



Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

Platform Plant Breeding

Plant Breeding & Biotechnology symposium

11-13 June 2019, Wageningen, The Netherlands

SUMMARY



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1. Introduction

SLU Platform Plant Breeding was established in 2014 to stimulate and support collaboration between personnel located at SLU's various sites and faculties, with three participating faculties (Faculty of Landscape Architecture, Horticulture and Crop Production Science (LTV), Faculty of Forest Sciences (S) and Faculty of Natural Resources and Agricultural Sciences (NJ)). One of the platforms aim is to strengthen SLU's profile in plant breeding internationally. To fulfil this aim, we organized an international symposium on 11-13 June 2019 in Wageningen, The Netherlands, together with Wageningen University and Research (WUR), and in collaboration with two graduate schools at WUR, Experimental Plant Sciences (EPS) and Production Ecology and Resource Conservation (PERC).

The symposium took place at the conference centre Hotel De Wageningsche Berg in Wageningen and was open for all researchers at SLU and WUR (including PhD-students, postdocs, technicians and senior researchers), with a maximum of 50 places available for people from SLU. SLU Platform Plant Breeding covered the costs for accommodation, food and travel for all participants from SLU, as well as the costs for the venue. Participants from WUR paid a fee to cover their costs for food. At SLU, the symposium was announced via SLU Platform Plant Breeding's email list and newsletter, with posters distributed at the SLU campuses Alnarp, Umeå and Uppsala, and via screens at the different campuses.

A total of 45 staff from SLU (of which 10 postdocs and 20 PhD-students; 20 from Alnarp, 13 from Umeå, 12 from Ultuna) and 42 staff (of which 32 PhD-students and 4 postdocs) from WUR participated in the symposium.



Picture 1: Opening of the symposium by SLU Platform Plant Breeding's chair Inger Åhman

2. Program

2.1 Sessions

The symposium consisted of four sessions:

- **Session 1: Bridging the gap between phenotype and genotype: phenotyping revisited**
Invited speaker: Gerard van der Linden, WUR; Moderator: Harry Wu
- **Session 2: Climate resilience and resource use efficiency in breeding for sustainable agriculture**
Invited speaker: Chuanxin Sun, SLU; Moderator: Gerard van der Linden, WUR
- **Session 3: Breeding for a circular bio-economy**
Invited speaker: Rodomiro Octavio Ortiz Rios, SLU; Moderator: Richard GF Visser, WUR
- **Session 4: Impact and use of omics in breeding**
Invited speaker: Richard GF Visser, WUR; Moderator: Rodomiro Octavio Ortiz Rios, SLU

Each session started with an inspirational talk within the theme of the session. Each session also included speed talks, oral presentations and poster presentations by the participants, which gave us insight into each other's work and stimulated fruitful group discussions. The meeting contained a total of four inspirational talks, 12 oral presentations (15 min) 19 short talks (5 min), 25 posters and four sessions of "get to know each other" group discussions. The first day finished with mingle. In the afternoon of the second day, participants visited different research facilities and the campus of WUR (see "Excursion tours" below). There was a common dinner in the evening of the second day. The meeting was arranged so that there were ample opportunities to get to know each other during coffee breaks, poster sessions, lunch and dinner.

[Click here to see the entire program.](#)



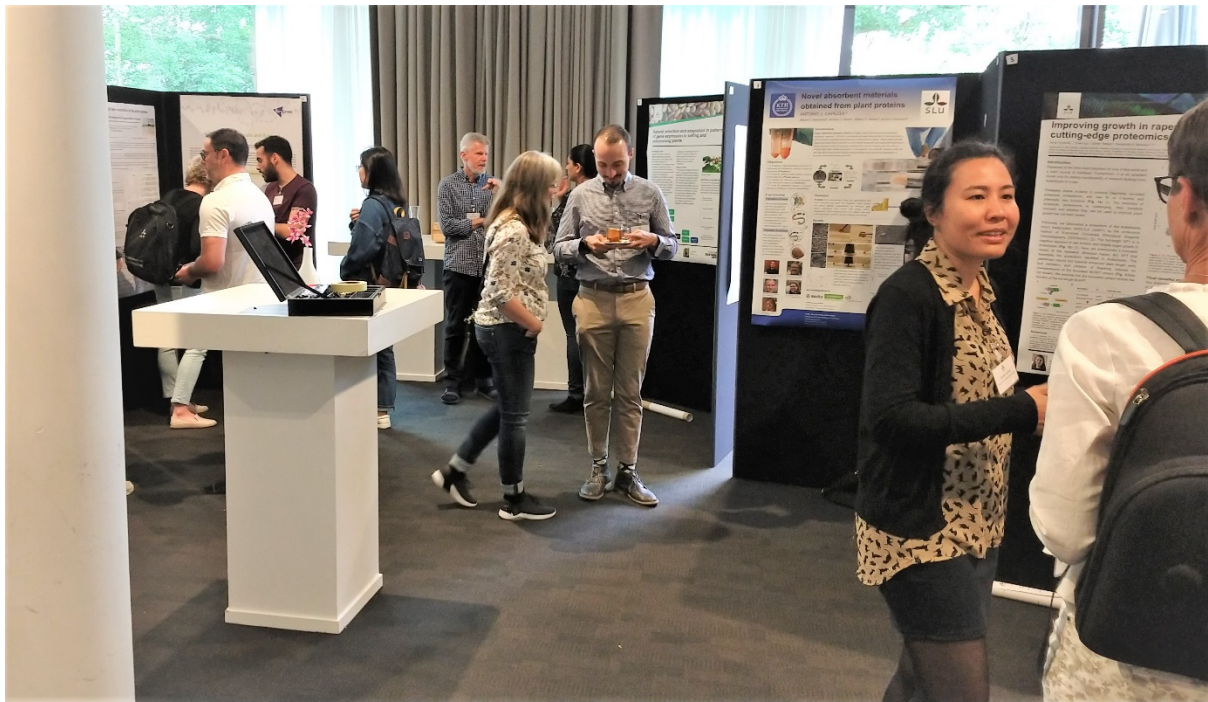
Picture 2: Participants listen to speakers during one of the sessions

2.2 Excursion tours at WUR

Participants could choose to attend one out of four different excursion tours to the WUR campus:

- The greenhouses and experiments therein
- The fields and some of the crops/experiments therein
- The new facilities for phenotyping
- The new facilities for postharvest research

The excursion tours were prepared by Richard Visser and his colleagues.



Picture 3: Participants meet each other during a poster session

2.3 Group work

Each of the sessions had a 1-hour pass with group work with ca 10 groups of nine people in each group. Participants were distributed randomly to the groups, but it was aimed to have people from both SLU and WUR in each group. Two people were appointed in advance for each of the groups to lead the discussion and to summarize the results, which meant that every participant had to lead a group once. After the group work, all results were put up in the poster room, and they were also sent out to all participants after the symposium.

The aim of the group work was to get to know each other better, to start thinking about new ideas for collaboration, and to start the development of new projects.

The following questions formed the base for the group work:

Session 1: Bridging the gap between phenotype and genotype: Phenotyping revisited

1. Breeding selection was based on phenotype in a long time, why phenotyping became even more important when we can now use genotype?
2. What are the traditional methods to improve the phenotyping (or phenotype observation) and why we want to improve phenotyping?
3. What are the new developments of phenotyping in crop and forestry breeding?
4. Can you list examples to the latest phenotyping and genotyping tools in crops and forestry?

Session 2: Climate resilience and resource use efficiency in breeding for sustainable agriculture

1. Do you have any good ideas and concepts to increase climate resilience and resource use efficiency in breeding for sustainable agriculture?
2. Breeding from genes to products usually requires biotechnology (CRISPR, GMO and etc) which cannot be employed for agricultural application. How can we solve the problem?
3. Do you have a good example using a single gene in breeding for climate resilience and resource use efficiency and how?
4. Why are methane and nitrous oxide counted as two dangerous greenhouse gases? What is the major agricultural activity that causes their emissions and how should we reduce the emissions?

Session 3: Breeding for a circular bio-economy

1. What are the main target traits for plant/tree breeding in a bio-based economy? Are the priority traits solely related to optimizing yield and quality for biomass production?
2. How to breed the crops and trees of the future for a circular bio-based economy in the EU? Should it be only through crossbreeding with the aid of DNA markers (including genomic prediction) or also considering genetic engineering for transgenics, cisgenics, gene editing and other new breeding technology?
3. Are there trade-offs between breeding for input/resource use efficiency and adaptation/tolerance to stress(es)?

Session 4: Impact and use of omics in breeding

1. How to develop an omics-based tool kit for breeding in the 21st century? Does it need thorough knowledge of genes and proteins controlling distinct biosynthesis pathways (vis-à-vis the “black box approach” of genomic prediction of breeding values for selection)
2. What are the trade-offs when pursuing genomic prediction of breeding values for selection? Genotyping costs versus field plots? ...
3. Which component of the breeder's equation (genetic variation, phenotyping accuracy, selection intensity or time) will benefit most for the use of omics in breeding?



Picture 4: Discussions during a poster session

3. Evaluation

In general, participants from SLU were impressed by the good facilities as well as the more holistic approaches and more interaction and collaboration at WUR. Participants from WUR realized that they have it better than they sometimes think.

A questionnaire was sent out to all participants after the symposium, which was answered by 66% (approximately half of these answers were given by SLU participants and half by participants from WUR).

Most participants were satisfied or very satisfied with the symposium (average 4.15, on a scale from 1, *very unsatisfied*, to 5, *very satisfied*).

Some comments from participants:

- *I enjoyed the symposium a lot, it was very interesting to get to know the type of research that is conducted both at SLU and WUR.*
- *The five-minute talk is an interesting idea, it brings more people to the stage and to share their research. However, it's hard to get enough information in such a short time.*

Most participants that answered the questionnaire found that they learned something new (53% *Yes, a little bit*, 42% *Yes, a lot*), and they also got to know new colleagues from both universities (35%, *many new colleagues, both from SLU and WUR*; 36%, *some new colleagues, both from SLU and WUR*). Only 2% found that they got too few new contacts. If these new contacts will lead to new collaborations remains to be seen. 11% think it is very likely that they will start new collaborations, but most participants are hesitant (average answer: 2,9 on a scale from 1, *not likely at all*, to 5, *very likely*). The reason for this may be that many PhD-students attended the symposium, who do not necessarily know how to start new collaborations or whose collaborators are already set. Comments from PhD-students illustrate this: *My project collaborators are already set, but some person might be of help in practical work. / I already have a collaboration with colleagues at WUR, and I did take the opportunity to meet with them during the symposium though. / It could be possible, future postdoc maybe. / I don't know how a PhD-student can start the new collaborations.* When looking at the average answers sorted by position, PhD-students think indeed that it most unlikely to start new collaborations, while senior researchers find it more likely (average answer PhD-students: 2,67; average answer postdocs: 3,25; average answer senior researchers: 3,36; scale from 1, *not likely at all*, to 5, *very likely*). See more on possible future collaborations in part 4.

Regarding the organisation of the symposium, the organising team got in general a lot of positive feedback (*Excellent organisation and hope we will have more of this in the future*). Several people commented on the late abstract decision. It was a difficult balance between a late registration date for people from the Netherlands and the decision on the presentations. Some people were not happy that they had to be actively involved in the group work. Others found that the group work could be improved by having different questions, discussing new collaborations directly, or presenting the group work to everyone afterwards. However, the group work was in general a good way to get people together and to start talking to each other. While some people enjoyed the speed talks, other found the presentation times in general too short. Also, the poster sessions could have been longer according to some. On the other hand, the timetable felt already intense for a few people, and it also is the balance here to include as much in the given time. To have the excursion before the dinner on the second day was not very practical for those that attended the symposium from WUR and hence did not take part in the excursion. Regarding the participants, it was noted that there were too few senior researchers, especially from WUR. Several departments from WUR were missing.

4. Possible future collaborations

Besides the “get to know each other” outcome of the meeting, which can lead to many fruitful collaborations later in the attendees careers, a number of common interests and initiation of collaborations were found or defined.

High on the task list for future collaborations were joint applications to EU calls or specific calls in Sweden and or Netherlands and many common research interests in specific traits, crops and techniques were identified.

Both universities have very recently started plant breeding research activities in Faba bean, and opportunities to team up to jointly develop and share resources (e.g. material and different omic-analyses) were defined. It was also generally discussed to more often share data between the universities, as has already been done in apple, and from that also to set up new research questions. Other common interests are the development and use of plant breeding methods/techniques, like for example genomic prediction and genome editing.

Increased collaborations on PhD education was found to be of common interest. Lennart Suselbeek is coordinating one of WURs research schools and he is interested in applying 2020 for an ELLS-financed PhD course in 2021 with WUR and SLU among the partners. To support and simplify post-graduate movement between the universities (i.e. postdoc positions) or to find positions at plant breeding companies was also defined as an important task.

The meeting also led to an awareness of the competences available at the two universities, which can lead to invitations as speakers to meetings and workshops. One concrete example is that Therese Bengtsson will be invited regarding SLUs work on aphids to an upcoming biannual international meeting held in Wageningen, arranged by the group working on resistance to insects led by Ben Vosman. One of the factors that WUR had high research productivities is the higher ratio of PhD-students to staff, and increasing PhD-students at SLU is vital for future success of the university in research.

Even though it might be difficult to collaborate around infrastructure, SLU had the opportunity to see the facilities and its ongoing research activities at WUR, which was inspiring and led to knowledge about whom to approach for support/information. Furthermore, WURs NPEC (Netherlands Plant Ecophenotyping Centre) could be a possible link between researchers within EPPN (European Plant Phenotyping Network).



Picture 5: The conference location with the main plenary room and tables for the group work