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Alimentación**AFRICAN COMMISSION ON AGRICULTURAL STATISTICS****Twenty-eighth Session****Pretoria, South Africa: 4 – 8 December 2023****AGENDA ITEM 7****Agricultural Science and Technology Indicators
Institutionalization and new national data collection approach****Hernán Daniel Muñoz (FAO-ESS)****Gert-Jan Stads (FAO-OIN)****FAO****SUMMARY**

The Agricultural Science and Technology Indicators (ASTI) program has been a global leader in compiling and analyzing agricultural research data for over two decades. It focuses on institutional developments, investments, human resource capacity, and research outputs in low- and middle-income countries (LMICs), and functions through a vast network of national research agencies, regional coordinating bodies, and international institutions. Major international and donor organizations, as well as decision-makers at regional and national levels, have relied extensively on ASTI data and analyses to assess the performance and impact of agricultural research in LMICs, and to set policies and investment priorities for increased agricultural growth and productivity. The program, formerly managed by the International Food Policy Research Institute (IFPRI), is now transitioning into FAO. This transition poses challenges and opportunities for ASTI, requiring a new vision and improved operational mechanisms, such as a redesign of the data collection process and a restructuring of the existing network of partners. In this context, the role of national statistical offices will be crucial to enhance the quality, timeliness, and completeness of ASTI data. The institutionalization of ASTI and the adoption of a new data collection approach include national validation, aiming to integrate ASTI into both global and national statistical mechanisms while fostering increased country ownership.

1. THE IMPORTANCE OF SCIENCE, TECHNOLOGY AND INNOVATION FOR AGRICULTURE

As the UN specialized agency for food and agriculture, FAO is called upon to be a driving force for facilitating solutions to agrifood system challenges through science, technology, and innovation (STI). The Organization is taking major steps to rise to the challenge of harnessing the transformative potential of science and innovation. In 2020, the first-ever position of Chief Scientist was established to join the core leadership team of the Director-General. A new Office of Innovation was also created to ensure that FAO leverages the use of innovation, technology, and new approaches across the Organization. The FAO Science and Innovation Strategy aims to bolster recent organizational developments by providing Organization-wide guidance, coherence and alignment on science and innovation to better serve countries by strengthening FAO's capacities.

There is considerable evidence that investing in agricultural research is a highly effective pathway both for reducing poverty and hunger and for addressing the climate change impacts on food systems. Regardless of the mode of investments, timeframe, and specific targets for adaptation chosen, studies have consistently shown that spending on agricultural research has had a greater impact on agricultural productivity than other types of public expenditures. In LMICs, agricultural R&D often represents one of the most significant areas for public investment in STI and thus has considerable prominence in national STI policies. It has also been demonstrated to yield beneficial impacts on the environment and natural resources management. The imperative nature of investments in agricultural R&D becomes evident when considering the formidable challenges that small-scale producers across the globe are currently grappling with and are poised to encounter in the foreseeable future. Consequently, strategic and sustained investments in agricultural R&D are indispensable for empowering these producers to surmount the considerable obstacles they face.

Quantitative data are essential to any informed decision-making process. Agricultural research stakeholders require quantitative data to analyze investment and capacity trends, identify key gaps, set future priorities, promote efficient resource use, and ensure effective coordination and coherence of agricultural research initiatives. Research indicators are also vital in assessing the contribution of agricultural research to broader development goals, such as agricultural and economic growth, food security, poverty reduction, and climate change mitigation. In addition, they are an indispensable tool when assessing the contribution of agricultural STI to agricultural growth and economic growth more generally. They assist research managers and policymakers in formulating policy and navigating decisions related to strategic planning, priority setting, monitoring, and evaluation. They also provide information to governments and others involved in the public debate on the state of agricultural R&D at national, regional, and global levels.

However, the collection of agricultural R&D data is not straightforward because agricultural R&D is carried out by a very large number of diverse institutions (including government, higher education, non-profit, and private for-profit agencies) and funded through multiple sources (government budgets, donor grants, private sector, producer levies, product sales). While national statistical agencies in OECD countries have generally developed the means for gathering and reporting STI information, many LMICs have not. The Agricultural Science and Technology Indicators (ASTI) program has attempted to fill this gap by compiling, analyzing, and publishing agricultural research data relating to institutional developments, investments, human resource capacity, and research outputs in more than 90 LMICs. ASTI

analysis includes the status and direction of agricultural R&D at national, regional, and global levels, as well as analytics on the efficiency and performance of research systems and the impact of R&D on productivity and social goals. Currently, ASTI data collection is focused on investment, human resources, research focus, and research outputs of agricultural R&D agencies.

The findings and outputs of ASTI's work have had important policy relevance at the national, regional, and international levels. At the country level, ASTI evidence has been an important input into medium- to long-term agricultural sector plans or development strategies in numerous countries. It is also used extensively by in-country stakeholders to advocate for increased R&D funding, to highlight capacity gaps, and to mobilize resources for neglected research areas. Regional decision-makers are also important users of ASTI evidence. For example, the African Union Commission has formally endorsed an ASTI report with investment recommendations for member countries and requested member countries to adopt these recommendations in future CAADP/Malabo biennial reviews¹. A large number of international organizations, donor organizations, CGIAR centers, as well as regional- and national-level decision makers around the world, have extensively used ASTI data and analyses to assess the performance and impact of agricultural research in LMICs, and to influence policy for increased agricultural growth and productivity.

2. ASTI'S CURRENT CHALLENGES AND OPPORTUNITIES

While ASTI has successfully updated its datasets for Africa, Asia-Pacific, Latin America, and the Middle East at regular intervals in the past, recent funding constraints have significantly diminished the geographic coverage, data quality, and frequency of data collection rounds. To overcome these challenges, integrating ASTI into FAO's Agrifood Systems Technologies and Innovations Outlook (ATIO) and FAOSTAT presents a compelling and timely opportunity to breathe new life into the program, expand its scope, and propel it to unprecedented levels of success. FAOSTAT works directly with countries to develop national statistical strategies, strengthen institutional and technical capacities, and improve statistical systems. FAOSTAT disseminates more than a million statistics covering five decades and 245 countries and territories. It is available in English, French, Spanish, Arabic, Russian and Chinese, and all data are publicly accessible through an open-source software platform called FENIX. The dataset counts approximately 200,000 users per month. As such, FAOSTAT is the most suitable data processing and dissemination platform to collect and disseminate ASTI data. However, the main hurdle in integrating ASTI into FAOSTAT lies in the imperative to strengthen data collection, analysis, and dissemination processes, harmonizing them with FAO statistical standards grounded in the core principles of the National Statistical Quality Assurance Frameworks.

In the past, ASTI has implemented national survey rounds in close collaboration with "focal points," the majority of whom are staff at national agricultural research institutes (NARIs). In some cases, the national focal point was a consultant or staff at an agency other than the NARI itself. At the start of each national survey round a complete list was compiled of all agencies involved in agricultural R&D and each agency was approached to complete a questionnaire. Time-series data were collected for three main indicators: "research investments," "research funding sources," and "research staff totals." The remaining indicators were collected for particular benchmark years for use in cross-country

¹ See: [AU-Summary-brief-English.pdf \(cgiar.org\)](https://www.cgiar.org/sites/default/files/pdf/au_rnd_africa/AU-2021-Endorsement-Recommendations.pdf) and https://asti.cgiar.org/sites/default/files/pdf/au_rnd_africa/AU-2021-Endorsement-Recommendations.pdf

comparisons. Additional qualitative information was gathered during country visits through in-depth meetings with various agencies.

The process outlined above encountered persistent challenges necessitating a more refined vision and improved operational mechanisms. These challenges included: a) in-country data collection being led by agencies lacking a clear mandate for such responsibilities; b) limited scope and insufficient incentive for individual host institutions to spearhead a coordinated global effort; c) incomplete datasets and a lack of timeliness; d) limited access to comprehensive investment data, especially from the private sector; e) reliance on project-based funding from donors, among other issues.

Thanks to a three-year grant from the Bill and Melinda Gates Foundation (BMGF) supporting the transition of ASTI into FAO, there is now an opportunity to strengthen the program, establishing a permanent institutional home for it. This presents a chance to transform ASTI into a more sustainable statistical operation as part of a new vision, making it more responsive to national policy needs and institutionalizing the data collection process within national statistical systems. This transition includes the uninterrupted continuation of ongoing activities, effective transfer of institutional knowledge, enhancements to program quality and credibility, identification of areas for improvement, and leveraging opportunities to maximize the long-term utilization and demand-responsiveness of ASTI.

In light of this transformative change, the West and Central Africa Council for Agricultural Research and Development (CORAF) organized a workshop titled "*Recent Data Insights and Future Strategies for Sustainable Agricultural Research Data Collection*" in Lomé, Togo in August 2023. FAO extended invitations to representatives from the NSOs of Nigeria, Côte d'Ivoire, and Benin with the objective of having them showcase the main features of their NSS and discuss potential contributions to ASTI. The workshop convened ASTI country focal points, primarily from NARIs, from across West and Central Africa. The primary goal was to share insights and deliberate on the outcomes of the latest ASTI data collection round and explore pathways for the long-term institutionalization of ASTI. The ensuing discussions not only empowered the ASTI team to refine its vision for integrating ASTI into FAO but also emphasized maintaining a robust methodology aligned with ASTI's established strategy for data collection, updating, and management. However, the workshop highlighted concerns about challenges in data collection. Specifically, ASTI data is not officially integrated into the statistical production of the countries, and NARIs lack a clear mandate for this critical task. Recognizing these challenges, the workshop discussions set the stage for future dialogues between NSOs and NARIs, aiming to foster enhanced cooperation within countries and develop tailored solutions that address each country's specific circumstances and needs in overcoming these challenges.

Further, ASTI stands to leverage FAO's strengths and strong mandate on data. Article I of the FAO Constitution mandates the Organization to "collect, analyze, interpret, and disseminate information relating to nutrition, food and agriculture". Within this framework, the FAO statistics division collaborates with countries to develop national statistical strategies, strengthen institutional and technical capacities, and improve statistical systems. Additionally, FAO develops and promotes methods and tools for collecting, analyzing, and disseminating data, along with setting international statistical standards on food, agriculture, and related topics. This strategic collaboration aligns with ASTI's goals, providing a valuable avenue for advancing sustainable agricultural research data collection.

3. THE TRANSITION TOWARDS A MORE INSTITUZIONALIZED AND SUSTAINABLE PROCESS

In order to chart a clear roadmap for enhancing ASTI's institutionalization and sustainability, a comprehensive assessment and review of the program's existing framework is currently in progress. As part of this process, a technical advisory group has been formed, comprised of global experts knowledgeable about agricultural R&D systems and STI data systems in LMICs as well as key representatives from FAO and BMGF. The advisory group's role is to offer input, expertise, and recommendations to guide the institutionalization of ASTI at FAO, offering advice on key decision points throughout the transition, and defining the focus, frequency, and scope of data and outputs that ASTI aims to collect, report, and analyze (based on demand, feasibility, and the resources available). Taking into account the valuable recommendations from the technical advisory group, ultimate decision-making responsibilities will shift back in-house to the relevant divisions within FAO. The next steps involve determining the optimal approach for this transition, ensuring a seamless incorporation of the ASTI dataset into FAOSTAT.

The existing data collection and processing approach of the ASTI network is undergoing a thorough review to ensure alignment with FAO's and FAOSTAT's standards and statistical processes. The ASTI dataset will be licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 IGO (CC BY-NC-SA 3.0 IGO), as with all FAOSTAT datasets. FAO encourages the use of FAOSTAT data for statistical, scientific, and research purposes. Accordingly, all databases are provided free of charge, in machine-readable format, subject to specified terms of use of this agreement available on the FAOSTAT website and the FAO Data Protection Policy.

Efforts will be made to retain current data providers within the ASTI network, and opportunities to engage with additional counterparts will be carefully assessed. A key focus of the project is to facilitate capacity development, aiming to establish technical capacity among current and potential data providers. Unlike IFPRI, which used to compensate countries for ASTI data collection, FAO member countries provide data to the FAOSTAT system without any economic incentive or contractual obligation. The objective is therefore to transition from a network of compensated collaborators to an institutionalized network of counterparts that respond to FAO-led questionnaires, providing essential data within their institutional mandate. This shift emphasizes the commitment of member countries to share agricultural data with FAO.

Aligning the current ASTI network of country focal points with the FAOSTAT system requires restructuring and testing of data collection mechanisms. This involves revising data sources and transitioning gradually from the IFPRI ASTI network of in-country or regional partners to the network commonly employed by FAO for data collection, which primarily relies on National Statistical Offices (NSOs) and line Ministries, and functions through FAO country, sub-regional, and regional offices.

The new data collection approach incorporates national validation of the data and aims to integrate ASTI into National Statistical System mechanisms, seeking official recognition to enhance country ownership. Simultaneously, it recognizes the importance of building on the existing network of national and regional partners. With the goal of reducing the burden on respondents and improving timeliness and completeness, the data collection process will be

divided into two based on the specificity, coverage, and official validation required for different types of data.

- i) Core data on agricultural R&D investments and human resource capacity will be collected through FAO questionnaires, administered on an annual basis to the designated national focal points in coordination with the NSOs. The data will be structured in accordance with FAOSTAT standards and detailed with standardized metadata. They will undergo a thorough cleaning and harmonization process using validated outlier detection strategies. The processed data will be securely stored in the FAOSTAT archives and subject to annual updates.
- ii) In addition, an extensive questionnaire will be circulated among the exhaustive list of national-level agricultural R&D agencies every 3-5 years. The aim is to capture more nuanced variables related to the institutional setup of agricultural R&D, research capacity, investment, funding sources, commodity and thematic focus, research outputs, and other specific demands. Ongoing efforts will ensure that these lists of in-country R&D players are kept current and reflective of any changes with each new data collection cycle. Emphasis will consistently be placed on prioritizing official statistical sources. Additionally, efforts will be made to secure support from regional partner organizations to supervise and enhance data collection endeavors.

The overarching goal is to standardize, harmonize, and improve the overall quality, timeliness, and completeness of the dataset, while making it more sustainable and country owned. Harmonization and standardization, as well as country ownership and awareness will also be fostered and institutionalized through UN mechanisms, including regional and global statistical commissions.

4. CONCLUSIONS AND RECOMMENDATIONS

The ASTI program, which has been a global leader in compiling and analyzing agricultural research data for over two decades, is now transitioning into FAO. This transition poses challenges and opportunities for ASTI, including the need for new institutional arrangements and the redesign of the current operational mechanism.

The new data collection approach that FAO will be implementing aims to integrate ASTI into NSS mechanisms so as to enhance national validation of the data as well as country ownership. This approach emphasizes the importance of building on ASTI's existing Network of National and Regional partners.

The participation of the NSS and NSOs plays a crucial role in establishing a well-defined mandate for data collection, guaranteeing compliance with quality standards, and capitalizing on their expertise in delivering timely data to FAO. Concurrently, FAO with its inherent mandate for country data collection and its engagement in both global and national initiatives, fosters an ideal setting for the development and institutionalization of ASTI. The proposed changes aim to establish a more sustainable and reliable data collection process, representing a substantial improvement compared to the existing resource-dependent and intermittent ASTI approach.

FAO is also proactively seeking opportunities to enhance the availability, accessibility, appropriateness, and ownership of ASTI data and evidence. This includes efforts to make ASTI more responsive to in-country, regional, and global data demands.

The institutionalization of ASTI in this process will require the support from AFCAS member countries, with a particular focus on collaboration with national statistical authorities. FAO will conduct specialized capacity strengthening activities, positioning itself as a key partner in these endeavors. These efforts aim to generate more accurate data on the status and direction of agricultural R&D at national, regional, and global levels, thereby enhancing its utility for well-informed policy-making. These data contribute directly to the United Nations' Sustainable Development Goal 2 on achieving food security and improved nutrition.

5. QUESTIONS AND INVITATIONS TO AFCAS MEMBER COUNTRIES

Questions:

- 1) Which statistical operations in your NSS do you think can be harmonized, strengthened and/or complemented by the information generated for ASTI?
- 2) What factors influence your decision-making process when transitioning from non-official to official statistics and integrating these into the NSS?
- 3) What elements of a quality assurance framework do you deem most relevant in this respect?
- 4) Are National Agriculture Research Institutes currently part of your National Statistical System? If not, what steps should be taken to facilitate inclusion?
- 5) What is your perspective on the new data collection approach presented above, specifically having a distinct official ASTI data collection mandate as an integral component of the NSS?

AFCAS member countries are invited to:

- Acknowledge the ongoing transition towards a more institutionalized and sustainable ASTI program;
- Support ASTI activities in Africa. FAO will conduct specialized capacity-building activities, with the national statistical authority identified as a key partner.
- Integrate their National Agriculture Research Institutes into their National Statistical System and undertake data quality assessments, or where applicable, pursue statistical quality certifications for ASTI data.
- Initiate national dialogues to establish fit-for-purpose models and enhance country ownership. FAO is exploring opportunities to pilot the new data collection approach in selected countries in the region.

6. REFERENCES

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