**PBCC state rep work session- Wednesday 8-9-17 at the NAPB annual meeting**

Introduction

**Thomas Lubberstedt and Kate Evans**

35 people present

Introduction of the new website and gave us a tour of the features

We spent some time with the map and talking about the representatives and closing the gaps.

We are doing a status report going over the objectives (except Genetic diversity and IPR as they were covered in earlier sessions)

A list of the objectives was presented, Pat Byrne is transitioning away from the leadership of Genetic diversity, we are looking for chair of this objective. Pat did find a candidate during this session {Pat would have to be asked for the name}.

There are some changes dealing with Visa issues that occur during with Private public partnerships. Mike Havey mentioned a model that Monsanto is using. Mike is planning to draft this model, so that is can be shared with state reps, and other companies (via NAPB).

**Klaus**

What are the implication of mergers on public plant breeding?

Funding, education, locations

MON/Bayer, 24 B, 50/50, seed/chem

Dow/Dupont, 14B,60/40, seed/chem

Syngenta/Chem China, 15B, 10/90, seed/chem

The companies have different briefs where assets are going. These companies have different potential to acquire additional assets with Chem China (Chinese government) having the deepest pockets. The companies have different strategies as Syngenta needs no longer report to the stock market as an asset of a Chinese state comany.

From 5-3 ag Companies reduction in funding sources, it will impact meeting support/  New research budgets will be around (8% of sale) is unlikely lead to a 1+1 level of support depending on the merger, MON/BYR ~=2, DOW/DUP~<2, Syn ~>2. The different mergers will have different impacts on how the companies function. Geography of the companies’ matters, US is not the same as Europe not the same as Asia. Overall there is likely to be a reduction in the number of funds available for public private partnerships. There is a move to increase automation both in the field and the lab, this will impact the lower level jobs in the companies and increase the educational requirements for those in research and field groups. Prediction is not going to eliminate phenotyping , investment in novel approaches in phenotyping will  actually likely to increase.

*Thomas:* So there will no be a reduction in field breeders?

*Klaus:* It is clear that there will be more phenotyping, much of it done by machines, but this will likely not reduce the number of breeders, but I don’t have a crystal ball. It is unclear how it will impact the workforce, but he doesn’t’ t think it will lead to a dramatic reduction in field breeders, there will still be a need for graduate students, it will likely stay flat, it will depend on the synergies (redundancies) created by mergers.

*What type of breeding students are needed?*

There will be more emphasis on data analysis, across genotypic and phenotype data, there will still be a large need for germplasm characterization across many environments. Breeders will have to have a more varied background (data science, engineering, and statistics), we are already seeing this in the student posters here at NAPB. Increasing students will have all of these capabilities (IT, tool use, ability to interact with data). There is a need to for lab managers to have a breeding background due to increased interaction between lab and field. Molecular breeder is an outdated term; the new term is Technology breeder.

New education models include more training in teamwork, project leadership, communication, more soft skills, More preparation for example FFAR proposal for graduate students. (University-Industry consortium). This new model will include phases of development in a corporate/company setting, there have been pilot programs, there will be flexibility in how to implement it. This is envisioned as integrated into the normal system a 3 weeks at the company than back to school, in a cyclical way based on the specific project.

Future Ag companies will still need help from the public/university sector, research collaborations and cooperative agreements etc. Many things in house are proprietary, but student still

*Steve:* There will be three giant corn companies, will there be more mergers in the future?

*Klaus:* It is likely to stay as three large companies, there may be more mergers but no the total change in the number of giants.

*Pat:* Is there a bright side of the mergers, is there an opportunity for small companies to spring up?

*Klaus:* Definitely, start-ups are likely to be more valuable than ever and will continue to a major asset.

*Ann Marie:* Thank you very much: It has been discussed that there may be a role for a round table for public/private breeders and ag scientists to get together so that they all areas are covered, to better learn the gaps of what is and isn’t being done.

*Klaus:* This is a good governmental goal, this is something that secretary of Ag I would push this, it is unclear how to address this topic, but it is potentially valuable, you will not get a full picture due to proprietary tech, but there is value in this proposal, and help direct funds.

**Kate Evans, Objective 1: plant breeding capacity**

Survey US plant breeding capacity regarding all aspects similar to Frey et al., 1996, there are additional surveys 2016-2017, Survey both public and private sector breeders

* Issues
* Questions
* Transparency

Two different surveys, private and public.

Start with public, trying to identify private sector champions to get reasonably applicable data between the surveys.

So far……

Build a contact list of plant breeders by state from the state reps

* Finished varieties
* Pre-breeding
* Germplasm improvement
* Plant breeding methods

Total there are 665 plant breeders on the list, it is a snap shot in time, always in flux.

To develop a survey, good list of people, encourage participation, and develop a good survey, to do this we are developing links with NRSP10 database resource to recruit Michael Coe (Cedar lake research group) to help with this

Currently a list of questions is being generated, these include

* Demographic
* career trajectory
* market types
* market size
* crops
* number of people on the project

There is a need for gap identification (e.g. market type, regional, breeding programs)

There will be questions about education

* courses taught
* graduate students
* what are students doing

Budget Questions

Infrastructure questions

Access to knowledge

Access to Tech

Access to Germplasm

Please send ideas to Kate

Hopefully state reps can help boost the number of completed surveys,

We are going to make the map of public plant breeding programs in LGU/SAES interactive, but we need the information from the survey to populate the map

Ag Experiment Station director involvement should ensure the survey completion

The timeline is that the survey will be developed by the end of the year with the survey being out Jan 2018, completed by April 2018 to give enough time for data analysis and presentation of survey results at the next PBCC meeting in Guelph.

*Unknown:* Gather information about collaborations/networking

*Ann Marie:* Examples

*Unknown:* Who are doing yield trials with, who are doing genetics with, who are you working with to leverage your resources. Solicit questions about successful collaborations work and how this happens.

*Stephen:* Wheat is a good example of collaborative national resources, trials, disease, trials, we should use. Industry will be hard to work with, perhaps get a third party AST to keep the data so there is anonymity. Bring in industry to help them populate the survey.

*Kate:* Start with the reps then get input from other sources. We need to develop an interest group.

*Ksenija:* Explaining how she has networked with industry in order to get information about how to develop the survey. In industry they share a lot of this information in their annual reports, industry was enthusiastic.

*Unknown:* We should also get information from USDA/ARS breeders, this is another large source of information that can be tapped.

*Ann Marie:* Great ideas, this study was last done in 1996, private sector data was available then but in 2001 the private sector did not participate. If you were in the AFRI session USDA NIFA is not allowed to ask many of these questions, PBCC data on funding sources would be very valuable to public plant breeding itself, there is really limited data on this its hunches and mythology, we need data. It is very difficult to figure out how to do this, it would be invaluable if the methods could be standardized to be able to do survey every 2-3 years.

*Unknown:* Getting faculty to participate should be possible, experiment directors and reps should be sufficient to do this. Willing to take the lead on getting the survey returned.

*Ksenija:* Chance to get specialized report if enough people within the state get specific reports.

*Steve:* We can ask the feds questions even though they cannot ask us question. We need to ask about trends, this data will only be snapshots. E.g. the trend in wheat is to replace not by commodity but to replace by discipline, this will drastically change the landscape of crop over time.

*Amy:* I have worked with Michael Coe, there are ways to keep the survey short but to get qualitative data that can really help understand the issues.

*Kate:* Please send any additional comment to the leadership committee

**Thomas: Core concepts in plant Breeding**

The motivation is to understand what are the main things that an MS or PHD student in plant breeding needs to know and retain after finishing her/his studies given the increasing load of information out there. What should be “second nature, reflexive”.

Core concepts are meant to make curriculum readily updatable, and allow for testable skills/knowledge that are needed in job market, and how to add and delete skills.

Do we need one generalist breeder, or do we need more specialists able to work in teams. Teams are likely the trend in the future.

Effective curriculum: The distance master’s program at Iowa State serves as starting point to work on core concepts initially.

Switch to a learner centered approach vs. teacher centered approach.

Identify learning goals, determine acceptable assessment, plant learning experience/teaching methods

**The key is to identify what is worthy of understanding?**

This leads to clarity in curriculum design.

* Essential question
* Enduring understanding
* Core outcome

Different levels

* Remember
* Understanding
* Apply
* Analyze
* Evaluate
* Create

Bloom’s revised taxonomy (<http://www.celt.iastate.edu/teaching/effective-teaching-practices/revised-blooms-taxonomy>)

This was developed from a workshop between Ag. Education and plant breeding faculty at Iowa State

There is a large list of outcomes/300-400 topics, this is being modified to digestible outcomes, down to 20-30 core concepts that are being ultimately defined, with the remaining becoming secondary concepts.

Core Concept: Breeders Equation, break it down, creating a repository of core concepts will help work with students who have different backgrounds and bring the up to speed in various aspects of plant breeding.

Related work: Smith and Wood, published in Genetics 2016, this is being developed for undergraduate curriculum in Genetics, can be modified such for plant breeding.

Thomas is going to boil this down to create an information that can be sent out for comments so that a communication tool can be developed for fundamental things that a graduate of a plant breeding program should know.

Upcoming tasks include

* Arrange categories in a hierarchical manner
* Connect with Blooms taxonomy
* Web based self-test built of core and sub-core concepts
* Fully investigate the literature
  + Connect with work on core genetics concepts
* Test at other schools and companies
* Present at NAPB 2019

*Amy:* I like this idea, I think it would be really great if one the core concepts is to make hybrids with male sterility, it would be really nice to work with a breeder who uses this system to help design this curriculum piece. It would be great to have membership to write curriculum for their specialties.

*Steve:* Leverage the CAP grants that have educational components, it may be a matter of bringing together all the resources that have been developed

*Amy:* It’s not problem sets, it’s a matter of lecture content

*Steve:* PBCC could coordinate education very effectively

*Amy:* It’s a matter of agreeing how to do this

*Unknown:* how interested are people in change? How do you incorporate technology? How much do people learn.

*Thomas:* Teaching is assigned, so there is limited opportunity to design courses to think a lot about this. There is a need for systems thinking at the level of the curriculum.

*Steve:* The model already exists, MIT. I teach in a blended classroom, this seems to work really well, I am going to challenge my faculty to do this as the data show that this works well. We need to challenge professors to up their level of teaching.

*Thomas:* We need to continually question what is relevant and what is needed

*Unknown:* We need to get fundamental knowledge to students

*Amy:* It is pretty easy to get students who can run with various aspects of educations (statistics, insects, diseases). You can help students find which niche works for them, but it takes active mentorship. We also do 5 week modules which allows you to only cover certain things

*Ann Marie:* The breeder’s equation is a great way to optimize any new technology, it may be a way to evaluate new technology. Is there a similar IT equation so that we can optimize both the breeding and IT.

**Communication: Mikey**

Discussion of different types of communication, core constituency, other scientific disciplines, and the general public

The discussion centered on how to use university communication offices, how to engage with other communication efforts on campus, video production classes, science communication classes. A key is to make videos/blogs/etc professional quality.

There was a conversation about how to reach out to allied disciplines.

There was a conversation about how to make public datasets more available and how to make sure students know how to use these datasets.

The conversation led back to making curriculum dynamic and easy for modification for different instructors.

Getting breeders access to multiple types of communication resources is important.

**General Consensus:**

PBCC session should be earlier in the conference, it would be nice to have more time. It would be nice to be able to have working groups start at the beginning of the meeting and have deliverables at the end of the day.

**Attendees**

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| **Name** | **State** | **Email** |
| Ksenija Gasic | SC | kgasic@clemson.edu |
| Julia Piaskowski | WA | [jpiaskowski@wsu.edu](mailto:jpiaskowski@wsu.edu) |
| Melanie Caffe-Treml | SD | melanie.caffe@sdstate.edu |
| Pushpa Kathir | DC | pkathir@nifa.usda.gov |
| Liang-Shiou Lia | MD | [llin@nifa.usda.gov](mailto:llin@nifa.usda.gov) |
| Kapalatha Melmaiee | DE | [kmalmaiee@desu.edu](mailto:kmalmaiee@desu.edu) |
| Peggy Osias-Akins | GA | [pozias@uga.edu](mailto:pozias@uga.edu) |
| David Stelly | TX | [stelly@tamu.edu](mailto:stelly@tamu.edu) |
| Ed Kaleikau | DC | ekaleikau@nifa.usda.gov |
| Eric Young | SAAESD | [eric\_young@ncsu.edu](mailto:eric_young@ncsu.edu) |
| Vasu Kuraparthy | NC | vasu\_kuraparthy@ncsu.edu |
| Brian Leckie | TN | [bleckie@TNTech.edu](mailto:bleckie@TNTech.edu) |
| Felipe Barrios Masias | NV | [fbarrios@cbnr.unr.edu](mailto:fbarrios@cbnr.unr.edu) |
| Patrick Byrne | CO | [patrick.byrne@colostate.edu](mailto:patrick.byrne@colostate.edu) |
| Shaun Townsend | OR | [townsenm@oregonstate.edu](mailto:townsenm@oregonstate.edu) |
| Emilio Oyarzabal | MO | [esoyar@monsanto.com](mailto:esoyar@monsanto.com) |
| Ann Marie Thro | USDA NIFA | [Annmarie.thro@osce.usda.gov](mailto:Annmarie.thro@osce.usda.gov) or [amthro@nifa.usda.gov](mailto:amthro@nifa.usda.gov) |
| Barry Tillman | FL | [btillman@ufl.edu](mailto:btillman@ufl.edu) |
| P. Stephen Baenziger | NE | [pbaenziger1@unl.edu](mailto:pbaenziger1@unl.edu) |
| Mukhlesor Rahman | ND | [md.mrahman@ndsu.edu](mailto:md.mrahman@ndsu.edu) |
| Jenny Koebermzk | Alabama | [jck0041@auburn.edu](mailto:jck0041@auburn.edu) |
| Kari Hugie | SC | kari.hugie@ars.usda.gov |
| Amanda Hulse Kemp | NC/USDA | [amanda.hulse-kemp@ars.usda.gov](mailto:amanda.hulse-kemp@ars.usda.gov) |
| Amy Iezzoni | MI | [iezzoni@msu.edu](mailto:iezzoni@msu.edu) |
| Neil Anderson | MN | [Ander044@umn.edu](mailto:Ander044@umn.edu) |
| Kate Evans | WA | [Kate\_evans@wsu.edu](mailto:Kate_evans@wsu.edu) |
| Thomas Lubberstedt | IA | [thomasl@iastate.edu](mailto:thomasl@iastate.edu) |
| Mikey Kantar | HI | [mbkantar@hawaii.edu](mailto:mbkantar@hawaii.edu) |
| Phil Simon | WI | [Phillip.simon@ars.usda.gov](mailto:Phillip.simon@ars.usda.gov) |
| Brian Garunia | MO | [bwgard1@monsanto.edu](mailto:bwgard1@monsanto.edu) |
| Todd Campbell | SC | [todd.campbell@ars.usda.gov](mailto:todd.campbell@ars.usda.gov) |
| Jodi Scheffler | MS | [jodi.scheffler@ars.usda.gov](mailto:jodi.scheffler@ars.usda.gov) |
| Seth Murray | TX/DC | [sethmurray@tamu.edu](mailto:sethmurray@tamu.edu) |
| Alex Lipka | IL | [alipka@illinois.edu](mailto:alipka@illinois.edu) |
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