



# Zimbabwe Plant Breeders Association

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## ZPBA NEWSLETTER Issue 1 of 2020

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Above: Participants at the 2020 FAW Training workshop & congress held on 29-30 January, 2020 at UZ Crop Science dept.

## THE 2020-21 ELECTED EXECUTIVE COMMITTEE



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# Drought Tolerance Breeding: The Tobacco Research Board Acquires a New Photosynthesis and Gaseous Exchange Measuring Instrument

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Tobacco Research Board, Plant Breeding Division

## Introduction

It is anticipated that climate change will continue to negatively affect productivity in agriculture and of particular concern to tobacco production are the recurrent within and between seasons' drought episodes. In anticipation the Tobacco Research Board, in 2014, embarked on a series of Research Projects aimed at developing drought-tolerant varieties that would use either or both tolerant and escape mechanisms. In order to allow a deeper understanding of the complex physiological and biochemistry parameters of photosynthesis under stress conditions, it was necessary to identify a method for their measurement during variety development. The Plant Breeding Division, therefore, acquired a sophisticated gadget, a Portable Photosynthesis Instrument (LI6800) to aid with this research work.

## The Portable Photosynthesis Instrument (LI6800)

The LI6800 (**Fig.1A**) is the latest version of Infra-Red Gas analysis instruments used for photosynthesis research developed by LI-COR Biosciences. Photosynthesis is an orchestration of multiple biochemical and biophysical processes that convert light energy into chemical energy and the subsequent assimilation of carbon dioxide (CO<sub>2</sub>) from the atmosphere into plant metabolites through the Calvin reactions. The instrument is able to provide researchers with detailed information on plant responses to environmental factors as well as measuring fundamental plant physiological and biochemical parameters related to photosynthesis, respiration and the integrity of chlorophyll and the gas exchange apparatus. Additionally, the instrument can be set such that it can provide information on how absorbed light energy is partitioned between photochemical processes, including electron transport, and non-photochemical processes that have a more photoprotective role (<https://www.licor.com/env/applications/gas-exchange.html>).



**Figure 1:** Portable Photosynthesis Instrument (LI6800). **A:** Key components of the instrument **B:** Tobacco response to drought experiments in the glasshouse.

## Applicability to TRB research

Tobacco is increasingly being grown in non-traditional tobacco growing areas such as Masvingo, Gweru and Matebeleland North. The new LI6800 will be able to provide detailed information on the agronomic performance of current varieties and experimental hybrids in these adverse environments. The instrument is currently being

used to generate response curves for different varieties in response to various environmental factors. One of the running experiments is to measure the response to simulated drought in the greenhouse to allow genetic differentiation in breeding material and ultimately in varieties (**Fig.1B**). In addition to drought studies, assessment of the CO<sub>2</sub> diffusion pathway from the intercellular leaf air space to the chloroplast (diffusive processes) is under investigation as a means of selecting tobacco parentals/varieties with improved water use efficiencies. Outputs from measurements of both light and Calvin reactions are providing basic information about plant resource allocation, utilization efficiency and overall health under simulated stressful conditions which are a major research thrust of the Crop Productivity Services and Plant Health Services Divisions of the TRB.

Munyaradzi Shamudzarira, one of the TRB Plant Breeders, was seconded to LI-Cor Biosciences in Germany for in-depth training on the use of the LI6800. After twelve days of training in Germany and gaining expertise on the use of the instrument, Munyaradzi has since cascaded the training to other researchers at TRB. These training efforts will enable the proper use and maintenance of the instrument by a wider range of researchers.

### **Conclusion**

The LI6800 undoubtedly is a great instrument that will aid in elucidating the physiological and biochemical mechanisms underpinning drought resistance in tobacco genotypes. However, the use of this instrument is not limited to tobacco research alone, and the TRB looks forward to collaborating with like-minded researchers to expand the capabilities for the search of drought tolerance in various crops in Zimbabwe. Those interested in learning how LI6800 can be incorporated their research can contact the Plant Breeding Division at the TRB.

## **Zimbabwe's Seed Services Institute on the International arena in 2019**

Dr Claid Mujaju (+263 71 261 1765; mujajuclaid@gmail.com)

Head of Seed Services Institute

The Seed Services Institute of the Department of Research and Specialist Services in the Ministry of Lands, Agriculture, Water and Rural Resettlement focuses on providing the enabling environment for provision of quality seed to farmers and other stakeholders in the agricultural value chain. In its quest to provide such enabling environment, one of its activities involves engagement with the international community notably ISTA, UPOV, SADC, OECD, ARIPO & COMESA.

The Official Seed Testing laboratory, housed in the SSI, undergoes a three-round proficiency testing annually and an International Seed Testing Association (ISTA) Accreditation Audit after every three years. The purpose for these are to check reliability of seed testing results and monitor uniformity in seed testing world-wide, and compliance to policies and operational standards.

In 2019, the Institute was awarded an ISTA Certificate after passing ISTA Accreditation Audit. ISTA's vision is uniformity in seed quality testing worldwide. It produces internationally agreed rules for seed sampling and testing and accredits laboratories. So with the ISTA accreditation the confidence/ credibility in the results of the seed quality testing coming out of the official seed testing laboratory is enhanced. This facilitates seed trading nationally and internationally.



In addition, Dr Claid Mujaju Head of the Official Seed Testing Station was voted as an ISTA Executive Committee Member representing Africa region for the next triennium 2019 – 2022. This provides an opportunity to bring to the fore important issues from this part of the world. The ISTA Executive Committee manages and directs the affairs of ISTA. Dr. Mujaju is also the current chairman of the COMESA Seed Committee.

Seed Services Institute developed a Manual entitled, 'A Simplified Guide for Production Managers, Quality Assurance Managers and Seed Inspectors'. This manual is to aid seed industry players to comply with the Organisation for economic Corporation and Development (OECD) Seed Schemes. The purpose of the OECD Seed Schemes is to promote certification of seed moving in international trade. Zimbabwe has been a member to this scheme since 1992.

Furthermore, the institute coordinated the development of 15 guidelines/manuals for implementation of the SADC Harmonisation Seed Regulatory System (HSRS) in 2019. It has also facilitated the registration of bean variety NUA45 under Zimbabwe Super Seeds and three maize varieties under CORTEVA onto the SADC Variety Catalogue. The SADC HSRS, which is now operational, seeks to ease seed trade within the SADC region.

Such participation and contribution by the Seed Services Institute in regional and international bodies helps in creating an enabling environment for the seed trade both nationally and internationally. Seed companies and other actors in the value chain should take advantage and grow their businesses.

## **Vegetable Soybean: A nutritious delicacy not known by most Zimbabweans**

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Attached to Seed Co for the PhD Research



Vegetable Soybean (*Glycine max* (L.) Merr.) popularly known as *edamame* in Asia is a specialty soybean which is harvested at R6 stage when the seeds are still immature but fully expanded to fill 80 to 90% of the pods (Juwattanasomran et al. 2012; Mentreddy et al. 2002). It is popular in Asia and United states of America (Shanmugasundaram and Yan 2004; Srisombun et al. 2004) but not much known in Africa, Zimbabwe included. It is consumed mainly as a snack, but also as a vegetable, an addition to soups, or processed into sweets. As a snack, the pods are slightly cooked in salted boiling water, and then the seeds are pushed directly from the pods into the mouth. As a vegetable, the beans are mixed with salads, stir-fried or combined with mixed vegetables (Mentreddy *et al.*, 2002). The above mentioned methods of preparation are popular in Asia and United states, but in our research in Uganda, we found out that the method of cooking can be tailor made to fit the locals (Tsindi, *et al.*, 2018). The Ugandans preferred well-cooked *edamame* the same way they cook their dry beans and peas.

While there was effort to introduce and expand production of vegetable soybean in Africa, little has been done to produce varieties adapted to Africa and accepted by locals (Chadha and Oluoch, 2004; Shanmugasundaram and Yan, 2004; Tsindi, *et al.*, 2019). Because of the photosensitivity of soybean, introduction of exotic varieties presents adaptation challenges to local environments. Very few genotypes are able to adapt to new environments (Tsindi, *et al.*, 2019). This shortage of adapted varieties has partly contributed to the low productions of vegetable soybean in Africa.

In Zimbabwe, very few farmers and consumers know vegetable soybean. Seed Co has released a variety of Vegetable Soybean on the market, **SC edamame**. With such a starting point, I believe farmers can take up the crop and utilize the advantages the crop has. Vegetable soybean provide 35 to 38% protein and 5 to 7% lipid on fresh weight basis; and is one of the few natural sources of isoflavones which are important nutraceuticals (Hartman, *et al.*, 2011), for human health, which help to prevent the buildup of arterial plaques. Other health benefits include, decreasing low density lipoprotein (LDL) cholesterol levels and reducing the risk of cardiovascular diseases.

For people requiring high protein diet, Vegetable soybean can be a good substitute for meat. Compared to all legumes, Vegetable soybean provides a much higher protein content and thus it can be substituted for beans and peas, providing better nutrition. Unfortunately, very few consumers are aware of this nutritious delicacy. Effort is required in Zimbabwe to make the crop known to farmers and consumers. Studies are required to assess the acceptability of vegetable soybean among farmers and consumers. This should also be complemented with effort from breeders to develop more varieties which can be selected and evaluated with the help of farmers and consumers.

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# THE 2020 Fall Armyworm themed training Workshop and Congress in pictures





## Contact Us

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## WHO IS ZPBA

**ZPBA** is a **membership-based, not-for-profit, non-political, professional association** of Zimbabweans based locally or abroad active or interested in plant breeding and/or plant breeding-related fields (e.g. seed agronomist, seed inspectors, seed technologists, geneticists, germplasm conservation specialists, biotechnologists, molecular biologists, etc.) launched on the **26<sup>th</sup> of January, 2016** at Holiday Inn, Harare with financial assistance from FAO.

**ZPBA** hopes to contribute towards agricultural and industrial development in Zimbabwe through creating a platform for information exchange and sharing amongst plant breeders and related professionals, contributing towards policy dialogue, building capacity in both the public and private sector through relevant training.

**ZPBA** is governed by an **elected Executive Committee**, which **derives its powers** from the **membership** and functions through an **appointed Secretariat**.

**ZPBA** is legally registered as a **Trust** in Zimbabwe: registration number 1791/2018. The **ZPBA Board of Trustees** consists of the elected **Executive committee of the ZPBA** who are bound by the Trust Deed and the ZPBA Constitution.

## REVIEW OF MEMBER SUBSCRIPTION

The 2020 Ordinary meeting reviewed the member subscriptions and agreed on the minimum rates indicated below for the year 2020. Those who are able to pay more are encouraged to do so.

CATEGORY	MINIMUM SUBSCRIPTION (US\$)
	(for ZW\$ equivalent use the prevailing bank rate)
Corporate member	250.00
Ordinary member	40.00
Student member	10.00