Demand-Led Plant Breeding

Chapter 6
Monitoring, Evaluation and Learning

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Objectives

1. **Performance benchmarking:** To enable breeders to devise a realistic performance assessment plan for their demand led breeding program that:

(i) Is incorporated into strategies and stage plans for new variety design and engages with clients and stakeholders in the value chain; and

(ii) Develops key performance indicators tailored for new variety development and delivery of a demand led breeding program's goals and objectives.

Objectives

2. Variety adoption and performance tracking

(i) To enable breeders to appreciate the importance of variety adoption assessment in demand led breeding

(ii) To design pathways for monitoring progress in demand led breeding with value chain clients, with defined responsibilities for the various actors

(iii) To explore improved, low cost methods for variety tracking to assess adoption of new varieties

Chapter 6 Outline

1. Introduction
2. Performance Benchmarking
3. Principles and Best Practices in Demand-led Breeding
4. Monitoring, Evaluation and Learning for Demand-led Breeding
5. Variety Adoption and Performance Tracking
6. Case Study on Bean Improvement in Ethiopia 2004-14
7. Learning and Communications

1. INTRODUCTION

Opening Discussion
(individual exercise and plenary discussion)

- Do you have institutional M&E systems in your organization?
- Are you using it in your breeding program?
- How do you measure success of your breeding programme?
- How do you get feedback from value chain clients and other stakeholders?

2. PERFORMANCE BENCHMARKING

Definition of Terms

- ***Breeding program*****:** *"The combination of all the activities required to create a portfolio of new varieties that serve farmers in different market segments and their value chains"*

- ***Breeding project:*** *"The means for creating a new variety to serve the needs of farmers, their markets and value chains"*

Definition of Terms

- ***Breeding goal:*** *"The overarching aim that guides decision making within the breeding project"*

- ***Breeding objectives***: *"the measurable steps that can be undertaken to deliver the goal"*

Definition of terms

SMART Breeding objectives are:

- ***Specific*:** Target specific aspects or combination of traits required by clients or the value chain for improvement
- ***Measureable*:** Can be quantified or have at least an indicator of performance
- ***Achievable*:** Can be delivered within the given time, knowledge, resources and enabling environment
- ***Relevant*:** Must relate closely and support the overall goal of the project
- ***Time-related*:** Appropriate for the timescales possible and it can be specified when results will be available

Definition of Terms

- ***Project Outputs*****:** *"The product(s) produced during the demand-led breeding project"*
- ***Project Outcome*****:** ***"****The changes in behavior or events that take place as a result of the new variety having been designed, developed, released and made available to clients".*
- ***Project Impact*****:** *"The economic and social benefits that accrue to farmers, their communities and their crop value chains as a result of using the new variety (or varieties) created during a plant breeding project"*

Definition of Terms

- ***Key performance indicator*****:** *"A descriptor/metric that can be measured to provide a quantitative assessment of the performance of core components of the project, such as efficiency and effectiveness of operational delivery, project outputs, outcomes and impact"*

- ***Target:*** *"A quantitative expression of the desired result of the breeding project. It can be used to describe an output, an outcome and be a key performance indicator".*

Definition of Terms

- ***Variety branding:*** *"A name, term, design, symbol or other features that distinguishes one institution's/company's/ individual breeder's variety from those of others*".

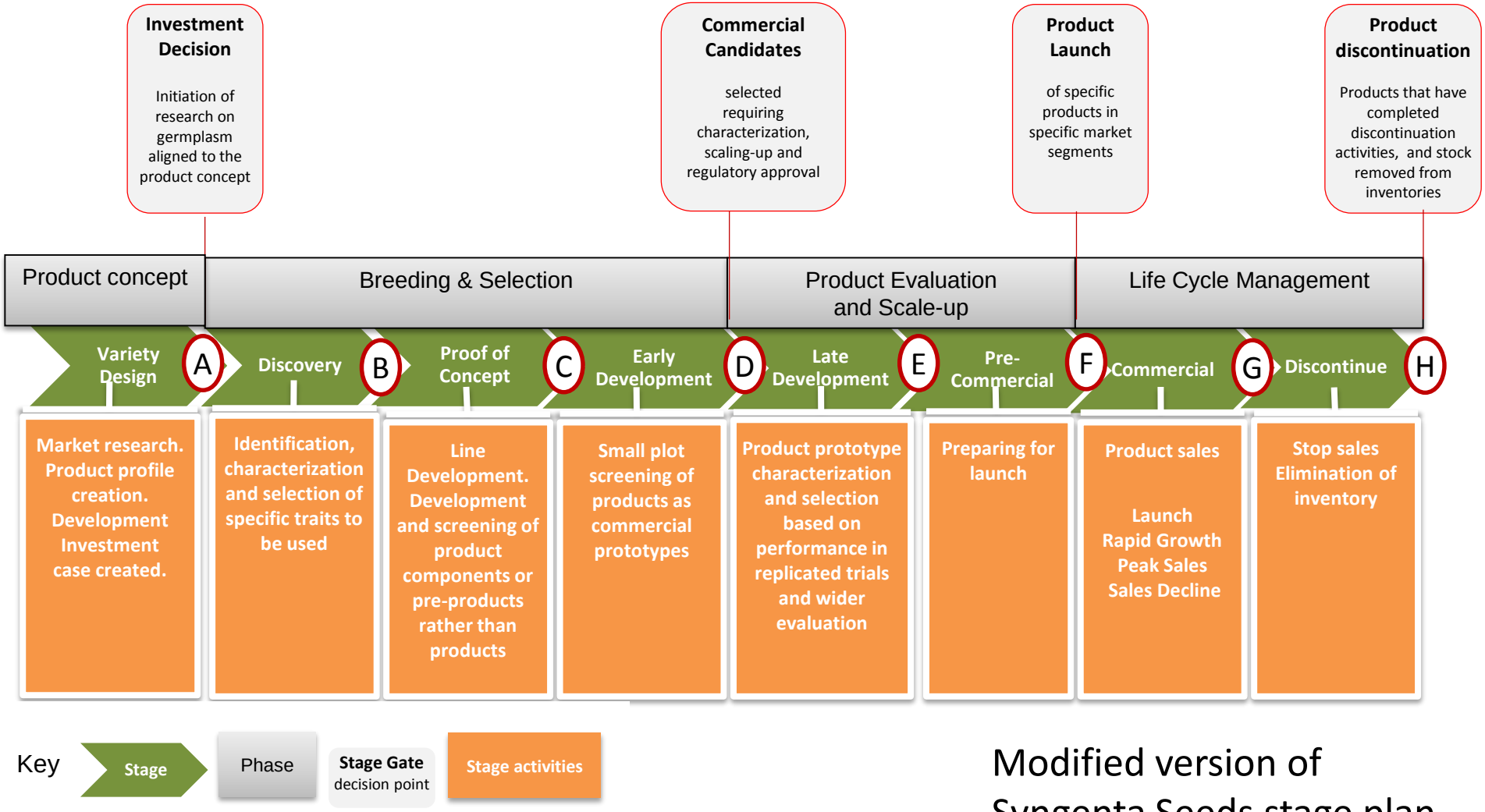
3. PRINCIPLES AND BEST PRACTICES in DEMAND-LED BREEDING

Principles of Demand-led Breeding:

- **Target driven:** Demand-led breeding is target driven and this is embedded in breeding and related M&E process
- **Demand-led strategy**: A demand-led development strategy is designed for each new variety. It includes the components of "*why*", "*what* ", "*who*" "*when*" and *how*"
- **Performance indicators:** The expected level of engagement and emphasis placed on the views of clients on the performance and use of varieties is much higher in demand-led than in conventional breeding programs

Demand-led Breeding Stage Plan

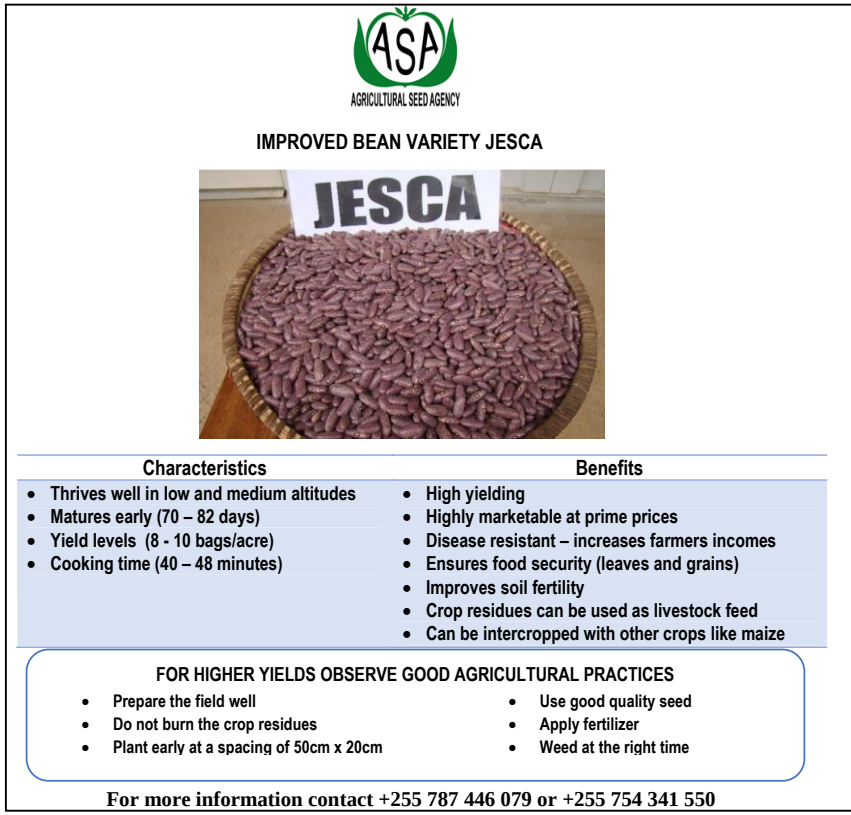
Line progression decisions



Modified version of Syngenta Seeds stage plan

Variety branding

- Variety brand: name, term, design, symbol or other features that distinguishes one variety from those of others.
- Appears on seed packages or printed as flyers/ posters used for marketing.
- Ensures returns on investments for breeders
- Enables breeders to be recognized for their skills and makes breeding a valued profession.



4. MONITORING, EVALUATION AND LEARNING FOR DEMAND-LED BREEDING

4. Monitoring, Evaluation (M&E) and Learning for Demand-led breeding

- What are the differences between monitoring, evaluation and learning in current breeding programs vs demand-led breeding projects and programs?
- What do these difference mean for your demand led-breeding program, for M&E and learning systems and the possible implementation challenges?
- What does this mean for your role as a breeder?

Monitoring, Evaluation (M&E) and Learning

- Monitoring, evaluation and learning is a process to improve project performance in achieving results, and is applicable to any breeding program.
- Four reasons for using M&E and learning in demand-led breeding projects/program are:

1. Delivery

– To support development and delivery of new varieties to meet clients needs, to their design specification, on time and budget

2. Quality

– To provide data on project progress and effectiveness
– To improve project management and decision making
– To provide data to plan future resource needs
– To provide data useful for policy making and advocacy

Monitoring, Evaluation (M&E) and Learning

3. Accountability

- To ensure accountability to clients, investors, partners, value chain actors, other stakeholders

4. Learning

- To provide opportunities to learn from experience of current breeding projects/program
- To provide evidence about what works and what does not, to inform future projects and scaling up

Monitoring

- Monitoring is a continuous observation and checking procedure on the progress of on-going breeding activities.
- Compares progress of activities against milestones and timelines for decisions in the stage plan
- Compares estimated and actual costs of the project against its approved budget
- The purposes of monitoring are:
  - To support reaching the milestones and targets set for the project in a timely manner;
  - To determine if corrective action is required to solve emerging problems or any delays;
  - To identify improvements that need to made to the stage plan.

Evaluation

- Evaluation is a systematic, objective examination of the performance of a breeding project and delivery of its goals, objectives and targets

- The best evaluations look at project performance in terms of relevance, effectiveness and efficiency and if expected outputs, outcomes and impact have been or will be achieved on time and on budget.

Evaluation

Four key decision points in the stage plan when critical evaluation needs to be undertaken to support investment and progression decisions, are:

- **Investment decision**: Decision to start a breeding project and invest in creating a new variety, based on a demand-driven product profile
- **Commercial candidates**: Deciding on lead lines to be developed and scaled up
- **New variety release**
- **Post-launch adoption and impact assessment.**

Key evaluation questions

- **Meeting trait performance targets**: How close is the performance of the new variety to the new variety design targets set in the product profile? Specifically, are the genetic gains required for each of the priority traits being delivered?
- **Satisfying clients' needs:** Does the variety satisfy client's needs and demand? Is it preferred to older varieties? Has it been adopted by the target numbers of farmers it was designed for?

Key evaluation questions

- **Impact:** Does the variety create the economic, social and environmental impact at the individual, household and community level? (as defined in the benefits case used to justify the investment in the breeding project)
- Impact may be assessed by *ex post* evaluation only several years after varietal release

How is M&E integrated into Demand- led Breeding Projects/Program?

- M&E is an important component for success and continuous improvement in demand-led breeding
- M&E for demand-led breeding is designed to be primarily **target driven** (and not breeding activity driven).
- **Key performance indicators** of success include **metrics** on:
  - Performance of new varieties, meeting trait specifications
  - Client satisfaction
  - Use of new varieties by farmers and their value chains

M&E Implications for the Breeder

- **Metrics**: Breeders should support performance measurements that go beyond number of varieties registered and include metrics on product use and performance after release
- **Variety identification**: Breeders should build identity recognition systems into their varieties to allow a simple, cost effective, and ideally *in-situ* identification to enable monitoring of variety adoption monitoring
- **Clients:** Greater engagement of breeders with clients and value chains at the key decision points in the variety stage plan helps to ensure demand and uptake on release

Key performance indicators for SMART breeding objectives

The quality and effectiveness of breeding objectives can be improved by ensuring they have **S.M.A.R.T** characteristics:

- **Specific** – target specific aspects or combination of traits required by clients or the value chain for improvement
- **Measureable** – can be quantified or have at least an indicator of performance
- **Achievable** – can be delivered within the given knowledge, resources and enabling environment
- **Relevant** – must relate closely and support the overall goal of the project
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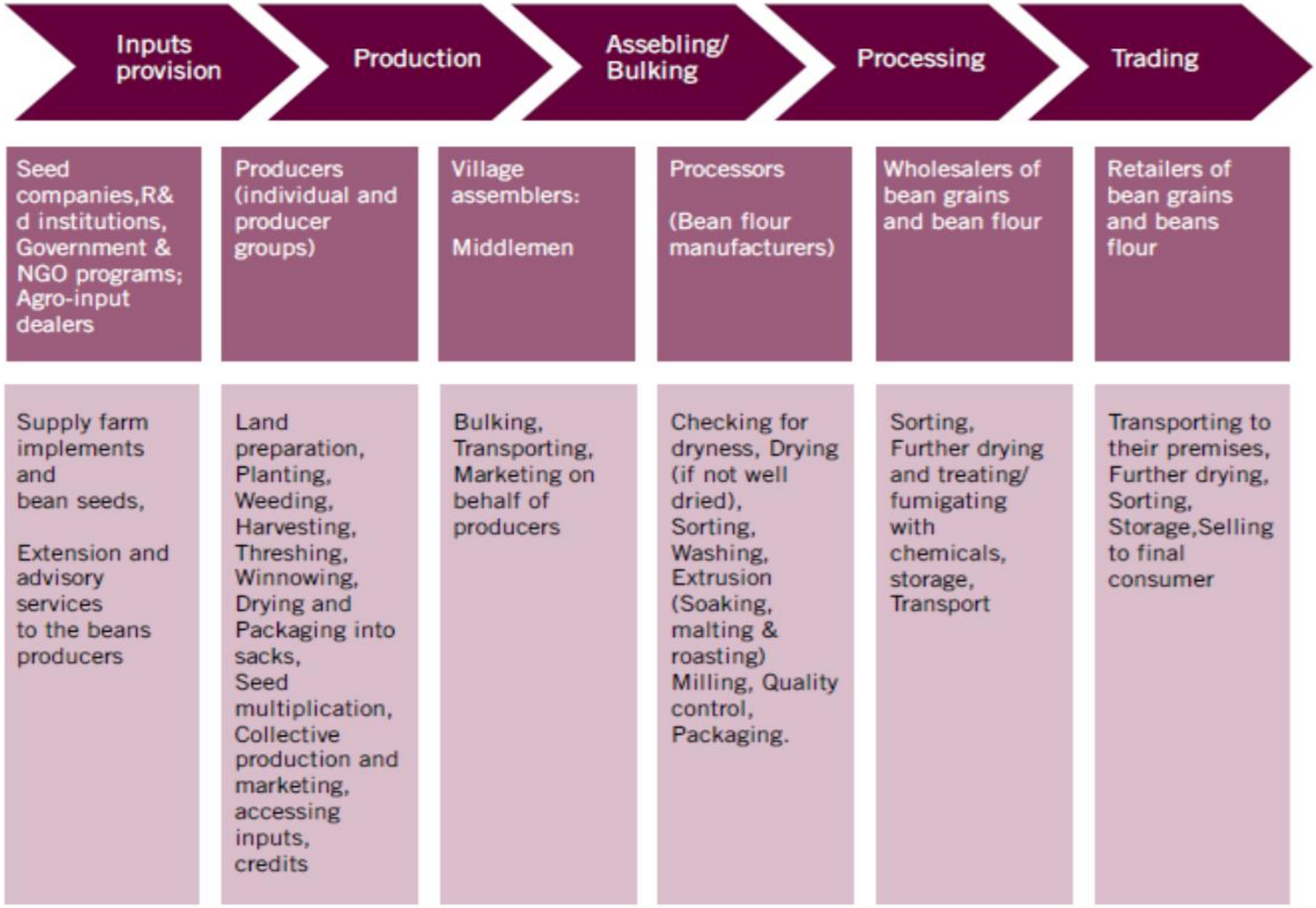
Ugandan dry bean seed value chain



Group Exercise – Formulation of KPIs

- Using the Ugandan dry bean seed value chain:
  - What information would you want from each value chain actor to measure the success of your variety?
  - List the KPIs (quantitative and qualitative indicators) along this seed value chain?

5. VARIETY ADOPTION AND PERFORMANCE TRACKING

Variety Adoption and Performance Tracking

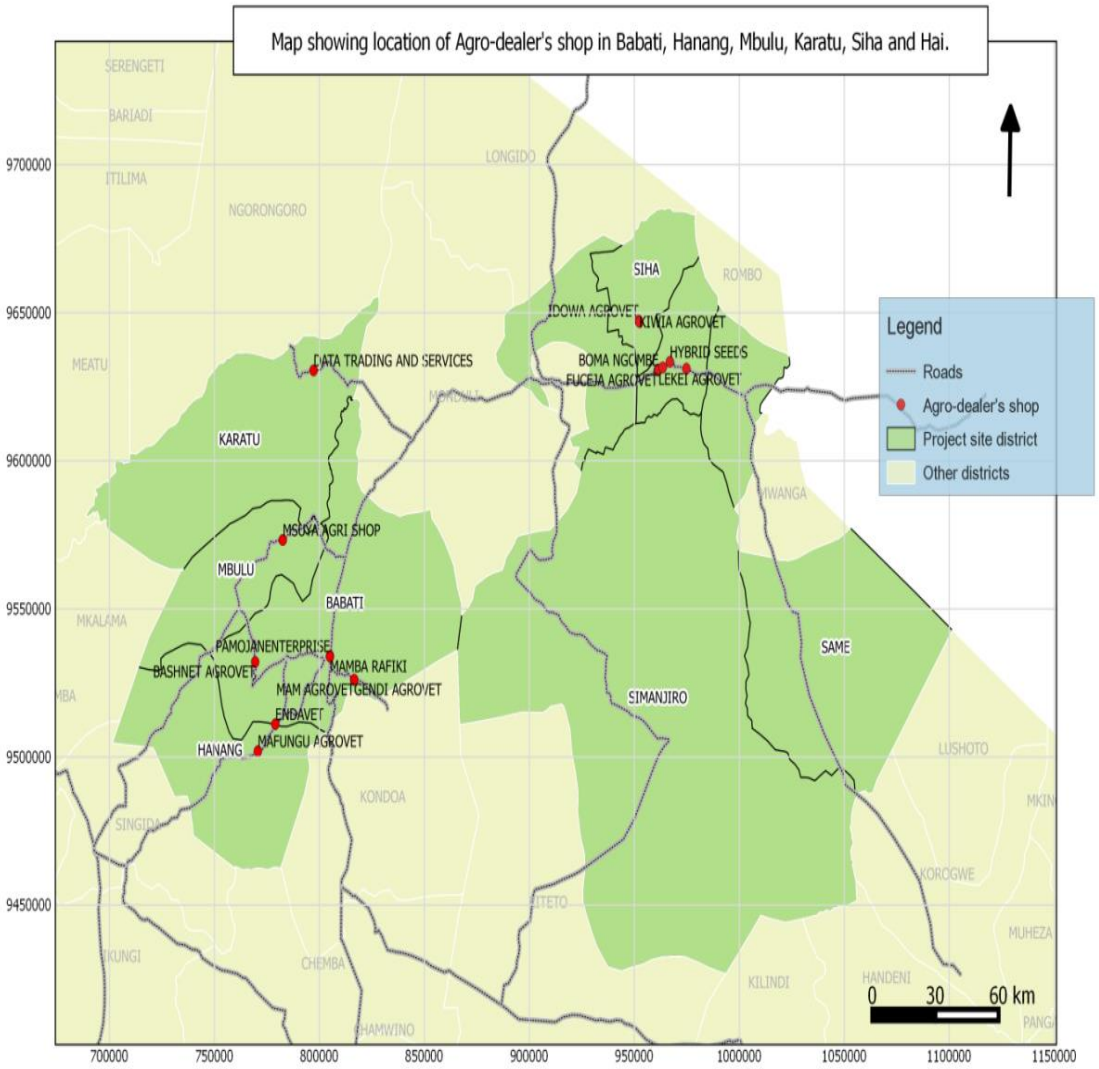
- How do you know which is your seed/variety in the field?
- Do you have a cost effective method to track your new variety after release?

Variety Adoption and Performance Tracking

- Success of a breeding program can only be verified if the adoption pathways and performances of the products are tracked and documented
- Breeders need to be aware of all variety identity and tracking technologies available e.g. phenotypic and low cost molecular approaches
- Evaluate each tracking option in terms of accuracy, technical feasibility and cost
- Select and incorporate the most appropriate tracking methods into the development strategy and stage plan

Variety tracking using GPS coordinates

- Important for breeders to:
  - Monitor the movement of their varieties
  - Determine if varieties are adopted and being used by the farmers.
  - Also include locations of seed sales agencies and their geographical distribution
  - New IT can help track seed sales of new varieties (e.g. GPS, mobile phones).



An example of variety tracking using GPS coordinates in six districts of Tanzania

6. LEARNING AND COMMUNICATION

Learning and Communication

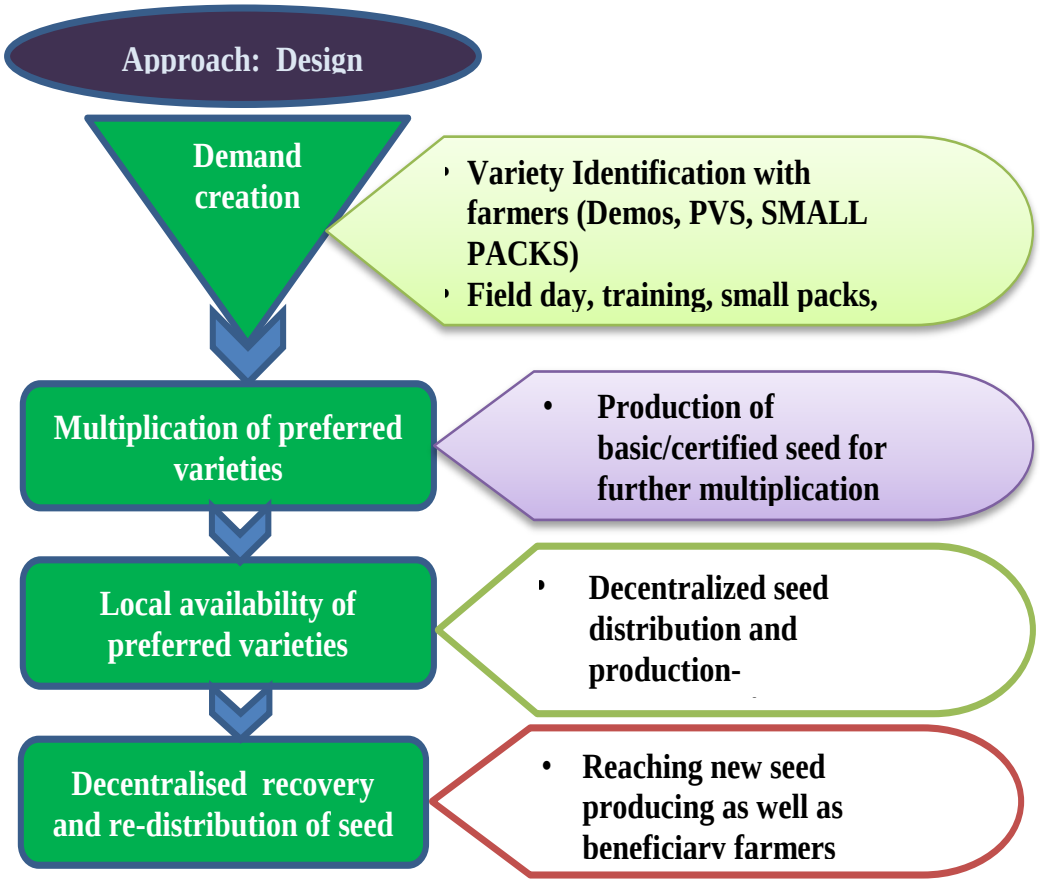
- Learning is an important aspect of a breeding project that is often overlooked.
- Success stories/case studies are important communication tools to share learning and impacts amongst breeders, clients, investors and value chain actors
- Case studies provide a medium for understanding and acting on knowledge gained and lessons learned;
- Case studies provide a lasting record of the breeding team's accomplishments and impact well beyond the completion of a specific breeding project (e.g. Norman Borlaug (wheat) and Gibesa Ejeta (sorghum) effect).

Learning and Communication

- Lessons can also be learned from less successful breeding projects

- Requires visionary R&D leadership to ensure negative evaluations lead to positive outcomes, by contributing to professional development of breeders and improving new variety designs for future breeding projects

Case study
Beans in Ethiopia 2004-2014



Other Success Stories in Plant Breeding

- Name of breeder, research institute/organization
- Name a success story from a national/international breeding program?
- What is the name of the variety? When was it released?
- Where was it released ? Can it be tracked via GPS/other?
- What is the evidence of adoption by farmers? Data?
- Does new variety meet and/or expand market demand?
- What are quantifiable benefits/impact of the new, (demand-led) variety?

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