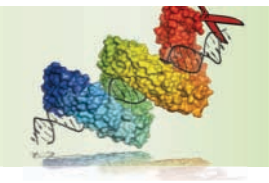


1st TALEN & CRISPR Training School
Halle (Saale), Germany
24.03. - 28.03.2014

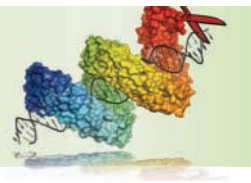
Final report

Summary: The aim of the Training School was to educate young researchers (PhD students and postdocs) in the highly novel and powerful genome editing technique to modify plant genomes. According to the COST initiative FA1208 this potentially GMO-free technique might allow generation of resistant crop varieties. The participance of a researcher from Bayer CropScience should support the "outreach" of the program to plant breeders.
Two expert groups (Boch/GER, Kamoun/UK) in the COST consortium joined their expertise to teach the participants in the two leading genome editing techniques. In addition, the course included the powerful Golden Gate cloning technique which is highly useful to generate the required constructs as well as any other desired constructs. Five internationally renowned invited speakers presented their research and discussed with participants. Five local speakers provided the background information on genome editing in an accompanying lecture series.

Organizer: Dr. Jens Boch, Martin Luther University Halle-Wittenberg, Department of Genetics, Weinbergweg 10, Halle (Saale), Germany; jens.boch@genetik.uni-halle.de

Location: Biologicum, Martin Luther University Halle-Wittenberg, Department of Genetics, Weinbergweg 10, Halle (Saale), Germany

Teacher:
Dr. Jens Boch (MLU)
Dr. Vladimir Nekrasov (The Sainsbury Laboratory, Norwich, UK)
Dr. Montserrat Solé Castellví (MLU)
Sebastian Becker (MLU)
Maik Reschke (MLU)
Annekatrin Richter (MLU)
Jana Streubel (MLU)



Participants:
17 participants (red label) from 11 countries attended the course in Halle (green label).

Nuno Almeida	Portugal
Servane Baufume	France
Eran Bosis	Israel
Emmanouil Domazakis	Netherland
Paolo Iovieno	Italy
Stefan Kusch	Germany
Tina Kyndt	Belgium
Haibin Lu	Spain
Sophie Mantelin	UK
Hazel McLellan	UK
Clemence Medina	France
Stian Olsen	Norway
Laurens Pauwels	Belgium
Waldek Skowron	Poland
Weronika Wituszynska	Poland
Mireille van Damme	Netherlands
Ilse van den Brande	Belgium

Program:

Lectures (invited):

Dr. Sylvestre Marillonnet — IPB Halle, Germany
Golden Gate cloning and modular cloning for Assembly of TAL effectors and multigene constructs

Prof. Dr. Holger Puchta — KIT Karlsruhe, Germany
Engineering of Plant Genomes by DSB Induction

Dr. Vladimir Nekrasov — TSL, Norwich, Germany
From TALENs to CRISPR/Cas: problems and successes with genome editing technologies in plants

Prof. Dr. Emmanuelle Charpentier — HZI Braunschweig, Germany
CRISPR-Cas9: from bacterial adaptive immunity to genome engineering

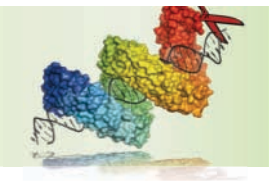
Dr. Patrick Schweizer — IPK Gatersleben, Germany
New technologies for plant research and breeding – GM or not?

Lectures (local):

Jana Streubel — MLU Halle, Germany
TALE RVD specificities & assembly kits

Maik Reschke — MLU Halle, Germany
Design and variations of TALENs and CRISPRs

Annekatrin Richter — MLU Halle , Germany
Target site selection for TALE proteins & CRISPR/Cas9



Dr. Jan Grau MLU Halle, Germany
Computational prediction of TALEN & CRISPR off-targets

Dr. Montserrat Solé Castellví MLU Halle, Germany
Delivery of TALENs/CRISPR-Cas9 constructs and in planta detection of genome editing

Experiments:
A) Assembly of a pair of TALENs
B) Cloning of sgRNA for CRISPR/Cas9
C) Detection of TALEN & CRISPR activity
- C1) *In vitro* transcription-translation
- C2) *In vivo* GUS reporter reconstitution
- C3) *In vivo* Surveyor assay
- C4) *In vivo* PCR and restriction site polymorphism

Material:
The participants were supplied with the following material
- Protocol booklet
- USB-stick with digital data (program, literature, lectures)
- Training school bag and pen
- Vector libraries for construction of TALEN & CRISPR/Cas sgRNA
- Indiviually constructed TALEN and sgRNA

Financial support:
All participants received a COST travel grant of 1,100 € (300 € travel, 160 €/day).
The participants supported the local expenses at MLU with 300 € per person.
MLU received the local organizer support (LOS) of approx. 2,000 € from the COST FA1208 grant holder (INRA).

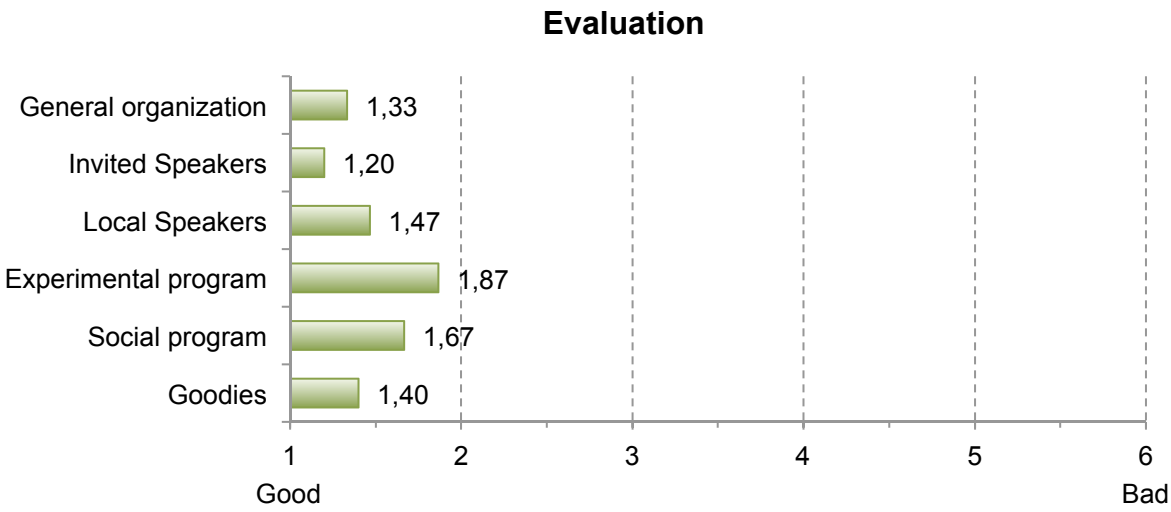
Expenses:

Expense	Detail	Cost
Program	Paper, foil, binding, digital material, printing	369,63 €
	Bag and material	175,11 €
Coffee breaks	Coffee, snacks, water, juice	459,54 €
	Cups, plates, paper towels	12,05 €
Networking meal		457,10 €
Laboratory consumables	Surveyor kit	330,00 €
	Oligos	198,19 €
	Restriction enzymes	157,86 €
	DNA minipreps, sequencing	120,52 €
Total		**2.280,00 €**

Additional expenses were covered by the participants via their contribution.

Evaluation:

This is the summary of an evaluation of the course from 15 participants.



Some comments:

"This was, without a doubt, the most inspiring workshop I have ever attended."

"I really enjoyed the different talks from the invited speakers but also from your PhD students"

"It was a great pleasure to have attended the TALEN and CRISPR/Cas school. Everything was organized in an exceptional way."

"Great speakers"