



Sixth Annual Report

July 2016 - June 2017

PlantLink is a network platform for plant science in Southern Sweden. It was formed in 2011 as an alliance between Lund University (LU) and the Swedish University of Agricultural Sciences in Alnarp (SLU Alnarp) with initial support from the Skåne Regional Council (Region Skåne). Our ambition is to stimulate, unite and promote plant research and higher education in the region.

PlantLink wants to bridge the gap between basic and applied plant research with the objective to provide plants as part of a sustainable agriculture for healthy food, medication, energy and new green materials. Associated to PlantLink are several within their field world-leading research groups.

PlantLink strives to increase the interest and competence in plant science through education and information. Our goal is to create an environment that excels plant research and innovation and that leads to dynamic interactions between the universities, private companies and the general public.

Research

PlantLink Focus Areas

- Plant Breeding research, modeling and engineering
- 'Post-harvest' – product quality and new products
- Abiotic stress
- Plant–microbe interactions
- Plant–plant and plant–insect interactions

Major research projects associated with researchers in PlantLink

- Future oil crops (SSF)
- Production of a blood substitute (SSF)
- TC4F Theme 4
- STEPS (Mistra)
- Mistra Biotech (Mistra)
- ScanOats (SSF)

Focus on bioinformatics

The PlantLink bioinformatician has been in place since June 2012 with the aim to strengthen the bioinformatics competence in plant research in Southern Sweden. The bioinformatician is part of NBIS Swedish network of bioinformaticians, which has partly financially supported this position. The person has been placed both in Alnarp and Lund to be close to the researchers in need of bioinformatics support. Over 20 larger bioinformatics projects have been supported, leading to more than 15 publications.

The 1st of January 2017 Jakob Willforss left the positions as the PlantLink bioinformatician to start fulltime as a PhD student. During the spring a new bioinformatician was recruited co-supported by SLU centrally and the LTV faculty in Alnarp. This new position will be part of the Plant Breeding Department at SLU and a larger SLU-driven effort to strengthen bioinformatics. PlantLink will continue to support 25% of the position and ensure a continued close collaboration with LU researchers and maintenance of the PlantLink server.

From the 1st of May Alexander Koc is temporary working as the new PlantLink associated bioinformatician, and in October 2017 Ganapathi Varma will start.

Snowy visit to MAXIV and ESS



Participants visiting MAXIV and ESS in February

This year's annual joint workshop between Copenhagen Plant Science Center (CPSC) and PlantLink was hosted by MAXIV and ESS. This was a chance to learn more about the new facilities and to interact with regional plant researchers and researchers working at MAXIV and ESS.

Fifty researchers from around the Öresund strait were welcomed by MAXIV's Life Science director Tomas Lundqvist, followed by presentations by Rajmund Mokso (Imaging hard X-rays with focus on plants), Karina Thänell (soft X-rays) and Marianne Liebl (coSAXS and ForMAX). And a tour of the facilities!

After lunch, focus shifted to ESS where Senior Advisor Sindra Petersson-Årsköld

gave an overview of what will be the world's most powerful neutron source. Jeffrey Warren (Oak Ridge National Laboratories) joined via video link with the talk: 'Application of neutron radiography to explore soil-rhizosphere-root water dynamics in situ'. During the coffee break the group could have a view of the construction work from a roof top platform overlooking the site – which this day was covered in deep snow! The day was rounded off by Edith Hammer who just obtained a new "MAXIV lecturer" position at the Department of Biology at Lund University giving a talk on plant research and synchrotron light sources.

PlantLink supported publications 2016-2017

Kushwaha et al., „NBSPred: a support vector machine-based high-throughput pipeline for plant resistance protein NBSLRR prediction“ *Bioinformatics*. 2016 15;32(8):1223-5

Hofvander et al., „Potato tuber expression of Arabidopsis WRINKLED1 increase triacylglycerol and membrane lipids while affecting central carbohydrate metabolism“ *Plant Biotechnol J*. 2016 Feb 23

***Kuktaite et al.**, „Monitoring Nanostructure Dynamics and Polymerization in Glycerol Plasticized Wheat Gliadin and Glutenin Films: Relation to Mechanical Properties.“ *ACS Sustainable Chemistry & Engineering* 4.6 2016: 2998-3007.

***Lankinen et al.** (2016), „Nongenetic Inheritance of Induced Resistance in a Wild Annual Plant“ *Phytopathology*, PHYTO-10.

Roy et al. (2016), „Diet dependent metabolic responses in three generalist insect herbivores *Spodoptera* spp.“ *Insect biochemistry and molecular biology*, 71, 91-105.

***Volkova et al.** (2016), „Combination of modern plant breeding and enzyme technology to obtain highly enriched erucic acid from *Crambe* oil“ *Sustainable Chemical Processes*, 4(1), 1.

Thieffry A (2014), „RNA-Seq: Yellow Nutsedge (*Cyperus esculentus*) transcriptome analysis of lipid-accumulating tubers from early to late developmental stages.“

Lenman et al., „Effector-driven marker development and cloning of resistance genes against *Phytophthora infestans* in potato breeding clone SW93-1015.“ *Theoretical and Applied Genetics* 129.1 (2016): 105-115.

***Glab et al.**, „Cloning of Glycerophosphocholine Acyltransferase (GPCAT) from Fungi and Plants: a novel enzyme in phosphatidylcholine synthesis.“ *Journal of Biological Chemistry* 291.48 (2016): 25066-25076.

***Ding et al.** (2016), „The yeast ATF1 acetyltransferase efficiently acetylates insect pheromone alcohols: implications for the biological production of moth pheromones“ *Lipids*, 51(4), 469-475.

**Seed money project, others are with bioinformatics support*

Four rounds of seed money projects

Through four rounds of research calls for innovative one-year projects the interactions between LU and SLU Alnarp have strengthened significantly. These annual so-called PlantLink seed money projects ran over four years starting in 2012. Approximately 50% of PlantLink's funding were allocated to these over the first years, corresponding to almost 8 million SEK. In all, 18 projects have been supported

A number of joint publications have come out of these collaborations. Another very important outcome is that two SSF projects call for the biological production system and a Formas grants based on three of the PlantLink's seed money projects received funding equivalent to approximately 75 million SEK. In addition, a consortium which LU and SLU Alnarp researchers are part of – ScanOats – a new Industrial Research Center focusing on different aspects of oats was granted an initial 75 million SEK in 2017. The official inauguration was in May 2017.

Read more about the projects and their outcome on www.plantlink.se and in the report „**Summary of PlantLink Seed Money Projects**“ to be published autumn 2017.

The new Biotron is inaugurated!

In 2014 SLU took the decision to build a new Biotron facility in Alnarp. On November 7 last year the festive inauguration took place, followed by a scientific seminar day on November 8 arranged by PlantLink with international speakers. The inauguration attracted large media attention. The Biotron has been identified by PlantLink as one of seven important regional platforms for plant research. More information can be found at slu.se/biotronen

Among the presenters during the seminar organized by PlantLink were Morten Lillemo (NMBU), Roland Pieruschka (Forschungszentrum Jülich), Eva Rosenqvist (University of Copenhagen), Johan

Lindqvist (Heliospectra), Rikke Bagger Jørgensen (DTU), Kristiina Himanen (University of Helsinki), Dominik Grosskinsky (University of Copenhagen), Anders Lindroth (LU/SITES) and Håkan Wallander (LU). Over 80 delegates participated during the day and there was of course a chance to visit the Biotron itself.

This facility of approximately 1100 m² is equipped with state of the art technology providing high precision climate for plant research. In the most advanced chambers, it is possible to simulate realistic outdoor conditions in different places of the world and for future climates. LED lighting is used to mimic sunlight spectral composition.



Exterior and interior of the new Biotron at SLU Alnarp. Photo: Anette Neldestam

Education

PhD Education

During the last year PlantLink has supported two PhD courses and one introductory course in UNIX: „Plant Protection Biology“, 5-16 September, in Alnarp and „Field-omics and remote sensing“, 18-22 June, in Alnarp, as well as an introductory course in UNIX , together with NBIS and GENECO, 9-11 November in Lund. Together these courses attracted more than 50 participants.

The cooperation with Post Graduate Courses in Life Science (PCLS) at Lund University continued for a fourth time during the autumn 2016, giving PhD students at SLU Alnarp full access to about 15 PhD-courses in molecular biology at Lund University. This collaboration continued in 2017.

Master studies

A master students' summer school within ELLS (Euroleague for Life Sciences), with the name „New plant breeding technologies“ was hosted by University of Copenhagen 21-27 August. 31 students from more than 10 countries attended the summer course. Members from the ELLS subject area 'Plant Molecular Breeding and Biotechnology' met in November 2016 in Stuttgart. The subject area was formed after an initiative from PlantLink and includes five of the six ELLS universities with Lund University as an associated university. This year's summer school will be hosted by Hohenheim University 2017.

Five active years in ELLS



In 2012 PlantLink initiated the subject area „Plant molecular breeding and biotechnology“ within the ELLS (Euroleague for Life Sciences) network. ELLS consists of 7 leading European Life Science universities and leads activities for joint teaching and learning, student and

staff mobility, and quality assurance. Lately, four leading universities outside of Europe has also joined ELLS, namely Lincoln University, China Agricultural University and Hebrew University of Jerusalem. PlantLink's engagement has led to 4 MSc summer courses within the scope of the subject area open to both LU and SLU MSc students and early PhDs. More than 120 students have attended these courses which so far have taken

place in Vienna, Alnarp, Copenhagen and Hohenheim under different leaderships. The summer schools have placed LU and SLU Alnarp plant research on the European map for MSc students. In 2018 the summer school is planned to be hosted by Warsaw University of Life Sciences.

Budget and organization

PlantLink had a budget of 1.5 million SEK over the year, with SLU and LU contributing ca 1 million and 0.5 million SEK, respectively

From July 2016 to June 2017 the total salary costs was 967,000 SEK. Positions funded were one director (50%), one coordinator (25%) and one bioinformatician (25-100%). Other costs include information and outreach events, seminars, website and travels.

PlantLink Personnel 2016-17

Erik Alexandersson (director)

Tina D'Hertefeldt (assistant director)

Jakob Willforss (bioinformatician until 31 December 2016)

Alexander Koc (bioinformatician from 1 May 2017)

Thomas Welwert (administrator)

Steering committee, 2015-2016

Marianne Sommarin, Umeå University, chair

Erik Andreasson, SLU

Leif Bülow, LTH

Vacant, Region Skåne

Rajni Hatti-Kaul, LU

Annette Olesen, Lantmännen Lantbruk

Allan Rasmusson, LU

Jens Sundström, SLU

Mariette Andersson, SLU

Magnus Carlsson, PhD representative, SLU

Vacant, student representative, LU

Permanent observatory members:

Svend Christensen, University of Copenhagen

Paul Jensén, SLU

Steering committee meetings

6 October 2016, Lund

5 December 2016, Alnarp

27 March 2017, Lund

24 May, 2017, Alnarp



Jenny Jönsson, one of two high school students with a summer internship 2017 related to plant research together with „Forskningsnätet Skåne“, see next page



Outreach

Social media

PlantLink has continued its extensive work with social media for the spreading of plant science related news, information, upcoming events etc. On Twitter we have more than 900 followers representing important organizations in plant science such as journals, institutes and companies. Over 1400 people like our Facebook page. Nine newsletters are distributed per year and our homepage (www.plantlink.se), which carries information on PlantLink's work and structure, associated researchers, relevant courses etc., was visited on average by over 400 unique visitors per month. A new homepage will be launched in August 2017.

Interactions

PlantLink has continued to interact with several partners both in- and outside of our region, such as Copenhagen Plant Science Center, The Linnean Centre for Plant Biology, Umeå Plant Science Center, EPSO, Mistra Biotech and Partnership Alnarp.

In collaboration with "Forskningsnätet Skåne" two high school students did a summer internship related to plant research. A number of guided visits for high school students as well as other groups from the Skåne region have been done upon request.

Fascination of Plants Day 2017!

For the fourth time PlantLink coordinated Fascination of Plants Day in Skåne in May. This day organized by EPSO (European Plant Science Organisation) puts the spotlight on plants, and their science and importance to people and society, for social, financial and environmental sustainability.

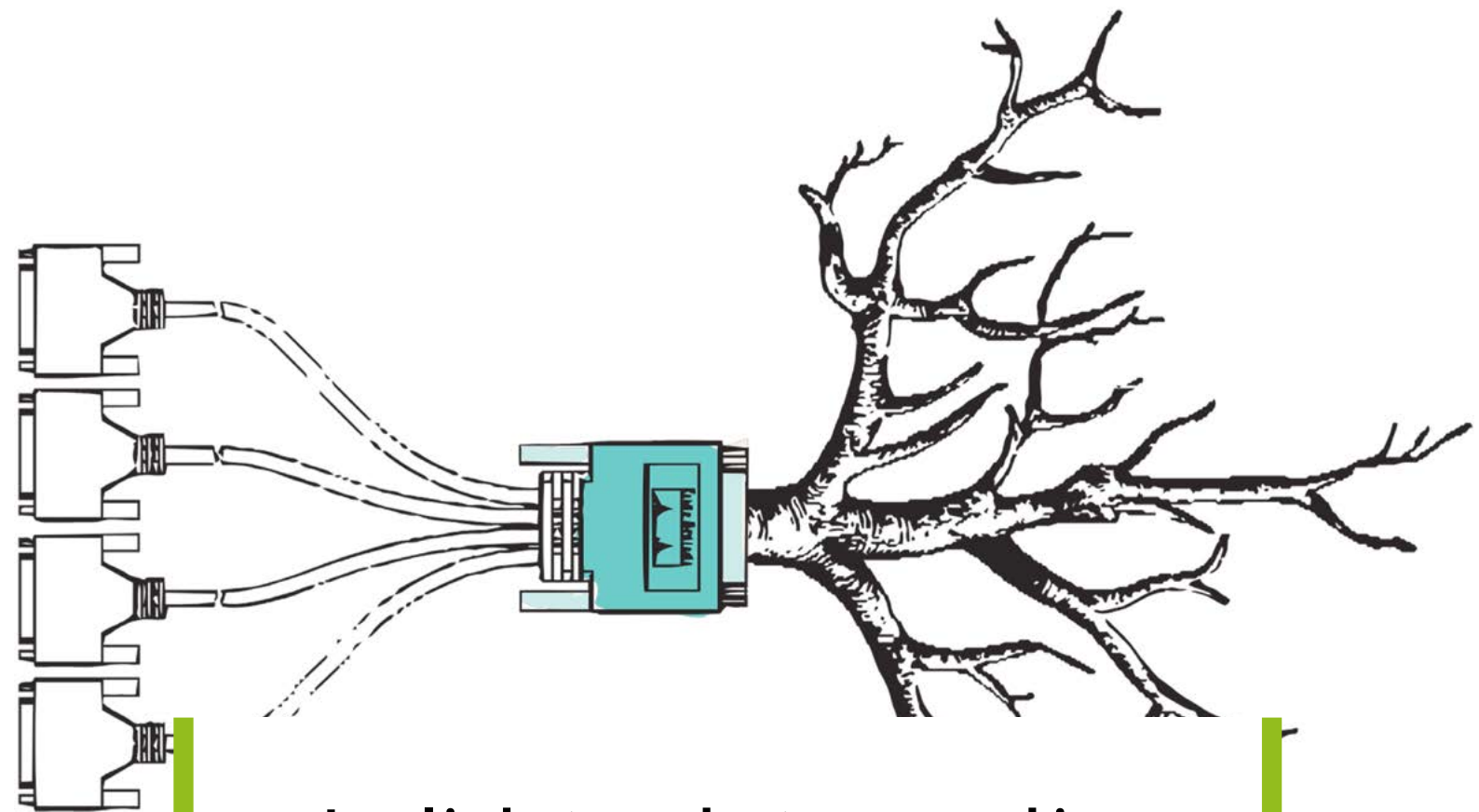
Under the theme "From wild to cultivated" PlantLink had a science tent on the 20th of May in the Botanical Gardens in Lund. We talked about plants with the general public and explained why a better understanding of these our best green friends still is so important! There was also a chance to taste wild plants.

More about this bi-annual event can be found at www.plantday.org

We would like to remind all plant researchers at LU and SLU that you can join EPSO for free as an individual member by visiting their homepage.



The PlantLink science tent during the Fascination of Plants Day in Lund Botanical Gardens 20 May 2017



Local industry and entrepreneurship

Several of PlantLink's research activities are in close collaboration with local businesses, for example, in crop protection and plant breeding. One important outcome is the PlantLink PhD/Post Doc Industrial Mentorship Program (see box previous pages). In February 2017 an SSF Industrial Research Center focusing on oats, ScanOats, was funded, and the official inauguration was in May 2017.

PlantLink events 2016 - 2017

(number of attendees in brackets)

- ELLS MSc Summer course : „New plant breeding technologies“ 21-27 August in Copenhagen (31)
- PhD course „Plant Protection Biology“, 5-16 September in Alnarp (18)
- PlantLink Day, 6 October in Lund (74)
- Biotron Inauguration Seminar „Here comes the sun!“ 8 November in Alnarp (82)
- Introductory course in UNIX, together with NBIS and GENECO, 9-11 November in Lund (20, max number)
- Joint workshop together with Copenhagen Plant Science Center visiting MAXIV and ESS, 8 February in Lund (50)
- Fascination of Plants Day, 20 May in Lund Botanical Gardens
- PhD course „Field-omics and remote sensing“, 18-22 June in Alnarp (16)
- 3rd round of PlantLink Industrial Mentorship, first meeting 30 June visiting Malmö University Open Lab and Medeon in Malmö (14)

Upcoming events 2017

- **Presentations of PlantLink during SEB Gothenburg conference and SPPS conference** in July and August
- **ELLS Master's student summer course „Analysis and Utilization of Genomic Diversity for Plant Breeding“**, 6-12 August in Copenhagen, Denmark
- **Launch of new PlantLink homepage**, August
- **PlantLink Day**, 4 October in Alnarp

Contact and more information

Follow us on Facebook and Twitter to get continuous updates from PlantLink.
For more information check our homepage: www.plantlink.se

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