

Seed Systems Development: Enabling and Scaling Genetic Improvement and Propagation Materials

Call under the NL-CGIAR Strategic Partnership



Nine projects are funded by NWO-WOTRO on generating insights that contribute to improving seed systems in focus regions within Asia and Sub-Saharan Africa. Specific seed systems addressed are cassava, maize, groundnut, vegetables, cocoa, forage seed, tilapia and chicken, while some projects have a more general focus on improving the functioning and inclusiveness of seed systems and (actors in) markets. The Call is part of the NL/CGIAR Strategic Partnership and the nine awarded project consortia consist of Dutch research institutes, CGIAR research centers (through CGIAR research programmes or platforms), and (local) partners from the public and private sector.

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Integrated vegetable seed systems development in ethnic minority communities in Northern Vietnam for enhanced nutrition and income security

Applicants

Main applicant: Dr S. De Haan (International Center for Tropical Agriculture (CIAT))

Co-applicants: Dr. T.J. Stomph (Wageningen University and Research), J.E. Raneri (Bioversity International), Dr. T.H. Ngo (Fruit & Vegetable Research Institute (FAVRI)), T. Nguyen Dinh (Vinaseed), T. Le Van (Tan Loc Phat), Van Khoi Le (Vietnam Farmers Union)

Objective

This project aims to address issues related to vegetable smallholder seed systems in Northern Vietnam. Issues mentioned in the proposal are identified as inadequate access to quality seed of exogenous and indigenous vegetables varieties of desirable uniformity, health, and physiological properties, and traits such as disease resistance, micronutrient density, and consumer characters.

Abstract

Vegetables are a main source of income and nutrition for ethnic minority farmers in Vietnam's Northern highlands. While value chains for fresh retail produce and seed markets offer huge opportunities for development, particularly for women and youth inclusion, current smallholder seed systems suffer from multiple problems. These are due to inadequate access to quality seed of exogenous and indigenous vegetables varieties of desirable uniformity, health, and physiological properties, and traits such as disease resistance, micronutrient density, and consumer characters. Insufficient quality guarantees, poor storage and treatment, lack of access to appropriate information resources, and limited smallholder participation in seed value chains, combine with the effects of biotic and abiotic shocks affecting seed security, aggravate the situation.

Our proposal will address these issues by elucidating how, and under what conditions, increased access and use of high quality seed translates into enhanced smallholder incomes and nutrition security. We will particularly address the knowledge gap of trade-offs to simultaneously optimize technical, organizational, economic, and social components of seed systems. Increasing clarity about trade-offs is essential to designs highly adapted innovations and to inform the policy debate steering Southeast Asian seed governance. We adopt an integrated approach organized around three major work packages (WP). WP1 will take a broad approach and pursue 'seed system characterization' for contrasting situations based on crop reproductive biology, producer ethnicities, and market systems. WP 2 will focus more in-depth on 4 to 6 case studies to research how select demand-driven and business-led improvements in seed production, marketing and business can enhance 'smallholder seed access' (specifically for ethnic minorities). WP 3 will provide fast-track insight into 'evidence based pathways', and interactions between seed access vs. nutrition security and seed security vs. food security.



Promoting stress-tolerant varieties at scale: Interlinking the private seed sector and insurance advisory services in Kenya

Applicants

Main applicant: Dr B. Kramer (International Food Policy Research Institute (IFPRI))

Co-applicants: Dr. B. Kivuva (Kenya Agricultural and Livestock Research Organization (KALRO)), Dr. R. Lensink (Rijksuniversiteit Groningen), Dr. F. Cecchi (Wageningen University & Research), R. Kariuki (Agriculture and Climate Risk Enterprise Ltd. (ACRE Africa))

Objective

This project aims to investigate how different types of market actors in high-quality seed systems can promote their clients' adaptive capacity by interlinking stress-tolerant varieties with innovative financial and advisory services that help resolve key barriers to adoption, targeting particularly female farmers and youths in Kenya.

Abstract

Smallholder farmers require innovative solutions to mitigate the consequences of increasing climatic risks. This project investigates how different types of market actors in high-quality seed systems can promote their clients' adaptive capacity by interlinking stress-tolerant varieties with innovative financial and advisory services designed to resolve key barriers to seed adoption, targeting particularly female farmers and youths. Specifically, we propose testing the impacts of bundling seeds with innovative crop insurance and advisory services that provide comprehensive yet affordable risk management solutions.

We will facilitate—through knowledge sharing, capacity building and research uptake activities—the scaling of these services. We hypothesize that bundling seeds with such services helps improve effectiveness and trust in seed quality, while also minimizing the (often perceived) risks around adopting such seed varieties—thereby potentially unlocking further agricultural investments. In the first two years, we test these hypotheses by means of a randomized trial with 6,000 farmers in which different types of seed market actors promote a stress-tolerant seed variety either in isolation (control) or bundled with 1) a high-quality comprehensive insurance product; 2) a personalized remote advisory service; 3) a combination of the two. We will analyse whether impacts differ depending on the type of seed provider offering these services, comparing the cost-effectiveness for an incumbent seed company, a smaller private seed company, and a national agricultural research centre, with potentially more inclusive distribution channels to reach women and the youth.

The project will build on findings from past seed systems interventions in Kenya, including the DTMA project and ACRE's Replanting Guarantee scheme, and the project will leverage existing initiatives including KALRO's Digital Hub for Agriculture, to facilitate a nationwide scale-up of key findings and lessons learnt with the different types of seed providers in the third year.



Accelerating aquaculture development in Ghana through sustainable Nile Tilapia seed production and dissemination

Applicants

Main applicant: Dr C.R. Ragasa (International Food Policy Research Institute (IFPRI))

Co-applicants: Dr. J. Newton (Koninklijk Instituut voor de Tropen (KIT)), Dr. S.K. Agyakwah (CSIR-Water Research Institute), M. Oyih MSc (Ministry of Fisheries and Aquaculture Development (MOFAD)), Dr. N. Tran (ICLARM (WorldFish)), I. Akortia (S-HOINT Limited), P. Safo MSc (Crystal Lake Fish Limited)

Objective

This project aims to build on the successes in Ghana's tilapia cage culture and to accelerate tilapia development through testing interventions to improve the seed system for small-scale cage and pond farmers.

Abstract

This proposal aims to build on the successes in Ghana's tilapia cage culture, and accelerate tilapia development through testing interventions to improve the seed system for small-scale cage and pond farmers, by addressing the research question "How can the production and marketing of high quality tilapia seed be developed in a sustainable and commercially viable manner?" This is done by addressing two objectives: (1) to improve the quality and service level of public and private hatcheries, and (2) to increase access to and use of high-quality fish seed for new or existing producers, with specific attention for women and youth (age=15-35).

Research will initially focus on exploratory research including gender-sensitive seed supply chain assessment; ex ante feasibility studies and ex post assessment of business models for seed production and distribution; and examining farmers' demand for quality fingerlings for tilapia culture (both pond and cage), farmers' willingness to pay for quality fingerlings, and the needs for capacity development among hatcheries and farmers. Partly parallel to this process we will start testing business and extension models, and quality assurance mechanisms to be implemented in the tilapia seed sector to accelerate access to and adoption of quality fingerlings and good aquaculture practices.

Research will involve both (1) action research, which involves stakeholder engagement in the research and documentation of practices and processes to provide practical advice to implementers both at private and public sectors, and (2) assessment and impact evaluation, using both quantitative and qualitative methods. Finally, these research outputs will be linked to a capacity development strategy and knowledge sharing and dissemination strategy.



Enabling agribusiness development for scaling quality cassava seed systems for control of major viral diseases in Rwanda and Burundi

Applicants

Main applicant: Dr S. Tumwegamire (International Institute of Tropical Agriculture (IITA))

Co-applicants: Dr. M. Schut (Wageningen University & Research), Ir. drs. M. Paauwe (Spark)

Objective

This project aims to engage in testing, evaluating and upscaling end-user-preferred cassava varieties with strong resistance to Cassava Brown Streak Disease (CBSD) and Cassava Mosaic Diseases (CMD) through different types of cassava agribusiness seed systems (CASS) models in Rwanda and Burundi.

Abstract

IITA, SPARK, WUR and the NARS of Rwanda and Burundi (RAB and ISABU) will test, evaluate and upscale end-user-preferred cassava varieties with strong resistance to Cassava Brown Streak Disease (CBSD) and Cassava Mosaic Diseases (CMD) through different types of cassava agribusiness seed systems (CASS) models. During the NWO proposal elaboration workshop, stakeholders and value chain actors collectively decided that the project should achieve three interrelated objectives:

1. To diversify the availability of cassava varieties with strong resistance/tolerance to CBSD and CMD that meet farmer and commercial end-user preferences;
2. To develop, test and tailor different types of CASS models (i.e. (i) government-led, (ii) privatesector-led and (iii) cooperative-led) with and for different groups of farmers;
3. To understand and respond to constraints and opportunities at farmer and institutional levels for upscaling CASS models in collaboration with different cassava value chain actors.

In achieving these objectives, the projects contributes to outcomes as expressed in the (i) NWO call's aims, (ii) CGIAR Research Impact Pathway and its IDOs, and (iii) relevant Areas for Action and the Seed Systems Development Theory of Change. At the end of the project, 5 cassava clones resistant to CBSD and CMD will be available to farmers through validated, innovative, and financially sustainable CASS models. This will increase production and income gains for farmers, as well as the profitability of industrial processing.

The validated CASS models, multi-stakeholder collaboration, and strong institutional embedding will attract investment to upscale the CASS models and their outcomes beyond the initial scope of the project. The project is implemented by a strong consortium comprising of the leading (inter)national organisations in research and development. All organisations have proven capacity to deliver as well as ongoing programs in the target countries that leverage and co-fund the proposed project.



Policy and regulatory reform options for seed market development: Expanding the empirical evidence base in Uganda

Applicants

Main applicant: Dr R.A. Sparrow (Wageningen University and Research (WUR))

Co-applicants: G. Otim (Wageningen University & Research), Dr. D.J. Spielman (IFPRI-Washington), Prof. dr. ir. E. Bulte (Wageningen University & Research), Dr. F. Bagamba (Makerere University), Ir. drs. R.P. Ntakyo (National Agricultural Research Organization (NARO)), Dr. B. Van Campenhout (IFPRI-Washington), Ir. drs. A. Mastebroek (Wageningen University & Research Centre for Development Innovation (WCDI))

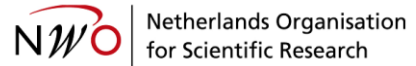
Objective

This project aims to improve the functioning, integration, and inclusiveness of seed systems and markets in Uganda by strengthening links between the regulatory framework, seed providers, and seed users across multiple dimensions.

Abstract

This project will improve the functioning, integration, and inclusiveness of seed systems and markets in Uganda by strengthening links between the regulatory framework, seed providers, and seed users across multiple dimensions. The project is a timely intervention designed to leverage the rapid growth in Uganda's market opportunities for seeds, traits, and agricultural commodities while addressing the persistent market and institutional failures that limit the transmission of information between smallholder farmers and seed providers. Ultimately, the project will advance seed system development in Uganda by providing realistic, evidence-based policy options that accelerate crop-specific development, production, and marketing of new varieties and quality seeds to smallholders across the country.

Emphasis will be placed on filling three critical knowledge gaps in the country's policy discourse on seed systems. First, the project will identify factors constraining the demand for seeds and traits across a range of informal and formal seed systems (represented by different crops), farmer typologies (with special attention to gender and youth), and agro-ecologies (representing variation in climate vulnerability), and test strategies designed to relax these constraints in the field. Second, the project will analyse the productive and innovative capacity of seed providers across Uganda, including foreign firms, domestic companies, small- and medium-sized enterprises, farmer organizations, and individual farmer-entrepreneurs, and test policy and regulatory interventions to increase this capacity. Third, the project will engage with strategic decision-makers to analyse how policies, investment, and regulatory solutions that expand inclusive access to—and the benefits from—new varieties and quality seed can be implemented. Taken together, research on these three topics will provide new and salient insights to encourage growth in opportunities for farmers, entrepreneurs, and investors.



Feed and forage seed business models to support further professionalization of the dairy sector in Kenya and Uganda

Applicants

Main applicant: Dr P.R. Gildemacher (Royal Tropical Institute (KIT))

Co-applicants: D.G. Steyn (Barenbrug South Africa), Dr. C. Wasonga (Advantage Crops Limited), Dr. M. Peters (International Center for Tropical Agriculture (CIAT)), B. Lukuyu PhD (International Livestock Research Institute (ILRI)), Dr. W.N. Nanyeenya (National Agricultural Research Organisation (NARO) – National Livestock Resources Research Institute (NaLIRRI))

Objective

The aim of this project is to develop viable business models for forage seed production and marketing that assure economically sustainable access to high quality forage seed to diverse clients in Kenya and Uganda.

Abstract

Sub-optimal feeding forms a major constraint for further professionalization and development of the dairy sector in Kenya and Uganda. As feeding represents 65% of production costs, improved forage productivity will greatly increase milk production efficiency and thus reduce the production costs and price of milk. As a result of a poorly functioning forage seed value chain, promising and demanded species and varieties which provide for high quality forage for Kenya and Uganda, remain under-utilized. The starting point for improved forage productivity is economically viable production and distribution of forage seeds and vegetative splits. The promotion of quality forage seed cannot be left to the private sector. Public co-investment is needed to support the professionalization of the dairy sector. This project will provide insight on how to effectively invest public and private resources in the production, marketing, promotion of use and quality control of forage seed.

The objective of the proposed research is to:

“Develop viable business models for forage seed production and marketing that assure economically sustainable access to high quality forage seed to diverse clients in Kenya and Uganda”.

In this research project international, national and local seed entrepreneurs, dairy farmers and national and international researchers will:

1. Analyse forage seed sector functioning, constraints and opportunities for change.
2. Identify, implement and assess business models for commercially viable forage seed production of promising and highly demanded species.
3. Test forage seed promotion marketing strategies.
4. Pilot seed quality assurance mechanisms.

The insights gained will be published as 3 working papers, 2 scientific papers and be presented in 2 relevant conferences. Furthermore training modules to communicate the working paper insights to a practitioner audience will be elaborated, tested and published together with dairy sector development projects and programs.



Women in business: chicken seed dissemination in Ethiopia and Tanzania

Applicants

Main applicant: Dr A. Omore (International Livestock Research Institute (ILRI))

Co-applicants: Dr. J. Newton (Koninklijk Instituut voor de Tropen (KIT)), Dr. S. Abegaz Kebede (Ethiopian Institute of Agricultural Research (EIAR)), Dr. E. Goromela (Tanzania Livestock Research Institute (TALRI)), Dr. J. Kaijage (Ministry of Livestock and Fisheries), Dr. T. Fseha (Ethiochicken), H. Njakoi (AKM Glitters)

Objective

This project aims to develop, promote and test women-led chicken businesses in Ethiopia and Tanzania with the goal of promoting the economic empowerment of young women, and also of improving the food and nutrition security of their households.

Abstract

Locally-relevant and high yielding chicken breeds can enhance the income, nutrition and food security of small-holder households in rural areas. The African Chicken Genetic Gains (ACGG) project is identifying such breeds in Tanzania and Ethiopia. Because rural women are generally more involved in chickens than men, ACGG developed locally-relevant and high yielding chicken breeds mostly by involving women farmers to ensure that these new breeds respond to their needs. Now that these new breeds are available, they need to reach women from the most remote areas. This proposed project aims to develop, promote and test women-led chicken businesses in Ethiopia and Tanzania with the goal of promoting the economic empowerment of young women, and also of improving the food and nutrition security of their households.

The intervention builds on the work of existing private partners in each country - who multiply ACGG genetic material and disseminate day old chicks (DOCs) – to reach customers (small-holder women in remote areas) who they may otherwise be unable to serve through their usual channels. It also leverages ACGG's Gender Strategy goals to enhance gender equity in access to technologies, skills and services, to progress towards women's empowerment and to provide evidence on gender dynamics in the value chain (ACGG Gender Strategy, 2017).

Through this project, we show whether and how a private sector intervention can be combined with small-scale and women-led businesses to enhance access to improved chickens in remote areas. We also show how such an approach may provide opportunities for the economic empowerment of local women. We focus in particular, on gender-responsive approaches that ensure women, and young women in particular, keep control of the income generated through the new business. Finally, the study explores how the economic empowerment of women relates to the nutritional status of their household members.



Upscaling improved groundnut varieties through integrated seed systems for improving income and nutrition in dryland of Ghana and Mali

Applicants

Main applicant: Dr H. Affognon (International Crops Research Institute for the Semi-Arid Tropics (ICRISAT))

Co-applicants: Dr. D. Sako (Institute D'Economie Rurale (IER)), Dr. D.K. Puozaa (CSIR-Savanna Agricultural Research Institute), Dr. P. R. Gildemacher (Royal Tropical Institute (KIT)), Dr. K. Traoré (Société de production de Semences Améliorées (SOPROSA-SARL)), Z. Sumani Iddrisu (Heritage Seeds Company Limited)

Objective

This project aims to sustainably improve the groundnut seed systems for the upscaling of improved groundnut varieties for improving the income and nutrition in Ghana and Mali by adopting an innovative seed systems model that integrates the formal and informal channels to enhance seed production and marketing.

Abstract

Africa is the second largest groundnut producing continent accounting for about 40% and 31% of the global area and production, respectively. West and Central Africa region accounts for more than 70% of the groundnut production in Africa where the crop is cultivated by smallholder farmers. Groundnut is a major cash crop for many households, and it is a nutritious food that contributes to improved nutrition and health of the rural population. Despite its importance, the productivity of groundnut in Africa remains low with unshelled yield of less than 1 ton/ha compared with global average of about 1.7 tons/ha and over 3 tons/ha in USA and China attributed to various constraints including biotic, abiotic stresses and socioeconomic factors. In addition, low availability of breeder and foundation seeds of improved varieties and weak formal seed distribution systems contribute to the low productivity of the crop.

Therefore, the aim of this project is to sustainably improve the groundnut seed systems for the upscaling of improved groundnut varieties for improving the income and nutrition in Ghana and Mali. The project will adopt innovative seed systems model that integrates the formal and informal channels to enhance seed production and marketing. The project will achieve its goal by documenting the current groundnut seed systems and identifying the key actors along the seed value chains. The project will also assess the enabling conditions underlying effective uptake by women, men and youth for wider spread of improved varieties of groundnut in the target areas of both countries. The integrated systems that assures availability and access to affordable quality groundnut seeds for men, women and youth farmers through innovative production technologies and efficient business models will be explored. Finally stakeholders, from the on-going programs and projects will be engaged to formulate and integrate recommendations for improved groundnut seed systems.



CocoaTarget: Using citizen science to improve climatic and agro-ecological targeting of varietal recommendations and accelerating planting material access for cocoa farmers in Ghana

Applicants

Main applicant: Dr J. van Etten (Bioversity International)

Co-applicants: Dr. H. D. Bisseleua (World Cocoa Foundation (WCF)), Dr. A. Laven (Royal Tropical Institute (KIT)), Dr. F. Padi (Cocoa Research Institute of Ghana (CRIG)), F. Appiah Amponsah (Kookoo Pa Farmers Association (Kookoo Pa))

Objective

This project aims to develop a farmer-led business model for the propagation and distribution of cocoa planting material that is more efficient and more responsive to climate change, and capable of providing rapid feedback to breeders in Ghana. The proposal attempts to achieve this based on citizen science, using the tricot approach that has been tested in cereals and legumes and is for the first time being tested in a perennial tree crop.

Abstract

West Africa produces 70% of global cocoa but is facing unprecedented challenges with anomalous climates. Extreme temperatures and water stress put pressure on the cocoa sector, including millions of smallholder cocoa producers and the chocolate industry. Current seed systems in Ghana are not serving cocoa producers' needs adequately because recommendations for cocoa planting material do not specifically target regional climatic and agro-ecological differences and do not respond to shifts in these conditions due to climate change. There have been successful efforts to provide solutions to these problems using a scalable citizen science approach for on-farm testing of crop varieties for climate adaptation: the triadic comparisons of technologies (tricot) approach.

This project will be the first one to apply the tricot approach to a perennial crop, cocoa. Through a strategic public-private-civil society partnership, we will adapt the citizen science "tricot" approach to cocoa variety testing, working particularly with women farmers to test cocoa hybrids and clones for climate adaptation in a gradient of agro-ecological zones in Ghana. We will develop and validate processes and guidelines for the production and distribution of selected climatically adapted, stress-tolerant cocoa hybrids and clones in a network of central and satellite nurseries and budwood gardens managed by women and youth, to ensure constant varietal renewal depending on the emerging needs of farmers and the findings on climate adaptation from on-farm testing. We will design appropriate dissemination and scaling mechanisms by supporting inclusive business development to ensure the delivery of diverse and adapted genetic materials of cocoa addressing the specific demand of farmers.