

Summary of research needs and challenges for sunflower genetics

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Kleingartner on needs and challenges in public research

- “It is necessary that the public sector fund research that the private sector cannot justify economically. Most often, that relates to matters like disease, insect and drought tolerance.”
- But... “A mounting problem within public sector research is the lack of funding.”
- The Sunflower, January 2009

In this presentation...

- Discuss public sunflower breeding and genetics research effort in the past and present
- Ways to improve public breeding research
- A (possible) future for sunflower genetics and breeding research

2008 operations

- About 1300 lines observed and purified in nursery space in Fargo
- 4 acres of yield trials in Casselton (testcrosses with lines from Fargo nursery and testing of commercial hybrids for extension publication)

2008 operations

- Screening of testcrosses for head rot and stalk rot in Tom Gulya's field trials (no yield taken)
- Screening of inbred lines for 4 insects (banded sunflower moth, sunflower moth, red sunflower seed weevil, and stem weevil) without yield taken
- 3000 sq ft greenhouse used as winter nursery

Past operations

- 5-10 years ago
 - 2000-2500 rows in Fargo nursery
 - 5 acres of yield trials in Casselton only
 - Similar disease and insect trials
 - Winter nursery in Hawaii and in greenhouses

What has changed?

- Funding availability – continuous decrease in “hard” funding
- Increasing expenses, esp. labor costs, winter nursery
- Students with interest in agriculture and/or willingness to do “grunt work” (hoeing, greenhouse watering, etc) has decreased.
- All the while, number of projects increase...
confection breeding, more diseases and insects, development of marker-assisted systems, etc.

What to do?

- Increase efficiency and eliminate as much redundant work as possible (cut labor needs... cut costs... give existing students more interesting work... recruit better students)
- Optimize allocation of resources to most productive projects and/or decrease effort in individual projects
 - the “C” word – Aiken, Grady, Knapp, Trostle, others
- Go for big grants – maybe get funding
- Invest in infrastructure (this presentation)

Problems with current infrastructure

- We plant with a 40 year old planter
 - No depth control, poor spacing control, and ability to open/close is not always good
- We harvest with a combine that presents data integrity and safety concerns
 - Harvest requires three people, one person feeding in heads
 - Seed tends to “blow out the top” or clog the yield estimation computer, making yields less accurate

Planting



Harvest



Recent NSA decision

- Encourage breeding and genetics research, collaboration among universities and USDA, and strengthen public research by helping the Sunflower Unit invest in needed infrastructure
 - Planter
 - Plot combine
 - Additional technician

Planting



Harvest



Economy

- Benefits to upgrade
 - Speed up planting 2x with greater accuracy in all regards and half as much seed preparation necessary
 - Speed up harvest to 20-30 seconds per plot as opposed to 2-4 minutes, with better threshing ability and a more accurate yield estimate
 - Should be able to get more information with greater similarity to producer's fields

Economy

- Further to that, the addition of a technician that is dedicated to maintaining and gathering data from field trials will allow us the ability to have plots outside of Casselton

The future I am working towards

- Yield trials proving usefulness of insect resistance at Prosper ND, Highmore SD, Colby KS, west TX
- Drought and heat resistance yield testing in western ND, central SD, other areas
- Agronomic yield tests outside the Valley (central and western ND, SD, KS, TX) and better disease screening

Future, continued

- Larger number of populations studied as my research group gets more cohesive (back to 2500+ rows in Fargo?)
- More work on marker-assisted selection systems
- Training of graduate students in plant breeding