

Plant Breeding, Plant Biodiversity Conservation and Climate Change.

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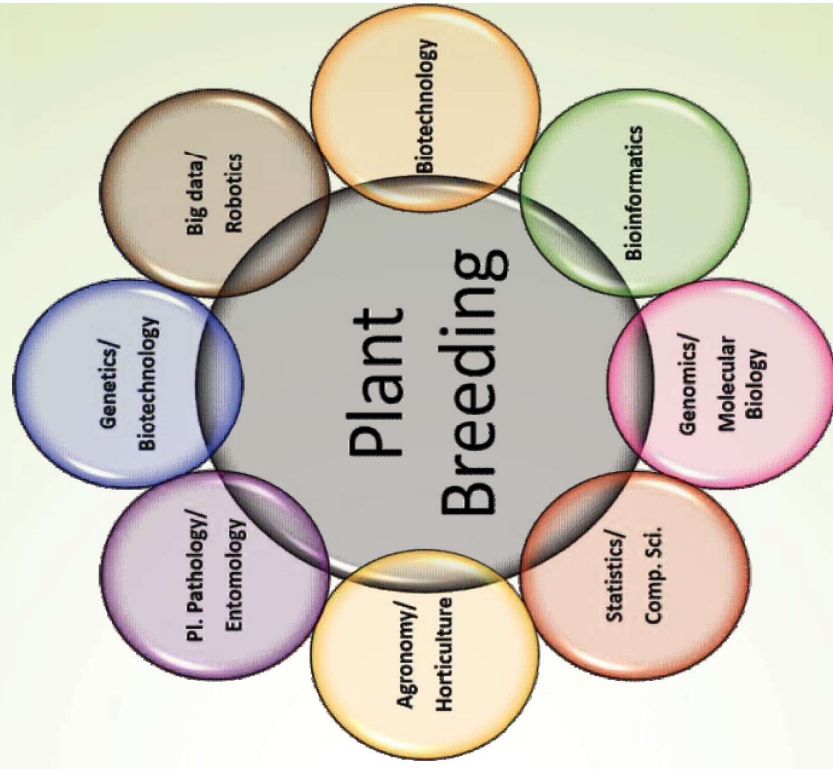


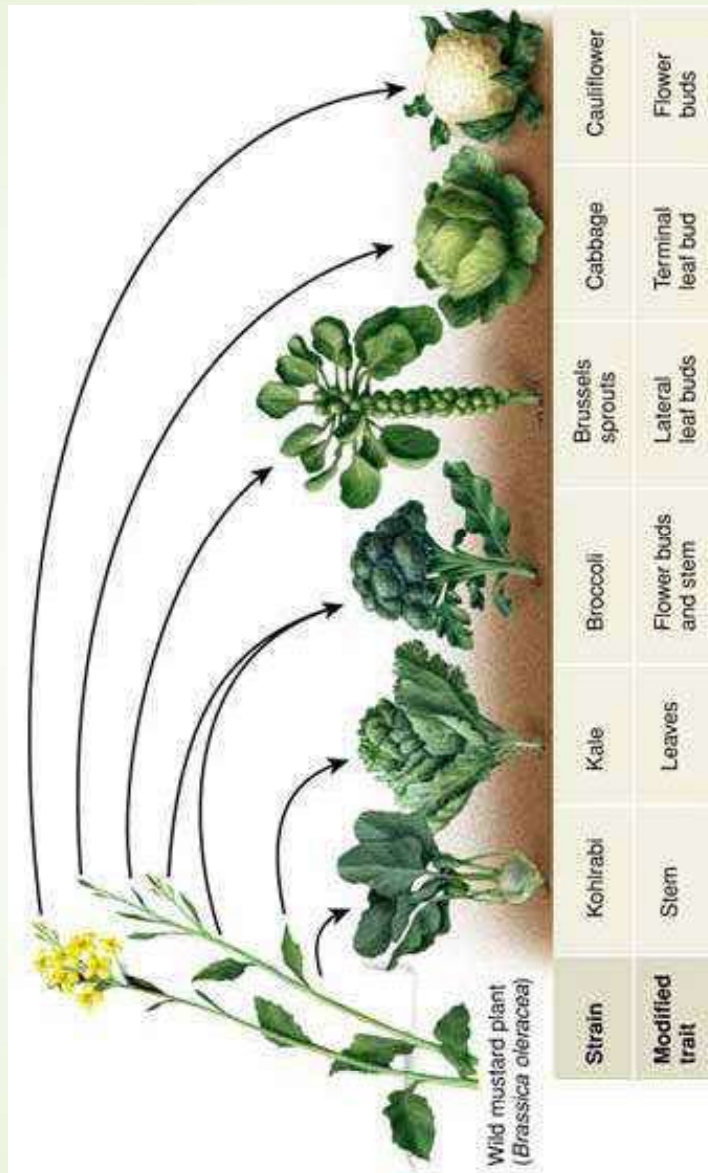
Some Key Words For the Presentation

Plant Breeding and Techniques, Plant Biodiversity
Conservation, Climate Change Effects, Sustainable
Agriculture, Climate-Resilience.
Collaborations and funding.

Plant Breeding**

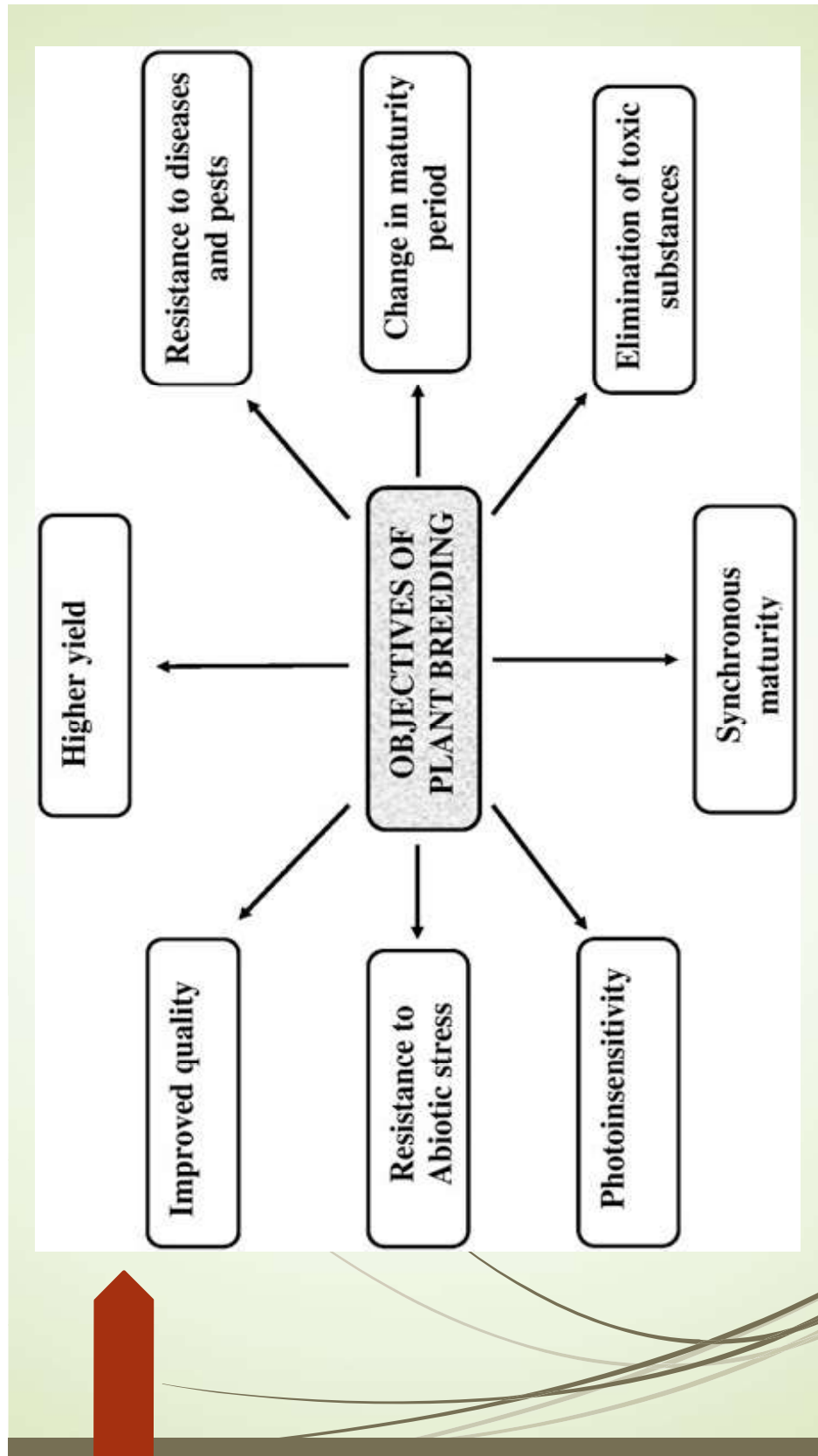
Plant breeding, application of genetic principles to produce plants that are more useful to humans.





Milestones in Plant Breeding





IMPORTANCE OF BIODIVERSITY

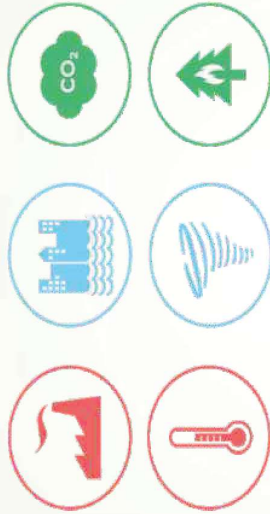


by Warless Nannecha-Bantais

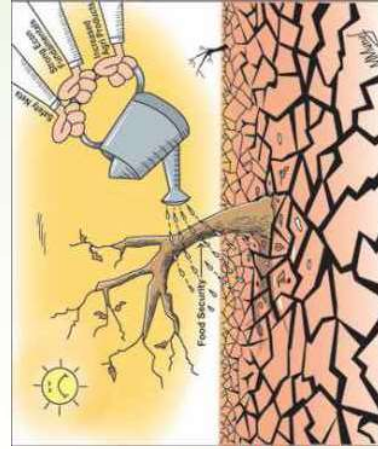
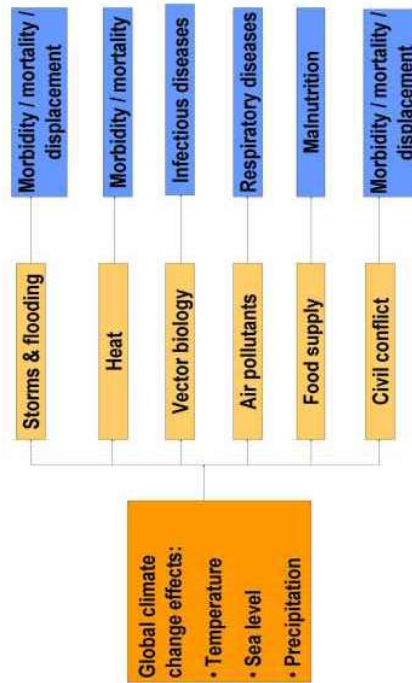
In drought-prone countries, children under five are up to **50% MORE** likely to be malnourished if born during a drought.

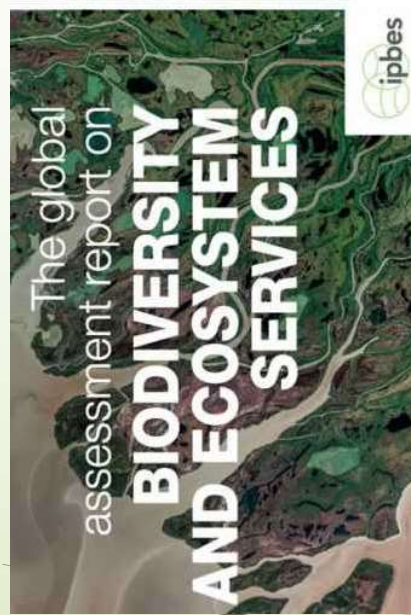


Constant Temperature rise



Climate change





KEY FINDINGS TO KNOW

1. The report shows that 75% of the land-based environment and about 66% of the marine environment have been significantly altered by human actions.
2. Nearly 1 millions species are at risk of extinction from human activities.
3. The loss of biodiversity increases the challenge of limiting climate change.
4. Climate change is intensifying biodiversity loss.

Need for Biodiversity (Crop/plant)



**Adaptation to climate change
Food and nutritional security**

Increased yields, stability...

New varieties

Seed systems

Breeding

Genebanks

**Crop
diversity**



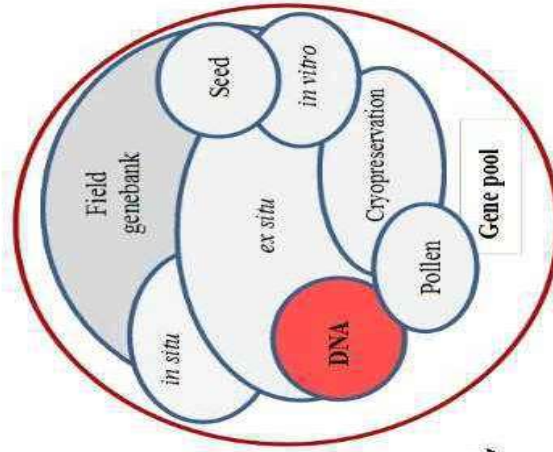
State of biodiversity – conservation

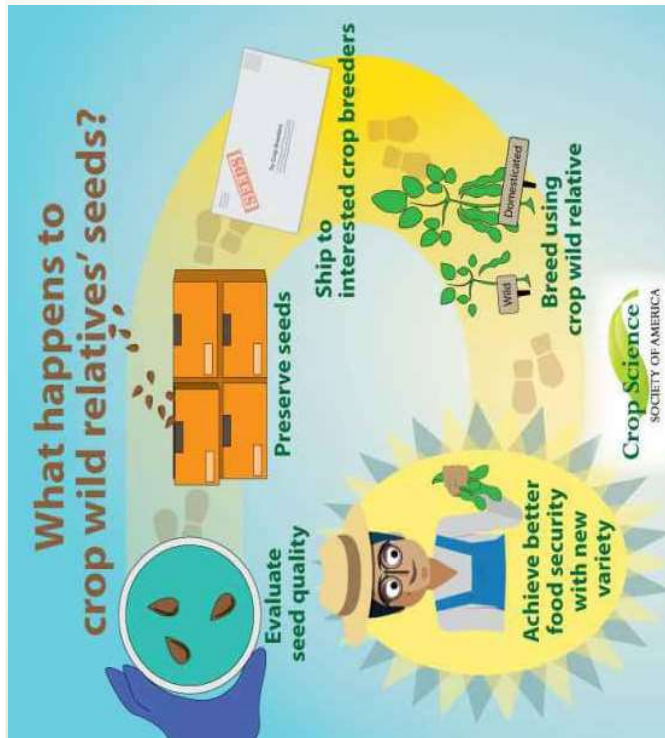
❑ *ex situ*

- Field (genebank)
- Long term
- Seed conservation
- cryopreservation
- *in vitro*
- DNA

❑ *in situ*

- On-farm conservation
- National parks, reserves,
- Landscape parks





GENETIC DIVERSITY OF TOMATO (*SOLANUM LYCOPERSICUM*) ACCESSIONS USING CHLOROPLAST DNA AND RANDOM AMPLIFIED POLYMORPHIC DNA MARKERS

Iloh AC^{1*}, Onwukwe AA^{1,2}, Falusi AO² and PC Onyenekwe¹

¹Figure 2: A UPGMA Dendrogram of genetic relationships of Tomato (*Solanum lycopersicum*) accessions using RAPD markers

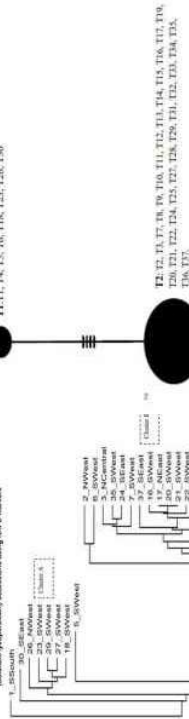


Figure 3: Statistical parsimony network based on trnH-psbA cpDNA sequences of tomato accessions

The use of both cpDNA and RAPD markers in this study has efficiently classified the selected tomato accessions according to their genetic make-up.

The continuous cycling/shuffling of species within the narrow gene pool is expected to lead to a continuous reduction in genetic variability, thus the need to breed with known wild cultivars to increase genetic variability.

PLANT BREEDING FOR SUSTAINABILITY

Without plant breeding, Europe would need an extra 19 million hectares of farm land to produce the same amount of food.

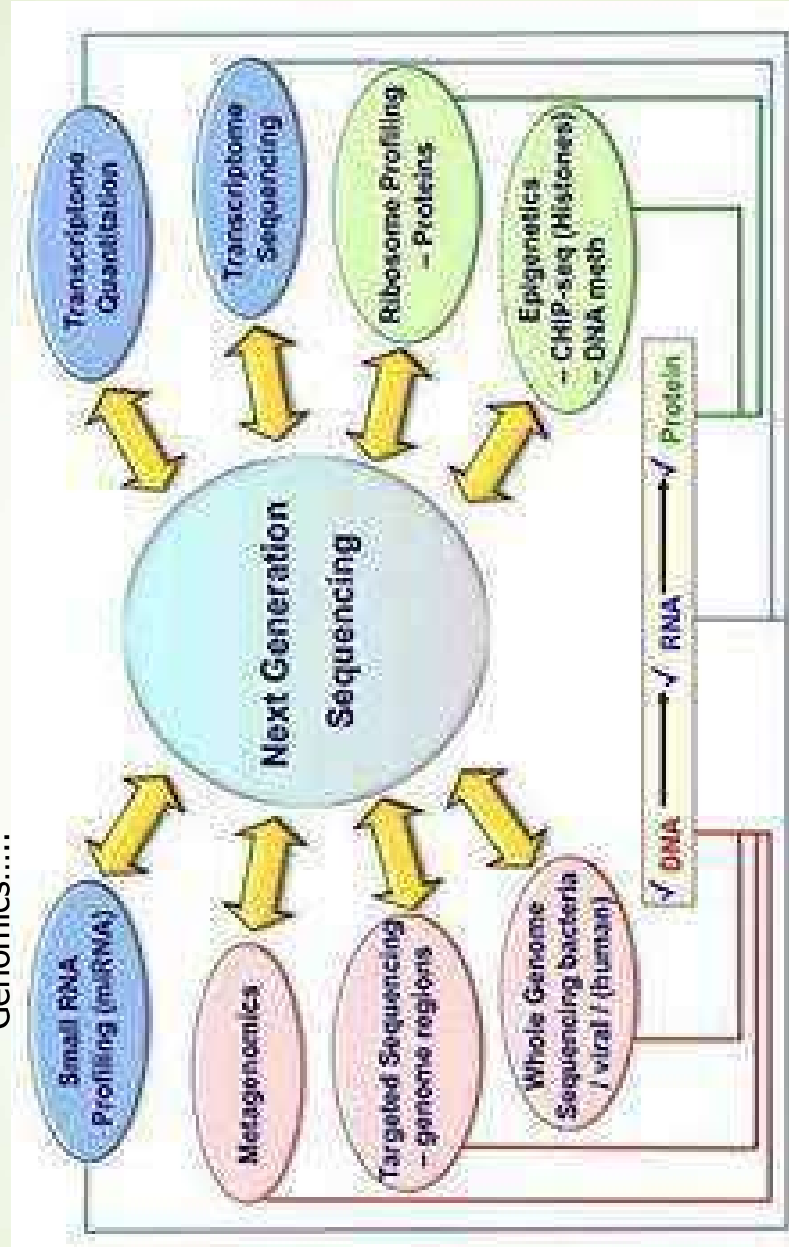
Turning 19 million hectares of forests, wetlands and other habitats into farmland would release 3.4 bn tons of CO₂.

Annualised, that's the same as all the greenhouse gas emissions from traffic in Germany, or the annual CO₂ emissions of a country like the Netherlands.

Research source: <http://nat.sci/planetip-HFFaResearch>
More info: www.planetip.org

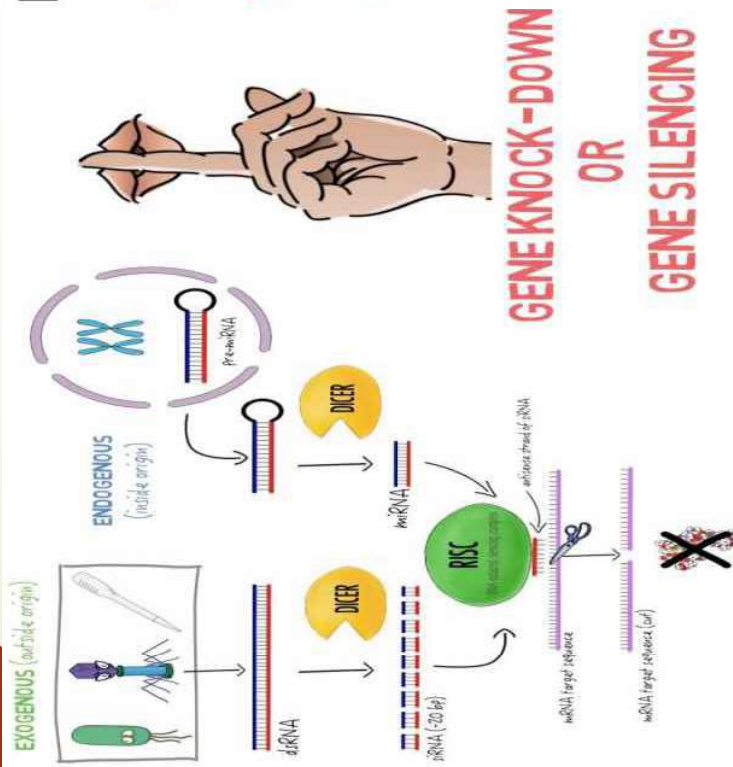


How Plant Breeding Addresses Climate Challenges**
 innovations and breakthroughs of Next generation
 Genomics....



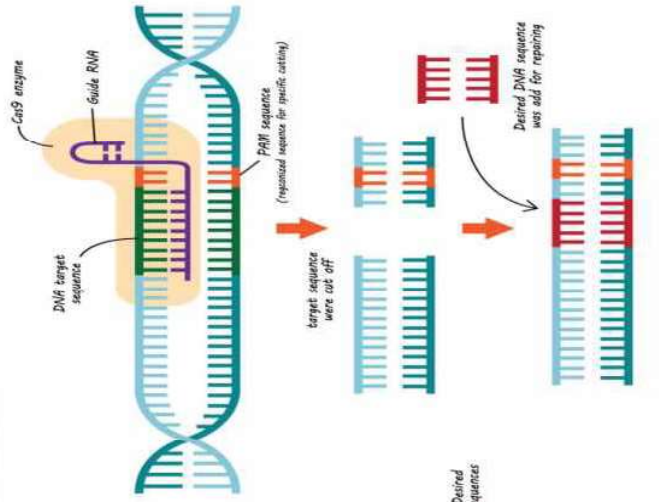
- Gene knockdown and knockout techniques
- CRISPR-Cas9 technology


Science ● ● ●



How does CRISPR-Cas9 work?


- Adapted from defense mechanism against virus of bacteria
- Cas9 is an enzyme using guide RNA leading to cut target DNA sequence
- Desired genetic sequence could add in repairing system for customize DNA






Applications of (CRISPR) genome editing in crops

Genome editing has many applications in crops - the plants we grow for food. CRISPR genome editing, in particular, makes it much easier to alter DNA sequences in crops. Precise DNA alterations can give crops many improved characteristics. These have the potential to increase the amount of nutrient-dense food available to people around the world. Some of the applications of genome editing in crops include:




Improving nutritional value




Increase the amount of nutrients in crops

Enhancing disease resistance

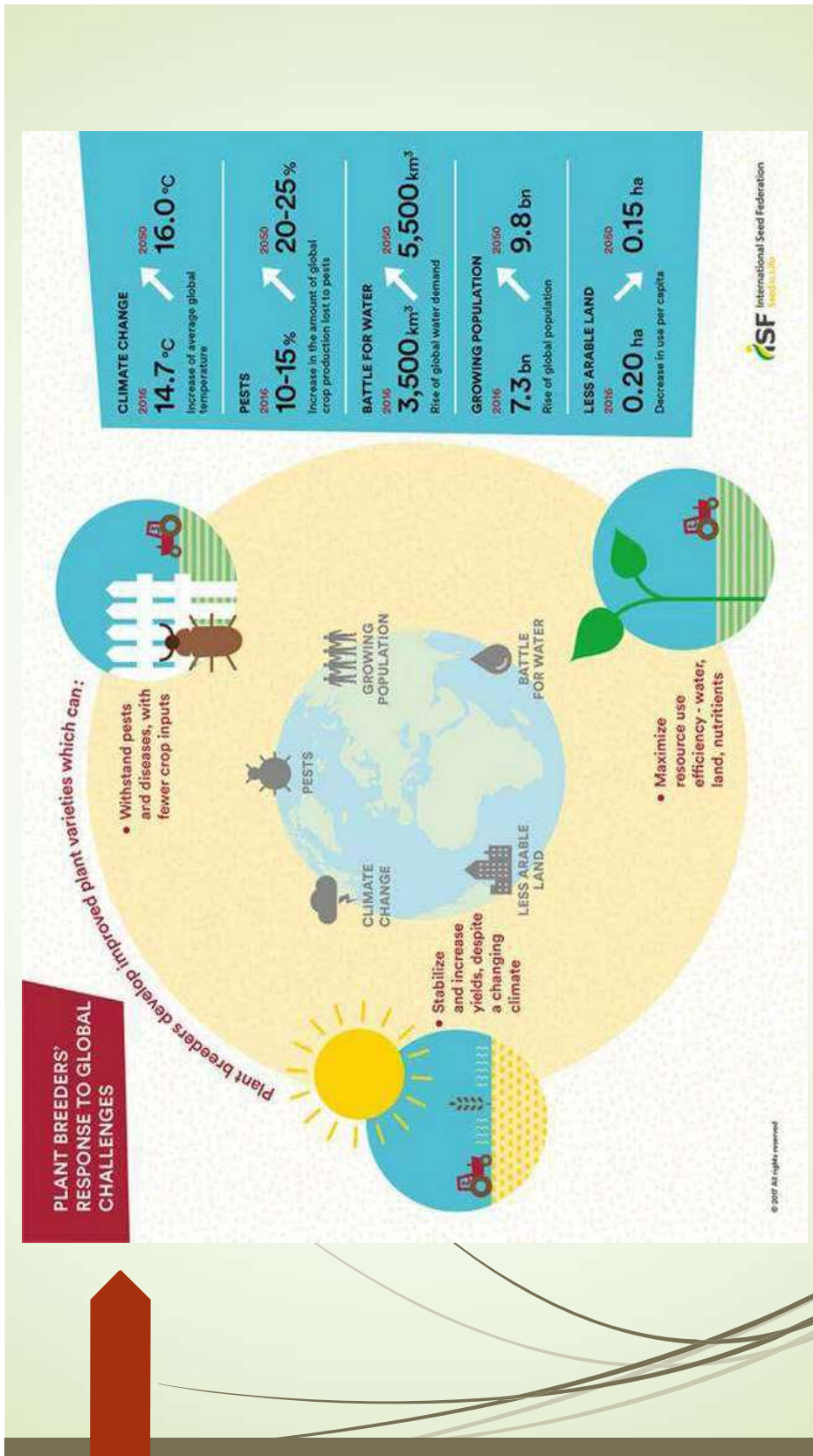


Protect crops from viruses, fungi, insects, and other pests

Domesticating crops



Make new and old crops easier to farm



Food Security.

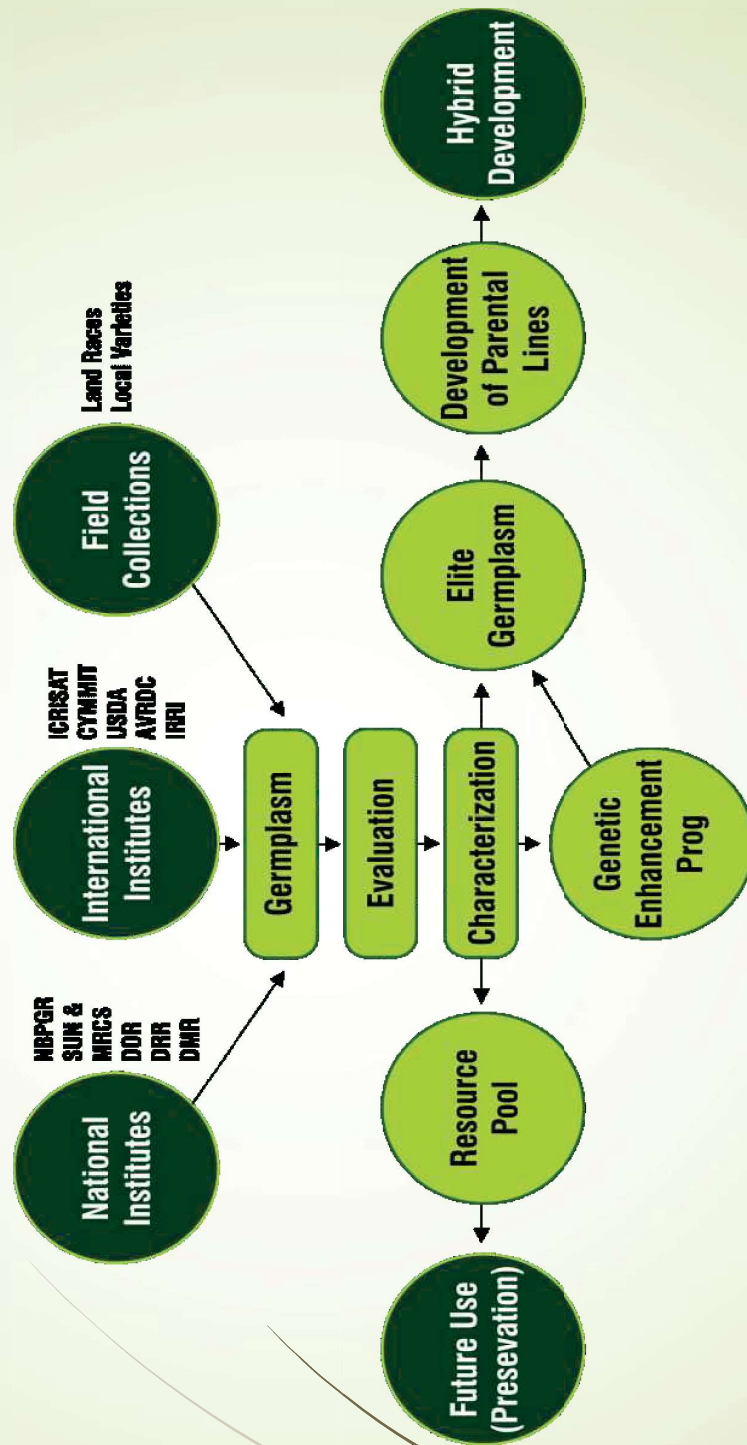




Climate Change



R & D GENETIC RESOURCES



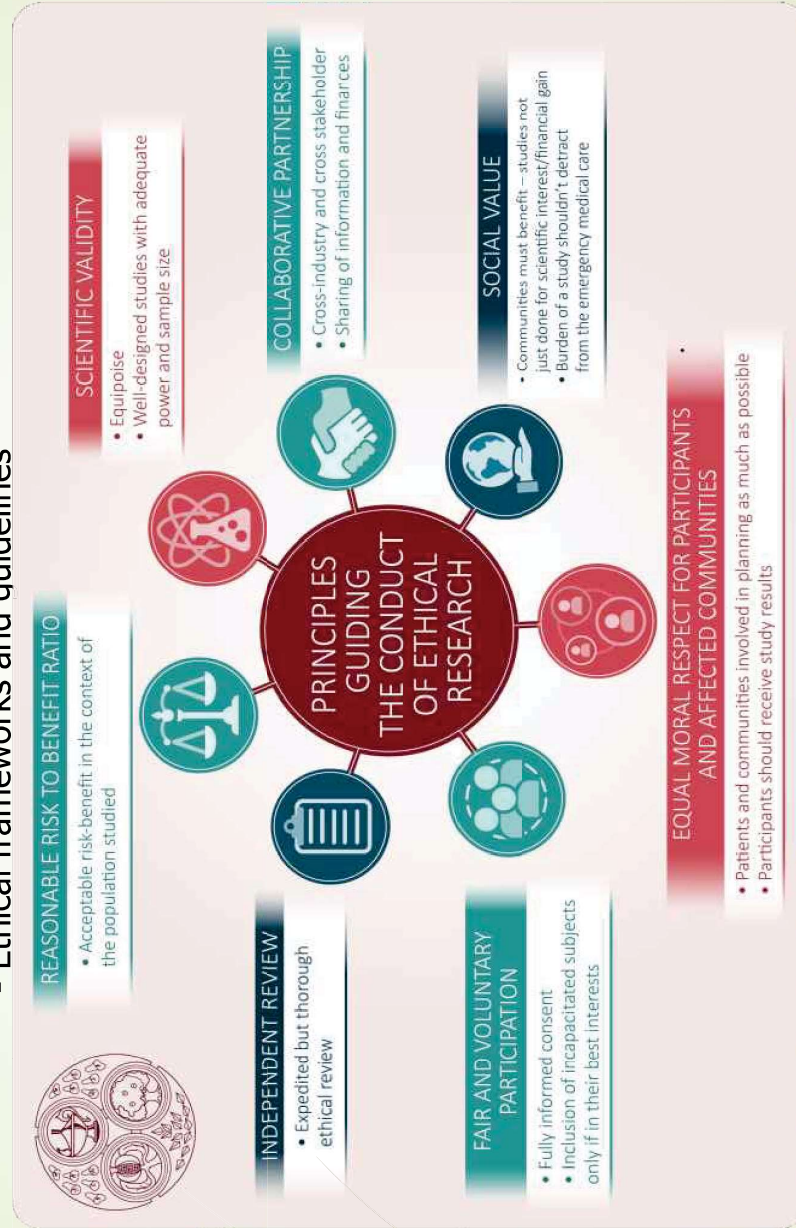
Collaborative Efforts**

- The importance of collaboration between researchers, industry, and policymakers
- Cross-sector partnerships



Ethical Considerations**

- Ethical concerns in life sciences research
- Ethical frameworks and guidelines

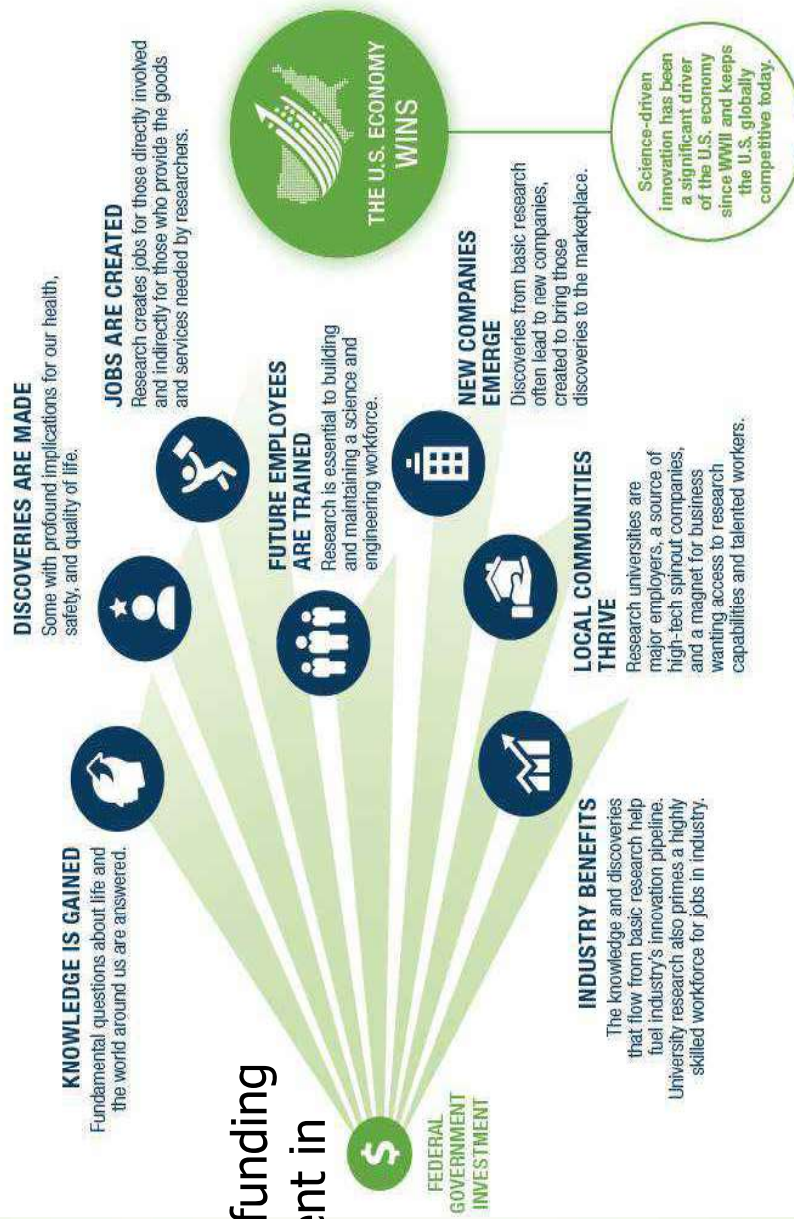


Funding and Investment**

- The role of Government funding and investment in research

BASIC RESEARCH — AN UNDERVALUED INVESTMENT

WHEN THE FEDERAL GOVERNMENT INVESTS IN BASIC SCIENTIFIC RESEARCH:

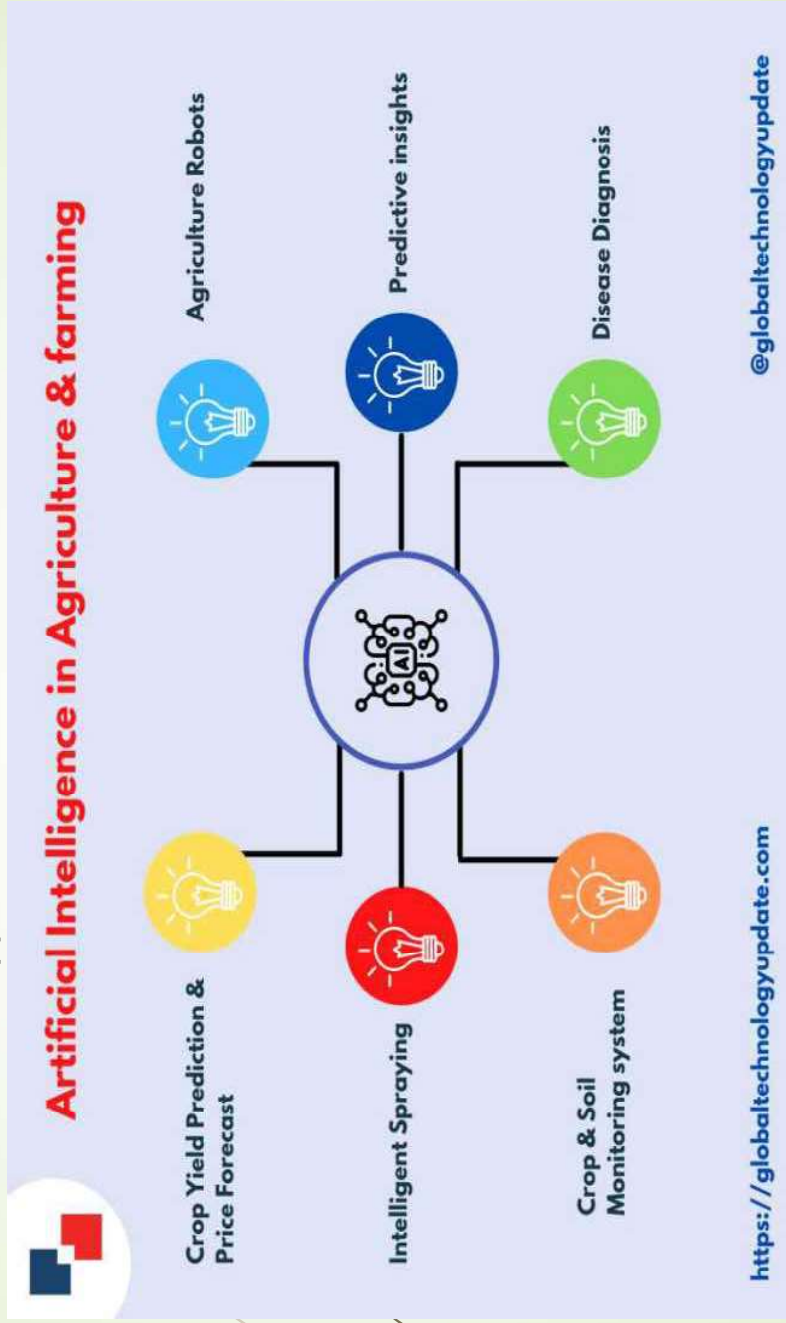




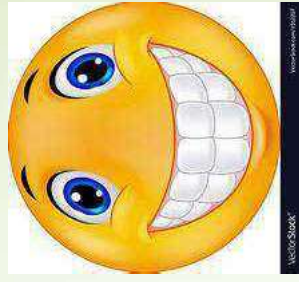
Private sector involvement in Funding Research

Future Trends**

- Merging trends in life sciences research
- Opportunities for the future



Will AI be a challenge for plant breeding/agriculture in the Future?



Your Guess is a good as mine