Elements of a project design for pre-breeding

Aim of the module

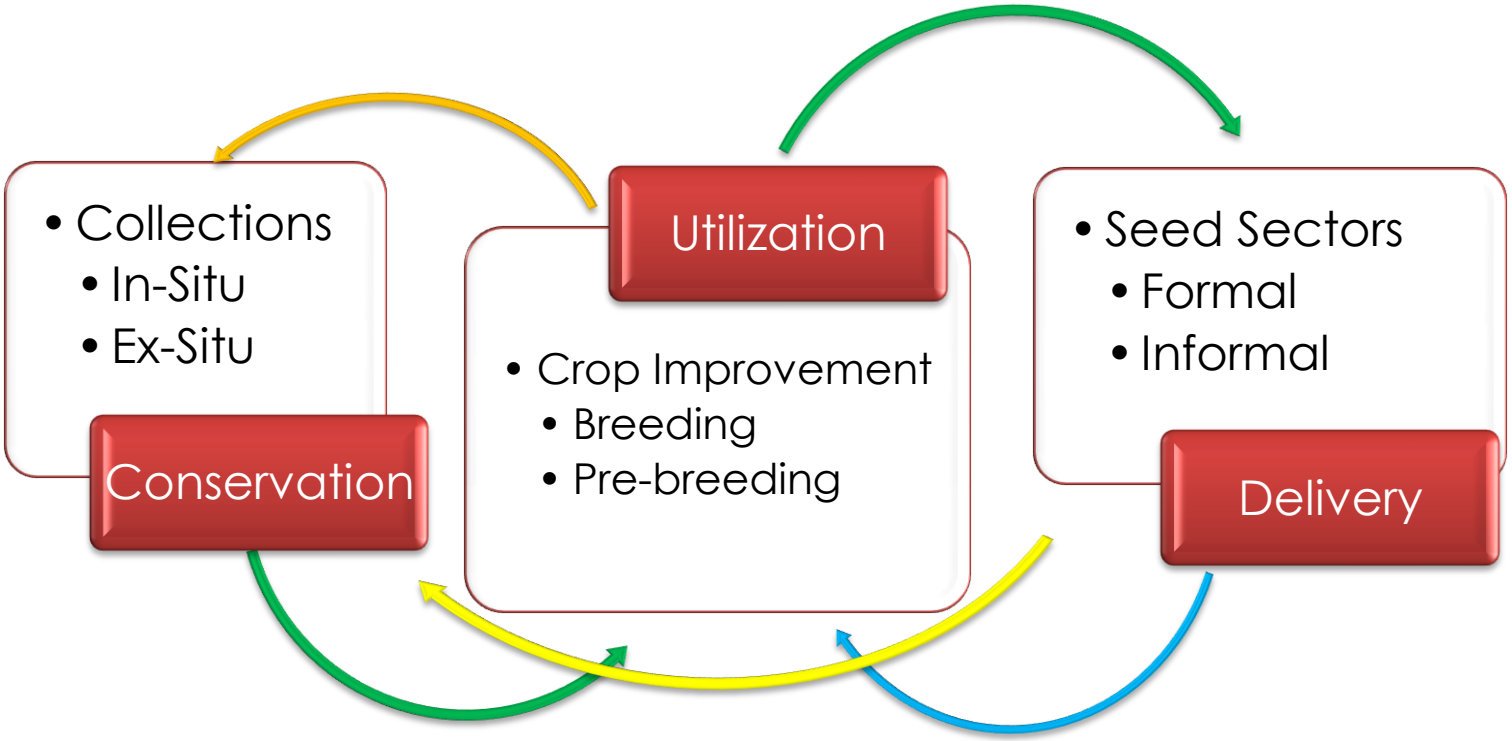
At the end of the module, we should be able to:

- identify the elements of a project plan for pre-breeding
- understand the importance of adopting a participatory approach throughout the project

Introduction

Pre-breeding

- aims to identify useful traits in non-adapted materials and transfer them into better adapted ones for further breeding
- is a key link between conservation and use of PGRFA



Plan

A typical plan might contain ten key elements

- Aims
- Outputs
- Evaluation criteria and data quality
- Resource requirements and sources
- Management structure
- Milestones
- Tolerances
- Dependencies
- Risks
- Timeframe

Setting the Aims

As an example, typical main aims of a pre-breeding programme might be to:

- Identify resistance to a pest or disease of a major crop among its wild relatives
- Transfer the resistance from the wild relative into a cultivar of the crop that can be used in a formal breeding programme

Identifying the Outputs

Using same example,

- a main output could be:
  - Ten wheat germplasm lines, each containing a different source of resistance to a specific pest, for inclusion in the main wheat breeding programme
- Secondary outputs could include:
  - Three scientific publications
  - One conference presentation
  - A master's degree for the principal pre-breeder
  - A training video

Evaluation criteria and data quality

Clarity on how the criteria for the selections, e.g. for resistance

- Scoring system, including the ranges
- Which score merits advancement and which results in discarding of the material?

Estimating resource requirements and sources

Answers to the question, ‘what do I need to carry out a successful pre-breeding project?’

- Human
- Financial
- Material
- Time

Financial Resources

Some pertinent questions – akin to all projects:

- Do I really need to invest in expensive laboratory equipment?
- Do I need full-time staff?
- Outsource – cost-benefit?
- Changes in exchange rates?
- When to procure equipment?
- Adequate contingency funds?

Material Resources

All the equipment, supplies and facilities needed

- biological resources – PGRFA and inoculum for pests and diseases
- Greenhouse, field and laboratory spaces, irrigation if applicable
- Equipment -- consumable and non-consumable supplies
- Best way to plan:
  - break down the various activities into separate components, tasks or phases
  - make checklists of material requirements for each.
  - Linked at least in part to list for estimating financial requirements and allocations.

Designing the project management structure

- Unlikely that one is the sole participant
- Project could be large and involve a network of co-operators and other partners
- Might also be sponsored by commerce or industry
- Therefore necessary to organize the management of the pre-breeding project
- Management structure should take into account the need for decision-making, information sharing and monitoring and evaluation
- Keep management slim and simple so as not to increase the administrative burden at the expense of project work.

Setting the milestones

Key phases	Suitable milestones for each phase for the principal output
Securing the germplasm	Specifying the minimum number of germplasm accessions you want for the project. If you intend screening germplasm from various geographical regions you might also specify according to distribution of the accessions
Screening the germplasm	Setting a minimum number of germplasm accessions for screening with particular strains of the pest at particular times or locations.
Crossing the materials	Quantifying the extent of the planned crossing programme.
Advancing the progeny	Specifying the size of the segregating populations you intend taking forward in the project according to resource availability.
Evaluating the products	Setting targets for evaluation in terms of numbers and quality of products.

Setting Tolerances

- Impossible to plan and carry out a pre-breeding project with absolute confidence on outcome
- nature of biological processes; unexpected circumstances and issues
- means that exceptions have to made
- Setting tolerances helps one decide how far one can stray from set aims while still adhering to the spirit of the plan
- Need for some leeway in order to make progress and ‘succeed’

Identifying the dependencies

Dependencies refer to the series of events that lead to an output – what needs to happen before the next thing can happen

- Securing the germplasm
- Screening the germplasm
- Crossing the materials
- Advancing the progeny
- Evaluating the products

Analysing the risks

Risk analysis is often linked with identifying the dependencies and may include:

- Genes behave differently than expected when transferred to the new background
- Estimates for resource requirements wrong
- Incorrect allocation of responsibilities
- Poor communication leading to misunderstandings
- Stakeholders unhappy
- Change in exchange rates mean less funding than anticipated

Estimating the timeframe

One of the most precious resources is time

- For many pre-breeding projects time will include an element of seasonality, for instance
- So, set the various activities against a calendar and make a timetable.
- This type of timetable is referred to as a Gantt chart
  - which is a graphical representation of the duration of tasks against the progression of time.

Summary

Producing a project plan is the starting point

- The project plan
  - details the precise aims of the project in light of the resources needed to carry it out and the requirements of the users of the project outputs.
  - details how the project is to be conducted, how progress is to be evaluated, the risks that are likely to be encountered and the timing of project activities.
  - is a working document that provides structure and direction to the project
  - can be modified as the project progresses
  - serves as a guide to project management