

**— VITAA —**  
**THE VITAMIN A FOR AFRICA**  
**PARTNERSHIP**

**PAVING THE WAY FOR FOOD-BASED**  
**SOLUTIONS TO UNDERNUTRITION**

**WINNER OF THE**  
**2003 CGIAR SCIENCE AWARD**  
**FOR OUTSTANDING PARTNERSHIP**

## FOREWORD

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Over the past years, the Vitamin A for Africa Partnership, known as VITAA, has made substantial progress towards generating a sustainable, food-based solution to the pressing problem of vitamin A deficiency in Sub-Saharan Africa. Through VITAA, more than 40 partner agencies are working together to disseminate and test the effectiveness of a series of improved orange-fleshed sweetpotato varieties that are taking hold in households, markets, and products throughout the region.

VITAA is the first initiative of its kind to bring together nutritionists, health experts, and agricultural scientists in pursuit of a common goal. Through their collective efforts, VITAA has succeeded in creating a working consortium that involves research and development agencies, community-based organizations, and nongovernmental organizations in seven African countries. Based on this solid, cross-cutting partnership experience and the impact it has already generated, VITAA provides the CGIAR Biofortification Challenge Program with a concrete model of the effectiveness of food-based approaches in tackling micronutrient malnutrition.

I have personally witnessed the enthusiasm of the farmers who grow the new orange-fleshed varieties and have seen firsthand how these have been readily accepted by consumers—especially mothers, infants and young children. I am therefore pleased to present this document to the CGIAR community.

Hubert Zandstra  
Director General  
International Potato Center (CIP)

## INTRODUCTION

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On May 9, 2001, an international group of 70 agriculturists, health experts, and nutritionists launched what is believed to be the first food-based initiative to attack vitamin A deficiency in Sub-Saharan Africa. The initiative—known as Vitamin A for Africa or VITAA—provides a comprehensive research and development framework for 44 partner agencies working in Ethiopia, Ghana, Kenya, Mozambique, South Africa, Tanzania, and Uganda.<sup>1</sup>

Vitamin A deficiency—Africa’s most treatable public health problem—is a leading cause of early childhood death and a major risk factor for pregnant and lactating women. Vitamin A deficiency does not kill its victims directly. Rather, it weakens the immune system, leaving them susceptible to deadly diseases such as measles, malaria, and diarrhea. Those most severely affected are young children and pregnant and lactating women.

Over the past 25 years, public health agencies have addressed vitamin A deficiency by providing children with vitamin capsules that contain mega-doses of supplementary vitamin A. The strategy has helped millions, but has proven expensive and, despite the best efforts of those involved, has left millions of children at risk.

As a complement to vitamin supplements, health experts have, from time to time, experimented with methods that address the problem through diet. Meat and milk are good sources of vitamin A and many fruits and vegetables are rich in beta-carotene (which the human body uses to make vitamin A). Although these foods, if consumed in sufficient quantity, can greatly reduce the impact of vitamin A deficiency, most of them are too expensive for African consumers, are only seasonally available, or are unpalatable to young children. The exception is sweetpotato, a highly productive, hardy, and affordable food crop that has few natural enemies and is widely grown and consumed in Sub-Saharan Africa (see Figure 1).

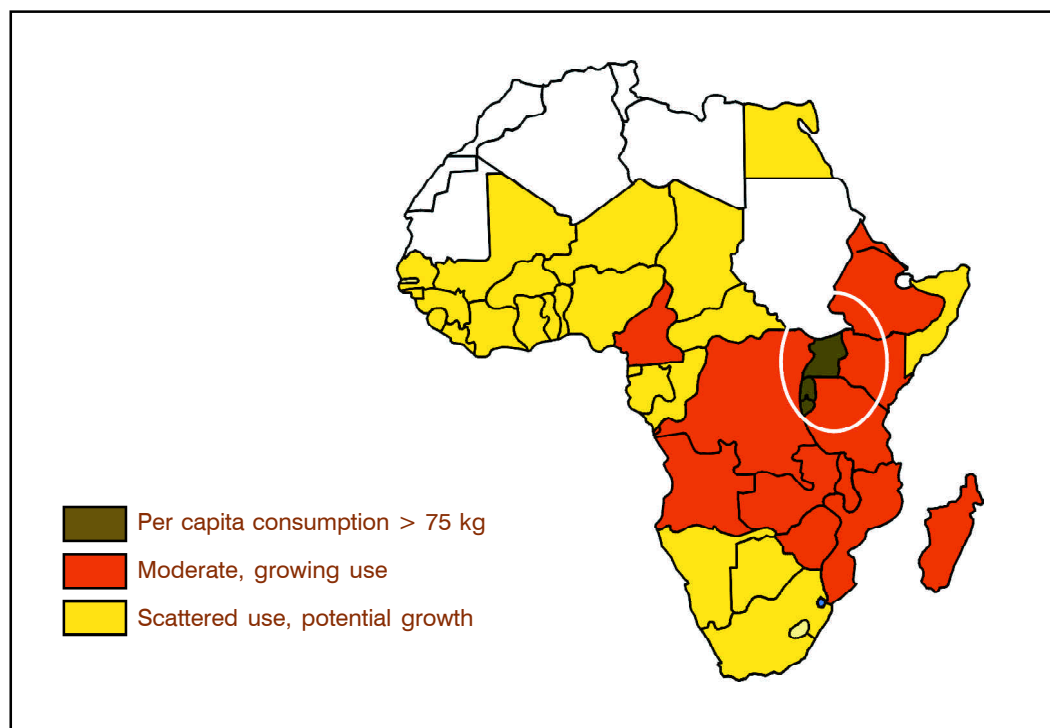
## ANTECEDENTS

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Conventional wisdom held that African consumers would not accept orange-fleshed sweetpotatoes because of their relative moistness and sweetness compared to the drier, white-fleshed type of sweetpotatoes they were used to eating. In 1999, CIP scientists identified a small number of orange-fleshed sweetpotatoes with high beta-carotene and dry matter content, and began to put them to the test with African consumers. The results were encouraging.

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<sup>1</sup> Rwanda, Madagascar, Malawi, Zambia, Angola, Nigeria, and the Democratic Republic of Congo are currently considering VITAA membership.



**Figure 1.** Distribution and consumption of sweetpotato in Africa.

A study<sup>2</sup> conducted by researchers from the International Potato Center (CIP), working with colleagues from the International Center for Research on Women (ICRW), a VITAA partner agency, demonstrated that African women readily accepted orange-fleshed varieties—if they were sufficiently high in starch and low in fiber—when they were introduced through community-level education programs focusing on the health of young children. Studies have also indicated that the consumption of just small amounts of these new sweetpotatoes—usually less than 100 grams per day—can eliminate or greatly reduce vitamin A deficiency in children and their mothers.

## THE VITAA AGENDA

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VITAA represents an important opportunity for the countries of southern and eastern Africa to tackle one of their most pressing public health problems using existing technology that has proven itself to be both effective and sustainable. With modest resources, VITAA will put into the hands of local communities a tool that can save the lives of millions of people and greatly enhance the well-being of countless others. CIP scientists and their colleagues believe that VITAA's orange-fleshed varieties can be made available on a large scale over the next five years.

<sup>2</sup> Jaarsveld, P. van; M. De Wet; E. Harmse; D. Rodriguez-Amaya 2003.

From its inception, VITAA was conceived as an alliance that would draw together a cross-section of research and development experts to respond quickly to a public health crisis that spans a range of national borders and agro-ecosystems. VITAA's unique multinational, cross-cutting platform allows agriculturalists to work directly with colleagues in the fields of health and nutrition. It offers significant economies of scale by promoting research that can be used by all partners while supporting adaptive research and development initiatives that respond to local conditions and circumstances. For example, costly plant breeding and nutrition studies are conducted collectively under VITAA, while seed distribution and public education programs are carried out at the national and local levels by government agencies and nongovernmental organizations (NGOs) associated with the initiative (see *Partnership: Lessons from the Field*, below).

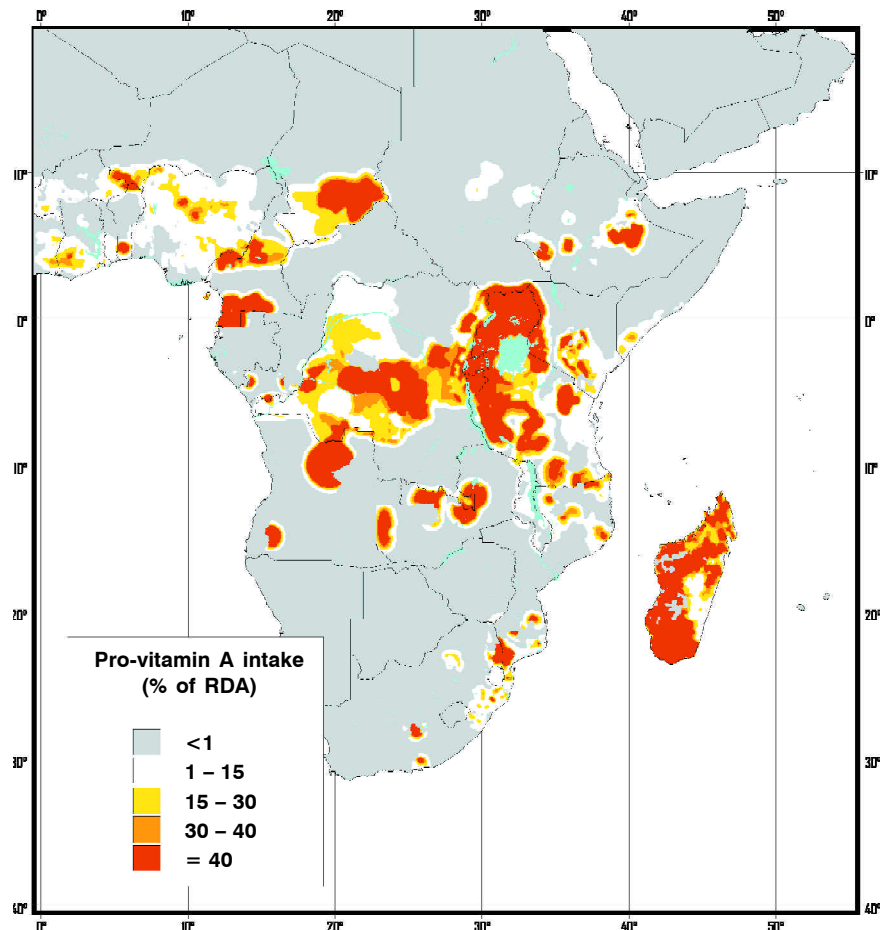
**Governance and coordination** VITAA's governance is provided by an international Steering Committee made up of nutritionists, public health experts, and agriculturalists from national research and development programs. Because VITAA recognizes the importance of women in sweetpotato production systems, the Committee also includes an expert in the field of gender analysis. The Steering Committee meets annually and provides oversight and guidance to the VITAA Coordinator, Dr Regina Kapinga. Dr Kapinga is a CIP sweetpotato breeder/agronomist based at the Center's liaison office in Kampala, from where she is well placed to coordinate activities with national partners and to liaise with regional agencies such as PRAPACE and ASARECA (see *Partner Agencies*), both of which are key players in the VITAA plan of action. At present, PRAPACE invests nearly half of its US\$400,000 annual budget in sweetpotato research and development, with the highest priority directed to the distribution and testing of orange-fleshed sweetpotato varieties and their processing, product development, and marketing.

**Investors** VITAA is supported by a variety of investors, including the German Agency for Technical Cooperation (BMZ), the OPEC Fund, the McKnight Foundation, and the US Agency for International Development (USAID). What makes VITAA somewhat unique is the fact that its CGIAR funding originates from sources not ordinarily available to international centers or their national research partners. USAID's support, for example, is provided by MOST, the USAID Micronutrient Program, and by USAID's Micronutrient Global Leadership (MGL) project. In addition, VITAA has attracted significant support from agencies wholly outside of the CGIAR, including the Micronutrient Initiative (MI). VITAA is also beginning to secure investments from private donors, most notably the Senior Family Fund, a small philanthropic investor in the United States (see *Donors Large and Small* in CIP's Annual Report for 2003). The contribution from the Senior Family Fund is considered an indicator of VITAA's potential to raise significant sums for national- and local-level development activities. CIP, in its coordinating function, is working with Senior Family Fund officials in an attempt to recruit contributions from like-minded philanthropies and private investors, an effort that is just now getting underway.

## VITAA RESEARCH AND DEVELOPMENT

VITAA research and development activities are based on an agreed-upon logical framework formulated by the partners and approved by the VITAA Steering Committee. The logframe's principal components include research on agronomy, health, and nutrition, postharvest, partnership development, information and communications, and monitoring and evaluation. Highlights of work conducted to date are provided below.

**Ex ante analysis** VITAA analyses, based on geo-referenced data from six countries, point to the high potential impact of replacing white-fleshed sweetpotato varieties with high-dry-matter orange-fleshed ones (see Figure 2). Scientists from the University of Michigan (USA) and CIP have estimated that some 50 million children under the age of six stand to benefit. More precisely, in countries such as Rwanda, Burundi, and Uganda—where sweetpotato production is already high—85 to 95 percent of the population most in need would receive the “full impact” level of 40 percent of the recommended dietary allowance (RDA) of vitamin A. Even in countries such as Ethiopia, which is not a major sweetpotato producer, about 30 percent of the at-risk population would enjoy partial benefits from enhanced beta-carotene intake as a result of switching from white- to orange-fleshed varieties.



**Figure 2.** Potential impact on pro-vitamin A intake in Sub-Saharan Africa of replacing white-fleshed sweetpotato varieties with orange-fleshed varieties.

**Efficacy and retention studies** Nutrition studies carried out under VITAA auspices by South Africa's Medical and Agricultural Research Councils (MRC-ARC) in coordination with the University of Wisconsin and CIP strongly support the view that food-based interventions using sweetpotato can effectively backstop or reduce the need for vitamin A supplements to avert vitamin A deficiency in young children. In the first study—an efficacy trial<sup>3</sup> involving primary school students in a rural area of KwaZulu-Natal Province—daily consumption of 125 grams of boiled sweetpotato contributed nearly 250 percent of the RDA of vitamin A for 4- to 8-year-old children. In a complementary retention study,<sup>4</sup> MRC-ARC researchers demonstrated that sweetpotato retained 70 to 90 percent of its beta-carotene when boiled. To confirm these findings, a second efficacy study will be conducted in Kenya in 2004 by nutritionists from the University of Nairobi. In addition, the retention of beta-carotene in processed food products, including fried and sun-dried convenience products, will be studied.

**Improved germplasm** A new series of CIP-developed breeding lines—offering superior agronomic characteristics and better cooking and eating qualities than the best previously available cultivars—has been introduced into the region. The series consists of 42 improved, high-beta-carotene plant types that are high in the dry matter needed to meet local market standards and taste preferences, as well as in the beta-carotene needed to prevent vitamin A deficiency in young children and pregnant and lactating women. These new sweetpotatoes, the first in a series to emerge from a six-year breeding program, are thought to be significantly better than the first generation of VITAA clones. Their dry-matter content ranges from 30 to 38 percent, which should make them highly attractive to African consumers. Each of the new clones is currently being subjected to 12 months of plant quarantine at the Kenya Plant Health Inspectorate Service (KEPHIS) prior to release for on-farm and processing trials. Following these trials, they will be distributed to Ethiopia, South Africa, Tanzania, and Uganda, where they will be further evaluated prior to on-farm testing.

## PARTNERSHIP: LESSONS FROM THE FIELD

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VITAA emphasizes empowerment of local partner organizations and supports their efforts to promote the use of orange-fleshed sweetpotatoes at the community level. These initiatives—which are perhaps most advanced in Uganda, but are gaining momentum elsewhere—include an extensive list of activities carried out by regional organizations and NGOs. Thanks to these efforts, high-beta-carotene varieties are quickly gaining recognition among producers and consumers and are attracting attention from government representatives. For example:

- In 2002, nearly 40,000 Ugandan farmers received vine cuttings of improved orange-fleshed sweetpotatoes through the personal initiative of Her Royal Highness, the Queen

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<sup>3</sup> Jaarsveld, P. van, W.M. Faber, S.A.Tanumihardjo, C.J. Lombard, A.J. Spinner Benadé 2003.

<sup>4</sup> Jaarsveld, P. van; M. De Wet; E. Harmse; D. Rodriguez-Amaya 2003.

of Buganda, and the Buganda Cultural and Development Foundation (see *Partner Agencies*), a royal NGO associated with VITAA. Known locally as the *Nabagereka*, the Queen appealed publicly to her subjects to fight malnutrition and poverty by growing and consuming orange-fleshed varieties. The *Nabagereka*, the wife of the *Kabaka*, Buganda's traditional ruler, is held in high esteem by Ugandans and she plays a pivotal role in mobilizing development throughout Buganda, Uganda's largest traditional kingdom. Because of her support, local officials have named one of Uganda's most popular sweetpotato varieties after her.

- More than 850,000 orange-fleshed sweetpotato vine cuttings were delivered to Ugandan farmers over the past year in the war-torn districts of Lira and Apac. During lulls in the fighting, farmers move from behind the defensive perimeter of the camps to attend to their fields. They depend on extension workers from the James Arwata Foundation (JAF), a local community-based organization and VITAA member, to find ways to deliver planting materials. The farmers, who normally grow crops like cassava and millet, reportedly prefer sweetpotato because it is earlier maturing than traditional crops. The contribution of orange-fleshed sweetpotato to the nutrition of malnourished children and pregnant mothers in displacement camps cannot be over-emphasized, say local officials. The situation in the camps is so serious that district authorities are urging JAF to speed up deliveries. To meet the demand, JAF—with help from VITAA, the Senior Family Fund, and other donors—plans to expand its distribution of orange-fleshed varieties before the end of 2003. Plans call for JAF to multiply large amounts of orange-fleshed sweetpotato variety SPK 004, not only to feed people in the camps, but also to produce planting material (vines) that displaced people can carry back to their villages when conditions improve. Uganda's National Agricultural Research Organization, PRAPACE, VITAA, and farmers from Uganda's Soroti District provide technical support to JAF.
  
- More than 500 farmers met recently in Uganda's Soroti District for what one official called the "largest field day ever organized to publicize the health benefits of orange-fleshed sweetpotato." During the event, students from a local primary school presented the play *Food for Life*, which highlights the importance of orange-fleshed sweetpotatoes for health and income. Presented in the Ateso and English languages, the play recounts an all too familiar tale of two students, one healthy and one who suffers from poor eyesight resulting from lack of vitamin A. In the first scene, the nearly blind student loses his school supplies and searches for them in vain. His friend, with good eyesight, finds them a close distance away. In the next scene, the boy with poor eyesight finds it difficult to read from the chalkboard. The teacher identifies the problem as lack of vitamin A. "These are simple stories," says VITAA Coordinator Regina Kapinga, "but they're an essential part of delivering the message to rural people that they can do something with their own resources to tackle an important public health problem."



## PRIVATE SECTOR INVESTMENT

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VITAA officials anticipate that the lessons learned from these types of initiatives will provide a foundation for developing more comprehensive regional work plans that can be used to support NGOs seeking to commercialize orange-fleshed varieties. Such organizations now include the Tanzania Home Economics Association, AFRICA NOW, a program in southern Kenya funded by the UK's Department for International Development, and Volunteer Efforts for Development Concerns in Central Uganda. With support from the McKnight Foundation, plans are also underway to assist NGOs in promoting production and commercialization of orange-fleshed sweetpotatoes, and to help farmers access capital to implement a program known as Farming as a Business. The objective is to empower the farmers to grow orange-fleshed sweetpotatoes as a commercial crop and to link them to potential markets.

Ultimately, however, VITAA's success may hinge upon its ability to create lasting partnerships with the private sector. Virtually all VITAA member agencies agree that the best way to promote rural development is for farm enterprises to tap into local and international markets. To take advantage of market opportunities, however, farmers will need to produce higher quality products, and deliver them on time and in sufficient quantity. To this end, VITAA—working through PRAPACE and others—encourages participatory research involving community-based organizations, the private sector, and national research and development programs.

- In 2002 investments in private sector initiatives led to the release of a highly nutritious porridge by the Maganjo Millers, a local food processor. The new high-protein, high-beta-carotene product, known as Nutri-Porridge, is made from a combination of orange-fleshed sweetpotato, maize, and peanuts. It is reportedly outselling all of its competitors on the Kampala market and is in high demand.
- Researchers working for the commercial feed companies UGACHICK and NUVITA in Uganda conducted studies to determine the feasibility of using sweetpotato as a principal ingredient in commercial animal feeds. If successful, their products will be sold in Burundi, the Democratic Republic of Congo, Rwanda, Tanzania, and Uganda. Processors are apparently attracted to orange-fleshed sweetpotato because of the production potential of the improved varieties and because of their early maturity, which helps farmers produce up to three crops per year.

## CONCLUDING STATEMENT

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VITAA has made substantial progress, moving forward a research and development agenda that is now supported by an array of agencies in the fields of agriculture, health, and nutrition. With backing from the international community, VITAA has made it possible for gov-

ernmental and nongovernmental organizations in seven countries to work together, share resources, and move towards a common goal that directly benefits the health and well-being of millions of young children and their mothers.

While VITAA draws its strength from the 40-odd agencies that implement its agenda, its long-term success ultimately rests in the hands of progressive farmers such as Jowelia Sekiyanja, a Ugandan sweetpotato producer whose income has steadily grown through sales of orange-fleshed roots and vines. Increasing demand for orange-fleshed sweetpotatoes, and Mrs Sekiyanja's ability to take advantage of a growing market, have transformed her status in the community and helped her to buy land and send her children to school. She, and scores of other farmers who were early adopters of the new varieties, are now training farmers throughout the region.

People like Mrs Sekiyanja are, perhaps, VITAA's most important partners. Through field days, word of mouth, and by personal example, they are creating a groundswell of support for a new, commonsense technology that supports the notion that improving nutrition is a goal best achieved by increasing the consumption of healthier foods, rather than relying solely on supplements or food fortification. Ultimately, her success—and the success of other VITAA partners and stakeholders—should help to set the stage in Sub-Saharan Africa for the introduction of the food crops currently being developed under the CGIAR Biofortification Challenge Program. It is an achievable goal that CIP and its many VITAA partners believe is well worth pursuing.

## THE VITAA WHO'S WHO

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### **Steering Committee**

Fina Opiyo, National Agricultural Research Organization, Uganda, Chair  
Bogalech Alemu, Ministry of Agriculture, Ethiopia  
Armanda Gani, Ministry of Health, Mozambique  
Charlotte Johnson Welch, International Center for Research on Women  
Regina Kapinga, VITAA Coordinator, CIP  
Edward Karuri, University of Nairobi, Kenya  
Gabriel Ngunduru, Tanzania Food and Nutrition Centre, Tanzania  
Thomas Remington, Catholic Relief Services East Africa  
Samuel Sossi, Ministry of Health, Ghana  
Sonja Venter, Agricultural Research Council, South Africa  
Annie Wesley, Micronutrient Initiative, Ottawa, Canada

### **Partner Agencies**

AFRICARE, Uganda  
Agricultural Research Council, South Africa  
Agriculture and Environment Program, AEP, Kenya  
AFRICA NOW, Kenya  
Appropriate Rural Development Agriculture Program (ARDAP), Kenya  
Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA)  
Awasa Agricultural Research Centre, Ethiopia  
Bugandan Cultural and Development Foundation (BUCADEF), Uganda  
Catholic Relief Services  
Department of Agricultural Research and Development, Tanzania  
Foodlink Resources, Kenya  
German Agro Action, GTZ, Kenya  
Helen Keller International  
International Center for Research on Women (ICRW)  
International Development Research Centre (IDRC), Canada  
International Potato Center (CIP)  
James Arawata Foundation, Uganda  
Kenya Agricultural Research Institute (KARI)  
Kenya Medical Research Institute  
Kenyatta University, Kenya  
Kirinyaga Flour Millers, Kenya  
Makerere University, Uganda  
Medical Research Council, South Africa  
Michigan State University, USA  
Ministry of Agriculture, Ethiopia  
National Agricultural Research Organization (NARO), Uganda  
Natural Resources Institute, United Kingdom  
Plant Quarantine Station, Kenya Plant Health Inspectorate Service

Regional Economic Development Services Organization, USAID, Kenya  
Regional Potato and Sweetpotato Improvement Network in Eastern and Central Africa  
(PRAPACE)  
Rural Energy and Food Security Organization, Kenya  
Sokoine University of Agriculture, Tanzania  
Soroti Catholic Diocese Development Organization (SOCADIDO), Uganda  
Southern Africa Root Crops Research Network (SARRNET)  
Tanzania Commission for Science and Technology  
Tanzania Food and Nutrition Centre (TFNC)  
Tanzania Home Economics Association  
UGACHICK, Uganda  
Ukiriguru Research Institute, Tanzania  
University of Nairobi, Kenya  
Volunteer Efforts for Development Concerns (VEDCO), Uganda  
Winrock International  
Women for Improved Rural Health and Nutrition, Kenya  
World Vision

**Investors**

Federal Ministry for Economic Cooperation and Development (BMZ), Germany  
Micronutrient Initiative  
OPEC Fund  
United States Agency for International Development (USAID)  
McKnight Foundation  
The Senior Family Fund  
Biofortification Challenge Program (pending)

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