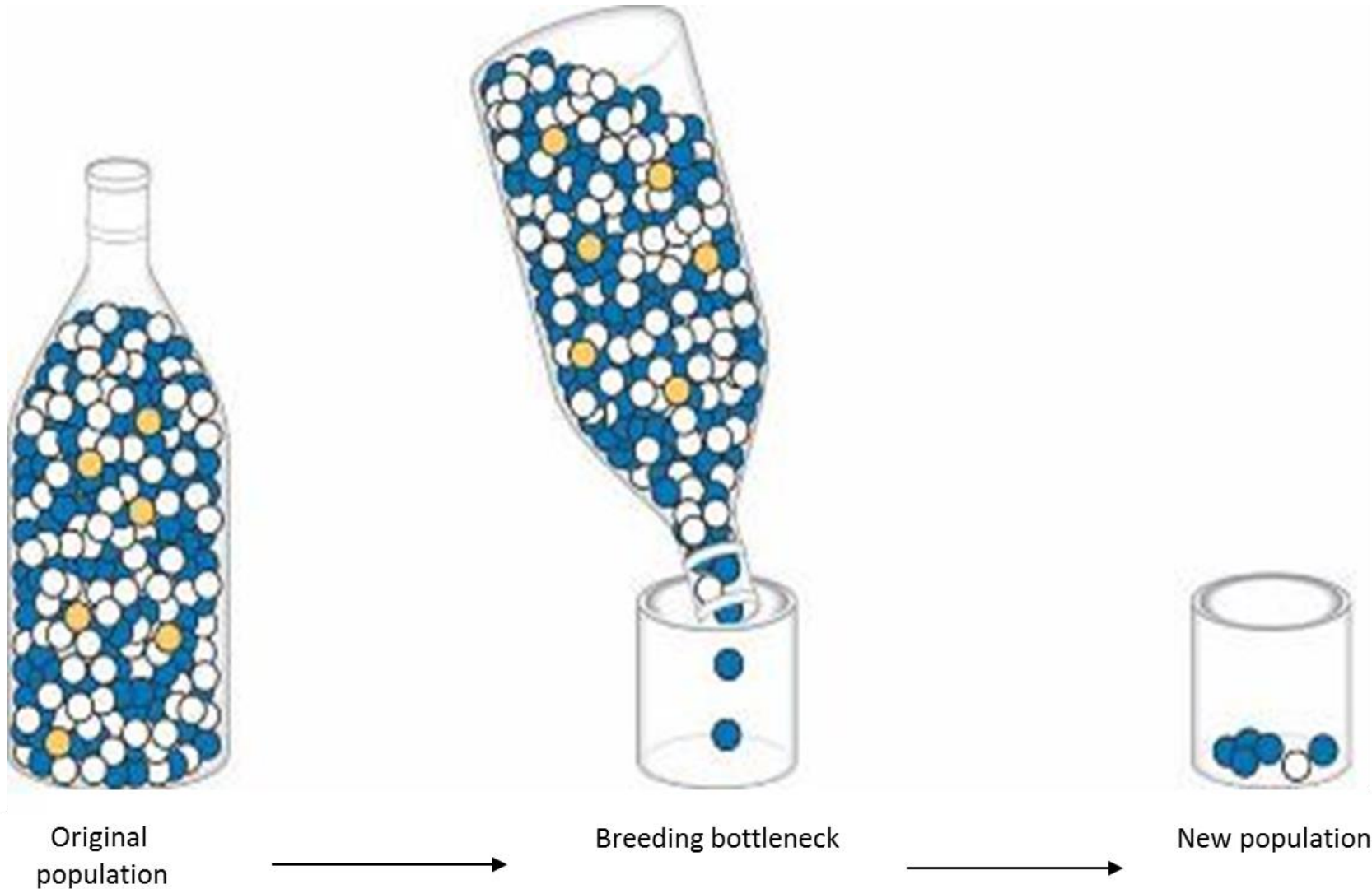


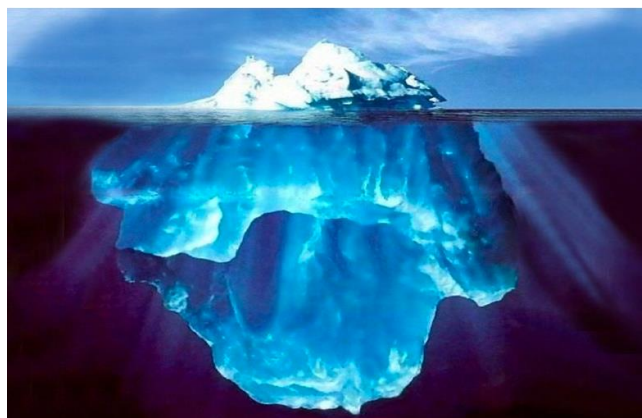
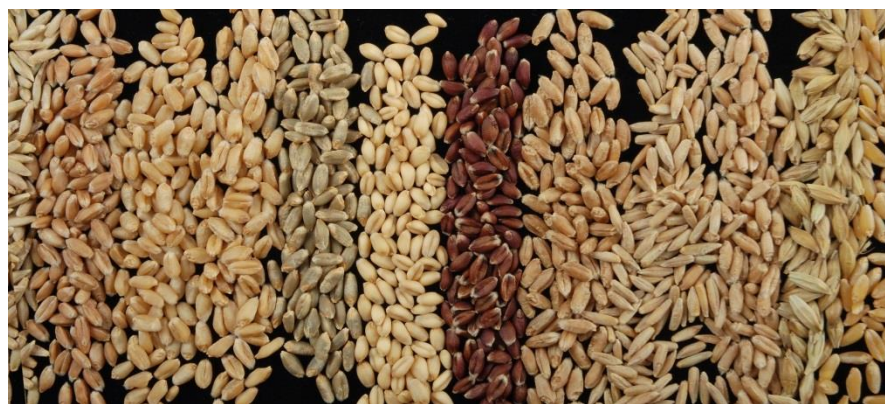
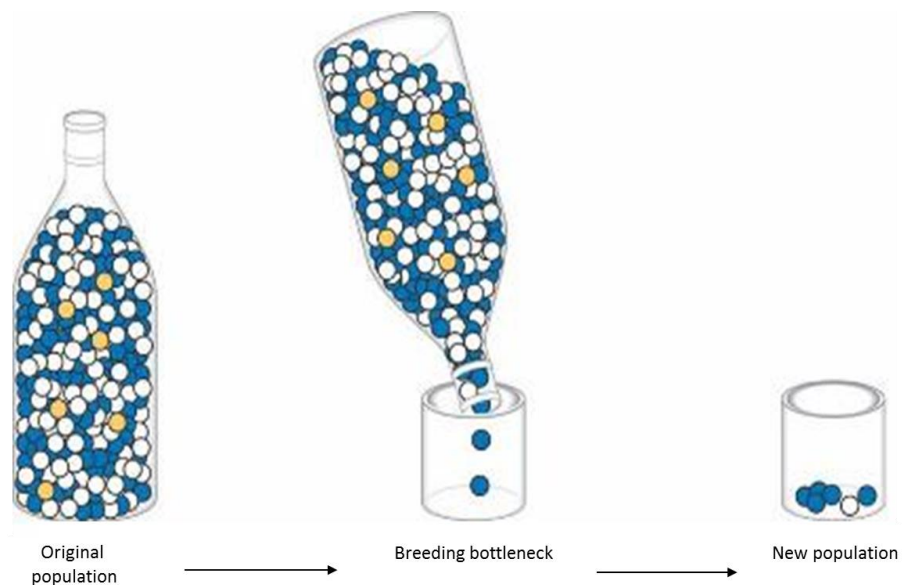
# **Current state of using plant genetic resources in modern breeding programs and the pioneering role of SeeD**

(Museums, supermarkets and cooking)

# Genetic variation in modern breeding materials is constrained



# Meeting the challenges – raw ingredients



6%

94%



# Genebanks- cool museum or functional resource?

Certainly “cool”





# CIMMYT Genebanks- distributions



## SO functional, yes?

2009 to 2013

25,000 and 41,000 samples of wheat and maize were distributed to partners in 147 countries worldwide



# CIMMYT Genebanks- distributions



The majority of these requests are for “breeding” germplasm not “exotic” materials



# Genebanks = supermarket





# Genebanks - used but not effectively

?



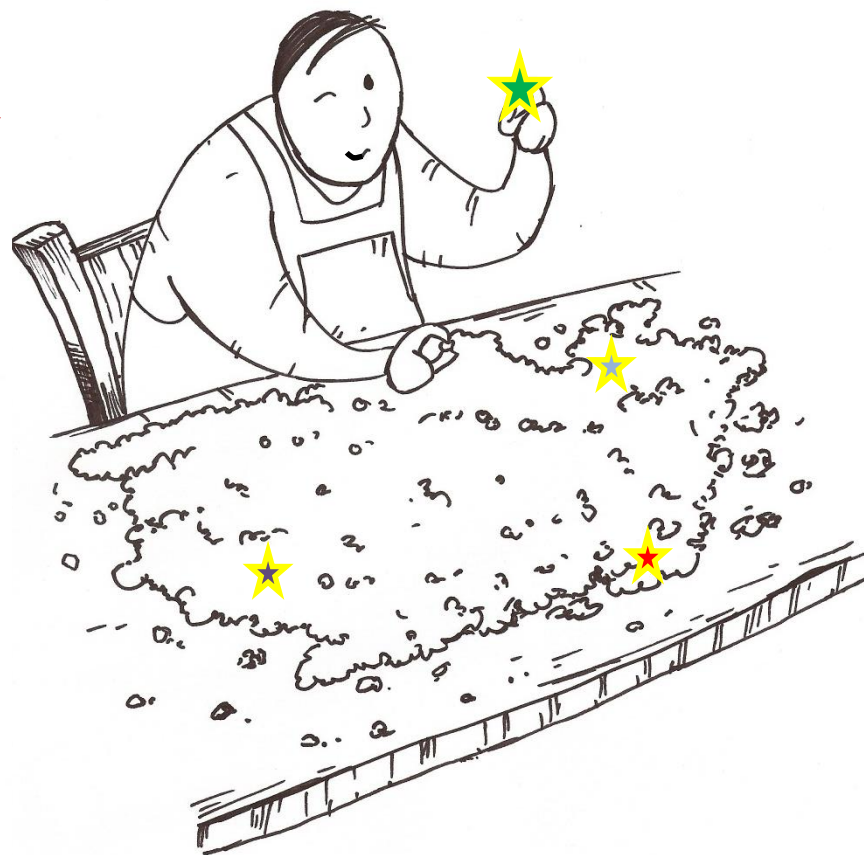
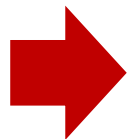
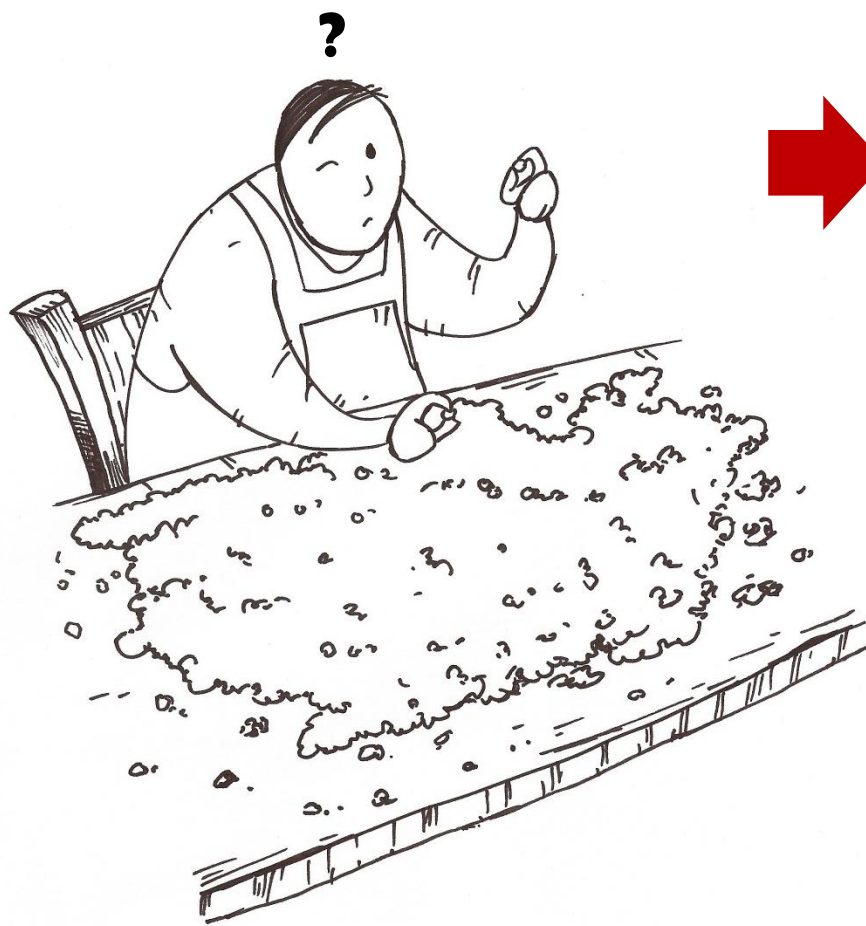
# SeeD



Maize and wheat  
genetic resources  
Genebank

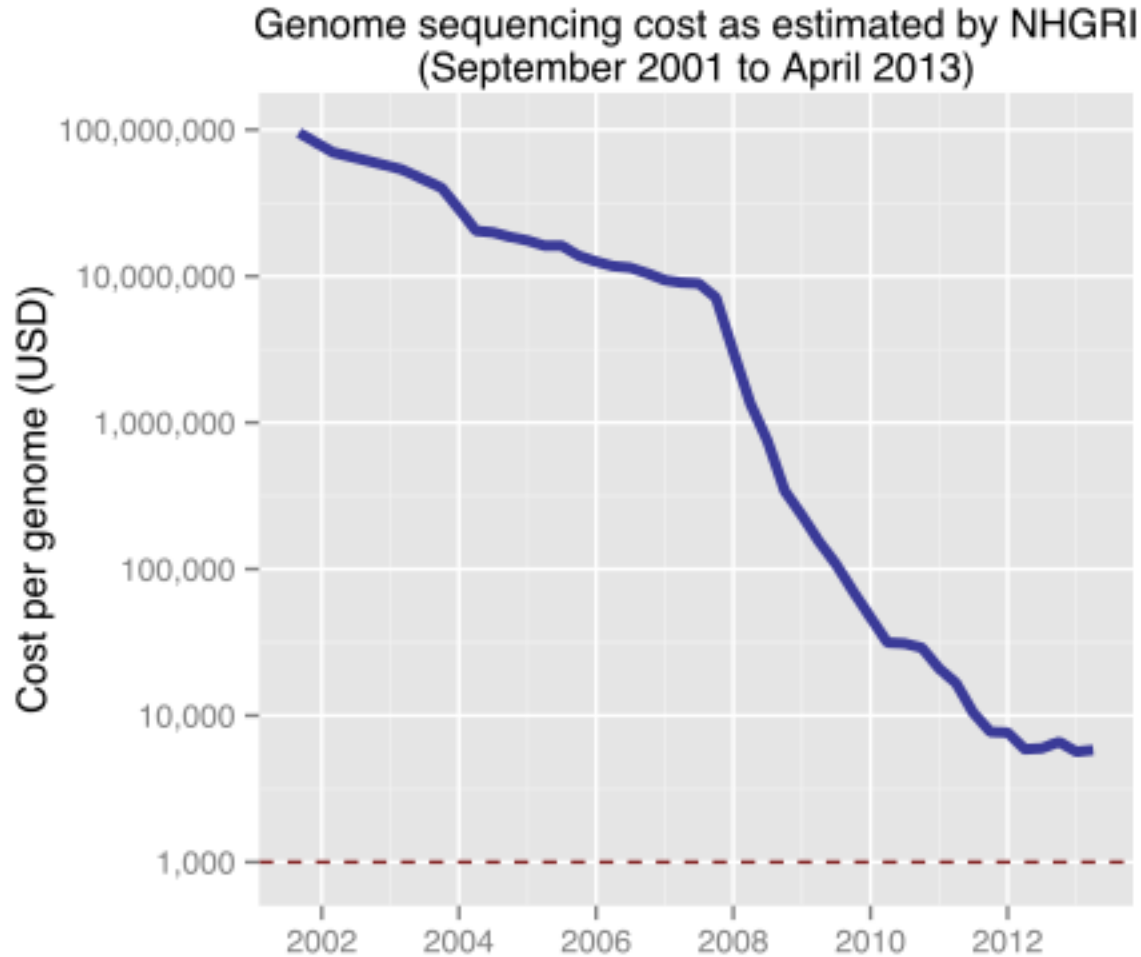
Cutting-edge  
discovery science  
and data handling







# Appliance of cutting edge science – why now?



# Labeling the cans

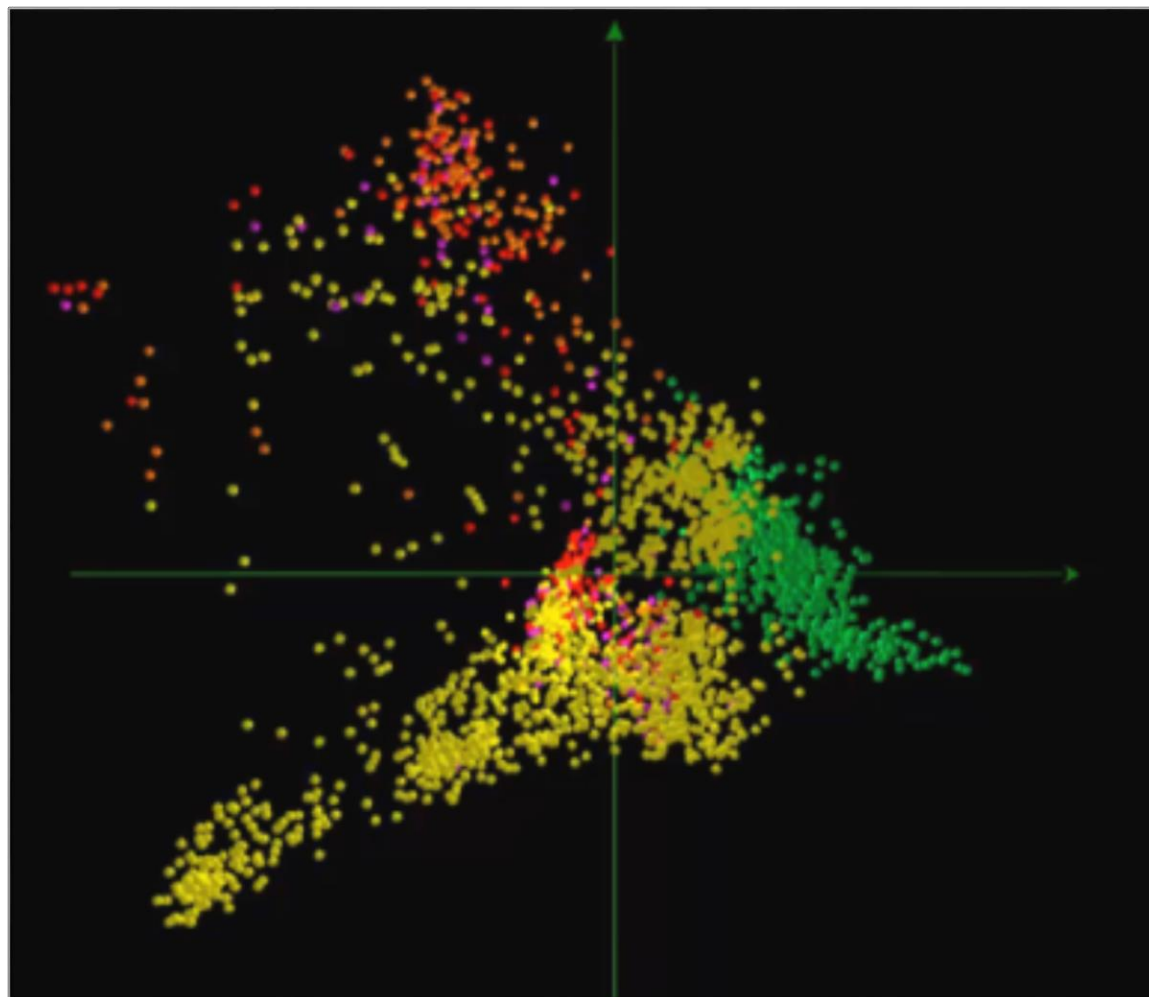







Label all the genebank cans with rich information (disease, drought, nutrition, storage, processing) for the same cost as developing and bringing to market 1-2 transgenics with 1-2 traits

# Knowing where to fish – maps help

Fingerprint ALL the samples in the maize and wheat genebanks of CIMMYT : public release of data 2015 & 2016

Data and tools to help interpret, understand and explore released through Molecular Atlases : components, platform and linkages 2014, 2016, 2018



-  CIMMYT elite maize lines
-   Drought during vegetative cycle (+ flowering)
-  Heat during flowering
-  Heat and drought



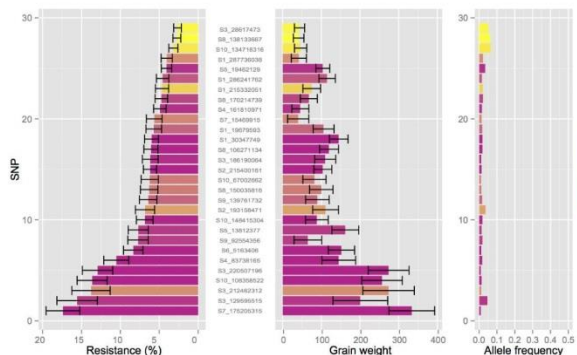
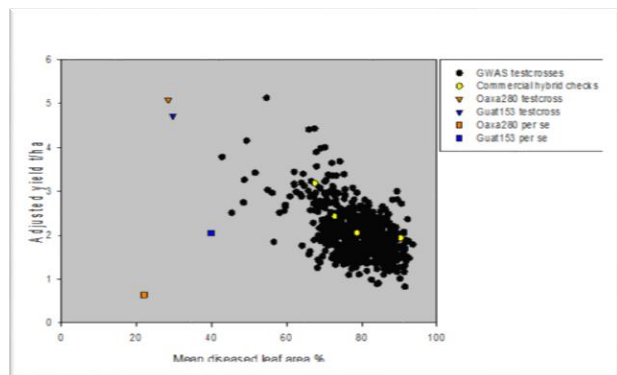
# Identifying the best fish



# Labeling the cans

Identify the best fish

What makes the fish good?



Extensive work on some traits already:

- Diseases Abiotic Stress, Quality, Agronomic characters- release data from 2014
- Initiate release of molecular signpost information – what and where – from 2015

Other traits:- MLN, rusts, mycotoxins, flooding tolerance, Zn content etc.

Know how, build capacity – decision support tools from 2017



# Taming the wild: picking ingredients to cook with





# Cooking- the right ingredients and tools for the job

You don't need a sledgehammer to crack a walnut



Simple ingredients- fast food, simple tools  
Many ingredients- slow cooking, more tools

Microwave- make fast and slow food faster

Feeding breeders: ingredients, recipes, appliances and training

Start releasing new, enhanced breeding germplasm from 2015 and 2018

# Tooling breeders for the future

## Breeder toolkit:

- Ingredients
- Recipe
- Appliances



# SeeD opening the black box

