



Future Proofing

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Future-proofing is the **process of anticipating the future and developing methods of minimizing the effects of shocks** and stresses of future events.

- In view of the increasing vagaries of weather due to climate change demands are being made to future proof the agricultural product as mysterious pathogen are reducing yield and ruining and killing crops across the world.
- For example, **Rapid apple decline or sudden apple decline** is being witnessed in many states across the USA. Scientists are not able to find any pathogen that is responsible for such decline, but largely they concur on the impact of climate change and the impact of it on bacteria, fungi, and viruses.
- Even in India, rapid decline in wheat production is being witnessed due to “wheat blast”.

Blast disease

- The increased outbreak of pests, diseases and abiotic stresses due to climate change pose a high risk to global food security. Emergence in fungal diseases has been increased 4-fold in the last four decades.
- One of the devastating threats to food security is the epidemic outbreaks of blast diseases in major food crops.
- **Blast is a worrisome plant disease of 50 species of grasses including two major food crops, rice, and wheat.**

One of the recent examples was the first outbreak of a **devastating wheat blast in Bangladesh in 2016** which damaged wheat crop in 8 districts with yield losses up to 100%. Wheat blast epidemic was aggravated by the untimely rainfall and warmer winter weather which is associated with the changing climate.

In view of these problems, the scientists are calling for **future-proofing of agricultural products.**

Need for future-proofing

Centuries of selective breeding have refined the genomes of most high valued crops. These breeds help in attaining the goal of high yield, at the cost of genetic diversity.

Genetic Diversity

- **Genetic diversity is important because it helps maintain the health of a population, by including alleles (a form of mutated genes) that may be valuable in resisting diseases, pests, and other stresses.**
- Maintaining diversity gives the population a buffer against change, providing the flexibility to adapt. If the environment changes, a population that has a higher variability of alleles will be better able to evolve to adapt to the new environment. In extreme situations (e.g. drought, disease epidemics) diversity could even mean the survival of the population.
- The process of domestication tends to decrease the genetic diversity of selected crop species, due in part to the genetic bottleneck imposed when only a few plants are selected and propagated.

How it should be future proofed

All crops have **wild relatives that are ill-suited to agriculture but which have vastly more genetic diversity** than their domesticated counterparts. Using the biotechnological methods, the genes of these pest-resistant varieties can be used to future -proof the existing varieties.