

Introduction to the Breeding Program Assessment Tool (BPAT)

- **Why?** Research leaders and investors in the CGIAR have **lacked criteria and instruments** for evaluating the effectiveness of breeding programs
- The BPAT is an effort to **distill criteria** used in the private sector into a form useful for public sector research managers and donors
- Provides a **common evaluation framework** to help identify systemic issues and for comparisons
- The BPAT can be used both as an **evaluation scorecard** and as the **basis for developing improvement plans**
- We wanted to share the BPAT with you and are seeking **your advice** on how it can be used and institutionalized to help CGIAR and national breeding programs improve

Improving breeding program performance

Difficult to measure performance near term

- Adoption of new varieties
- Their on-farm performance
- Seed sold or disseminated
- Variety turnover/Ave age of varieties on-farm
- Welfare benefits

These impacts and outcomes can only be measured ~10 years after the start of an investment



Process performance metrics predictive of genetic gain

- Widely employed in private sector
- Size of program (#crosses, plots, trials, etc)
- Breeding cycle time (gens/yr or cycle)
- Quality of measurement (trial CV%s)
- Quality of data management
- Performance against checks on-farm

Intermediate performance metrics are relatively easy to capture

The Breeding Program Assessment Process and Benefits

BPAT is a structured evaluation process for breeding programs

- BPAT assesses management, organization and capacity using criteria commonly used to evaluate commercial plant breeding programs
- It consists of a **questionnaire** (96 questions) and an evaluation visit by a team of cultivar development experts
- A **scorecard and report** are generated describing program strengths and areas for improvement
- The evaluation is then used as the **basis for developing an improvement plan**
- It will be used by the Gates Foundation for evaluating and developing investments in crop improvement

The assessment process benefits breeding institutions

- Provides **opportunity for institution self-reflection** on their strengths and weaknesses and to prioritize opportunities for improvement
- Institution can more effectively:
 - lobby internally for increased resources to fill gaps
 - more clearly articulate their case to donors for general or specific support
 - more effectively identify the correct technical expertise

Free to public – can do self assessment

Developing the BPAT

Best practice interviews

- Team of public and private breeders and change-management experts **conducted interviews** with public and private sector breeding organizations across four continents as basis to build the initial assessment draft
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Breeding institution pilot visits

November 2013-April 2014

- International Rice Research Institute (IRRI) -- Philippines
 - International Institute for Tropical Agriculture (IITA) – Nigeria
 - Cowpea & cassava
 - Bangladesh Rice Research Institute (BRRI)
 - National Root Crop Research Institute (NRCRI) – Nigeria
 - Cassava
 - Ethiopian Institute for Agricultural Research (EIAR)
 - Chickpea, wheat
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Refinement

- Tool refined by expert team and BMGF staff based on direct input of pilot organizations' staff scientists
- Process refined through experience in running the pilot assessments

The BPAT has nine components

Breeding Program Components

1 Education, Experience Support

- Plant breeder, allied scientific personnel and staff
- Genetics, agronomy, statistics, information systems, etc

2 Infrastructure

- Lab, glass-house, & seed facilities
- Mechanization support infrastructure

3 Program Design, Execution Field support

- Clarity of objectives
- Appropriate methods, best practices
- Metrics of scale, speed, efficiency

4 Cultivar development, release & production

- Speed of cultivar development & release
- Robustness of testing and advancement
- Breeder seed production

5 Product support

- Agronomic package with variety
- Marketing & extension support
- Feedback loop

6 Program impact

- Process to measure market share
- Productivity increases
- Program impact on SHFs, others

Enabling Components

7 Strategic planning & management

- Shared vision, strategic planning, alignment, succession planning
- Collaboration and partnership

8 Budget & finance

- Budget management
- Equipment replacement strategy
- Financial planning, metrics

9 Performance management

- Performance evaluation process
- Individual and team incentives
- Training opportunities
- Recruiting-sourcing, selection

The BPAT process typically spans ten to twelve weeks

1 week

Introduction to the assessment¹



- Assessment tool introduced through group call

5 weeks

Pre-visit questionnaire



- Pre-visit questionnaire to relevant breeders and management
- 2 weeks to complete the survey
- Assessors have 3 weeks to review survey
- Enables more targeted questioning

1 week

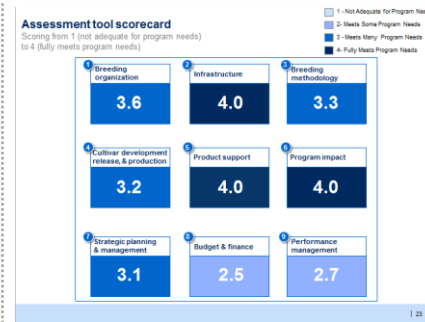
In-person visit



- 3-5 day visit by assessors
- Visit includes staff meetings, one-on-one discussions with senior breeders and staff, and facility visits

2-3 weeks

Post-visit debrief



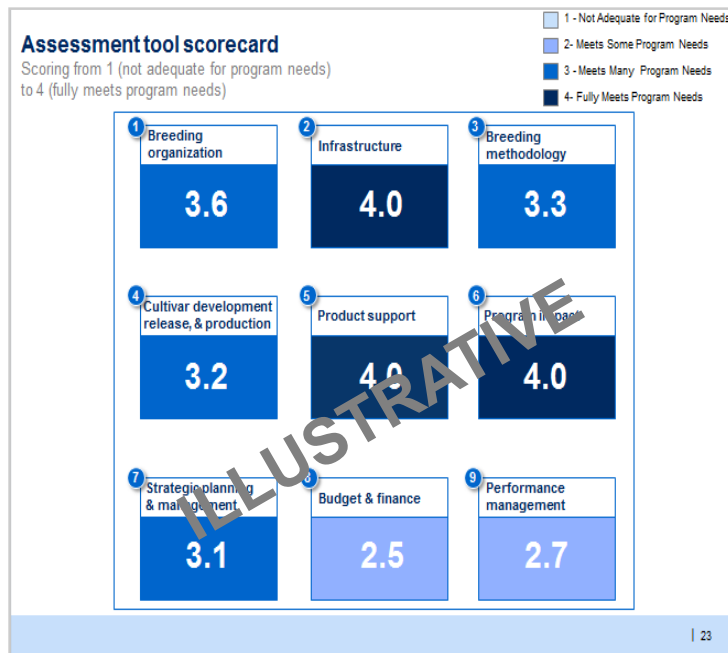
- Assessors score each question and author a memo outlining institutional strengths and opportunities
- Assessors hold a call to share perspectives and begin outlining next steps to act on findings

¹ Assessment team has arranged with coordinator at institution in weeks prior to launch.

Post-visit de-brief

Detailed assessment results

- Institutions receive assessment results assigned a 1-4 score per question based on the organization's perceived current capabilities



Memorandum

- Institution receives detailed memo that outlines strengths and opportunities for improvement
- Organization can prioritize opportunities as part of a long-term transformation plan
- Helps the institution to understand what qualifies as 'leading practice'

Confidential

Summary report

Accelerating Plant Breeding Program Outcomes: Assessment Results

Bill & Melinda Gates Foundation

A joint project supported by McKinsey & Company and the Context Network

Project introduction and overview

The Bill & Melinda Gates Foundation is developing and refining an assessment tool that identifies a public sector breeding program's potential for achieving higher rates of genetic gain. The tool pinpoints opportunities to continuously improve the institution's breeding activities and to allow continuous monitoring of genetic gain. As part of this process, the institution was invited to be a part of a pilot program to test the new assessment tool.

The assessment team would like to thank the team at the institution for its participation in this pilot. The 5-day visit in October helped immensely with the test of the tool and the assessment process.

This memo and the attached assessment tool results for the institution (in Excel) outline the initial observations from the visit. They highlight the institution's strengths and the opportunities based on the nine components of the assessment tool that were introduced during the visit. These include: (Exhibit 1): breeding organization, infrastructure, breeding methodology, cultivar development, release and production, product support, program impact, strategic planning and management, budget and finance, and performance management.

Scoring categories - Example from Question #27

#	Item	Unable to Assess	(1) Not Adequate for Program Needs	(2) Meets Some Program Needs	(3) Meets Basic Program Needs	(4) Fully Meets Program Needs	Notes to Assessor	Assessor's Rating Score
27	Yield Trial Program: Statistical Analysis of Results		Quality of trials is not monitored using statistical analysis; CV & trial repeatability (heritability) not monitored	Quality of trials assessed using CV values primarily; single trial heritability (H) not monitored or averages less than 0.3 for yield	Quality of trials assessed using primarily CV & H; 10% to 20% of trials rejected due to poor quality (H < 0.15)	Breeders use highly sophisticated statistical design & analysis (in addition to CV & H); ≤ 10% of trials rejected due to poor quality (H < 0.15 or known errors)	<i>This metric is about whether the quality of trials is actually measured</i>	2

BPAT customized for two types of breeding organizations

Type	Example	Assessment distinction	Rationale
<p>Genetics and breeding institution operating both germplasm and cultivar development</p>	<ul style="list-style-type: none"> International Rice Research Center (CG Center) 	<ul style="list-style-type: none"> Question on relationships with national programs Questions on trait discovery activities and pre-breeding stage 	<ul style="list-style-type: none"> Impact of CG center depends on NARES Relevant only to discovery institution
<p>Cultivar breeding institution whose breeding pipeline largely deploys lines developed elsewhere</p>	<ul style="list-style-type: none"> Bangladesh Rice Research Institute (NARS) 	<ul style="list-style-type: none"> Question on quality of relationship with international center 	<ul style="list-style-type: none"> International center provides germplasm for further selection and release, stimulates new ideas, robust feedback loops

Institutionalizing BPAT

(will go deeper in one of the Assessing the Efficiency Breakout sessions this afternoon)

RFP Developed for Hosting BPAT

1. Administering the tool

- Oversee BPAT assessments of programs and results reporting

2. Tool and results management

- Make BPAT publicly available on the web
- Retain results accumulated from the BPAT report on aggregated findings periodically
- Update BPAT (6 months?)

3. Criteria for Host Selection

- Plant breeding experience and research
- Experience working with developing world institutions
- Past experiences similar hosting a tool
- Institutional resources outside the immediate department that may be relevant and helpful to hosting BPAT
- Perception of bidding institution within plant breeding community
- Work with developing world breeding programs

Afternoon Breakout Group on BPAT for deeper Discussion

Assessing efficacy of crop improvement investments: BPAT and other approaches

Institutionalizing BPAT

Key topics to address:

- Value of common assessment approach
- Potential flaws and shortcomings of BPAT & process
- Donor coordination on assessment and follow up
- Funding and governance approach
- Selection of the correct body to host and execute assessments
- Hosting the BPAT
 - Sending out the RFP
- Refining, specializing, and keeping the BPAT current

Assessing the landscape

Existing activities in the space:

- PBCA
- Others?

Other groups to include:

- Other donors
- Experts from the private sector
- Grantees
- Academic institutions

Who else might benefit from BPAT?

- Groups to use the BPAT

Forming a plan

Next steps:

- Capture buy-in and major concerns with BPAT
- Addressing these concerns, building in improvements
- Follow up on any other tools similar to BPAT
- Include other potential tools in BPAT RFP
- How do we coordinate efforts to improve the BPAT
- Contact other stakeholders involved in public sector breeding
 - Plan for sharing BPAT more widely

Comparison between two related tools: the BPAT and the PBCA

	<u>Plant Breeding Assessment Tool (BPAT)</u>	<u>Plant Breeding Capacity Analysis (PBCA)</u>
Objective of plant breeding tool	Provides outside assessment of the effectiveness of a breeding program	Online, self assessment modules to evaluate and plan aspects of the program
Primary use	Standardized assessment process and common framework <ul style="list-style-type: none"> ▪ Increased comparability for donors ▪ Improved coordination ▪ Identifies gaps in best practice 	<ul style="list-style-type: none"> ▪ Determining if a program should be started or ended (crop value, need) ▪ Detailed questions on seed systems, production regions, existing cultivars
Developer	BMGF	Developed for FAO by Dr. Fred Bliss
Years developed	2013-15	2010-14
Time to complete survey	10-12 weeks	Several hours to 2 days
Assesses the need for a breeding program	No	Yes
Effectiveness of personnel	Yes – 26 scaled responses	Yes – 10 high-level multiple choice questions
Performance management	Yes – 3 scaled responses	No
Effectiveness of tangible assets	Yes – 7 scaled responses	Yes – 3 high-level multiple choice questions
Effectiveness of breeding methodology	Yes – 28 technical questions	Yes – over 2 dozen technical open response and multiple-choice questions
Program impact	Yes – 7 questions covering gains, market adoption, and measurement	Yes – quantifiable questions that can help determine if a program should be continued
Strategic planning	Yes – 10 scaled responses	No
Budgeting	Yes – 5 scaled responses on various topics	Yes – Inquires on aspects of budget but not in depth