

Search for a Spanish Partner for a Bilateral R&D Project

Organization	
Date of Request:	27 th July, 2023
Company name:	The Biotechnology and Nuclear Research Institute (BNARI) of Ghana Atomic Energy Commission
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SECTION 1: Entity launching the partner search	
<i>(Please give brief / to the point explanations. For more explanation on any point below, you may add a short paragraph as an annexure, with this document.)</i>	
Sector	Ministry of Environment, Science and Technology and Innovation
Entity mission or core functions	<p>BNARI exists to conduct research into the development of sustainable solutions by exploiting, biotechnology, nuclear and related techniques for enhancement of food and nutrition security, health and wellbeing, industrialization and poverty alleviation.</p> <p>Our vision is to be a leading Institution that provides sustainable solutions to challenges in agriculture, health, and industry through biotechnology and nuclear science interventions.</p>
Date of establishment	The Biotechnology and Nuclear Agriculture Research Institute (BNARI) was established as a result of the upgrading of the Department of Biology, Food and Agriculture of the National Nuclear Research Institute. The main objective of the institute is to apply isotopes, ionizing radiation and biotechnologies to increased agricultural and economic development in Ghana. With the

	Act of Parliament that allow GAEC to commercialize its research findings (Act 588 of 2000 replaced Act 204 and PNDC Law 308 and enabled the Commission to create new institutes and commercialize its research findings)
Ownership (if public and traded, add stock exchange and ticker symbol)	Public
Total number of employees	117
Number of employees in R&D	45
Key products sold or services provided	<p>BNARI's core mandate is to promote the peaceful application of biotechnology, nuclear and related techniques for the development of sustainable solutions for increased food and nutrition security (SDG 2), health and wellbeing (SDG 3), and industrialization (SDG 9) for economic development and poverty alleviation (SDG1) in Ghana.</p> <p>Being the only institution in Ghana that combines biotechnology and nuclear techniques with other relevant technologies in agriculture, BNARI works to develop sustainable solutions in laboratories established under its five (5) Centres and Units. Our research areas include: soil and water management using nuclear and related techniques; crop improvement using mutation and conventional breeding techniques; integrated pest and disease management using the sterile insect technique and other compatible tools; post-harvest management and food processing using a combination of radiation and other innovative technologies.</p> <p>To effectively impact society with our work, we commercialize our research innovations and transfer new technologies (solar-drying and processing of tomatoes, sterile Insect Technique, and uses of black soldier fly) to end-users such as farmers, producers, manufacturers etc.</p>

	<p>To ensure sustainability and continuity of R&D in biotechnology and nuclear agriculture, BNARI supports academic training and capacity building in agriculture at all levels.</p>
<p>Entity core technical competences</p>	<p>Scientific staffs of BNARI, majority with their PhD degrees in their fields of study, cut across a wide range of disciplines. These include, Radiation experts, Post-harvest management experts, Food processing engineers, Microbiologist, Virologists, entomologist, soil scientists, sensory analysts, socio-economic and commercialization experts.</p>
<p>Key R&D programs and activities</p>	<ul style="list-style-type: none"> • Radiation Processing • Post-harvest management • Food product development • Sensory evaluation • Mutation breeding, plant disease diagnostic • Soil, water & nutrient management • Pest & Vector Control – (mosquito, fruitfly, fall armyworm, black soldier fly)
<p>Examples of accomplishments</p>	<p>Using nuclear technology, BNARI has produced and released five (5) cassava varieties with the University of Cape Coast (UCC) and a mutant cassava variety (<i>Tek Bankye</i>) in collaboration with Kwame Nkrumah University of Science and Technology (KNUST).</p> <p>The Biotechnology Centre using tissue culture techniques has produced commercial-scale quality planting materials of plantain/banana, pineapple and sweet potato for sale to farmers.</p> <p>Nuclear agriculture research has led to the development of techniques for mass rearing of tsetse flies and mosquitoes. Also, the pilot field trial of Sterile Insect Technique (SIT) for control of riverine tsetse flies in Northern Ghana</p>

	<p>BNARI's entomology laboratories have been recognized and selected as a competent mass-rearing Centre for supply of pupae under the PAN-AFRICAN Tsetse and Trypanosomiasis Eradication Campaign (PATTEC).</p> <p>BNARI has successfully established Fall Armyworm (FAW) colony and developed protein baits.</p> <p>The institute has developed protocols for mass propagation of food and industrial crops.</p> <p>BNARI supports farmers/entrepreneurs to establish piggery and fish ponds.</p> <p>Over the years, BNARI has successfully used nuclear irradiation to preserve food (yams, potatoes, onions, cereals, etc.) by extending its shelf life and eliminating harmful pathogens, without compromising its nutritional value.</p> <p>As part of our research collaboration, BNARI has also hosted scientists and students from various laboratories across several countries within Africa and beyond.</p>
Company strategic orientation	

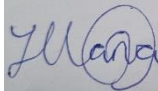
SECTION 2: Spanish Company Profile

(Please provide a brief summary of the prospective partner company or organization. This summary may address some or all of the points below)

Profile of ideal technology partner	A company into research & development, value addition to food, and sensory & consumer evaluation of food.
Core technological competencies and expertise	<ul style="list-style-type: none"> - The use of ultrasonication for debittering. - Expertise support to upgrade our sensory laboratory to support the inclusion and use of Artificial Intelligence (AI) systems for analysis.
Other essential qualifications (e.g.: ownership, track records etc.)	

<p>If you have a list of companies with whom you are in contact or interested in contacting, please provide contact details</p>	<p>N/A</p>
<p>If you are interested in collaboration: please specify details and other important information you want to share with a potential company</p>	<p>Fermented foods and beverages constitute a major portion of people's diets in Africa including women in their reproductive age. <i>Forofo</i>, a spontaneously fermented millet drink with high probiotic content, is widely produced in homes especially in upper east region of Ghana for use directly as a healthy refreshing drink and given to breastfeeding mothers as a means to boost breast milk production.</p> <p>We seek to replace millet with sorghum, a drought resistant and a potential African food security crop and fortify the <i>forofo</i> drink with turkey berries (<i>Solanum torvum</i>), a food crop used in traditional medical practice as hematinic agents for the treatment of anemia and other ailments.</p> <p>Turkey berries are underutilized and normally found in the bushes or backyard gardens of many households in Ghana. Turkey berries contain high levels of the essential elements, iron (76.869mg/kg), manganese (19.466mg/kg), calcium (221.583mg/kg), copper (2.642mg/kg) and zinc (21.466mg/kg). The berries also contain 78mg/100g of vitamin A and 2.686mg/100g of vitamin C. The berries are used for juices and also teas with spices.</p> <p>Like most legumes and citrus fruits, turkey berries have a bitter mouthfeel and aftertaste. Sorghum also presents some bitterness due to the presence of phenolic compounds, especially condensed tannins. These</p>

	<p>objectionable sensory attribute (bitterness) may reduce consumer acceptability and economic value of the fortified <i>foroforo</i> drink. Therefore, research into processing techniques that can effectively de-bitter turkey berry fruits to enhance the nutritional quality and increase its utilization is very essential.</p> <p>Successful use of sorghum and turkey berries to produce <i>foroforo</i> drink with good consumer acceptability, will help change the status of these crops as underutilized ones into major food security crops and help boost ongoing efforts to combat micronutrient malnutrition especially iron in women of maternal age.</p>
Interested areas of collaboration	<p>Debittering of fruit juices - the impact of ultrasonication on the degree of enzymatic hydrolysis of bitter compounds.</p> <p>Artificial Intelligence (AI) systems for sensory and consumer evaluation.</p>
Specific R&D contribution you are seeking/offering	Product development, sensory and consumer evaluation of new products.



Signature

Name: Joyce Agyei-Amponsah

Date: 7th August 2023