

Appendix 1 - Standardized approaches to B4T data management

Author: B4T leadership; included in GF Contracts as Appendix 1.

Breeding for Tomorrow (B4T) has developed a set of tools to standardize data management and analysis of its programs. CGIAR centers and crops that are part of the B4T program are required to consistently use the Breeding Hub (Breeding Portal and Program Management Platform [PMP]), Service Portal, Bioflow, Enterprise Breeding System (EBS), and GloMIP. Data from these platforms will then be available to you online in controlled environments as a single source of truth.

High level metrics and key performance indicators will be extracted by the Harmonized Crop Report cubic interface across multiple platforms. The Harmonized Crop Report allows to drill into data, and the wider platform interface allows to extract and make available other relevant data – to crop teams, leaders, funders and reviewers. **These indicators are:**

A. Indicators that describe the relevance of the Breeding Strategy

1. The Development Indicators in the targeted Market Segments, both absolute values and when compared (%) to the total area in the Target Region(s):
 - a. Area harvested (ha).
 - b. Production value (USD).
 - c. Population with < \$2.15/day.
 - d. Chronic hunger (DALYs).
 - e. Hidden hunger (DALYs).
 - f. # people in cropping areas facing changing season length.
 - g. # people in cropping areas facing drought.
 - h. # people in cropping areas facing flooding.
 - i. # people in cropping areas facing high growing season temperature.
 - j. # people in cropping areas facing rainfall variability.

B. Indicators that describe the Breeding & Partner Strategy

2. Target Countries, their crop area (ha) and the level of collaboration (Level 1, 2, 3 or self-funded).
3. (engaged) Partner organizations.
4. Annual investment (USD) in the Breeding and Partnership Strategy.
5. The Breeding Strategy, i.e. the link between the Breeding Pipeline – Target Product Profiles – targeted Market Segments, with the breeding effort given and the Market Segment area (ha).
6. Relative emphasis (%) to improve or maintain value propositions and associated essential traits.
7. The Target Product Profile with essential improve traits, essential maintain traits, targeted scores, check varieties (accessed by drilling-in).

C. Performance Indicators – Genetic gain and variety advantage achieved

8. Cycle time = Average age of parents in breeding starts.
9. Multi-environment (MET) trial analytics (of traits measured and analyzed) at Early Testing, Late Testing and On-Farm Verification Stage:
 - a. # environments.
 - b. Accuracy of the model: R², genotypic and error variance. (Further details can be accessed by drilling in).
 - c. Correlations between environments (accessed by drilling in).
 - d. # entries (accessed by drilling in).
 - e. Merit estimates of top entries (accessed by drilling in).
10. Genetic gain analytics at Early Testing, Late Testing and On-Farm Verification Stage:

- a. Rate of genetic gain (%).
 - b. Accuracy of the model: R2 and P-value.
- 11. In development: Product advantage and advancement (comparison of candidate varieties' performance with performance of the variety/varieties the candidate variety is expected to replace; as used to support product advancement decisions; based on cumulative trial performance)
- 12. In development: Stage of Trait Discovery & Development (TD&D) efforts and their relevance to Target Product Profiles pursued and Market Segments targeted.

D. Performance Indicators – Reach achieved

- 13. # and list of variety releases.
- 14. # of countries involved.
- 15. # and list of scaling partners involved.
- 16. The area and number of people benefiting once the varieties are scaled (using the same indicators as in # 1).
- 17. To be added: Additional scaling parameters that can be collected from scaling partners on a routine basis.

Through powerful data integration, the Harmonized Crop Report strengthens B4T teams' ability to debate strategy, extract data to support funding proposals, identify bottlenecks, increase performance and return-on-investment. It calls on teams to be strategic and make data-driven choices for where to invest. Reports (or data needed for reports) relevant to a particular funder are generated by selecting the Crop(s), Breeding Pipeline(s), Target Product Profile(s), Market Segment(s) that are (co-)supported by that particular funder.

The type of data shown in the Harmonized Crop Report derives from Accelerated Breeding-led cross-center and cross-initiative efforts to identify selected, high-value performance metrics from among countless indicators used in the past. In new grant proposals, CGIAR centers are requested to utilize performance metrics extracted by the Harmonized Crop Report, and to help evolve the CGIAR ambition to utilize consistent, high-value performance indicators within CGIAR Science Programs.

The Harmonized Crop Report and the Dashboards in the Breeding Hub pursue a progressive integration of data across B4T tools. By B4T teams consistently using the B4T tools for their day-to-day work, additional analytical capabilities will become available. They will empower B4T teams and extend the metrics and key performance indicators that funders routinely ask for.

IMPORTANT: High-quality reports rely on updates as information change and high-quality data.

Section 1: Purpose of the various B4T tools

- 1. Use the Breeding Portal to define the currently valid Breeding and Partnership Strategy and capture performance results (e.g. variety releases) that drive the Harmonized Crop Report. Details are described in Section 2.
- 2. Use the Service Portal for shared service requests.
- 3. Use the Enterprise Breeding System (EBS) for the management of day-to-day breeding data.
- 4. Use the Program Management Platform (PMP) for workplan management, i.e. to assign clear responsibilities and timelines to your team, so that the goals agreed with funders are being achieved at high quality and on time by your team.

5. Use GloMIP to query development indicators and benefit projections that go beyond those extracted by the Harmonized Crop Report.

Section 2: Updated data required to generate standardized metrics and key performance indicators by the Harmonized Crop Report

1. Updated list of active Breeding Pipelines.
 - a. Active = funding exists.
 - b. Archive Breeding Pipelines for which funding no longer exists.
2. Annual investment in the active Breeding Pipelines, across all sources of funding.
3. Currently valid cycle time = Average age of parents in breeding starts for Breeding Pipelines.
4. Updated and active Target Product Profiles (active = funding exists) and as agreed with funders. In the case of the Gates Foundation, this means giving an accurate description of the targeted Breakthrough Product. Archive TPPs for which funding no longer exists.
 - a. The Breeding Effort directed at the Target Product Profile (Category 1, 2, 3, 4).
 - b. The Essential Improve and Essential Maintain Traits, and the targeted Scores.
 - c. The Check Variety(-ies) to be replaced.
5. The Market Segments targeted by the supported Breeding Pipelines and Target Product Profiles
 - a. Accurate area estimates for countries within this Market Segment.
 - b. Accurate description of the eight Market Segment descriptors.
6. Updated list of active Trait Discovery and Deployment (TD&D) efforts and their Stage (forthcoming Breeding Portal Module).
7. Multi-Environment Trial (MET) results for Early Testing, Late Testing and On-Farm Verification.
 - a. Use Bioflow to execute the standard state-of-the art MET analysis.
 - b. Upload the MET Bioflow analysis (html file) into the Breeding Portal.
8. Genetic Gain estimates for Early Testing, Late Testing and On-Farm Verification.
 - a. Use Bioflow to execute the standard state-of-the art genetic gain analysis.
 - b. Upload the MET Bioflow analysis (html file) into the Breeding Portal.
9. Level of effort directed at each Target Country within a Target Region.
 - a. Level 1: (technically or financially) supported for breeding, testing and scaling.
 - b. Level 2: (technically or financially) supported for testing and scaling.
 - c. Level 3: no direct support; may/will benefit once varieties are being scaled (often countries in CGIAR target regions with small areas or conflict zones).
 - d. Self-funded: upper-middle and high-income countries in Target Regions.
10. Partner organizations in Target Countries actively involved in Program execution.
11. Registered CGIAR-derived varieties or, if no formal registration exists, CGIAR-derived varieties that are being scaled in particular countries.

12. Forthcoming: Success by partners in scaling these varieties. - B4T is in the course of developing a standard survey that can be shared with scaling partners across any B4T effort and from which non-sensitive data will be made available through the Harmonized Crop Report (e.g. aggregate seed production).