STDF Standards and Trade Development Facility

STDF PROJECT PREPARATION GRANT (PPG)

APPLICATION FORM

The Standards and Trade Development Facility (STDF) provides Project Preparation Grants (PPGs), up to a maximum of US$50,000, for the following purposes (or a combination thereof):

- application of SPS-related capacity evaluation and prioritization tools;
- preparation of feasibility studies that may precede project development to assess the potential impact and economic viability of proposals in terms of their expected costs and benefits; and/or
- preparation of projects proposals that promote compliance with international SPS requirements, for funding by the STDF or other donors.

Applications that meet the STDF's eligibility criteria are considered by the STDF Working Group, which makes the final decision on funding requests. Complete details on eligibility criteria and other requirements are available in the *Guidance Note for Applicants* on the STDF website (www.standardsfacility.org). Please read the *Guidance Note* before completing this form. Completed applications should be sent by email (as Word documents) to STDFSecretariat@wto.org.

PPG Title	**Strengthening phytosanitary capacity in Nigeria for facilitating market access: Developing and integrating digital system for pest surveillance, pest reporting, seed certification and traceability**
Budget requested from STDF	US$49,796
Full name and contact details of the requesting organization(s)	International Institute of Tropical Agriculture (IITA) Oyo Road, PMB 5320, Ibadan, Nigeria Contact: Lava Kumar, Head of the Germplasm Health/Virology & Molecular Diagnostics; IITA, Ibadan, Nigeria; e-mail: L.kumar@cgiar.org; +2347032565130 Nigerian Agricultural Quarantine Services (NAQS) Postentry Quarantine & Diagnostics, Moor Plantations, Ibadan, Nigeria Contact: O.O. Ogunfunmilayo, Head of Postentry Quarantine, NAQS, e-mail: delefunmilayo@gmail.com; +234 7089310378 National Agricultural Seeds Council (NASC) NACRDB Plaza, PMB 716, Central Business District Abuja, FCT, Nigeria Contact: Ishiak Khalid, Deputy Director-Seed Certification; e-mail: ishiakbio@gmail.com; +234 8036071556
Full name and contact details of contact person for follow-up	Allan Liavoga Head, Project Development & Administration Unit International Institute of Tropical Agriculture (IITA) PMB 5320, Oyo Road, Ibadan, Nigeria c/o IITA Ltd 7th Floor, Optivo House, 125 High Street Croydon CRO 9XP, UK Tel: +234 700800IITA or 12016336094 ext. 2890 Fax: (+873/870) 761798636 Email: A.Liavoga@cgiar.org

I. BACKGROUND AND RATIONALE

1. What is the purpose of this PPG? Explain whether it is requested to: (i) apply an SPS-related capacity evaluation or prioritization tool; (ii) prepare a feasibility study (prior to project development) to assess the potential impact and economic viability of proposals in terms of their expected costs and benefits; and/or (iii) prepare a project proposal for consideration by the STDF or other donors?

General purpose is to prepare a feasibility study (prior to project development) to assess the potential impact and economic viability of proposals in terms of their expected costs and benefits; and to prepare a project proposal for seeking funding from the STDF or/and other donors.

The specific purpose of this PPG is to conduct key stakeholder consultations and organize a stakeholder workshop to design implementation plan for establishing 'digital systems' for pest surveillance and diagnostics, pest reporting, seed certification and traceability to improve phytosanitary capacity pertinent to export of seed and crops produced in Nigeria. Digital systems envisioned includes use of ICT tools, including web applications for (i) Nigerian Agricultural Quarantine Service (NAQS) to conduct pest surveillance and diagnostics especially, pre-border quarantine inspections, active crop growth stage inspections of seed and crop fields meant for export markets, pest reporting in accordance with the IPPC guidelines; and (ii) for National Agricultural Seeds Council (NASC) to track seed production and digital certification for farm to market traceability. A project proposal will be developed based on the consultations for consideration by the STDF and other donors in 2018.

The proposed approach will bring relevant stakeholders onto a common platform to take stock of current status, identify opportunities, establish linkages, identify gaps and risks to implementation, develop risk mitigation and sustainability plan, and identify capacity development needs for adoption and adaptation of digital systems for pest surveillance, pest reporting, seed certification and traceability.

Ultimately, the project resulting from this PPG will harmonize linkages between the regulatory institutions responsible for seed quality and phytosanitary certification in Nigeria; foster establishment of fit-for-purpose digital systems for pest surveillance and seed certification; strengthen electronic databases, and catalyse migration from paper-based to e-certification for improved operational efficiency, traceability and transparency. It may serve as a scalable model for agencies such as Inter-African Phytosanitary Council (IAPSC) for improving pest surveillance and seed certification in sub-Saharan Africa, to enable member countries access to lucrative regional and international markets apart from enhancing the domestic market access.

This PPG is proposed for 6 month duration from February – July 2018.

2. *Explain the key SPS problems and/or opportunities to be addressed. Clarify why these issues are important, with attention to market access and poverty reduction. Describe, if relevant, how these issues relate to SPS priorities in the Enhanced Integrated Framework's Diagnostic Trade Integration Studies (DTIS), the findings of SPS-related capacity evaluations, national poverty reduction strategies, sector development strategies or policies, etc. See Qn. 7. (b) – (d) of the Guidance Note*.

The main objective of the PPG is to instil digital systems as a tool for building phytosanitary capacity to access international markets for seed and crop products produced in Nigeria.

In 2016, the Federal Ministry of Agriculture and Rural Development (FMARD) of Nigeria has unveiled the Agricultural Promotion Policy (APP) (FMARD, 2016) titled 'the Green Alternative' to promote agriculture as a business for commercialization of agriculture, improve market-linkages between producers and off-takers, promote value chain approach to link value chain stages, and

policy integrity for accountability, transparency and efficiency, with an overall aim to improve income to smallholder formers, create in rural households, increase agricultural revenue to GDP and access to international markets. IN 2016, FMARD also unveiled a unified quality control management system plan for 'zero reject' of agricultural commodities/produce and non-oil exports from Nigeria (FMARD 2016b). Federal agricultural organizations have initiated various measures to align to the new priorities through operational reforms. Use of information technology (IT), for improved operational efficiency and communication, is one of the thrust areas of the reform process to ease business operations, and improve accountability and transparency.

Export trade requires phytosanitary structures to conduct field inspections, pre-border inspections, ability to trace products along the value chain, knowledge on endemic pests and pest lists, linkages with relevant national agencies involved in quality assurance and capacity to deliver timely services cost-effectively. The Nigerian Agricultural Quarantine Service (NAQS) is responsible to delivery these services however is facing with several challenges due to limited capacity and funds to conduct pest surveillance and update pest lists. This situation poses serious limitation to export trade as importing national requires pest information for risk assessment and assurances for safe trade. Whereas the National Agricultural Seeds Council (NASC) is the nodal agency responsible for domestic seed certification in Nigeria is promoting private sector to undertake early generation seed production to tap regional and international seed markets. However, insufficient capacity in implementing quality assurance is a challenge (USAID, 2016).

As part of the 'Green Initiatives' and 'Zero Reject' measures are being taken to address challenges in the two most important regulatory organizations vital for agricultural export trade. However, funding is limited to achieve desired progress in short term to address existing bottlenecks. Recently, both NAQS and NASC have engaged in innovative partnerships with IITA, which resulted in novel approaches to undertake pest surveillance and seed certification. The USAID funded project to protect cassava production in Nigeria from cassava brown streak virus disease risk has led to the development of a digital application 'cassava disease surveillance (CDS)' to conduct surveillance and pest alert system operable by NAQS (Kumar et al., 2016, 2017a,b). Similarly, the Cassava Seed Tracker (CST) program was established to facilitate seed certification and quality assurance by NASC through a project funded by CGIAR Research Program on Roots, Tubers & Bananas (CRP-RTB) and Bill & Melinda Gates Foundation (BMGF) (Kumar et al., 2017a,c). More details about CDS and CST are provided in the Section 4.

This PPG is submitted to STDF to undertake consultations and develop a proposal for development and integration of a comprehensive digital systems capable of (i) pest surveillance, pest reporting, and field inspection and export certification by NAQS; (ii) seed certification and seed traceability by NASC; (iii) institutional capacity building necessary to instil digital systems; (iv) establishment of operational procedures to develop synergies between complementary regulatory organizations; (v) training personnel for effective implementation; and (vi) communication and advocacy for awareness raising among relevant stakeholders and ensure client adaptation to new systems.

Element of digital systems will include:

Digital pest surveillance and diagnostics system, and national pest list database: It will be based on the CDS program model to collect data using smartphones or any internet enabled device from the field or ports, and upload information into central repository. Curated and verified data, where necessary after laboratory testing, will be made public and added to the pest database. This system will also offer provision to aggregate available information to populate database with knowledge available in other organizations. Flexibility will be built into this program to use the same system for export inspection, post-entry quarantine inspection, and active growth stage inspection of export fields, linkages with NASC for automatic information sharing on fields producing crops or seed for export. System functionality will be tailored to NAQS operational structure. Data collection forms will have inbuilt features to generate unique barcode, geo-reference code with time point reference for traceability of information. Information collection and reporting formats will be consistent with IPPC standards. Successful establishment of such a

system will pave the way to adoption of a robust e-Phyto Certification system in Nigeria where the relevant departments have fragmented responsibilities at present. Basic infrastructure necessary for implementation of digital systems exists in NAQS.

Seed tracker program for seed certification and traceability: This will be based on the CST program and existing databases to cover seed certification for all crops. The CST program facilities field registration, field inspection, barcoding, generation of geo-coded information for verification and traceability at various stages of production, processing, packing to market chain. This program will be tailored to prevailing seed regulation policy and field inspection procedures applicable to various crops and at different stages, and integrate with NAQS to enable export inspections for export consignments. This offers simple end-to-end tracking and traceability.

Both CDS and CST will have features to operate in zones of no internet and upload information when connected to internet. The digital systems offer robust, low-cost solution to data collection from multiple points in real time for easy coordination and decision making. It improves competencies and offers reliable service and information to stakeholders. Every effort will be made to suit digital systems to existing structures and operational comfort of user for high adoption, low-maintenance cost and sustainability.

The digital tools, operating protocols and information reporting systems will be aligned to the Nigerian national and the international phytosanitary (IPPC) protocols and standards. For instance, the protocol for conducting pest surveillance using digital tools will be in accordance with the ISPM-6 guidelines, and the status of occurrence of pests in a given area and any efforts of eradication of exotic pests of quarantine nature will be in accordance with the ISPM-8. The digital tools will offer convenient system to make information available for pest risk analysis, management efforts to establish pest-free areas and preparation of pest lists. Pests identified during purposeful surveillance efforts, seed field quality certification and other ad hoc or sentinel surveys will be reported as per the ISPM-17 guidelines. The digital tools will include alert systems for real time reporting of verified information to appropriate authorities within the government and IPPC, and also presents information on publically accessible website managed by the NAQS, which is the nodal agency responsible for managing national pest lists and reporting of pest occurrence to national authorities as well as IPPC. Essential all the operations will be carried in accordance with standards of applicable ISPM.

3. Which government agencies, private sector, academic or other organizations support this PPG request? Letters of support from each of these organizations would be advantageous (Appendix 1). See Qn. 7. (e) of the Guidance Note.

Federal Ministry of Agriculture and Rural Development: The ministry is responsible for agriculture development and export trade of agriculture commodities and produce from Nigeria. Since 2016, FMARD is coordinating Green Initiative and Zero Reject plans to enhance agriculture export trade from Nigeria. NAQS and NASC are the technical organizations of the FMARD leading the implementation of the key tasks related to phytosanitary controls and certification. FMARD, NASC and NAQS have extended support to this PPG (see letters of support enclosed in Appendix section).

Nigerian Agricultural Quarantine Service (NAQS): A federal agency operating under the FMARD supports this PPG. NAQS is responsible for implementing and ensuring compliance to national and international (IPPC) phytosanitary standards. This agency has recently initiated pilot testing of digital surveillance program for monitoring emerging diseases such as cassava brown streak. NAQS is pursuing e-surveillance programs for improved efficiency. Mr. Ogunfunmilayo, Head of the Post-entry Quarantine Diagnostics Station is the contact person and co-implementer of this PPG.

National Agricultural Seeds Council (NASC): A federal agency also administered under the FMARD supports this PPG. NASC is the nodal agency responsible for seed certification, accreditation of seed companies, seed quality standard setting and issuance of certification labels for marketing. NASC is promoting the early generation seed program for regional markets. NASC has been

planning to implement e-seed certification for ease of business operations, improved traceability and improve phytosanitary capacity of seed industry to access international markets in Africa. Mr. Ishiak Khalid, Deputy Director-Seed Certification, is the contact person and co-implementer for this PPG.

International Institute of Tropical Agriculture (IITA): Is a CGIAR Center located in Ibadan, Oyo State Nigeria, supports this PPG. The Center was established in 1967 in Nigeria has been implementing several collaborative projects with federal agricultural organizations such as NASC and NAQS, and is a technical partner of 'Zero Hunger' and several other government initiatives focused on improving agriculture, food security and incomes in Nigeria. This PPG offers IITA to work collaboratively with NAQS and NASC to further build on-going initiatives to implement innovative approach to improve phytosanitary capacity to facilitate export trade for the agricultural products produced in Nigeria.

4. How does this PPG complement and/or build on past, ongoing and/or planned national programmes and/or donor-supported projects? See Qn. 7. (f) of the Guidance Note.

This PPG builds on series of donor-supported projects in Nigeria to enhance seed systems and enhance phytosanitary capacity to safe guard agricultural production and export markets from invasive biotic threats.

(i) The USAID funded project under 'Collaborative Research Network Projects in Africa' on developing capacity for pest risk assessment and early warning network (surveillance net) to safeguard cassava from invasive pest risks (e.g. cassava brown streak disease). This project executed by IITA in collaboration with NAQS has developed an innovative digital surveillance system, the 'cassava disease surveillance net (CDS) (www.cassavadiseasnet.org), for monitoring, rapid diagnosis, pest reporting and emergency deployment to contain invasive threats (see Fig 1 for flow of operations). This system enables collection of geo-coded field information by mobile phone or any internet enabled device using CDS app; quick communication and expert diagnosis based on symptoms; and pest reporting. It includes a chain of command considering the NAQS administration structure for quick decisions and deployment of rapid response where necessary. A solar powered 'Digital Surveillance Unit' has been established at NAQS Post-entry Quarantine Diagnostics station at Ibadan, Nigeria. The custom made CDS offered a simple, convenient and cost-effective system to perform pest surveillance and reporting. This application is usable when internet is not available as the Web app features store data and upload information when connected to internet. The CDS is being pilot tested by the NAQS in Oyo State.

The proposed PPG will build on this concept to expand digital systems to cover overall pest surveillance programs of NAQS in accordance with ISPM guidelines, and establish linkages with seed certification programs of NASC for phytosanitary inspections of seed fields during active growth stage and facilitate export permits necessary for international trade. Envisioned digital technology will be developed offered as open-source suite for unrestricted use. It will improve competencies of NAQS staff, strengthen diagnostic capability and reporting. The geo-coded data and referral databases improve source data traceability and reliability of information. Such system improves regular monitoring of seed production sites for pests and diseases enriching baseline knowledge on pests and pest lists vital for phytosanitary protection and export trade. The digital systems will be build 'to-fit-for-purpose' and empowers NAQS to utilize ICT in routine operations and dealings with sister agencies involved in regulatory approvals of products for international markets.

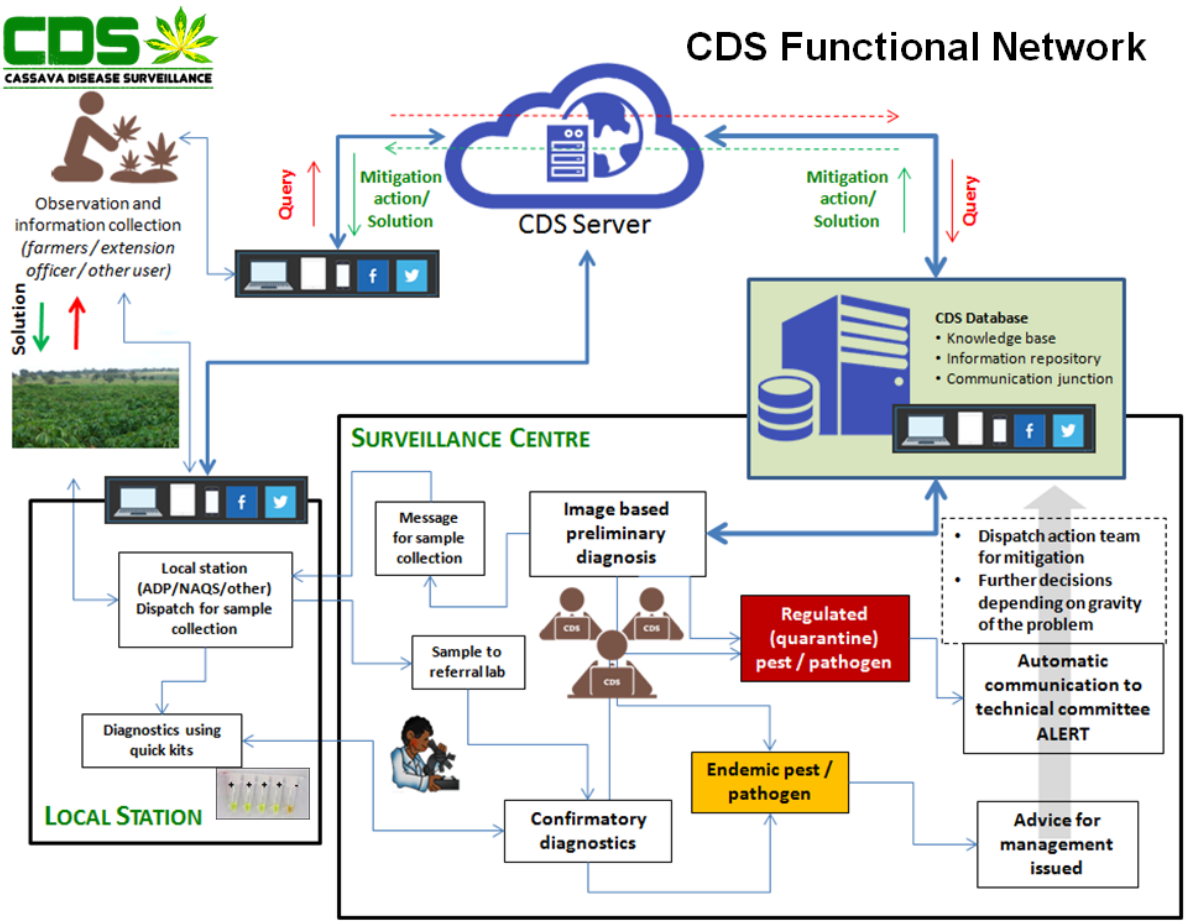

Fig 1. CDS system recently piloted for surveillance of invasive pest risks to cassava

(ii) The CGIAR-RTB and the Bill & Melinda Gates Foundation (BMGF) funded projects on Building an Economically Sustainable, Integrated Seed System for Cassava in Nigeria (BASICS); Under this project, IITA in collaboration with NASC developed the Cassava Seed Tracker (CST) Web app (www.seedtracker.org/cassava) (see Fig 2 for application features) for collection and exchange of geo-coded data using internet-enabled devises (smartphone) between seed producers and seed certifiers. The CST app has been customized to Nigerian seed regulations and NASC administrative set-up. It encompasses all operations of seed producers and certifiers, beginning from producer accreditation, field registration, inspections, and harvesting. The system features offers barcoded data for easy tracking of products at various stages and also archive and data retrieval features. The CST serves as an interphase between seed producers and seed certifiers, offering real time tracking, seed traceability, barcoding for digital certification, and transparency. NASC has begun pilot testing with an aim to use CST for certification, labelling and tracking seeds for markets.

The proposed PPG will review and design plans for expanding CST to cover all crops and build linkages with NAQS to facilitate pest surveillance, active growth stage inspection, export certification and traceability of seed using unique barcoding and geo-coded data collection from farm to markets to ports. Existing databases will be improved for data integration, sharing, archiving and retrieval. Digital systems in NAQS and NASC will complement each other and expected to improve competencies of the regulators to facilitate export trade and offer transparent and traceable service to agribusiness enterprises.

Seed producer	Certifier
Registration	Verification of registration
Source of seed	Pre-planting inspection & qualification
Planting information	Active growth stage inspection & qualification
Management information	At harvest inspection & qualification
Harvest details	Confirmation of stocks
Seed stock	Provision of labels
Inventory of operations (input cost)	E-certification

Fig 2. Key functions of the Cassava Seed Tracker program piloted by NASC in Nigeria

(iii) IITA is spearheading several seed system projects on crops cassava, yam, cowpea, maize and soybean to ensure access to early generation seed (breeder and foundation class of seed) to public and private seed sector growers for commercial markets. A number of these projects already have close collaborations with NAQS and NASC pertinent to pest surveillance, diagnostics and seed certification. The on-going collaborations with these institutions have resulted in setting up of two digital systems, CDS & CST, which are being piloted in Nigeria. . The IITA's R4D program has expert pool to develop tailor made ICT tools and promote them for adoption and adaptation.

(iv)Several global initiatives are adopting digital systems for pest diagnostics, including STDF program on e-certification, CAB Plantwise, Australian PaDIL, CGIAR Germplasm Health, Penstate, Plantvillage are relevant to this PPG. However, none of these programs offer integrated solution to pest surveillance and seed certification. The PPG proponents have links with the on-going initiatives to benefit from the experience and technology while designing fit-for-purpose integrated solution to seed certification and pest surveillance to facilitate access to international markets. In addition, efforts will be made to establish specific linkages with the research team of the STDF PG Grant # 432 titled 'Strengthening Information Systems for Pest surveillance and Reporting in Asia Pacific'. We will seek STDF support for engagement with the PG-432 grant team and facilitate participation in the project development workshop proposed in this PPG application.

5. Have you discussed this PPG request – or funding for the project proposal which would result from it – with any potential donors (bilateral, multilateral, Enhanced Integrated Framework, etc.)? If so, provide details below and indicate potential sources of funding for the resulting project. See Qn. 7. (g) of the Guidance Note.

Specific discussions about this PPG or resultant proposal have not been discussed with STDF or other donors so far. The pilot digital systems on seed certification (seed tracker) and pest surveillance (cassava disease surveillance net) are funded by BMGF and USAID, respectively, as well as the CGIAR Research Programs (CRPs) are keenly monitoring the progress and potential of the digital tools to improve operational efficiency and traceability issues to promote market access of seed and crops produced in Nigeria. As part of promoting 'Green Alternatives' the government of Nigeria has been encouraging digital transactions, is a patron for this PPG. We will have

opportunities to widely share outputs of this PPG and proposal, including through regional platforms such as Inter-African Phytosanitary Council, and discuss funding opportunities with relevant donors.

6. The application should briefly explain how cross-cutting issues (e.g. related to gender, the environment) are relevant for this PPG and, if appropriate, how they will be addressed. For instance, are there any specific issues, needs or opportunities related to gender or environmental aspects?

Realization of the outputs proposed in the PPG, such as pest database and information relay systems, immensely useful to the national efforts to combat climate change induced effects on agriculture and trade. Pest data by crop and agroecology collected over a period time serves as baseline data to assess the variations in pest situation and better preparedness to cope with new outbreaks.

II. IMPLEMENTATION & BUDGET

7. Who will take the lead in implementing this PPG? If particular national experts and/or international consultants are proposed, attach a copy of their Curriculum Vitae and record of achievements (Appendix 2). If no names are provided, the STDF will provide a shortlist of consultants if the PPG request is approved.

IITA, NASC and NAQS will jointly coordinate and implement this PPG. IITA will submit this PPG to STDF and administrate the grant, including financial and technical reporting responsibilities to STDF. Lava Kumar (IITA) will serve as coordinator supported by Ishiak Khalid (NASC) and O. Ogunfunmilayo (NAQS), who will also act as national consultants. One expert on e-certification will be identified with the support of STDF for recruitment once the PPG is approved. The PPG will actively consult experts and program leads on seed certification, pest surveillance and diagnostics in NAQS, NASC, IITA, and other public sector programs, grower and trader associations, producers and policy makers from public and private sector.

8. In the table below, briefly describe the main activities to be carried out under this PPG and specify who would be responsible. Provide an estimate of the budget required (e.g. for national/international expertise, travel and DSA of consultants, stakeholder meetings or workshops, general operating expenses, etc.).

Activity	Responsible	Estimated Budget (US$)
Pre-workshop consultations • E-mails consultations and intra-organizational focus group meetings in NAQS and NASC to identify needs, existing systems, SWOT analysis for development and adoption of digital systems for specified uses through production to marketing value chain [Duration: 1 month] • Conduct literature review on digital systems in use for pest surveillance, reporting and listing; policy analysis on data management, data sharing, data privacy and data security issues, and prepare a feasible model [Duration: 1 month] • Preparation of a 'white paper' on needs, feasibility, capacity development plan, and 'fit-for-purpose' design for digital systems to use as a	IITA will steer this task with NAQS and NASC, along with the two national consultants, one each at NASC and NAQS.	7,500

pre-briefing document for participants of the national consultation and planning workshop [Duration: 1 month] Budget will cover local consultants for 30 days at $200 per day = $6,000; and $1500 for stationary/office supplies and communications		
National consultation and planning workshop: A 4-day workshop will be organized (25 persons) to identify and discuss. • Develop, vision, mission and strategy for digital pest surveillance, diagnosis, pest reporting, seed certification and seed traceability • Identify required functionalities to fit with organizational structure and client needs • Identify choice of digital applications and types of integration required for seed certification, pest surveillance and reporting • Draw lessons from piloting of 'cassava seed tracker' and 'cassava surveillance net' in Nigeria • Identify gaps and risks to implementation and sustainability and develop mitigation plan • Identify the capacity building needs of relevant actors • Develop a road map for implementation of digital systems • Identify partners and potential donors • Develop outline for project proposal and nominate proposal development team Budget will cover conference facility rent, AV equipment, participants DSA, transportation costs, stationary, printing and communications. • Workshop costs (conference room, AV equipment, workshop material, stationary, communications) = $8,900 • Air fare (12 x $350: between Abuja – Lagos; Abuja – Ibadan; total = $4,200; one international airfare for e-certification expert: $1,900) • Fuel / vehicle hire for on-road travel=$2,000 • Accommodation @ $100; 4 days x 25 persons = $10,000 • DSA @ $50; 4 days x 25 persons = $5,000 • International expert on e-certification (to be identified with STDF support) @ 500 x 4 days = $2,000 [Duration: 1 month; including organization planning and workshop report preparation] <u>Main outputs</u>: (1) Workshop report with priorities	IITA, NAQS and NASC will coordinate organization of this workshop. Invitees will include technical experts from implementing agencies (IITA, NASC and NAQS) and national programs, members from FMARD, Export Promotion Council of Nigeria, NAFDAC, ECOWAS, Farmer associations, export traders associations and logistic suppliers. Experts from FAO-African region, IPPC, STDF, IAPSC, will also be consulted, and extend invitation to participate in the workshop with offer of covering local expenses. Members of the donors (USAID and BMGF) will be notified and invited to attend this workshop on self-sponsorship basis. IITA will take overall responsibility to finalize the workshop report and circulate to participants and other stakeholders. This report will also be prominently displayed on the websites of PPG implementing organizations.	34,000

and road map; (2) Outline for project proposal		
Develop project proposal for funding consideration by STDF and other donors • A project development team will be constituted to prepare a proposal for implementation of digital systems for seed certification, pest surveillance and reporting, based on the priorities and road map established during the consultation workshop. • The proposal will emphasize ways to strengthen digital systems, adopt and adapt for defined uses in seed certification and phytosanitary surveillance as per the IPPC standards. It will include plans to use existing databases, web and smartphone applications, mobile data capture tools, tailoring seed tracker and digital surveillance programs to suit the user needs, data management plan, sustainability and uses. • Proposal will spell the outcomes, objectives, outputs, activities, timeline and milestones, verifiable indictors, partners, project administration and implementation plan, risks and risk mitigation and flowcharts. • Emphasis will be placed in offering a scaling-up model to other countries in sub-Saharan Africa. [Duration: 2 months to prepare the final draft] Main output: Project proposal	Proposal drafting team. One member each from IITA, NASC and NAQS will jointly coordinate this effort; share final draft with partners and stakeholders for comments and the final version (short and detailed versions) will be used for canvassing for funds; including formatting a proposal for STDF consideration. IITA will take overall responsibility to finalize the proposal and circulate to participants and other stakeholders.	3,000
Implementation of PPG, financial and technical reporting to STDF. Proposed budget ($5296) is for grant administration, bank charges, office supplies and communications [Duration: 3 weeks from project end date] Main output: PPG financial and a technical reports	IITA will coordinate together with NASC and NAQS, to submit final technical report and financial report	5,296
Grand total		49,796

Appendixes
Appendix 1: *Letters of support from each of the organizations supporting this proposal.*
Appendix 2: *Curriculum Vitae and record of achievements for any consultants proposed to implement this PPG.*
Appendix 3: *Terms of reference for consultancy services*

Appendix 1: Support letter from Nigerian Agricultural Quarantine services (NAQS)

NIGERIA AGRICULTURAL QUARANTINE SERVICE

FEDERAL MINISTRY OF AGRICULTURE AND WATER RESOURCES
MOOR PLANTATION, P. M. B. 5672, IBADAN.

Telephone:(02)2314183
E-Mail:npqs_ngr@yahoo.com
Website: www.nplantquarantine.org

Ref. No.....

Date..... 2 August 2017

The Secretariat
Standard and Trade Development Facility (STDF)
World Trade Organization
Rue de Lausane 154
CH-121, Geneva
Switzerland

Dear Sir/Madam,

Ref: Developing digital system for seed certification, surveillance and pest reporting in Nigeria

The Nigerian Agricultural Quarantine Services (NAQS) of the Federal Ministry of Agriculture and Rurai Development (FMARD) of Government of Nigeria is entrusted with enforcing and managing nations phytosanitary regulations in accordance IPPC standards, perform pest surveillance, pest reporting, PRA, pre-border inspections upon import and export of crops and commodities, and plays a vital role in supporting export trade.

NAQS and International Institute of Tropical Agriculture (IITA) have been collaborating for several decades on pest diagnostics using conventional and modern methods. Since two years, we are working together to develop digital surveillance systems for monitoring emerging pests, such as cassava brown streak, maize lethal necrosis, army worm, and others. Presently we are piloting cassava disease surveillance net through our recently established 'digital surveillance lab' in our Postentry Quarantine Station in Ibadan, Nigeria.

Through this PPG, we are inclined to broaden the scope of digital systems to cover various tasks associated with pest surveillance and reporting; and also strengthen linkages with our sister institutions, such as National Agricultural Seeds Council (NASC) to streamline the phytosanitary inspections of crops produced for international and regionalmarkets, for use as seed or consumption/processing. The proposed topic provides excellent opportunity for internal consultations, and establish implantation plan for digital information systems pertinent to phytosanitary services discharged by NAQS. This will also help to develop a coordinated action plan with related stakeholders to bridge gaps in agricultural commodity export value chain.

This work is line with government priority to ease business operations and improved transparency to enhance regional and international market access of agricultural products from Nigeria; and NAQS ambition to implement e-certification. NAQS is in full support of this project proposal grant (PPG) jointly developed with IITA and other partners. This project will build on previous achievements to strengthen phytosanitary capacity in Nigeria.

Sincerely,

Name: Ogunfunmilayo Akindele Oluwole
Designation: Head, NAQS Post Entry Diagnostic Station, Ibadan.
Phone: +2347089310378
E-mail: delefunmilayo@gmail.com

Letter for support from National Agricultural Seeds Council (NASC)

OFFICE OF THE DIRECTOR GENERAL
NATIONAL AGRICULTURAL SEEDS COUNCIL
Federal Ministry of Agric. And Rural Development
KM 29, Abuja - Lokoja Highway Sheda
P.M.B 716, Garki, Abuja.
Website: www.seedcouncil.gov.ng E-mail: info@seedcouncil.gov.ng

Ref: NASC/FMA/IITA/57 *Date:* 2nd August, 2017

The Secretariat,
Standard and Trade Development Facility (STDF),
World Trade Organization (WTO),
Rue de Lausane 154, CH-121,
Geneva, Switzerland.

Dear Sir/Madam,

Ref: Developing digital system for seed certification, surveillance and pest reporting in Nigeria

The National Agricultural Seeds Council (NASC) is a Federal Agency under the Federal Ministry of Agriculture and Rural Development in line with the provisions of National Agricultural Seeds Act No. 72 of 1992. The NASC is charged with the overall development and regulation of the National Seed Industry.

We are working to build a market-driven seed industry for the production and distribution of high quality Seed and improved planting materials accessible and affordable to all farmers in Nigeria and neighbouring countries in West Africa. We are actively working to transform the Nigerian seed system into a leading seed industry worthy of producing high quality early generation seeds to access markets in sub-Saharan Africa.

As part of this mission we are mainstreaming digital systems for seed certification operations. In collaboration with IITA, we recently started piloting 'Cassava Seed Tracker' digital certification program as a test case for cassava seed systems. We are inclined to streamline digital system for covering all aspects of seed production, quality monitoring and certification.

This Project Proposal Grant (PPG) will offer chance to assess the needs and design operational plan; and streamline linkages with Nigerian Agricultural Quarantine Service (NAQS), also a federal agency mandated for phytosanitary inspection of seed fields and issue phytosanitary permits for seed exports.

This PPG results in exploitation of complementary strengths of two regulatory agencies and technical capacity at IITA to implement digital systems vital for seed certification and phytosanitary capacity development in Nigeria, vitalto access to regional and continent-wide markets. NASC extends full support to this PPG, and also participate as a coordinating partner in realizing the proposed outputs.

Yours faithfully,

Ishiak Khalid
For: Director General

Name: **Ishiak Khalid**
Designation: **Deputy Director, Seed Certification and Quality Control Department. National Agricultural Seeds Council, Headquarters, Abuja, Nigeria**
Phone: **+2348036071556**
E-mail: **ishiakbio@gmail.com**

Letter of support from the Federal Ministry of Agriculture and Rural Development (FMARD), Nigeria

FEDERAL MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT

OFFICE OF THE PERMANENT SECRETARY

OFFICE:
Area 11, P.M.B 135
Garki-Abuja

Tel: 09-6727283
Fax: 09-6711073

FMARD/PSO/QS/GC/45/V.I/15 **08th September 2017**

The Secretariat,
Standard and Trade Development Facility (STDF)
World Trade Organization;
Rue de Lausane 154,
CH-121, Geneva;
Switzerland.

Ref: Project Proposal Grant (PPG) application on *"Strengthening phytosanitary capacity in Nigeria for facilitating market access: Developing and integrating digital system for pest surveillance, pest reporting, seed certification and traceability"*

Sub: Letter of support to PPG submitted to STDF by NAQS (Nigerian Agricultural Quarantine Services), NASC (National Agricultural Seeds Council) and IITA (International Institute of Tropical Agriculture) for planning and development of a project proposal on afore mentioned subject.

I am pleased to inform you that the Federal Ministry of Agriculture and Rural Development (FMARD) of Nigeria has been implementing the Agricultural Promotion Policy (APP) titled 'the Green Alternative' to uplift and promote agriculture as an enterprise for improved incomes to farmers and other value chain-actors by tapping into both domestic and international markets.

2. Promoting seed industries and export of agricultural commodities are among the thrust areas. As part of this drive, Federal Government is establishing appropriate support systems, including use of digital technologies for improved operational efficiency, communication and accountability.

3. In this regards, the plans of NAQS and NASC to adopt digital tools for pest and disease monitoring, pest reporting, seed health assurance and seed certification is a good initiative to improve organizational capacity and efficiency. The proposed PPG, together with IITA's technical partnership to hold planning workshop for broader consultation and develop project proposal is a much needed first step to steer this task. FMARD will support this plan to strengthen the organizational and phytosanitary capacity in Nigeria.

4. Thank you.

Dr. Bukar Hassan
Permanent Secretary
bukar_hassanyimird@yahoo.com

International mailing address
IITA, Grosvenor House, 125 High Street
Croydon CR0 9XP, UK

Headquarters
PMB 5320, Oyo Road, Idi-Oshe
Ibadan, Nigeria
Tel.: +1 201 6336094
+234 700 800 4482
Fax.: +44 (208) 711 3786 (via UK)

4 August 2017

The Secretariat
Standard and Trade Development Facility (STDF)
World Trade Organization
Rue de Lausanne 154
CH-121, Geneva
Switzerland

Dear Sir/Madam,

Ref: Developing a digital system for seed certification, surveillance and pest reporting in Nigeria

I am pleased to inform you of the support of the International Institute of Tropical Agriculture (IITA) for this PPG. As detailed in the PPG, IITA has been working with the Nigeria Agricultural Quarantine Service (NAQS) and the National Agricultural Seed Council (NASC) to improve health systems to safeguard crop production from endemic and invasive threats. This partnership is also aimed at strengthening phytosanitary capacity to enhance access to domestic and international markets for agricultural products generated in Nigeria. This PPG presents a plan to further build on recent investments to strengthen phytosanitary capacity through innovative digital solutions, such as Cassava Disease Surveillance (CDS) and Cassava Seed Tracker (CST), developed by IITA. These purpose-built tools fit operational procedures of regulatory agencies in Nigeria and the participating institutions are committed to adopt new technologies for overcoming decade old bottlenecks to core operations. We are excited with the potential of these tools from the on-going validation exercise for pest surveillance, reporting and seed certification.

IITA, in partnership with NAQS and NASC, fully supports this PPG and will continue to collaborate with other relevant stakeholders for improving phytosanitary capacities for safe regional and international trade.

We sincerely hope for the support of STDF for this plan.

Sincerely,

Dr. Robert Asiedu
Director for West Africa; Biotechnology and Genetic Improvement | Research-for-Development Directorate
International Institute of Tropical Agriculture (IITA, www.iita.org)
Headquarters and West Africa Hub
PMB 5320, Oyo Road, Ibadan 200001, Oyo State, Nigeria
International Mailing Address: IITA, Grosvenor House, 125 High Street, Croydon, CR0 9XP, UK
Tel: +234 2 7517472 Ext. 2325 | USA Tel: +1 201 6336094 | Fax: +44 208 7113786 | Mobile no: +234 8039784007
Skype: robertasiedu
Twitter: @rasiedu1

Appendix 2. CVs of consultants

OGUNFUNMILAYO Akindele Oluwole

Gender: Male
DATE OF BIRTH: 29TH SEPTEMBER, 1965
NATIONALITY: Nigerian
HOST INSTITUTION: Nigerian Agricultural Quarantine Services (NAQS)
Post-entry Quarantine Diagnostics Station
Moor Plantation, PMB 5672, Ibadan, Nigeria
e-mail: delefunmilayo@gmail.com

EDUCATION: Ph.D Crop Entomology (In view).
Master of Technology - Pest Management (2012)
Post-graduate Diploma in Crop, Soil and Pest Management (2005)
Higher Diploma in General Agriculture (1990)
Ordinary Diploma in General Agriculture (1985)

PRESENT POSITION/RANK: Head, Post–entry Diagnostic Station & Chief Agricultural officer (GL. 14).

CAREER PROGRESSION:

AGRICULTURAL SUPERINTENDENT	GL.07	20TH OCTOBER, 1992
HIGHER AGRICULTURAL SUPERINTENDENT	GL.08	4TH OCTOBER 1995
SENIOR AGRICULTURAL SUPERINTENDENT	GL.09	1ST JANUARY, 1999
PRINCIPAL AGRICULTURAL SUPT-II	GL.10	1ST JANUARY, 2003
PRINCIPAL AGRICULTURAL SUPT-I	GL.12	1ST JANUARY, 2008
ASST. CHIEF AGRICULTURAL SUPT	GL.13	1ST JANUARY 1994
CHIEF AGRICULTURAL OFFICER	GL.1 4	1ST JANUARY, 2014

DUTIES PERFORMED AS HEAD POST ENTRY DIAGNOSTIC STATION:

Head, Post-Entry Inspection and Surveillance, Nigeria Agricultural Quarantine Service with the responsibility of managing and running of the quarantine station.

- In-charge of quarantine screening and development of guidelines for the screening of germplasm materials for pest diagnosis using various post-entry quarantine facilities.
- Training Instructor and formulation of course curriculum at the Plant Quarantine Training School for training of Plant Quarantine Officers and Inspectors.
- Supervises subordinate officers in phytosanitary inspection, treatment and certification.
- Represents Nigeria Agricultural Quarantine Service at various meetings on phytosanitary issues on import and export of plants and plant products.
- Maintenance of diagnostics center and initiation of pest risk analysis to make biological/scientific recommendation and decision that guides plant import regulations.
- Establishment of pest free production sites for production of agricultural crops for export.
- Undertaking biotechnological research for the production of pest free planting materials through tissue culturing.
- Developing appropriate research linkages with other related scientific organization (Research institutes, ADPs, Universities and International organizations) to address the challenges of both indigenous and exotic pests issues on crops.
- Instilling appropriate scientific culture among the staff through participation at meetings seminars, symposium, etc and access of scientific information through the use of modern information technology (internet etc.)

- Updating the post and pre-entry quarantine staff, research institutes and stakeholders on new pest interceptions.
- Involved in the periodic review and update of import regulation of plants and plant products on crop by crop basis.
- Involved in the in-country consultation on international phytosanitary measure guiding export trade of pest free agricultural plants and plant products.
- Involved in various national workshops, seminars and meetings on the promotion of export of agricultural products in Nigeria with stakeholders and other regulatory organizations.

WORK EXPERIENCE: (PLANT QUARANTINE ENTOMOLOGIST- 2003- TILL DATE).

- Visual/microscopic inspection of import and export plant materials at arrival.
- Interception of disease/Insect Pest specimen accompanying Import and Export agricultural plant materials.
- Identification and Classification of Intercepted Insect Pests.
- Fumigation, Incineration of pathogen infected/badly infested and Chemical treatment of plant products.
- Involves in source of origin inspections of Agricultural products.
- Field inspection activities for phytosanitary certification of Export Agricultural crops.
- Inspection of growing on test plants for disease/insect pest at the NAQS glasshouse/germplasm introduction field.
- Involves in National Biological control programs.
- Field surveillance to monitor for early detection of disease/insect pest outbreaks and pest review.
- Attending training, workshops, seminars to upgrade scientific knowledge.
- Training of Plant Quarantine Inspectors in the knowledge of Plant Quarantine procedures to facilitate disease/ insects' interception on import/export commodities at the point of entry/exit.
- Training of students on Industrial attachment and supervision of Ordinary National Diploma and Post Graduate Diploma students' final year projects.

PRE–ENTRY QUARANTINE INSPECTOR (OCT.1992- MAY 2003)

- Enforcement of Nigeria Plant Quarantine (Now NAQS) Import and Export regulations on agricultural plant materials.
- Inspection of Agricultural Products (Import or in transit) Export for pest infestation and or infection on Agricultural commodities.
- Officer In Charge of NAQS Pre Entry stations at Sahuda-Mubi, Gude, Mayorguli and Bahuli (Adamawa state), Gamboru Ngala (Borno state) in North East zone, Margaret Ekpo Int. Airport, Ekang, Ikang, and Agbokim (Cross River state) Oron (Akwa Ibom state) in South East zone and Mallam Aminu Kano Int. Airport, (kano state), Illela (Sokoto state) in North West zones.
- Collation of monthly reports from PQS stations on pest interceptions on Import and Export agricultural commodities in North-West Zone, Nigeria and writing of monthly, quarterly and annual reports.

PROFESSIONAL DEVELOPMENT AND TRAINING

- Participated actively in the Annual Project meeting of the BBTV mitigation: Community Management in Nigeria, and screening wild banana progenitors for resistance. **12th – 16th June, 2017** held at IITA, Ibadan.
- Active participant in the 13th Triennial Symposium International Society for Tropical Root Crops - Africa – Branch (ISTRC-AB) at Dar es Salaam, Tanzania at the White Sands Hotel. **3rd – 10th March, 2017**.
- Training participant at Pan African Control on Aflatoxin (PACA) training held at Bolton White Hotels, Abuja from **14th – 17th March, 2017**.
- Participated actively at the 1st International Phytosanitary conference held at Kemphis Hqtrs, Karen Nairobi, Kenya **12th – 15th September, 2016**.
- Certificate Training Course on Monitoring and identification of **Thrips** vectors at International Institute for Tropical Agriculture (IITA), Ibadan. Oyo-State. Nigeria (**1st- 5th August, 2016**).

- Certificate Training on BTSF Food Testing course on **Residues of Plant Protection Products** in Athens, Greece. (**22nd May - 4th June, 2016**).
- Certificate of participation on Advanced Laboratory Training 'UNIDO ISO/IEC17025' organized by United Nations Industrial Development Organization (UNIDO) at Ilorin, Kwara-State. Nigeria (**14th - 18th March, 2016).**
- Certificate of participation on Basic Laboratory Training 'UNIDO ISO/IEC17025' organized by United Nations Industrial Development Organization (UNIDO) at Ilorin, Kwara-State. Nigeria (**19th - 23rd October, 2015).**
- Certificate Training Course on Global Agricultural Practices (GAP) organized by Best Produce International United Kingdom at Lagos Airport Hotel, Lagos. Nigeria. (**1st – 3rd Sept., 2014**).
- Certificate Training course on CABI's Invasive Species Compendium. Accra, Ghana (**13th - 15th November, 2012**).
- Certificate Training Course on Regional Training on Area Wide Integrated Fruit fly Suppression Including MAT & SIT Organized by International Atomic Energy Agency at Burkina Faso. (**11th - 13th March, 2013**).
- Certificate of Participation at Regional Workshop on Technical and Economic Studies for Establishment of Radiation Processing Technology Transfer by International Atomic Energy Agency (IAEA) in conjunction with Nigeria Atomic Energy Commission. Abuja. Nigeria (**20th - 24th June, 2011**).
- Certificate of Attendance on Global Agricultural and Environmental Sustainability: The Challenges and Solutions Organized by International Associate of Research Scholars and Fellow (IARSAF) International Institute for Tropical Agriculture (IITA), Ibadan. Nigeria (**17th -20th March, 2009**).
- Foreign agricultural Service (USDA)/Cochran Fellowship West Africa Management Training Course in Fruit fly at Hawaii (**12th -26th Sept. 2010**).
- Certificate course in Plant Protection and Inspection Services (PPIS) at Shefayim, Israel (**Jan. 31st –Feb. 23rd 2007**).
- Certificate of Attendance on Food and Agriculture Organization (FAO) Hortivar Database on Horticultural Cultivars Organized by Horticultural Crops Group AGPC Plant Production and Plant Protection Division of Food and Agriculture Organization (FAO) Moor-Plantation, Ibadan. Nigeria **August, 2007**.
- Certificate in Bio safety training Workshop on Confined Field Trials Inspection at Accra, Ghana (**March, 2006**)
- Certificate course on Food and Agriculture Organization (FAO) Assisted Training Program in Seed Health Testing, Pest Identification/Fumigation at Plant Quarantine Regional Training Center, Moor Plantation, Ibadan. Nigeria (**August, 2003**)
- Training in Contemporary Phytosanitary Measures and Procedures at Plant Quarantine Regional Training Center, Moor-Plantation, Ibadan, Nigeria (**May, 2003**).

ISHIAKU OTHMAN KHALID (amnim)

B. Agric, PGDPA, MBA, M.Sc

PERSONAL BIODATA

Surname:	Ishiaku
Other names:	Othman Khalid
Date of birth:	26th April 1965
Nationality:	Nigerian
Postal address:	National Agricultural Seed Council. Abuja
Telephone:	08036071556
E–mail:	ishiakbio@gmail.com

PROFESSIONAL/ACADEMIC QUALIFICATIONS OBTAINED WITH DATE

Doctor in Philosophy (Ph.D)	in View
Master Degree in Agricultural Economics (M.Sc)	2010
Master of Business Administration (MBA)	2003
Post Graduate Diploma in Public Administration (PGDA)	1994
Bachelor of Agriculture Hons.	1988
WASC/GCE	1981
School Leaving Certificate	1976

ACADEMIC INSTITUTIONS ATTENDED WITH DATES

Primary School	- L.S.B. Primary School, Gwasoro	1971 – 1976
Secondary School	- Borgu Secondary School New-Bussa	1976 – 1981
Tertiary Institution	- University of Ilorin, Ilorin	1983 – 1988
	- Kwara State Polytechnic, Ilorin	1993 – 1994
	- University of Ilorin, Ilorin	1996 – 2003
	- Abubakar Tafawa Balewa University	2005 – 2010
	- Abubakar Tafawa Balewa University	2013

PROFESSIONAL MEMBERSHIP

ANIM	Associate Member Nigerian Institute of Management

WORKING EXPERIENCE

NYSC	Senior Science Teacher, Government Secondary School, Ologba, Dekina Local Government, Benue State.	1988 – 1989
Master II Class Teacher	Borgu Secondary School, New-Bussa, Kwara State.	Oct. 1989 – Oct 1990
Agric. Officer II	Federal Department of Agriculture, Federal Ministry of Agriculture, FCT Abuja.	Oct. 1990 – Jan. 1992
Agric. Officer II	Federal Department of Agriculture, National Seed Service, Iwo Road, Ibadan, Oyo State.	Jan. 1991 – Jan. 1992
Agric. Officer I	National Seed Service, Federal Department of Agriculture, Ilorin, Kwara State.	Jan. 1992 – Dec. 1994

Kwara/Kogi States Seed Certification Officer	National Seed Service, Federal Department of Agriculture, Ilorin.	Jan. 1992 – Dec. 1994
Regional Seed Certification & Officer	Middle Belt Region, National Seed Service, Quality Control Federal Department of Agriculture, Ilorin.	Feb. 1994 – May 1997
Regional Seed Officer	North-East Region, Certification & National Seed Service, Quality Control Federal Department of Agriculture, Jos.	June 1997 – March 2010
Chief Agric. Officer	National Agricultural Seed Council, Kano.	March 2010 – Feb. 2011
Assistant Director Seed Certification & Quality Control	National Agricultural Seed Council, Abuja.	Jan. 2011 to Dec. 2014
Deputy Director Seed Certification & Quality Control	National Agricultural Seeds Council, Abuja	Jan 2014 till Date

PROMOTION HISTORY

National Dates	Effective Dates	Old Post	Old Grade Level	New Post	New Grade Level
1 – 7 – 1994	1 – 7 – 1996	AO II	08	AO I	09
1 – 1 – 1996	1 – 1 – 2003	AO I	09	SAO	10
1 – 1 – 2003	1 – 1 – 2006	SAO	10	PAO	12
1 – 1 – 2006	1 – 1 – 2008	PAO	12	ACAO	13
1 – 1 – 2009	1 – 1 – 2010	ACAO	13	CAO	14
	1 – 1 – 2011	CAO	14	AD	15
	1 – 1 – 2015	AD	15	DD	16

TRAININGS AND CONFERENCES ATTENDED FROM 2014 TO DATE

- BASICS-Review of seed certification and diagnostics capability of England (FERA), United Kingdom, November to December, 2016.
- BASICS-Understudy of the relatively advanced cassava seed value chain in Tanzania and Kenya, 2016.
- BASICS-Quality seed component Workshop, Umudike, Nigeria, 2016.
- Early Generation Seed (EGS) Workshop on Promoting the commercial and sustainable supply of Early Generation Seed of food crops in sub-Saharan Africa, Addis Ababa, Ethiopia, 2016.
- Seed certification study tour in South Africa, Johannesburg, 2015.
- Seed Quality Assurance short course at the Indian Institute of Agricultural Research (IARI), Delhi, India, 2014.

Name: Lava KUMAR

Current position and affiliation: Head, Germplasm Health Unit/Virologist; International Institute of Tropical Agriculture (IITA), PMB 5320, Ibadan, Nigeria

Profile: Virology; molecular biology; epidemiology; diagnostics; phytosanitation; germplasm health management; host plant resistance; IPM & IDM; germplasm indexing; production of disease-free planting material; international exchange of germplasm; knowledge and technology dissemination; R&D coordination and program management.

Employment:

01/08/10 to present: Head, Germplasm Health Unit / Virologist: IITA, Nigeria

01/08/07 to 31/07/10: Virologist (West & Central Africa): IITA, Nigeria

01/01/05 to 30/05/07: Scientist – Virology: ICRISAT, India

31/12/04 to 01/09/99: Special Project Scientist (Virology): ICRISAT, India

Education:

Degree	Subject	Institute	Year of passing
PhD[1*]	Virology	Sri Venkateswara University, Tirupati 517 502, AP, India	2000
MSc[2]	Virology	Sri Venkateswara University, Tirupati 517 502, AP, India	1995

Career Highlights

- 21 years of experience – 20 of those in CGIAR and 17 after PhD degree – in virology, diagnostics and plant health management in South Asia, sub-Saharan Africa, UK, Europe and USA.
- Versatile research expertise on plant and animal virology, molecular biology/biotechnology, immunology, diagnostics, epidemiology, virus vectors, phytosanitation, transgenics and in vitro cell and tissue propagation, pathology, mycotoxicology, nematology and phytosanitary research.
- Internationally recognized as lead resource person on issues related to virus diseases, diagnostics, germplasm health management and phytosanitary management.
- Experience in characterization and management of virus diseases of banana/plantain, cassava, chickpea, cocoa, cowpea, maize, pigeonpea, soybean and yam. Special emphasis on host-plant resistance, epidemiology and disease management of virus diseases of these crops.
- Strong collaborations with scientists in Asia, Africa; USA, UK and Europe; CGIAR centers; and intergovernmental agencies such as FAO, and Africa Union.
- Path breaking research on characterization of pigeonpea sterility mosaic virus, the first example of genus *Emaravirus*, and the only Emaravirus purified to-date. This work and subsequent research on virus-vector interactions and development of host resistance laid pathway to comprehensive management of the most economically important virus disease of pigeon pea in Asia, and won me 'CGIAR Award' in Young Scientist category.
- Developed low-cost ELISA based test for detecting aflatoxin adducts in human blood samples that was successfully used to screen human subjects for aflatoxin exposure in India.
- Sustained investigations on established and emerging virus diseases in sub-Saharan Africa, including cassava brown streak disease, banana bunchy top virus, cassava mosaic-Uganda variant (EACMV-UG) and maize lethal necrosis.
    - Led continent wide study, along with entomologist, to map the spread of BBTV, decipher BBTV diversity and postulated the mode of BBTV spread in the continent backed with advocacy for research funding BBTV, which eventually led to funding from RTB, subsequently from BMGF and FAO, leading to the formation of ALLIANCE for BBTV Control in Africa.
- **Leadership, large-program management and delivery**: (i) Leading germplasm health unit (GHU) at IITA; and has been involved in facilitating GHU strategy in the Genebank Platform program; (ii) Advocacy on strengthening phytosanitary capacity development in Africa; (iii) Initiated BBTV Alliance since 2009, for BBTD control in Africa– www.bbtvalliance.org; (iv) Led, disease component of GLCI, funded by BMGF, which led to the mapping of cassava brown streak in East Africa and also development of diagnostic capacity; (v) Led, plant health component of seed yam of YIIFSWA project funded by BMGF, which contributed to establishment of clean planting materials of popular

landraces, development of QMP and certification system, capacity development in yam virus diagnostics and seed health management; Advisory member and observe of the Inter-African Phytosanitary Council; also involved in controlling important transboundary diseases such as maize lethal necrosis, BBTV, cassava brown streak and other diseases.

- **Leading the CGIAR Germplasm Health module:** Led the development, and implementation of germplasm health module; liaison with CGIAR GHUs on needs assessment and priorities; GHU R&D especially for cross center activities; member of the Genebank Platform program; member of the Agricultural Food System CRPs on RTB, MAIZE and DCLASS; Cluster leader of Banana virus disease in RTB; IITA lead for the germplasm health, RTB complementary projects on BBTV Alliance; Seed Degeneration; and Seed Framework; key member in developing cluster case on BBTV.
    - Established schemes for managing seed yam quality (YamQMP) which was adopted by Nigerian and Ghana seed regulators as provisional scheme to improve seed yam health and quality.
    - Advocacy for stronger emphasis on phytosanitary management of germplasm conserved in genebanks resulted in inclusion of GHUs as one of the components in CG Genebank Platform with IITA as lead organization
    - Developed digital surveillance program to monitor emerging disease threats in SSA.

- Experience in managing, as well as participating in, large international and inter-disciplinary projects in Asia and Africa, involving partners from developing and developed countries.
- Organized international conferences in India and Africa; and conducted over 30 training courses on virus disease diagnostics and control in several countries in Africa and India.
- Invited speaker in international conferences in several countries on all the continents.
- Member of several institutional and international technical committees;
- Published >90 articles in peer reviewed journals; at least 50% of those are Thomson listed. Authored several book chapters, edited books, journals and severed as ad hoc reviewer.
- Played strong role in strengthening plant health capacity by individual and group training and also building lab capacity in India and Africa.
- Contributed to the raising funds (at least 20 million) for research and development activities.

Selected Recent Peer-reviewed publications:

1. **Kumar, P.L.,** Selvarajan, R., Iskra-Caruana, M-L., Chabannes, M. and Hanna, R. **2015**. Biology, etiology and control of virus diseases of banana and plantain. *Advances in Virus Research* 91: 229-269. [http://dx.doi.org/10.1016/bs.aivir.2014.10.006] Kamowa-Mbewe, W., **Kumar, P.L**., Changadeya, W., Ntawuruhunga, P. and Legg, J.P. **2015**. Diversity, distribution and effects on cassava cultivars of cassava brown streak viruses in Malawi. *Journal of Phytopathology* 163(6): 433-443. [doi: 10.1111/jph.12339]
2. Silva, G., Bömer, M., Nkere, C., **Kumar, P.L.** and Seal, S.E. **2015**. Rapid and specific detection of Yam mosaic virus by reverse-transcription recombinase polymerase amplification. *Journal of Virological Methods* 222: 138-144. Doi: http://dx.doi.org/10.1016/j.jviromet.2015.06.011]
3. Patil, B.L. and **Kumar, P.L. 2015**. Pigeonpea sterility mosaic virus: a legume-infecting *Emaravirus* from South Asia. Molecular Plant Pathology 16(8): 775-786. [Doi. No. 10.1111/mpp.12238]
4. **Kumar, P.L**., Hanna, R., Alabi, O.J., Soko, M.M., Oben, T.T., Vangu, G.H.P., and Naidu, R.A. **2011**. *Banana bunchy top virus* in sub-Saharan Africa: investigations on virus distribution and diversity. Virus Research 159: 171-182.
5. Gerald Otti, G, Bouvaine, S., Kimata, B., Mkamillo, G., **Kumar, P.L.,** Tomlins, K., Maruthi, M.N. **2016**. High throughput multiplex real time PCR assay method for the simultaneous quantification of DNA and RNA viruses infecting cassava plants. *Applied of Applied Microbiology* (accepted).
6. Seal, S., Turaki, A., Muller, E., **Kumar, P.L.,** Kenyon, L., Filloux, D., Galzi, S., Lopez-Montes, A. and Iskra-Caruana, M-L. **2014**. The prevalence of badnaviruses in West African yams (*Dioscorea cayenensis-rotundata*) and evidence of endogenous para retrovirus sequences in their genomes. *Virus Research* 186: 144-154.

Appendix 3: Terms of reference for consultants

1. Local consultant to prepare 'white paper' (30 days).
    a. Conduct e-mail and focus group consultations with internal and external stakeholders
    b. Review and prepare synthesis reports from e-mails consultations and intra-organizational focus group meeting reports on digital systems;
    c. Conduct literature review on digital systems for pest surveillance and e-certification pertinent to SPS compliance in other countries and prepare a few case studies as models;
    d. Review national policy on data management, data sharing, data privacy and data security and prepare guidelines for digital data management and sharing;
    e. Prepare a 'white paper' on feasibility and draft plan to use as briefing document in the national consultation workshop;
    f. Participate in the consultation workshop and assist in developing an implementation plan;

2. International consultant to advice on e-certification planning (4 days; excluding travel) (to be identified)
    a. Participate in the national consultation workshop; advice and guide design and plan for implementing e-certification
    b. Prepare a report on needs and plan for implementing e-certification

References

1. FMARD 2016a. The Agriculture Promotion Policy (2016 – 2020): Building on the Successes of the ATA.Gapshttp://fscluster.org/sites/default/files/documents/2016-nigeria-agric-sector-policy-roadmap_june-15-2016_final1.pdf
2. FMARD 2016b. Zero Rejct strategy to promote non-oil exports from Nigeria. http://fmard.gov.ng/address-of-hon-minister-agriculture-rural-development-during-the-validation-of-nigerias-strategy-for-zero-reject-of-agricultural-producenon-oil-exports/
3. USAID 2016. Nigeria Early Generation Seed Study – Country Report by USAID Africa Lead Scaling up for Food Security in Africa. http://www.africaleadftf.org/wp-content/uploads/2016/09/Nigeria-EGS-Study-Final-Report-August-2016.pdf
4. Kumar, P.L, Kulakow, P., Onyeka, J., Egesi, C., Ogunfunmilayo, A.O., Onyeani, C., Kahlid, I., Kanju, E. and Legg, J.P. 2016. Contingency planning for management of CBSD: the Nigeria case. In, Abstracts of the 'First World Congress on Roots and Tubers, 18-22 January 2016, Nanning, China.
5. Kumar, P.L. 2017a. Harnessing ICT for Plant Disease Diagnosis and Health Protection in sub-Saharan Africa. In, 15 -18 May 2017, ICT4D Conference, Hyderabad International Convention Center, Hyderabad, India.
6. Kumar, P.L., Ogunfunmilayo, A.O., Ogunya, B., Onyeka, J., Egesi, C. and Kulakow, P. 2017b. Cassava disease surveillance system in Nigeria In, 13th International Symposium: International Society for Tropical Root Crops, Dar es Salaam, Tanzania. pp215.
7. Kumar, P.L., Shah, T., Ogunya, B., Turry, O., Ishiak, K., Ojo, P.O. and Kulakow, P. 2017c. The Cassava Seed Tracker Web App for seed quality management and seed certification. In, 13th International Symposium: International Society for Tropical Root Crops, Dar es Salaam, Tanzania. pp216