**Tamil Nadu Agricultural University**
Coimbatore – 641 003

Dr. M. Rajavel, Ph.D.,
Public Relations Officer
Mobile: 94890 56730

Phone: 0422 - 6611302
Fax: 0422 – 2431821
E-mail: pro@tnau.ac.in

To

Date: 24.02.2025

The Editor,

Sir,

I request that the following message may kindly be published in your esteemed daily:

## TNAU alumnus recognised by Word Food Prize Foundation

The **2022 Borlaug Award** (also known as the **World Food Prize Borlaug Award for Field Research and Application**) was awarded to **Dr. Mahalingam Govindaraj**, senior scientist recognized for his outstanding contributions to **agricultural research** and **sustainable crop improvement specialised for biofortification**. This prestigious award, established in honour of Nobel Peace Prize laureate Dr. Norman Borlaug, is given annually to individuals who have made extraordinary contributions to global food security through innovative field research and application.

**Dr. Mahalingam Govindaraj: Borlaug Award Winner (2022)**

Dr. Govindaraj was recognized for his **groundbreaking work** in improving tropical crops like **millets, rice and legumes,** which are vital for food security in many developing countries. His research focused on **genetic diversity** and **crop breeding**, which helps to develop **high-yielding**, **climate-resilient**, and **nutritious** varieties of crops that benefit smallholder farmers, particularly in tropical regions. Released word first and several biofortified crop varieties.

His contributions, especially in the areas of **plant breeding and genetics**, have been instrumental in improving agricultural productivity and supporting food security in areas vulnerable to climate change. Dr. Govindaraj's work is particularly relevant in light of the challenges faced by small-scale farmers in the tropics, who often deal with soil degradation, water scarcity, and pest infestations.

**Key Highlights of His Work:**

1. **Crop Improvement**: He has played a key role in developing varieties of crops that are **resistant to pests**, **diseases**, and **climate stresses** such as **drought** and **heat**. These crops are more productive and can thrive in the changing environmental conditions that many regions are experiencing.
2. **Genetic Diversity and Breeding**: Dr. Govindaraj's research on **genetic diversity** has led to the identification of valuable genetic traits that can be used in crop breeding to enhance **resilience** and **yield**. His work focuses on maximizing genetic resources, which is crucial for addressing the challenges posed by climate change.

3. **Field-based Impact**: Dr. Govindaraj's approach emphasizes practical, field-based solutions. His breeding programs have had significant, real-world impacts on farmers' lives by providing them with crops that are easier to grow, more nutritious, and more resistant to environmental stresses.
4. **Sustainable Agriculture**: In line with the broader mission of the **International Center for Tropical Agriculture (CIAT)**, where Dr. Govindaraj is affiliated, his research has contributed to **sustainable agricultural practices** that increase productivity without exhausting the environment. This focus on **sustainability** helps farmers increase their yields while protecting natural resources.

**Impact of His Award and Contributions:**

1. **Improved Food Security**: Dr. Govindaraj's contributions are directly tied to enhancing food security in regions where millions of people depend on agriculture for their livelihoods. By improving crop resilience and productivity, he has contributed to more **stable and diverse food systems**, which is crucial in the face of increasing global challenges like climate change and population growth.
2. **Economic Benefits for Smallholders**: His work has particularly benefited smallholder farmers, who make up a significant portion of the agricultural workforce in developing countries. By providing farmers with better, more resilient crop varieties, his research helps increase **crop yields**, reduce **post-harvest losses**, and improve **farm income**. This has a positive ripple effect on local economies.
3. **Global Recognition and Encouragement for Further Innovation**: Winning the Borlaug Award highlights the importance of **applied research** that leads to tangible benefits on the ground. This recognition draws attention to the need for continued investment in agricultural research and development, encouraging other scientists to engage in work that can have a direct impact on food systems.
4. **Climate Change Adaptation**: As the world faces climate challenges, Dr. Govindaraj's work on developing **climate-resilient crops** is critical. His contributions help communities adapt to **shifting weather patterns**, which is vital for maintaining agricultural productivity in the face of unpredictable climate conditions.

**Long-Term Impact:**

- **Borlaug Legacy**: The Borlaug Award is part of a legacy of honoring scientists who contribute to **global food security**. Dr. Govindaraj's work contributes to this ongoing legacy of improving agricultural systems and helping to meet the nutritional needs of a growing world population.
- **Future Directions**: Dr. Govindaraj's recognition by the Borlaug Award has amplified global attention on the role of **agricultural innovation** in addressing future challenges. His work encourages further **collaboration** between governments, research institutions, and farmers to tackle issues such as **climate resilience**, **poverty alleviation**, and **agricultural sustainability**. Feeding 9 billion mouths by 2050 with adequate nutrition is a big challenge his research breakthrough (biofortified varieties bring high yield and nutrition at a very cheaper cost) will certainly be an addition to sustainable global solutions.

In summary, **Dr. Mahalingam Govindaraj's recognition** with the **2022 Borlaug Award** honours his exceptional contributions to agriculture-nutrition-health, focusing on crop improvement, climate resilience, and food security. His research is pivotal in the fight against hunger and malnutrition, particularly in tropical and developing regions where these challenges are most pressing. His work exemplifies how agricultural science can have a transformative impact on both **local communities** and **global food systems for next-generation health**. His innovative varieties and grain are best fit for school breakfast, mid-day meals and PDS for rural areas where malnutrition has been predominant. Therefore, we strongly recommend Tami Nadu State government recognise his world-class innovation and impact to appreciate his young leadership capabilities, dedication and continuously leading biofortification mainstreaming in the food system in India and Africa.

**Mahalingam Govindaraj - An unsung youth leader in Agri-science**

*Developed the world's first biofortified varieties and hybrids and set the world's first nutrition policy in variety release!*

Biofortification is now a well-accepted, core strategy for reducing mineral and vitamin deficiencies in LMICs. Pearl millet, which is a climate-resilient staple food crop that grows on marginally productive land, in particular reaches low-income, small-holder farm households. As outlined below, Dr. Govindaraj has done an outstanding job in managing the crop development and dissemination of biofortified cultivars in India and sub-Saharan Africa. I have organized my remarks around the priority qualities for which nominated candidates are being evaluated.

**Background**

Dr Govindaraj is a well-trained plant breeder recognized by the global research community (CGIAR). Currently lead CGIAR biofortification mainstreaming and networking projects. Received his M.Sc. degree in Plant Breeding and Genetics from the Tamil Nadu Agricultural University (TNAU), and a Ph.D. degree in Plant Breeding and Genetics from TNAU. He completed a skill development course on sustainable agriculture (USAID), quantitative methods in plant breeding (NIAB-Cambridge), and leadership training. Before his present position, he was Senior Research Fellow at Sugarcane Research Station, Tamil Nadu (India), and Visiting Scientist, millet breeding at ICRISAT. His entire research agenda started with pearl millet from his master's degree dissertation. He is an expert in mineral sampling and analytical protocols. His focus is on developing and disseminating diverse breeding lines and hybrid parents in pearl millet. He also has produced well-demonstrated products through population improvement, varietal, and hybrid breeding approaches. He has strong basic and applied statistical analytical backgrounds which are important for conducting quality breeding and multi-location trials. These abilities have driven his peer-reviewed scientific publications as listed in his curriculum vitae.

**Persistence**

Breeding for grain micronutrient content is a significant challenge in any crop improvement program. Breeding for iron pearl millet is a highly challenging task in pearl millet where the production is largely pushed towards the marginal lands. The continued screening of a large number of germplasm and commercial varieties requires substantial investment. With the support from HarvestPlus, screening of pearl millet germplasm, identifying sources, and developing high iron breeding lines was accomplished under the difficult circumstances/critical assumptions that i) nutrition traits would

be adequately bio-available in the crop; ii) these traits would not adversely affect yield, and iii) farmers would adopt the high iron varieties. Dr Govindaraj efforts in achieving the trait genetic gain from 42 mg/kg iron to 72 mg/kg (breeding target) in elite germplasm and release of 10 cultivars are remarkable. Interestingly, he found a several-fold genetic variation in pearl millet germplasm and breeding lines, especially varieties or hybrids grown in farmer's fields which are high in nutrition (iron). His research publications and competitive breeding products convinced the national and international pearl millet research community to accept biofortification and to mainstream nutrition traits in breeding programs. This shows his persistence over time to develop demonstrated products which farmers have wanted to adopt.

**Research/Science**

His excellence in breeding science and cultivar deliverables is well recognized (see in C.V). He has a sustained output of peer-reviewed publications (70+) and several on-ground breeding products (see CV for details). He has demonstrated that it is indeed possible to breed pearl millet combining high grain iron/zinc content and high yield with disease and drought resistance.

Dr Govindaraj reported the world's largest genetic variation for iron (30–125 mg/kg) and zinc (20-90 mg/kg) content in pearl millet. He validated large scale screening using XRF as compared with the ICP method. He defined breeding benchmarks and developed evidence for no-better-parent heterosis, larger seed set effect, no xenia (pollen) effect, and no terminal drought and inbreeding effect on Fe and Zn density. He showed that the dwarfing gene (d2) decreased both micronutrients in pearl millet. He built higher micronutrients into dwarfing backgrounds to address this and in hybrids as well. All these have contributed to improving trait genetic gains. Standard Operating Protocols are in place from sampling to final products through strong breeding and testing methods. He established and strengthened XRF lab facilities for fast-track pearl millet, sorghum and finger millet screening at Patancheru. Also, the XRF facility was established for sorghum and millet in Niamey. At his initiative the world-first online XRF portal was launched in 2019 for easy accessibility and traceability http://biofortification.icrisat.org. All these contributed to breeding efficiency.

Nutrition research has shown that mainstreaming efforts in achieving the breeding target level for pearl millet hybrid (72 mg/kg Fe) significantly contributes to meeting the Recommended Daily Allowance. He defined ICRISAT's current breeding baseline in hybrid pearl millet parents (65 mg/kg Fe and 40 mg/kg Zn) and established these as core traits in pearl millet product profiles for India and sub-Saharan Africa. In a very short-time, Govindaraj developed and designated High-Fe and disease resistance A/B pairs in different cytoplasmic backgrounds (A1, A4 and A5 CMS systems) and corresponding high-Fe restorers. Materials bred by him have now reached eastern and southern Africa (Tanzania, Zimbabwe, Kenya) and West and Central Africa (Sudan, Niger, Mali, Burkina Faso, Nigeria, Togo, Senegal). More than 1000 advanced high-Fe lines have been shared with the public/private sector breeders for use in crop development programs.

**Extension/Application/Impact/Communication**

Dr Govindaraj's research evolved from a short-term goal (discovery/pilot study) to longer-term objectives (mainstreaming nutrition) through the medium-term goal, defined in the strategic research framework, of delivering to farmers (lab to field and take it to farmer) with additional market traits.

As a crop leader of the pearl millet biofortification project in India and West and Central Africa (WCA), he focused on breeding high-iron and high-zinc pearl millet cultivars with higher yields. He built a strong biofortification partnership with more than 30 public and private sector programs in India, and a similar partnership has been initiated in WCA.

Pearl millet is already an important staple food in drier regions of India (Rajasthan and Maharashtra) and sub-Saharan Africa, especially in Nigeria, Niger, Senegal, Mali, and Burkina Faso. The "chakti" variety was released for commercial cultivation in Niger in partnership with the Niger National Institute of Agricultural Research (INRAN) under the Economic Community of West African States (ECOWAS) seed harmonization law, which facilitates farmer access to seed in Niger, Senegal and, Mali.

Currently, about 200,000 farming households are growing biofortified pearl millet cultivars in India. 20,000 ha were reached in the first year of chakti release in the WCA region in 2019. In 2019, Govindaraj facilitated biofortified hybrid seed large scale production and dissemination agreements between NARS and seed companies for hybrids in India, as part of basic seed system promotion in the India millet mission program.

Dr Govindaraj's research outcomes largely supported ICAR/NARS/SAUs and seed companies to develop their own biofortified varieties of pearl millet. His research supported capacity building for partners, connecting them with food companies for pilot procurements. Exceptionally, Nestle started to explore iron and zinc biofortified grains for baby foods (Cerelac).

**Leadership/Innovation**

Govindaraj's active collaboration and deliberation with NARS led to India being the first country in the world to establish iron and zinc standards as core traits in the *National cultivar release policy* in pearl millet testing and release. This is a story highlighted in CGIAR-CRP-GLDC as key crop policy https://repo.mel.cgiar.org/handle/20.500.11766/9874 .

**Summary**

Dr M Govindaraj has contributed significantly to the CGIAR's goals for reduced poverty and improving food and nutrition security, as well as to the Sustainable Development Goals (SDGs) of no poverty, zero hunger, good health, and well-being, and creating partnerships. Iron-rich pearl millet has a higher appreciation by farmers with no issue in acceptability (color/taste) among consumers. These products had much higher (50-100% more) iron and zinc than market varieties. More than a million farmers benefit directly and about 10 million consumers consume his biofortified grains.

Annually, India loses over $12 billion in GDP to vitamin/mineral deficiencies. Four independent nutrition studies using high-Fe pearl millet, showed significant improvement in iron status and functional outcomes, thereby alleviating malnutrition (one of the pathways to poverty reduction) in developing countries. Therefore, dissemination and utilization of biofortified breeding lines and hybrid parents (through mainstreaming) by partners is essential to increase adoption. Dr Govindaraj's scientific excellence and field applications are very fundamental in creating the cheapest source of dietary Fe and Zn for low-income groups in the dryland tropics.

Dr Govindaraj has contributed to effective and efficient research-for-development models, demonstrating youth leadership abilities in innovation of connecting agriculture for health. I strongly say that he is an unsung hero in agriculture research for development in Asia and Africa. Let the

governments and public and private sectors recognize his works to enable malnutrition-free nations by empowering staple foods and poor communities across the globe.

Feeding 9 billion mouths by 2050 with adequate nutrition is a big challenge his research breakthrough (biofortified varieties bring high yield and nutrition at a very cheaper cost) will certainly be an addition to sustainable global solutions. His work exemplifies how agricultural science can have a transformative impact on both local communities and global food systems for next-generation health. His innovative varieties and grain are best fit for school breakfast, mid-day meals and PDS for rural areas where malnutrition has been predominant. Therefore, we strongly recommend Tami Nadu State government recognise his world-class innovation and impact to appreciate his young leadership capabilities, dedication and continuously leading biofortification mainstreaming in the food system in India and Africa.

**Public Relations Officer**