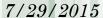


NOTES TO THE FRUIT AND VEGETABLE INDUSTRY ADVISORY COMMITTEE FVIAC

SEPT 2015

USDA Office of the Chief Scientist

Ann Marie Thro, Sr. Advisor Plant Health, Production, and Plant Products



Background:

Office of the Chief Scientist, OCS



2008 'farm bill': USDA Chief Scientist,
Under Secr'y for Research, Education, & Economics (REE)
presently Dr. Catherine Woteki

OCS supports and advises Chief Scientist and Secretary; Fosters collaboration and coordination among USDA science agencies





OCS has a Director; staff incl. Sr. Advisors in 6 areas:

Plant Health, Production & Products // Animal Health,
Production & Products // Natural Resources & Environment incl.
Bioenergy // Food Safety & Nutrition // Agricultural Systems incl.
Climate Change // Agricultural Economics & Rural Communities

Five USDA Agencies Conduct or Support Plant Breeding

Plant breeding, genetic resources, and related biological research:

• Agricultural Research Service (ARS)

• Forest Service (FS)

• Natural Resource Conservation Service (NRCS)

Economic and policy analyses

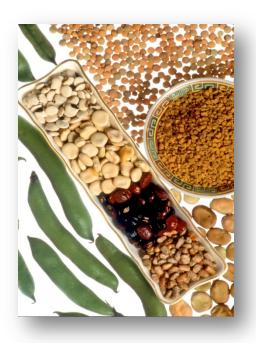
• Economic Research Service (ERS)

Capacity and competitive funds for Research, Education, and Extension (i.e. extramural plant breeding)

• National Institute for Food and Agriculture (**NIFA**)

What is Plant Breeding?

"Human-aided development of plant cultivars with needed characteristics"



The *organizing principle* of breeding is the genetic gain equation:

$$\Delta G = h^2 S$$

Gain in a desired trait (ΔG , or "delta-G") is a function of

- the heritability of that trait (h²)
- the intensity of selection (S)

Plant breeding "puts it all together", using many different resources, tools, and methods to maximize gain, ΔG .

Role of USDA Plant Breeding

To provide plant breeding outcomes that are needed to achieve USDA's Strategic Goals,

...When these have the nature of "public goods":

E.g.,

- o Breeding for long—term horizons -- too distant for private investment
- o Important goals but probability of success is low or unknown
- o Market size is small

An Increase in Stakeholder Attention to USDA's Plant Breeding

Examples include:

- Land-grant U's: Plant Breeding Coordinating Committee 2007
- National Assoc. of Plant Breeders (NAPB) (publ+priv) 2009
- American Seed Research Summit (private-sector organized) 2008
- Seeds & Breeds for 21st Century Ag. (organic/sustainable) 2014

Since ~2010.

Increasing number of stakeholders, across sectors, engaging w/USDA officials to present plant breeding needs & priorities

USDA Response:

- Plant Breeding Working Group (PBWG) 2012
 - Support to USDA Chief Scientist (REE UnderSecr.)
 - Interagency coordination; advise re issues & priorities
- Public Plant Breeding Listening Session 2013
- USDA Plant Breeding Roadmap 2014/15

Both documents posted at:

http://www.usda.gov/ wps/portal/usda/usdahome?navid=OCS



What We've Learned

What stakeholders—both public and private—see as USDA's core contributions to plant breeding:

- The National Plant Germplasm System collections (NPGS) incl.
 - Collection, curation, rejuvenation, characterization, and pre-breeding
 - Genetic Resources Information Network (GRIN):

GRIN is an *Information management system* for genetic resources:

Inventory, images, rejuvenation status, IPR status, requests/order status

What We've Learned, con't.

Additional core contributions -- as seen by stakeholders:

USDA's breadth of geographic coverage, through partnerships including:

- USDA sites (e.g. ARS, FS, and NRCS)
- State Agricultural Experiment Station (SAES):
 - Agric. research units of the state land-grant univ's.
 - Co-funded through USDA since in 1887
- Others, e.g.
- Long Term Agricultural Research sites (LTAR) (multipartner)

What We've Learned, cont'd.

Deliverables "by and for" public plant breeding cited by stakeholders as <u>needed from USDA</u>:

Intramural

- Cultivars (varieties) for "public-goods situations"
- New tools & methods, publically available for any breeder to help maximize gain, ΔG .
 - E.g. new tools / methods to :
 - o Incorporate new genetic & biological understanding
 - o Reduce breeding cycle time (from cross-to-variety release)

Extramural

- Adequate and appropriate funding mechanisms,
 - for the long-term nature of plant breeding;
 - for education

What We've Learned, cont'd.

<u>Heard from stakeholders:</u> <u>concerns about</u>...

External funding thru' USDA

- Low total funding + many proposals leads to low success rates in compet. programs (<10%, sometimes <5%)
- Short-duration (2-4 yrs); non-renewable

Education

- Few funding opportunities for student stipends
- Even fewer for faculty to develop contemporary plant breeding curricula

Challenges for USDA's response

- Not enough competitive funding to respond to stakeholder concerns
- Plant breeding needs longer-term funding cycles

Solution?

- Rely on intramural USDA plant breeding?
 - ... leads to more questions:
- Loss of university plant breeding?
- Loss of closeness to needs and opportunities of local farming?
- Whence opportunities for educating future breeders
 - -- within active breeding context?



National Institute of Food & Agriculture, NIFA is USDA's extramural funding agency.

NIFA funding programs that can include plant breeding:

Capacity programs (source of ± 40% of NIFA plant breeding funding 2008-13)

Hatch 1862 state land-grant univ's.

Evans-Allen 1890 land-grant univ's.

McIntire-Stennis State forestry schools

Competitive programs (± 50% of NIFA funding to plant breeding 2008-13)

AFRI (Agriculture & Food Research Initiative); including:

AFRI Fellowships (2010) / Challenge Areas (2010) / Foundational (2013)

OREI Organic Agriculture Research & Extension Initiative (started 2005)

SCRI Specialty Crops Research Initiative (2008)

BRDI Biomass Research & Development Initiative (2009)

SBIR Small Business Innovation Research

Other programs including special grants (less than 10%)

Also from the Roadmap process: Issues broader than USDA

Recruit / Educate

- Encourage more young people to be interested in plant breeding
- Education: K-12, CC's, undergrad.; grad.

Public / Private

• Most favorable balance of investment in plant breeding?

IPR.

 Optimal understanding and use of intellectual property rights (IPR) and tech transfer mechanisms?

Funding the model

- A joint endeavor: intra/extramural; capacity/competitive; public/private
- Funding the training pipeline

What are ways that USDA can respond?