



# CEPLAS

Cluster of Excellence on Plant Sciences

## NEWSLETTER 1/2015

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### ACTIVITIES

#### Technology transfer: CEPLAS meets Industry



On January 28, the first CEPLAS meets Industry event took place in Düsseldorf. CEPLAS Principal Investigators and Associated Researchers met with a group of representatives from industry (Bayer CropScience, BASF, KWS, Keygene and others) to present the CEPLAS research areas and to discuss about potential points of cooperation. Presentations were given by Andreas Weber, Peter Westhoff and Paul Schulze-Lefert.

As a follow-up of the meeting, CEPLAS organised one day especially for members of KWS on March 20 at Heinrich Heine University. The aim of the meeting was to present selected research topics in detail that were of special interest to the company.

#### Start of the public lecture series: Vom Urweizen der Steinzeit zu den Genpflanzen der Zukunft

On April 7, we start again with our public lecture series: Vom Urweizen der Steinzeit zu den Genpflanzen der Zukunft. This year, the lecture takes place at the Cologne Biocenter at 7 pm. Within six lectures Peter Westhoff and Andreas Weber will give a comprehensive overview from the beginning of agriculture and the methods of plant breeding to the challenges of the future.

For the detailed programme, please visit our **homepage**. The lecture series is in german and addresses a public audience.



Location: Cologne Biocenter, lecture hall 0.024

### OPEN POSITIONS

- Coordinator of the CEPLAS Graduate School
- Postdoctoral position on plant secondary metabolites at the University of Cologne
- 2 Postdoctoral positions at Heinrich Heine University Düsseldorf

MORE INFO ON [WWW.CEPLAS.EU](http://WWW.CEPLAS.EU)

## SHORT NOTES

- CEPLAS Cooperation Partner Barbara Sears (Michigan State University) wins Award for outstanding service to study abroad in the course of the exchange programme with Heinrich Heine University
- Juliette de Meaux receives ERC Consolidator Grant for the AdaptoSCOPE project
- 11 new Postdocs will start till summer: after the selection workshop in February, we succeeded to fill 11 of the 14 announced positions. The new researchers will start between May and August this year. Three positions are currently readvertised
- CEPLAS and politics: In April a small group of CEPLAS representatives will meet Patricia Lips (Abgeordnete des Deutschen Bundestags, Vorsitzende des Ausschuss für Bildung, Forschung und Technikfolgenabschätzung) to discuss about the importance of plant science for bioeconomy and for Germany as a research site.
- Fascination of Plants Day 2015: CEPLAS participates with a public lecture on May 12 and with the annual symposium on May 18/19.



## NEW FACES



**Anna Sergeeva**

PhD student at the Institute for Botany, HHU

Start: 01.02. 2015

Topic: Nutrient recycling in the perennial model plant *Arabidopsis*



**Silke Weckopp**

PhD student at the Institute for Plant Biochemistry, UoC

Start: 01.01. 2015

Topic: Nitrogen and sulfur metabolism in  $C_4$  plants

## NEXT DATES

### CEPLAS Fridays

- |          |   |
|----------|---|
| April 24 | Harro Bowmeester, Wageningen University, Laboratory of Plant Physiology<br>Martin Hülskamp, Cologne Biocenter |
| May 29   | Petra Bauer, Heinrich Heine University<br>Fabio Fiorani, Jülich Plant Phenotyping Centre, FZJ                 |
| June 26  | Juliette de Meaux, Cologne Biocenter<br>Harry Vereecken, IBG-3 Agrosphere, FZJ                                |

### Other events

- |           |  |
|-----------|--|
| May 18/19 | CEPLAS Symposium 2015: The genetic basis of complex traits<br>Rautenstrauch-Joest-Museum Cologne |
| June 25   | Opening of the CEPLAS section on energy plants in the Botanical Garden, Düsseldorf               |

## SPONSORING ACTIVITIES



- International Conference on Arabidopsis Research, 5-9 July, 2015  
CEPLAS Speakers: Jane Parker, George Coupland, Andreas Weber



- FASEB Science Research Conferences - Mechanisms in Plant Development  
CEPLAS Speakers: Miltos Tsiantis, Organiser: Rüdiger Simon

## PLANTER'S PUNCH

Under the heading Planter's Punch we present each month one special aspect of the CEPLAS research programme. All contributions are prepared by our young researchers.

### The genus *Flaveria* – our model to study the evolution of $C_4$ photosynthesis

The genus *Flaveria* belongs to the Asteracean family, more widely known as composite plants. The English common name for *Flaveria* is yellowtop, referring to their small yellow flowers. In nature they can be found, depending on the species, in North and South America, Australia, Asia and Africa.

Why is this genus now interesting for our studies, what makes it special?

$C_4$  photosynthesis is a special and very efficient form of photosynthesis.  $C_4$  photosynthesis occurred in at least 66 lineages among the plant kingdom independently (Sage et al., 2012). One can therefore assume that the evolution from  $C_3$  to  $C_4$  photosynthesis was rather easy in biological terms. To study these changes the plant genus *Flaveria* functions as one of our favourite models. One of the major benefits of this genus is that it not only contains  $C_3$  and  $C_4$  species, but also a range of species that exhibit an intermediate type of photosynthesis. One example for a species of each type of photosynthesis can be seen in figure B. This allows us to analyse the changes a plant has to undergo in the transition from  $C_3$  to  $C_4$  photosynthesis.

Physiological analyses were conducted already many years ago and led to the characterisation of the photosynthesis type of the different species. The phylogeny of the *Flaveria* species was molecularly analysed in detail (McKown et al., 2005).

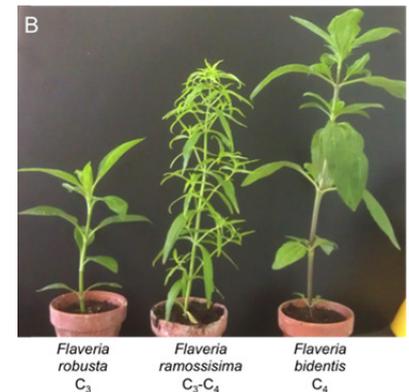
Recently the transcriptomes of nine *Flaveria* species were published (Mallmann et al., 2014) thereby providing us with the information of all transcribed genes at a given time. In addition one of the  $C_4$  species, *Flaveria bidentis*, is transformable with the soil bacterium *Agrobacterium tumefaciens*, i.e. we can implant new genes in these plants and thus the molecular tools are becoming more numerous.

Taken together this gives us new ways and means to understand the transition from  $C_3$  to  $C_4$  photosynthesis. This will help us to come closer to one of the goals CEPLAS wants to accomplish, namely to alter a  $C_3$  plant into a  $C_4$  plant.

Contribution by Stefanie Schulze, HHU

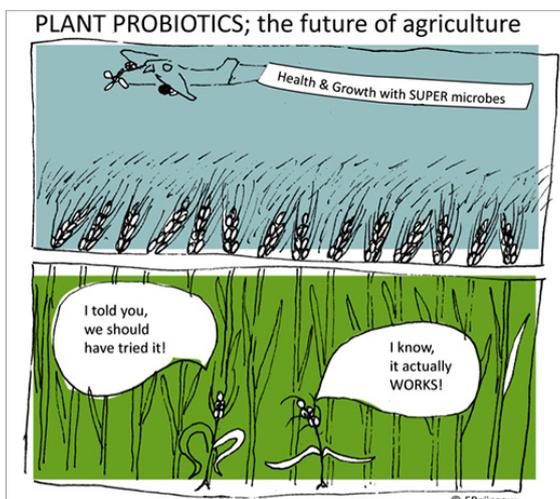


A Detail of the flowers of *Flaveria ramossissima* ( $C_3$ - $C_4$ ) showing the yellow colour and the single ray flower per head.



B Plant habitus of the  $C_3$  species *Flaveria robusta*, the intermediate species *Flaveria ramossissima* and the  $C_4$  species *Flaveria bidentis*. The shown plants are seven weeks old and were grown together in the green house.

### Plant Probiota: the future of agriculture?



Like humans, plants are colonised by billions of microbes. Some of these are pathogenic and can cause disease but most are polite guests which use the nutrient rich environments of higher organisms to thrive and establish a niche.

The host in turn takes advantage of the ability of microbes to synthesise or assimilate essential metabolites which can enhance growth and fitness of the host. It has also been reported that some plant-associated microbes prevent the growth of disease-causing bacteria or fungi. Additionally, bacterial biofilms (concentrated patches of bacteria) might protect the plant from stressful environmental conditions.

By studying the types of individuals that make up such microbial populations and which factors regulate the community structure, CEPLAS is paving the way to ecologically based applications in agriculture.

Gaining a deeper knowledge of plant-associated microbes might be the key to enhancing plant health and productivity, while at the same time

reducing reliance on fertilizers and chemical disease treatments that harm the environment in large parts of the world.

Contribution by Friederike Brüssow, MPIPZ