STDF PROJECT PREPARATION GRANT (PPG)
APPLICATION FORM

PPG Title	**Establishment of quality systems to address the issue of aflatoxin contamination of chillies and the resulting international trade barriers in Pakistan**
Budget requested from STDF	$34,000
Full name and contact details of the requesting organization(s)	Pakistan Agricultural Research Council 20 Ataturk Avenue, G-5/1 Islamabad 44000, Pakistan Tel: +92 (0)51 9203966 Fax: +92 (0)51 9202968 Web: www.parc.gov.pk
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I. BACKGROUND AND RATIONALE

The purpose of this PPG proposal is to carry out an initial analysis of the underlying technological, socio-economic and policy factors that are leading to aflatoxin contamination and the resulting barrier to international export of chillies in Pakistan.

Mycotoxin (including aflatoxin) contamination is seen as a major challenge to food/feed safety worldwide because of the potential serious consequences for human and animal health. Many of the toxins produced by fungal species are known to have potent carcinogenic, mutagenic, hepatotoxic, immunosuppressive and anti-nutritional effects. In view of this, authorities in the EU and other jurisdictions have successively lowered the permissible limits for aflatoxins in commodities imported from developing countries. In Pakistan, the agri-food commodity most prone to fungal contamination, and consequent build up of aflatoxins, is chillies. Although, depending on (inappropriate) processing and storage conditions, a few other commodities may occasionally suffer contamination issues, but among all the main agri-food commodities chillies pose the most problematic case in Pakistan.

Besides the issues relating to harvesting, drying, storage and handling of chillies throughout the supply chain, it is also important to know the nature and extent of fungal contamination and the factors that lead to build up of the toxins in a given commodity. Although most of the contamination of chillies in Pakistan appears to be through the

production of aflatoxins in their various forms but the available information is too sparse to underpin appropriate control measures that are relevant and effective at the most critical control levels. Thus, identifying the types of fungal strains involved and enabling the farmers and inspectors to detect the contamination at early stages would be of vital importance in any effort to control aflatoxin levels in chillies. For example, whilst *Penicillium verrucosum* is the main ochratoxin-A producer in northern European countries, the same toxin is produced by *Aspergillus ochraceus* in the tropical regions. There are other factors, for example, a fungal strain may be toxigenic (toxin producer), non-toxigenic (non-producer), facultative (i.e. it can start producing toxin under certain conditions) or produce different isomers of the same toxin e.g. different ratios of aflatoxin B1 and G1 according to the different ratios of *Aspergillus flavus* or *Aspergillus parasiticus* present.

Importance of the Issue to Pakistan

Pakistan Government has placed a top priority to the issue of aflatoxins in chillies. This is because Pakistan is one of the major producer and exporter of chillies in the world, and chillies are also a part of everyday diet of people in Pakistan. The issue of aflatoxin contamination has already led to increasing number of rejections of chilli exports in recent years, and the EU and Japan have recently placed a ban on the export of chillies and chilli-based products from Pakistan. A scrutiny of the data relating to rejections of Pakistani products by the EU over the past few years has shown that around 35% of the total rejections were solely due to excessive levels of aflatoxins (Mubarik Ahmed et al., 2012). Since the last decade, about 42% of Pakistani food commodities export consignments were confiscated or rejected due to the exceeded levels of mycotoxin (largely aflatoxin). Near to quarter of those consignments included chillies or chilli-based products. This not only has economic consequences for the country, but also a source of concern over the continued risk to public health in Pakistan. The prosperity of chilli growing area's women is directly relates with the growth of chilli business. As they execute traditionally a very important step of chilli production i.e. the plucking of chilli pods from plant.

Scale of the problem

Pakistan is one of the largest exporters of chillies in the world amongst other countries (China, Spain, Mexico, Morocco and Turkey). Figures provided in Agricultural Statistics of Pakistan (2005-6 and 2010/11) and Mubarik Ahmed *et. al* (2012) indicate that chillies contribute 1.5% to Pakistan's overall GDP. In 2010/11, chillies were grown in Pakistan over around 63.6 kha, with a 5 year average of 64.9 kha. In 2010/11, 171.8 k tonnes of chillies were produced.

Considering a recent study by Sahar et al. (2013) a quarter of this (~43 k tonnes) could potentially be contaminated with levels of aflatoxins that would exceed the EU limits of 5 ppb. This means that potential losses that year, if rejected in export, could have been as high as 23 million US$. However, in reality, the current export size of chillies is only marginal – again due to the quality issues related to aflatoxins – and has been estimated at 5.32k tonnes in 2005/06 amounting to US$ 5 million. This highlights the current constraints on exports due to the quality issues, as at a value of ~52 US$ (5,250 Rupee)

per 100 kg the potential export of chillies has been projected to go up as high as 90,000 tonnes, which would bring the country a much needed foreign exchange of around US$ 47 million a year.

The PPG proposal

In view of the problem, Pakistan Agricultural Research Council (PARC) is seeking support from STDF to establish appropriate quality systems to resolve the issue of aflatoxin contamination and the resultant international trade barriers for chilli exports. The PPG will enable PARC to invite a few key International Experts to participate in a workshop of key national and regional/ international experts as well as government and non-government stakeholders to take stock of, and systematically review, the key issues and the contributing factors from the farm-gate through the supply chain to the point of export. The ultimate objective of the workshop will be to prepare a full proposal for more detailed follow-up project that can address the identified challenges. The PPG will therefore enable identification and analysis of the main technological, socio-economic, policy and regulatory aspects of the issue, and consideration of the possible improvements in the existing systems that may have been adopted in other countries facing similar problems.

This PPG will use chillies as a model to assess the potential inadequacies and gaps in the existing procedures and practices that are in place to safeguard against aflatoxin contamination of chillies in Pakistan. The information gathered at the PPG stage, in conjunction with the involvement and commitment of major stakeholders (including government authorities), will provide a solid basis for the follow-up proposal that will aim to develop recommendations for improvement in the critical processes and procedures at different levels in the supply chain and relevant policy/regulatory levels. The follow-up full project will provide guidance, practical demonstration, training, and necessary tools to enable early detection and monitoring of chilli quality at different stages in the supply chain.

<u>Government Commitment and Relevant Activities</u>

The problem of aflatoxin contamination of chillies and the ensuing trade barrier is being addressed at the highest possible levels within the government in Pakistan. These include the Minister, the Secretary, and the Chairman and Director General of PARC. In view of the urgency of the problem, the government of Pakistan has started to seek collaboration with other international organisations, such as the Food and Agriculture Organization (FAO). An example of this is provided in the attached copy of endorsement from the Federal Secretary (Ministry of National Food Security and Research) for collaboration with FAO in terms of assistance in food safety research (see attached copy of a recent internal communication – SARC letter of support).

The government has also launched a number of activities in terms of research and extension work to understand and address the issues. However, the interventions so far have lacked proper technical guidance and capacity necessary to provide a solid

technically-sound platform and a framework for action by different stakeholders. PARC, the apex body for agricultural research in Pakistan, has dedicated a team of scientists to work on different aspects of the aflatoxin problem through chemical and microbiological investigations, lab and field scale investigations, study of the current harvesting/ storage methods and agronomic practices, etc.

A PhD project on this subject has just been completed by a PARC Scientist. The thesis entitled 'Studies on the Aflatoxin Contamination in Red Chillies Grown in Pakistan' by Najmus Sahar is currently undergoing evaluation at the University of Karachi. This PhD project was designed to provide baseline information on the aflatoxin levels in available ready-to-use chilli products through an extensive 3-year survey between 2007 and 2009, and study of the current practices at the farm and supply chain levels that could contribute to aflatoxin contamination. The study showed that virtually all of the samples of chilli and chilli-based products analysed were contaminated with aflatoxins at levels between 0.15 and 70 ppb. Out of these, almost 25% of the samples contained aflatoxin levels above the permissible limit of 10 ppb as set by the European Union. The study of farm practices showed that whilst pre-harvest contamination of chillies with aflatoxins was very low (~1.5 ppb), it was the post-harvest handling, drying, and storage practices that led to a progressive increase in the aflatoxin levels (up to 300% increases after 2 months storage). Further investigations showed that the drying stage was more critical a factor in aflatoxin build-up in chillies than the storage stage. Post harvest chillies are normally sun-dried in Pakistan, and depending on various economical and traditional factors, they may be dried on different types of surfaces, including bare soil. It was found that sun-drying of chillies for 2-weeks reduced the moisture content from ~75% to ~10%, but there was a variation in the aflatoxin levels in chillies dried on different surfaces. It was also noted that damaged pods had the highest levels of aflatoxins. This points out to the need for improvements in the current harvesting practice for chillies that are mainly hand-picked by untrained farm workers, and the potential value of segregating the pods before marketing or further processing. Such information will be valuable for identification of critical factors for the work planned for this PPG. In view of the importance of handing processes, duration of sun drying, and subsequent storage of chillies in relation to the build-up of aflatoxins, the follow-up STDF project will also aim to advise the ongoing government-funded research in Pakistan to investigate appropriate drying and safe storage conditions at various moisture contents of (semi)dried chillies. The outcome of the previous research will be complementary to, and disseminated through, the follow-up STDF project. In addition, there will be training of staff in additional laboratory techniques to aid producers and support agencies in the future. These will include mycological identification techniques and the use of rapid on site techniques for the analysis of aflatoxins.

Stakeholder Commitment/ Involvement

Although some preliminary activities have been carried out by PARC, they are mainly in terms of initiating the activities towards determining the levels of aflatoxins in chillies under different situations. A few seminars and meetings have also been organised with the assistance of Agricultural Support Fund (ASP, USAID) and GIZ (Germany), but nothing concrete has been drawn yet due to the lack of appropriate expertise and guidance in this area. Realising the problem that has started to cripple the chilli farmers in relation to getting a fair price of their exportable produce, the farmers' associations in

Pakistan have also taken up this issue as a priority and are keen to address it as soon as possible to protect their commodities, trade and exports (see attached letters of support).

However, despite urgency of the matter, and initial moves to resolve it through available capacity and resources, a well thought-through framework still needs to be worked out to overhaul the existing systems through short, medium and long-term action plans for different stakeholders to actively address the problem. It is in this context that the STDF support is sought to consolidate the different stakeholders and activity strands under one umbrella and to address different aspects of the problem in a coherent and comprehensive manner.

A similar exercise was carried out on Brazil Nut production and problem with export in Brazil (SAFENUT Project 2005 to 2008). The lessons from this project will be applied to this project to develop a workable model for chillies. For the SAFENUT project, recommendations were made on the production chain and monitoring procedures, but there were some shortcomings in final implementation due to a combination of will at the authorities' level to change/augment traditional practices. These aspects will be carefully considered in developing strategies for chillies with a full backing of government authorities and other stakeholders involved in the production and supply chain. This is the main reason behind the proposed stakeholder's workshop at the PPG stage so that a consensus can be reached to ensure all key stakeholders are fully committed to solving the problem. The project will also establish benefits of any proposed changes to the existing systems in terms of health, welfare and economy.

The proposed workshop will provide an opportunity to the key stakeholders and international experts to interact and explore different aspects of the problem, and to draw action oriented guidelines. Initiation of such activities will not only enable the export of safe and high quality chilli based products that are currently facing serious challenges in the international markets, but also provide a focus for other government-funded projects to aim towards protecting the health of the average consumer in Pakistan. This will also result in revenue generation in the rural economies, and help the processors and exporters in the form of high quality chilli products derived from varieties that are only grown in this part of the world.

PARC is also very keen in establishing a training programme for those involved in various stages of the production, processing, supply chain, and export of chillies. The follow-up STDF project will aim to address this specific need through the development of training material, protocols, practical demonstrations, and necessary tools to enable early detection and monitoring of chilli quality at different stages in the supply chain.

Key SPS problems and/or opportunities to be addressed

As mentioned before. aflatoxin contamination of chillies has started to have an impact on the export of Pakistani food products, and increasing rejections are leading to a trade barrier to the whole chillie supply chain in Paksitan. This needs an urgent strategy to tackle the issue, as it is likely to become more problematic in the future. In view of a similarity between agricultural practices, as well as cultural and climatic conditions, it is likely that other regional countries are also facing similar problems in chillies or other

commodities. This aspect will be explored in the proposed workshop and the control strategies for chillies will be developed with sufficient flexibility to allow potential adoption/adaptation for other commodities in future and/or by other regional countries facing similar problems. In view of these considerations, a few selected experts from neighbouring countries (e.g. India, Bangladesh, Sri Lanka) will also be invited to the workshop, to share their issues, ideas, and experiences. It is envisaged that the follow-up STDF project will also focus on developing a wider stakeholder platform for potential implementation/adaptation of the chilli model in Pakistan and by other regional countries.

The aflatoxin contamination of chillies has also highlighted a so far hidden public health concern. Despite the possible adverse effects of aflatoxins intake via food products on public health in Pakistan, no assessment of the impacts has so far been carried out. There is, nevertheless, a growing realisation of the issues within the national authorities who are keen to progress this project, not only from an export barrier point of view, but also from a public health standpoint. Therefore the follow-up STDF project will involve government authorities in Pakistan to carry out assessment of the impact of aflatoxin contamination of food on public health, and provide help and guidance in overcoming the quality issues to benefit not only to farmers and the exporters, but also to health and wellbeing of the local people.

Support and underpinning work for the follow-up STDF proposal

Pakistan Agricultural Research Council (PARC) is the apex research organization of the country that undertakes, promotes and coordinates agricultural research and is responsible for arranging expeditious utilization of the research results. PARC has a network of research institutions around the country and also utilizes the provincial setup if and when required for the execution of work. As a result of a strong pressure from chilli farmers, and the Senate of the country, PARC has already initiated some of the research work in Sindh province that produces around 90% of the chillies in the country. This has been initiated through SARC, Karachi.

PARC being a part of the Ministry of National Food Security and Research is also well linked with the agricultural departments in the provinces, Ministries of Trade and Health, and various other departments such as NAPHIS (National Animal and Plant Health Inspection Service), Department of Plant Protection. However, the prime role of PARC revolves around research and dissemination to facilitate the end users. In view of this, other ministries and departments seek support and guidance from PARC to address issues of national priority relating to the agri-food sector. The council as a result of its research in the chillies producing areas is already well linked with the farming community, traders, processors, and other stakeholders and possess capability to bring them on a common platform. The council is also well equipped and possess the infrastructure to operate through its ISO 17025 accredited SARC labs that have been assigned this task and have the capacity and links with chilli farmers to undertake R&D, engagement/ dissemination and implementation of policies on the ground.

For financial and health reasons there is an imperative to succeed in circumventing the problem of aflatoxin contamination in chillies, and also because no alternative to the export of surplus chillies is available. There is therefore a strong political will behind the

efforts to tackle these problems and to ensure the limits of contamination in line with the EU and other jurisdictions are met. This proposal is supported by:

- The Chilli Growing Association of Pakistan
- The National Animal and Plant Health Inspection Service in Pakistan – NAPHIS
- The Rice Exporters Association of Pakistan – REAP
- Department of Food Science & Technology – University of Karachi
- Food Agriculture Organization (FAO-Islamabad)
- The Food and Environment Research Agency (UK)
- The University of Chester (UK)
- European Diagnostic Companies (DE/NL)

As mentioned before, some initial work has been carried out by PARC in terms of surveying the farms to identify the source of aflatoxin contamination of chillies. The information gathered so far will provide a useful basis for further work under the STDF projects. During the PPG stage, similar efforts that may have been undertaken by other countries in the region will also be taken into account.

This proposal has also been discussed with the FAO regional office in Pakistan for their support in principle. However, it has not been discussed with other donors and therefore the proposal (at least in the first PPG phase) will not have funding from any other source.

Outline of the proposal

The outlines of the concept behind the proposed project are presented below:

1. PPG stage:
    a. Aflatoxin contamination of chillies will be used as a model for establishment of quality systems to address aflatoxin contamination of chillies and the resulting international trade barriers in Pakistan. The systems will be intended to be flexible enough for potential adoption/adaptation for other commodities and / or by other regional countries facing similar problems.
    b. With the help of International Experts, a stakeholder workshop will be organised to take stock of the key issues and to provide a platform for the experts and key stakeholders in Pakistan (farmers, food processors, food inspectors, government regulators, exporters) for further action. In this way both government and non-government stakeholders will share commitment to and ownership of the project.
    c. A systematic identification and analysis of the issues will be carried out relating to the extent of the contamination problem. The study will also scrutinize various aspects relating to the management of chillies in the production and supply chain, i.e. from the farm-gate to the point of export, as well as the various technological, socio-economic, policy and regulatory aspects that could be the influencing factors.

d. Critical control points will be identified and feasibility of improvements to the existing procedures and processes involved in the chillie supply chain will be assessed while considering any successful models on tackling similar problems in other countries.

e. A detailed follow-up project proposal will be developed with the aim to improving the existing processes and procedures, developing appropriate guidance, and providing demonstration and training, necessary tools, and recommendations for implementation at the policy/regulatory levels.

2. Potential topics for the follow up proposal (more/different aspects may evolve during the activities undertaken at the PPG stage):

   a. Formation of a wider platform of national (and potentially regional) stakeholders to tackle the aflatoxin contamination in chillies.

   b. Establishment of processes for surveillance based on HACCP (Hazard Analysis and Critical Control Points) to identify critical control of the production chain for chillies from farm to the end user.

   c. Provision of training to staff within the country and abroad in mycological techniques, chemical analysis of aflatoxins in foodstuffs, rapid on-site screening methods for aflatoxins, etc.

   d. Exchange of staff and students between institutes, universities with additional funding sought through the EU/ Marie Curie programmes.

   e. Development of national quality standards, establishment of procedures and manuals on safe production/ handling and storage of chillies.

   f. Raising awareness amongst growers, processors, exporters, and promoting best practices to maintain the required standards of produce quality for local consumption and exports.

   g. Supporting appropriate policies at the government level to enable overcoming trade barriers, e.g. through establishment of quality-based procurement systems that are backed up by incentives for the farmers/ traders for maintaining quality, and penalties for non-compliance.

   h. Capacity building in trainees for adopting good agricultural practices in all stages of chilli production and processing to prevent contamination of unwanted materials, organisms and substances in the harvest and leading to improvement in quality and milling yield.

   i. Developing characteristics such as self reliance, reliability, responsibility, team sense and ability to lead the program in the field.

   j. Recommendations for improved procedures to maximise and protect the chilli harvest during picking, post-harvest handling, drying, storage, marketing and processing.

   k. Systems for assuring the maintenance of chilli quality during production, processing and packaging.

   l. Providing safe and high quality chillies to the consumers in Pakistan and worldwide.

II. IMPLEMENTATION & BUDGET

The implementation of the PPG will be led by Pakistan Agricultural Research Council (PARC) through their Southern-zone Agriculture Research Centre (SARC) in Karachi. The lead person will be Dr. Mubarik Ahmed who is Director General of SARC. There has been a long standing relationship and collaboration between the main partners (PARC, Fera, University of Chester). There has been in kind contribution from the UK partners by means of support for the preparation and management of the proposal, and availability of assets such as scientific capital equipment, training, and expert guidance.

Support of the PPG

Letters of support from within Pakistan

- Chilli Growing Association of Pakistan
- National Animal and Plant Health Inspection Service in Pakistan – NAPHIS
- Rice Exporters Association of Pakistan – REAP
- Department of Food Science & Technology – University of Karachi
- PARC AgroTech Company (Pvt) Ltd.
- Letter of support from FAO – Pakistan.
- Letter of support from Department of Plant Protection, Government of Pakistan.

External consultants

The PPG is supported by the following expert consultants:

- The Food and Environment Research Agency (UK) - Dr. Qasim Chaudhry
- The University of Chester (UK) - Prof. John Banks and Prof. Graham Bonwick
- Discussions are also underway with European diagnostic companies for their support and participation (DE and NL). Their role will be to supply expertise and rapid on-site diagnostic techniques and training in these methods to the staff on the ground.
- Other potential donors such as World Bank, Food and Agriculture Organization (FAO), Agriculture Linkage Program (ALP) are also being explored. A proposal for funding a post-doc researcher has been submitted to the HEC (Higher Education Commission) of Pakistan to carry out R&D on this topic and is awaiting a decision.

Description of main activities

The Table below describes the main activities to be carried out under this PPG:

Activity	Responsible	Estimated Budget (US$)
1. A desk study will be carried out	The study will be carried	**$10,000****

to systematically analyse the key issues, estimate the extent of the contamination problem, and to take account of the various aspects relating to the production and supply chain management of chillies, as well as relevant technological, socio-economic, policy and regulatory aspects that may be a factor. The study will also identify possible improvements to the existing procedures, processes and policies that are already in place in Pakistan. The outcome of this activity will be in the form of a study report that will be submitted to STDF, and disseminated to stakeholders at a workshop.	out by PARC, in conjunction with FERA, UoC with participation of other key stakeholders in Pakistan.	To cover staff time of scientists from PARC ($2000), and experts from Fera ($4000) and University of Chester ($4000).
2. Organisation of a workshop to take account of the key issues, and to provide a platform for the International Experts to lead discussions with the key stakeholders to achieve a consensus on the issues and commitment to the roadmap for future steps. The workshop will be held over 2 days in Pakistan (Karachi or Islamabad), with an additional one-day roundtable meeting between the experts and the stakeholders to draft outlines of a subsequent follow-up project proposal.	The workshop will be organised by Pakistan Agricultural Research Council (PARC), in collaboration with The Food and Environment Research Agency (FERA), and the University of Chester (UoC). Attendee will be the International Experts from the UK, and key stakeholders from Pakistan and up to four invited experts from neighbouring countries.	**$16,000*** The budget will cover T&S expenses of the two Experts from the UK ($2,400) and their daily allowance at $600 per day each for the 3 day workshop/ roundtable ($3600). T&S expenses of some of the stakeholder attendees from Pakistan and up to four experts from neighbouring countries will be covered (estimated at $10,000).
3. Preparation and submission of full proposal on a follow up project aimed at improving the existing processes and procedures for the chilli value chain, developing appropriate guidance for different stakeholders, providing practical demonstration and training, and developing recommendations for implementation of system improvements at the	The project proposal will be developed and submitted by PARC, in collaboration with FERA, UoC and other stakeholders.	**$8,000**** To cover staff time of scientists from PARC ($2000), and experts from Fera ($3000) and University of Chester ($3000).

policy/regulatory levels in Pakistan and possible adoption for other commodities and / or by regional countries.		

***** to cover the workshop costs, travel related actual expenses for some of the attendees from within Pakistan and other countries. Daily allowances will only be covered for the two Experts from the UK.
** to cover staff time costs for the participating experts.

Administration of Finances:

The funds for this PPG will be received and administered by FAO (Pakistan) on behalf of PARC. This is because FAO has appropriate and advanced financial systems and disbursement of funds through FAO will streamline the management of funds and bring transparency to the spending under the project. For this, FAO will establish a dedicated project account, and will reimburse the participants' expenses and/or other contingency costs on the basis of provided proof. All details of the disbursements will be kept in records and will be available for audit if required.

Project development experience of the consultants

Professor John Banks

At FERA
Prof. Banks has been involved in the development and implementation of 10 large EU funded projects on moulds, mycotoxins and other natural contaminants in food and feed and numerous other related nationally funded projects. In addition, he worked with French and Swedish collaborators to assist Brazilian partners in the preparation and implementation of a STDF funded project on aflatoxins in Brazil Nuts (SAFENUT Project 2005 to 2008). His activities also continue at FERA as he was honoured by being awarded an honorary Fellowship of the institute.

At University of Chester
Professor Banks has developed on his own and with his team, a number of important knowledge transfer networks, business engagement links, student exchanges with European Universities, developed training courses of business, workshops on Nanotechnology in food, and assists in the supervision of post graduate science students working on mycotoxin and other contaminants in food related projects.
In addition to the obvious benefits of this work, it has also been partly instrumental in winning of ERDF funding for a Food Centre at the University of Chester.

Dr. Qasim Chaudhry

Dr. Chaudhry has an academic background in chemistry and biochemical toxicology, with over 30 years of experience in leading numerous UK and EU R&D projects into evaluation of the safety of chemical substances to human health and the environment. Dr. Chaudhry is a Fellow of the Royal Society of Chemistry (FRSC) and a Chartered Chemist (CChem), and has a visiting Chair at the University of Chester (UK). His expertise encompasses different aspects of chemistry, biochemistry and molecular biology, and includes materials and products of some new and emerging technologies, such as nanotechnologies and synthetic biology. Other areas of interest include computational

toxicology to assess chemical safety without testing on animals, natural products from plants, development of immunodiagnostics for small-molecule organic compounds (including mycotoxins), detection of toxigenic fungi, molecular mode of action of chemicals, and mechanisms of pest resistance to pesticides.

In addition to his work at the UK's Food and Environment Research Agency, Dr. Chaudhry provides his expert advice as a Member of the European Commission's Scientific Committee on Consumer Safety (SCCS) based in Luxembourg, on risk assessment of chemical substances and nanomaterials intended for use in non-food consumer products. He is also a Member of the Scientific Committee of the European Food Safety Authority (EFSA), based in Parma (Italy), where he provides scientific advice to support EFSA's work on risk assessment in relation to food and feed safety. He has also been participating in various scientific Expert groups of FAO, WHO, and OECD.

Dr. Chaudhry's past career and continued links and collaborations at PARC (Pakistan) have been instrumental in developing this proposal. He has acted as an external adviser to a PhD project conducted by a Scientist at PARC, and co-author of a publication (Sahar et al., 2013) on the issues relating to aflatoxin contamination of chillies in Pakistan.

Professor Graham A. Bonwick

- Professor of Applied Biology, Department of Biological Sciences, University of Chester, Chester, UK.
- Director – ERDF Food Growth Project (NowFood Centre), Environmental Quality & Food Safety Research Unit; Centre for Science Communication;.
- Academic Link Tutor – BSc Food Technology with Management (Reaseheath College).
- Faculty representative – Knowledge Transfer sub-Committee, Knowledge Transfer Management Group
- 2003 Professor of Applied Biology (University of Liverpool)

Qualifications

1980-1984 BSc Applied Biology - University of Salford.

1984-1991 PhD Ecotoxicology - University of Salford.

2012 Prince2 Project Management Practitioner

Teaching interests: include development of distance and blended learning, research project supervision, applications of chemical analytical techniques and immunodiagnostics, environmental quality, food safety and security.

Research interests: Food nanotechnology, environmental quality and food safety, environment and food chain monitoring technologies, rapid bio-analytical techniques, contaminant ecotoxicology, biomarkers, science communication.

Publications and Presentations: 70 publications, 9 invited contributions, 5 patents, 1 patent application pending. Recent output includes:

Annexes

Annex 1: Letters of support from each of the organizations supporting this proposal.

Annex 2: Curriculum Vitae and record of achievements for any consultants proposed to implement this PPG.

Annex 3: Endorsement from the Federal Secretary (Ministry of National Food Security and Research) for PARC collaboration with the FAO.

Annex 4: Recent article by Sahar et al., 2013 on mycotoxin issues in chillies in Pakistan

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