EXECUTIVE SUMMARY

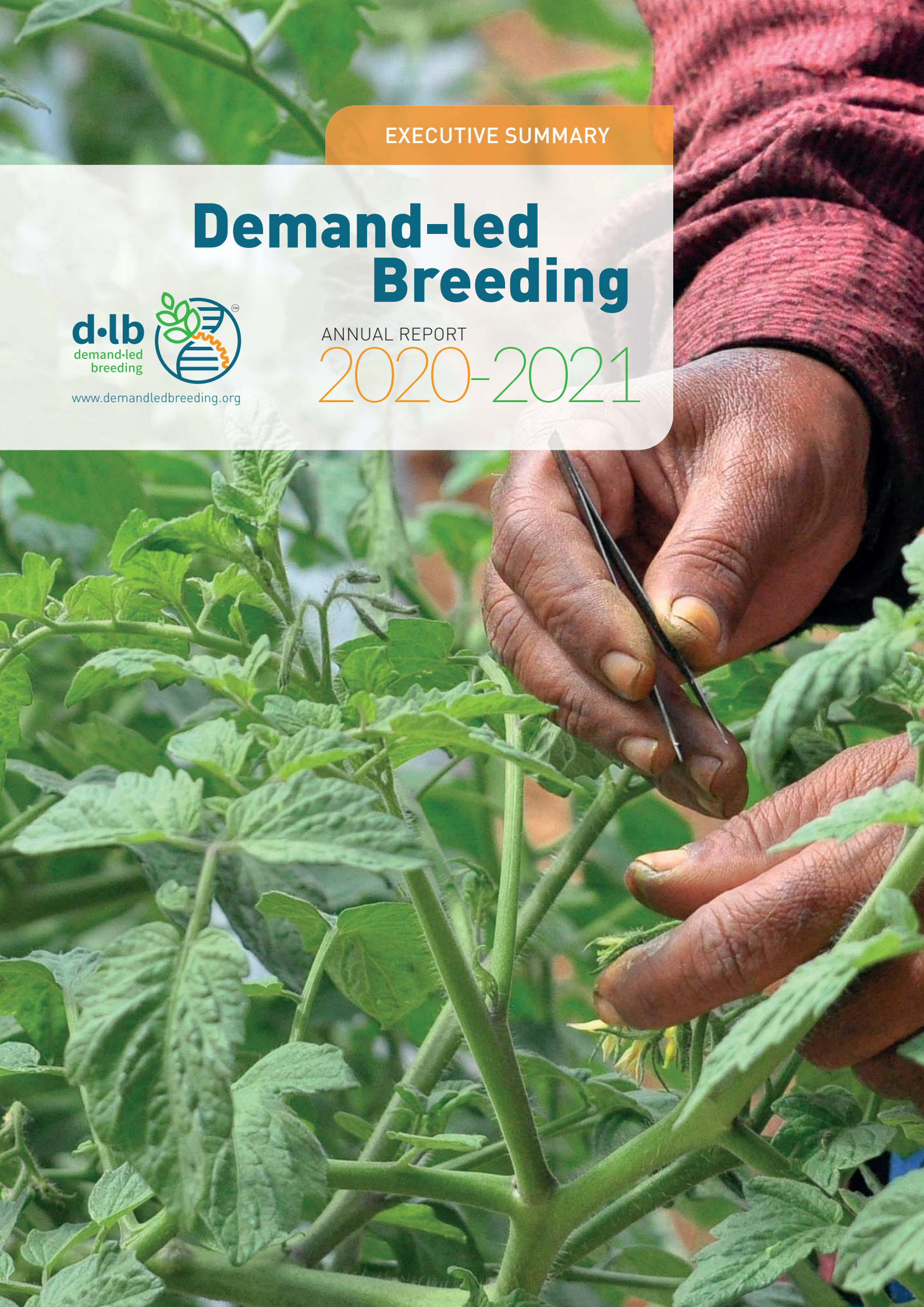
Demand-led Breeding

ANNUAL REPORT

2020-2021

d·lb demand·led breeding

www.demandledbreeding.org



EXECUTIVE SUMMARY

INTRODUCTION

The aim of the project on *Demand led Plant Variety Design for Emerging Markets in Africa, which commenced in 2015,* is to accelerate uptake and use of new crop varieties that meet farmer needs, consumer preferences and market demand in Africa. These new varieties are designed to meet client needs by connecting plant breeders with crop value chains, seed distribution organizations and encouraging enterprise and entrepreneurship in transforming agriculture in Africa.

Central to the transformation of agriculture in Africa is identifying market demand and developing new products with suitable characteristics to meet market requirements. Such demand can originate from producers, processors, and/or consumers. A more customer focussed approach to plant varietal design will affect public and private sector plant breeding programs. Decisions on determining the preferred traits for which to breed new varieties are paramount for success. Private sector companies have considerable experience worldwide in developing new crop varieties that fit the needs of customers. This experience in plant variety design can add value to public as well as private sector breeding programs in emerging economies. As economies mature and markets expand, it can be expected that the private companies will also become increasingly involved in breeding new high performing varieties (HPVs) to meet customer requirements and market demand in emerging economies.

PROJECT GOAL AND OBJECTIVES

Project goal: To contribute to the transformation of African agriculture by enabling small scale farmers to better participate in local and regional markets, by increasing the availability and adoption of high performing plant varieties that meet market demands.

Objective 1: Best practices in plant variety design: To enable plant breeders to develop new high performing varieties that meet customer requirements and market demand, by having increased access to and ability to implement start-of-the art knowledge, methodologies and best practices from the public and private sectors on demand led plant variety design.

Objective 2: Education and training: To build capacity within plant breeding programs on demand led variety design, through strengthening education and training programs for plant breeders, including through post graduate curriculum development and new professional development programs on demand led plant variety design for plant breeders in Africa.

Objective 3: Policy analysis and advocacy: To provide evidence to support new policy development and investments in plant breeding that will help generate more high performing varieties to meet emerging market demands, with emphasis on Africa.

RESEARCH STRATEGY

The project aims to:

- Encourage *market-led approaches* to determine breeding targets within crop improvement programs, especially in Africa. This will enable research leaders to have access to and interpretation of high-quality data about a range of business drivers and views of stakeholders. These business drivers and stakeholders will influence demand and determine the rate of uptake of new technologies, specifically new varieties of crops grown for food security and/or income generation.
- Develop, disseminate and communicate about a set of *new decision* support tools that will enable R&D programs in Africa to obtain and evaluate information about market demands and use this information to set targets and product specifications within plant breeding programs;
- Expand the use of *innovative approaches to plant breeding* that drive delivery of new seeds, uptake and purchasing of new varieties, technologies, and other inputs by smallholder farmers in Africa.

The project will seek to understand and learn from best practices in plant variety design globally, in the private sector and in leading public research agencies with outstanding track records in uptake of their research outputs. The project will test the thesis that market-led product development by public and private sector research agencies will lead to increased availability and higher levels of uptake of new high performing crop varieties that enhance productivity and profitability of the target crops in selected countries of Africa.

Success in demand-led plant breeding depends on the following factors: Breeding targets and quantitative goals are set; new varieties reach and fulfil client expectations; a development strategy is designed for each new variety; a delivery investment plan is in place; and emphasis is given to the views of both farmers and consumers from rural and urban areas. Success

in demand-led plant breeding will be determined by the adoption and use of the new varieties that meet the market-led demands throughout crop value chains.

The intended research outcome is that plant breeders in Africa will adopt more demand-led approaches to plant breeding, including in the design of new plant varieties that respond to the preferences of farmers, consumers, and others along the value chain.

PROGRESS TOWARD OBJECTIVES

The progress towards achieving the project goal and the three project objectives and the activities and outputs achieved are summarised in this Annual Report which covers the period July 1 2020 to June 30 2021. The highlights include the following:

Expanding partnerships with African national agricultural research institutes and universities: The key project partners in Africa include two regional centres of excellence specialising in post graduate education of plant breeders, and an increasing number of partners within national agricultural research systems (NARS), African universities and international organizations. The key partners include the African Centre for Crop Improvement (ACCI) at the University of KwaZulu Natal in southern Africa; the West Africa Crop Improvement Centre (WACCI) at the University of Ghana; the Alliance of Bioversity International and the International Centre for Tropical Agriculture (CIAT) and the Pan African Bean Research Alliance (PABRA); the Ethiopian Institute of Agricultural Research (EIAR); Haramaya University, Ethiopia; the National Agricultural Research Organization (NARO), Uganda; Makerere University, Uganda; and the University of Nairobi, Kenya.

Demand led breeding community of practice developed with plant breeders in Africa: The DLB project has developed a demand-led breeding "community of practice", composed of more than 400 plant breeders working within African national agricultural research systems (NARS) in eastern, southern and West Africa. The members of the DLB community of practice are primarily African plant breeders who first participated in the DLB sponsored education and training workshops, some 24 of which have been held between 2015-2021. These DLB workshops introduced to the African plant breeding community the principles of demand led plant breeding and its applications to crops important for food security and increasing incomes in farming communities throughout Africa. These African plant breeders now constitute a "community of practice" with whom the DLB project team is working to mainstream demand led breeding approaches within national plant breeding programs for a range of crops in the countries of Africa.

The DLB Pan African Coordinator, Dr Nasser Yao, who is based in Nairobi Kenya, is primarily responsible for developing and supporting the DLB community of practice of plant breeders, including making available new education resource materials and establishing regular communication channels and new distance learning opportunities. These virtual educational and professional development activities were initiated in 2019 and have become increasingly important due to the impact of the COVID pandemic through 2020-21. Most countries in Africa, as elsewhere, have restrictions on movement within and between countries, as part of their COVID-19 pandemic control measures.

Highlights of project activities during 2020-2021, for each project objective, are given below:

Objective 1: Best practices in plant variety design

Best practices in demand led breeding include the systematic use of *product profiles* to define the priority traits, as identified through consultations with farmers, consumers, processors, traders, and others in the value chain, for specific crops and countries. The DLB project team have developed and published a set of *Product Profile guidelines*, for use by plant breeders to prepare product profiles for their priority crops in Africa.

Early examples to demonstrate the usefulness of these DLB product profile guidelines have been for the development of product profiles for new bean varieties for countries in eastern Africa (developed by bean breeders working within the EIAR in Ethiopia and the national bean breeding program in Uganda); and new tomato varieties for domestic and export markets in West Africa (developed by plant breeders in tomato breeding programs in Benin and Ghana). These product profile guidelines and tool, kit are being used by plant breeders to generate profiles for new varieties in a wide variety of crops in Africa and beyond.

Objective 2: Education and training

A comprehensive education and training program has been developed by the DLB team to build capacity within plant breeding programs in Africa on demand led variety design. This objective is being met by: (i) providing new professional development opportunities for plant breeders in Africa; and (ii) producing and disseminating new education and training materials related to the implementation of demand-led breeding programs.

DLB education and training workshops held in Africa in 2020-21

DLB principles and practices have continued to be introduced to plant breeders in Africa, by means of several workshops hosted by DLB partners in eastern, southern and West Africa during 2020-21. Some of these workshops were face to face meetings while others were virtual events. The teaching and research faculty who planned and led these workshops are all senior African plant breeders who are members of the DLB educators' group.

The DLB educators' group are also co-authors of chapters within the DLB text book published by CABI on *"The Business of Plant Breeding: Market-led Approaches*

to Plant Variety Design in Africa" (2017). The textbook continues to provide the core course material for the DLB education and training workshops. Copies of the text book are made available to all workshop participants. The textbook and associated research and educational resource materials are also available to download as open access on the CABI web site at: https://www.cabi.org/products-and-services/about-cabi-books/open-resources/the-business-of-plant-breeding/

Several African universities have now incorporated the demand led breeding approaches, developed through the DLB project, into their formal post graduate teaching programs on plant breeding. These include the post graduate plant breeding courses at the University of Ghana, University of KwaZulu Natal, South Africa, and the University of Nairobi, Kenya.

Developing new education and training materials on demand led breeding

The project is developing additional educational materials during 2020-21, covering three topics: (1) *Creating product profiles; (2) Gender and Diversity in Plant Breeding; and (3) Making the Case for Investing in Demand led breeding.* The product profile publications (1) are now completed, published and are being widely disseminated to plant breeding programs throughout Africa. The new educational materials in the other two areas are in preparation, to be completed during 2021-22.

Product Profiles: Overview and Practitioners' Guide

An important early step in demand led breeding is developing product profiles that identify the priority traits required by various actors along the value chain. A working group of several Africa and international plant breeders met virtually several times during March – July 2020, to address the principles and practice of developing product profiles and to develop guidelines and a methodology for developing and communicating product profiles, which are applicable across a wide range of crops, environments, and markets.

The guidelines for creating product profiles were finalised in mid-2020 and launched in August 2020 at an international webinar, cosponsored by the Syngenta Foundation for Sustainable Agriculture (SFSA) and the DLB project. The launch was attended by some 120 participants worldwide. The DLB series of four publications on Product Profiles cover:

- *Product profiles—A Practitioners Guide: Overview*
- *Product profiles—A Practitioners' Guide: Creating product profile summaries*
- *Product profiles for two new bean varieties in Tanzania and Uganda*
- *Product profiles for two new tomato varieties in Benin and Ghana*

These publications are available on the DLB web site at: www.demandledbreeding.org

Objective 3: Policy and advocacy

Communications

The main DLB communications activities during 2020-21 were focussed on launching and disseminating the *Product Profiles: A Practitioners Guide* and making these guidelines and some early examples of their applications in developing product profiles for specific crops widely available through the DLB Community of practice and to the wider African plant breeding community.

The Africa Centre for Crop Improvement (ACCI) and the DLB team are co-sponsoring a series of webinars during 2021 on "Making the case for investing in demand led breeding in southern Africa". The speakers include a range of business, policy and science leaders throughout southern Africa.

A DLB communications strategy has been developed to guide DLB communications activities through 2021 and beyond. The communications channels will also include new social media channels (Facebook, YouTube, Flickr, Twitter), as well as ensuring that the DLB website is a key site to enable plant breeders in Africa ready access to new publications, teaching materials and other professional development opportunities.

ACKNOWLEDGMENTS

The Demand led breeding project is supported by an Alliance for Food Security, established by the Australian Centre for International Agricultural Research (ACIAR), the Crawford Fund, and the Syngenta Foundation for Sustainable Agriculture (SFSA), Switzerland. The project is managed by the University of Queensland on behalf of the co-sponsors. The financial and technical support of the three co-sponsors is much appreciated and gratefully acknowledged by all partners who are implementing the project across eastern, southern and West Africa.

d·lb demand·led breeding

www.demandledbreeding.org

Key African partners

The key project partners in Africa are three regional centres specialising in plant breeding, namely: African Centre for Crop Improvement (ACCI) at the University of KwaZulu Natal in southern Africa; West Africa Crop Improvement Centre (WACCI) at the University of Ghana; and the Alliance of Bioversity International and the International Centre for Tropical Agriculture and the Pan African Bean Research Alliance. In addition to the three centres, other DLB partners include; the Ethiopian Institute of Agricultural Research (EIAR) and Haramaya University, Ethiopia; the Ugandan National Agricultural Research organization (NARO) together with Makerere University, Uganda; and Kenya's University of Nairobi. The project team also works with an extensive Community of Practice of more than 400 plant breeders working in national agricultural research institutes and universities throughout Africa.

acci
African Centre for Crop Improvement

Alliance
Bioversity International
CIAT
International Center for Tropical Agriculture
Since 1967 Science to cultivate change

PABRA
Pan-Africa Bean Research Alliance
Better Beans for Africa

Ethiopian Institute of Agricultural Research (EIAR)

HARAMAYA UNIVERSITY
Haramaya University

Makerere University

National Agricultural Research organization (NARO)

University of Nairobi

WACCI
WEST AFRICA CENTRE FOR CROP IMPROVEMENT

DLB sponsors

DLB is supported by an Alliance for Food Security formed by the Australian Centre for International Agricultural Research (ACIAR), the Crawford Fund and the Syngenta Foundation for Sustainable Agriculture (SFSA). The program is managed by the University of Queensland, Australia.

Australian Government
Australian Centre for International Agricultural Research

Crawford Fund FOR A FOOD SECURE WORLD

syngenta foundation for sustainable agriculture

The University Of Queensland AUSTRALIA