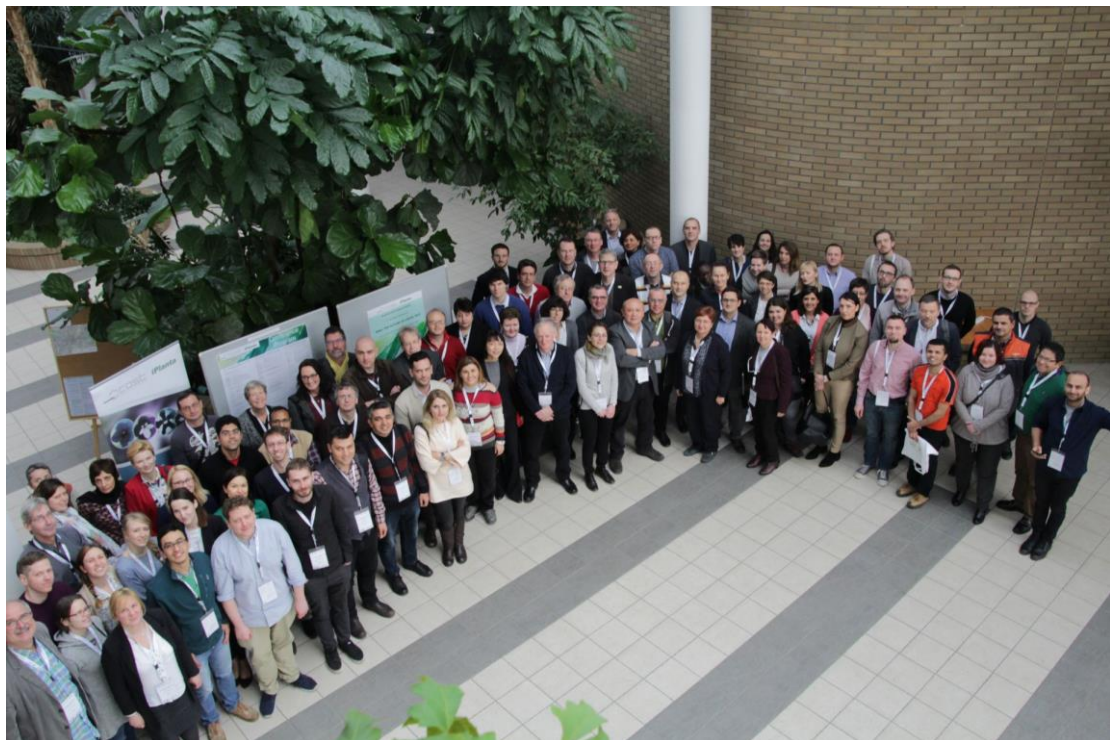


Figure 2 - - Participants at 2nd iPlanta Cost Conference

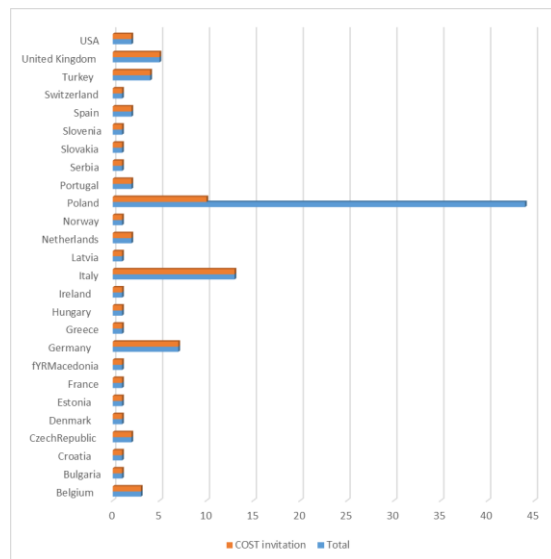


Figure 3 – Participant distributions by country in the 2<sup>nd</sup> COST iPlanta conference held in Poznan, 14<sup>th</sup>-16<sup>th</sup> /02/2018.

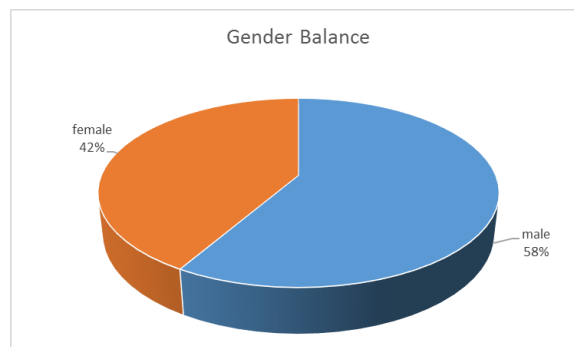


Figure 4 – Gender balance in the 2<sup>nd</sup> COST iPlanta conference held in Poznan, 14<sup>th</sup>-16<sup>th</sup> /02/2018

### Invited speakers:

ANDRZEJ WIERZBICKI (University of Michigan, Department of Molecular, Cellular and Developmental Biology, Ann Arbor, MI 48109, USA) MECHANISMS OF RNA-DIRECTED DNA METHYLATION

HAILING JIN (Department of Plant Pathology and Microbiology, Center for Plant Cell Biology, Institute for Integrative Genome, Biology, University of California, Riverside, CA 92521), CROSS KINGDOM RNAI AND SPRAY-INDUCED GENE SILENCING FOR CROP PROTECTION