



Zimbabwe Plant Breeders Association

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NEWSLETTER

ZPBA Newsletter Issue 3 of 2017

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Upcoming events

- Prof P Tongoona Symposium on 25 January, 2018
- Demand-led Plant Breeding Approaches training workshop
- Preparation and presentation of the Variety Release Proposals – a one day training workshop

1. WHO IS ZPBA- Zimbabwe Plant Breeders Association

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 **26th of January, 2016** at Holiday Inn, Harare.

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**.

Read more <http://zimbabweplantbreedersassociation.org.zw/about-us/>

2. IN THE NEWS

*****2.1*****



ZPBA Recognises Professor Pangirayi Bernard Tongoona (pictured above), an academic, for outstanding achievements in plant breeding training, research and leadership.

In its sitting on 22 November 2017 the ZPBA Executive Committee unanimously agreed to give Prof. Tongoona that honour of **ZPBA Honorary life membership** according to section 4.1.1 of the ZPBA Constitution. Let it be on record that he is the **FIRST RECIPIENT** of this honour. **Thursday 25 January, 2018** Mark this date for the Prof Pangirayi Tongoona Symposium – from Art to Science in the Crop Seed Sector at Harare Holiday Inn

Presently, Prof Tongoona is a visiting Professor (Plant Breeding and Genetics) and Associate Director for Breeding Programmes at the West Africa Centre for Crop Improvement (WACCI), University of Ghana. The following narration highlights his educational background, and the outstanding achievements in plant breeding training, research and leadership.

Prof Tongoona obtained his BSc Agriculture (Honours) Crop Science, MPhil in Plant Breeding and PhD in Plant Breeding and Genetics, all at the University of Zimbabwe (UZ). To compliment his academic background and work experiences, he has been a visiting scholar at the Michigan State University, University of Botswana, Purdue University, Cornell University and Texas A&M University.

Professor Tongoona started his academic career in 1987 as a Lecturer at UZ and was subsequently promoted to Senior Lecturer in 1995. He then moved to the University of KwaZulu Natal (UKZN) in South



Africa, in 2003, where he got promoted to full Professor of Plant Breeding in 2005. Upon retirement from UKZN in 2014 he moved to the current positions at WACCI, University of Ghana. He was however appointed Honorary Professor at UKZN due to high productivity in research and postgraduate supervision.

Some of the **leadership positions** that he has held include, but are not limited to: Deputy Dean Faculty of Agriculture (1988-1990, UZ); Chairman Department of Crop Science (1998-2002, UZ); Deputy Director, ACCI, UKZN (2003-2014); Deputy Director, WACCI, University of Ghana (2014-2016); Honorary Professor, UKZN (2014 to date); Academic Leader, Production Sciences Cluster, UKZN (2012-2014) and Associate Director, Breeding Programmes, WACCI, University of Ghana (2016 to date). He has served on numerous University Committees since the inception of his career in 1987. Prof Tongoona's research and publications profile shows that he was able to facilitate formation of inter-institutional, inter-country, inter-continental and multi-disciplinary collaborative research teams. It is also notable that some of his students are holding leadership and influential positions in the public sector, industry and the CGIAR system.

In the area of **teaching**, he developed and taught several courses in basic Genetics, Quantitative Genetics, Plant Genetics and Plant Breeding both at undergraduate and postgraduate levels at the Universities of Zimbabwe, Botswana, KwaZulu-Natal, Makerere and Ghana. Postgraduate courses were only developed and taught at the Universities of KwaZulu-Natal, Makerere and Ghana. He has examined 23 MSc/MPhil dissertations and 36 PhD theses from Universities in Zimbabwe, Zambia, Tanzania, Uganda, Malawi, South Africa, India and Ghana. Professor Tongoona has also been an External Examiner for BSc Agriculture Programmes at Sokoine University of Agriculture, Tanzania and Midlands State University, Zimbabwe. He supervised 90 postgraduate students (65 PhD and 25 MSc/MPhil) who have successfully graduated. Among the graduates, one is already a full professor, while the other is an associate professor. Currently he is supervising 20 postgraduate students from the University of Ghana and two from the UKZN. This means that he would have supervised over 100 postgraduates in the next 3-4 years when all the current students have graduated. This is indeed an incredible and rare achievement in the training of plant breeders. In addition, he has supervised more than 40 BSc Honours projects.

Professor Tongoona's **research** profile is equally impressive. He raised over \$3.5 million in research funds on castor (*Ricinus communis*), wheat (*Triticum aestivum*), sorghum (*Sorghum bicolor*), pearl millet (*Pennisetum typhoides*) and maize (*Zea mays*). Castor breeding resulted in development of putative castor varieties, while wheat breeding resulted in breeding lines that were used to develop wheat varieties adapted to warm rainfed environments by Seed Co Zimbabwe. A project on genomics of Grey Leaf Spot (GLS) disease resistance in maize resulted in identification of inbred lines with Quantitative Trait Loci (QTL) for GLS resistance. While this project is still on-going at UKZN, hybrids generated from the GLS resistant lines are being tested in readiness for release. Another project on development of sorghum hybrids using male sterility is also still on-going at UKZN. Sorghum lines suitable for conversion to male sterility were identified and by 2014, some of them were at the backcross six stage. Presently, development of maize hybrids for the West African environments is also on-going at WACCI, University of Ghana. Three maize hybrids were released in June, 2017 from this programme. Other completed projects have focused on breeding for *Striga* resistance in sorghum; and breeding maize for reduced phytic acid content. An enormous and positive impact of his contributions to plant breeding in Africa will be seen through the countless varieties emanating from breeding programmes of his graduates. The majority of the graduates have capacity to use the next generation technologies, which can be expected to increase efficiency in their breeding programmes.



Professor Tongoona authored and co-authored 94 articles in peer reviewed journals, mostly published in very high impact journals. He also authored and co-authored 34 book chapters. Some of his research findings were shared in more than 26 conference presentations. He authored a Genetics Module for the University of Distance Education in Zimbabwe. He is also a co-author of a book entitled '*The Business of Plant Breeding*' where he contributed a chapter titled '*Understanding Clients in a Breeding Programme*'. The book is to be launched by CABI in November at TROPAG 17 conference in Brisbane, Australia. He is a member of the African Crop Science Society, Zimbabwe Plant Breeders Association, Southern African Plant Breeders Association and a Review Editor of Frontiers in Plant Science Journal.

Nominated by Prof. John Derera & Dr Hapison Mushoriwa

*****2.2*****

A note on Eucalyptus breeding in Zimbabwe.

By

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Eucalyptus are one of the most important exotic hardwoods for commercial planting in Zimbabwe for various end uses due to its fast growth compared to indigenous trees. The five major eucalyptus species grown locally are *E. grandis*, *E. cloeziana*, *E. citriodora*, *E. tereticornis* and *E. camaldulensis*. Amongst these, *E. grandis* and *E. cloeziana* are best suited to high rainfall areas where they grow very fast and produce long straight poles mainly for industrial use. The other three are adaptable to low rainfall areas and are multi-branching making them suitable for firewood. Apart from these five species, there is a whole host of other eucalyptus trees grown in Zimbabwe although to a minor scale.

All the commercial seed that is made available for planting is collected from carefully planned and well-maintained seed orchards around the country. Each species has its own seed orchards where selection to maintain the best families has been conducted. The process starts by identifying different families from either a single provenance in which case it is called progeny testing or it could be from several provenances referred to as provenance-progeny testing. The germplasm is then grown in a Breeding Seedling Orchard (BSO), so called because of a series of intensive selection and roguing that follows at pre-determined periods to remove poor performers. Depending on objectives and end-use, data collected at 3, 5 and 8 years is analysed and inferior families are rogued out completely leaving the best trees for commercial seed production. The best trees, called Plus Trees (PT), in terms of the trial objectives are identified and marked for collecting seed for future breeding purpose.



Fig. 1: *E. grandis* seed orchard at Forest Research Centre in Highlands, Harare. Fig. 2: A 4-year old *Eucalyptus tereticornis* breeding seedling orchard

Note the straight branchless stems.

Over and above the testing of different families of pure eucalyptus species, an attempt has also been made to produce interspecific hybrids to combine the desirable characteristics of different species. The major breeding objective so far have been to combine the fast growth rate of *E. grandis* and the drought hardiness of *E. camaldulensis* and *E. tereticornis*. *E. grandis* was used as the female parent in each case and results have shown that the F1 progeny is superior in growth traits compared to the pure parental species. Currently the F1 seed is available for commercial planting in tobacco growing areas.

Eucalyptus breeding in Zimbabwe has suffered a major setback from invasive alien pest species which are threatening the future of this industry. Efforts are however underway to deal with these pests in collaboration with FAO as well as South Africa's Forestry and Agricultural Biotechnology Institute (FABI). A breeding program to select for resistance to some of these pests is also under consideration in the country.



Zimbabwe's seed industry: vibrant, amidst emerging challenges

Timely availability of improved seeds at affordable prices is critical to increased productivity by smallholder farmers in Africa. Improved seeds can deliver state of the art technology to farmers including higher yields, disease and pest resistance, climate change adaptation, and improved nutrition. Over the last two decades, formal seed systems in Africa have been gradually liberalized resulting in increased participation of private seed enterprises.

The African Seed Access Index (TASAI) is a tool that appraises the structure and economic performance of formal seed sectors. For the top four grain and legume crops in each country, TASAI tracks 20 indicators in five categories: Research and Development, Industry Competitiveness, Seed Policy and Regulations, Institutional Support, and Service to Smallholder Farmers. The pilot TASAI research was conducted in 2014, in four countries - Kenya, South Africa, Uganda and Zimbabwe. A second round of studies in these countries was completed in 2016 and 2017. In addition, the TASAI research was expanded to an additional nine African countries - Democratic Republic of Congo, Ethiopia, Ghana, Madagascar, Malawi, Mozambique, Senegal, Tanzania and Zambia. This article highlights some of the key findings from the Zimbabwe research, where the four focus crops were maize, beans, sorghum and soya beans.

Zimbabwe has one of the most vibrant private-sector led seed industries among the 13 African countries covered in the TASAI survey. The evidence of this vibrancy is the aggregate volume of seed sales. In 2016, on aggregate, seed companies in Zimbabwe sold more than 44,000 tons of maize seed. This was the highest volume sold, among the 13 countries, higher than seed sales in South Africa (33,000 tons in 2016), Kenya (38,000 tons in 2015) and Zambia (33,000 tons in 2016). The vibrancy of Zimbabwe's seed industry is a result of multiple factors along the seed value chain, from breeding and variety development, to marketing.

One of the factors is that most seed companies in Zimbabwe manage their own breeding programs. As a result, the seed companies rate the adequacy of their breeders as 'excellent'. This



is important, because there are fewer breeders (for the top four crops) in Zimbabwe (32) than in Tanzania (46), Kenya (63), or Ethiopia (74). These other countries all have dominant public-sector breeding programs, where public breeders out-number private-sector breeders. Despite having more breeders and publicly-funded breeding programs, the seed companies in these countries have a lower rating of their respective breeding programs. Further, seed companies in Zimbabwe also rate the availability of foundation seed (for maize and soya bean) as “excellent”, compared to a rating of “good” in other countries such as Kenya, Malawi, Tanzania, Uganda and Zambia. These findings point to an easier access to foundation seed in Zimbabwe than other countries in the region.

In addition to having strong private breeding programs, Zimbabwe also has an effective seed inspection system. Zimbabwe laws require seed companies to have their own seed inspection units, who are expected to complement the public seed inspectors under the government seed regulator, called Seed Services. As a result, there are more private seed inspectors (46) than public inspectors (14). This arrangement appears to be working very well for the industry, as the seed companies rate the seed inspection services as ‘excellent’. This was the highest rating among all the 13 countries that were surveyed. Other countries like South Africa and Zambia also have more private than public seed inspectors; with their seed inspection services receiving a rating of ‘good’ from their respective seed companies.

Despite the positive aspects of Zimbabwe’s seed industry, the sector still faces several challenges. One of the challenges is the prevalence of fake seed in the market. In 2016, the Seed Services dealt with 10 cases of fake maize seed, mostly from unscrupulous dealers. In addition, seed companies encountered 42 cases of fake seed. The total of 52 cases is a notable increase from 41 cases reported in 2013. Seed companies were less satisfied with efforts to stamp out fake seed in 2016 (satisfaction score of 56%) than in 2013 (satisfaction score of 67%).

The second challenge is that the seed import and export process has become less efficient over the past few years. In 2013, seed companies reported taking between 10 and 15 days to import seed. In 2016, the import time increased to about 30 days on average. The same trend is observed in seed exports. The average length of time for seed exports in 2016 was 35 days. The seed companies’ satisfaction over this period has dropped significantly from ‘good’ (opinion score of 69%) in 2013, to ‘poor’ (opinion score of 27%) in 2016. The companies’ dissatisfaction is due to the long and bureaucratic process to obtain import and export documentation. The import/export process has become more expensive and time-consuming, requiring more paperwork and visits to more offices than before.

The third challenge is the dominance of maize in formal breeding programs, relative to the other three focus crops. Of the 32 active breeders for the four crops in 2016, more than half (17) were



for maize. In addition, of the 48 varieties released between 2014 and 2016 for the four crops, 34 (71%) were for maize. Further, of the 95 varieties of the four crops, sold in 2016, 59 (62%) were maize varieties. This dominance is similar in most of the other countries including Ghana, Kenya, Malawi, South Africa, Tanzania and Zambia. This calls for the need to increase both private and public investments in the research and development of other important food crops.

The fourth challenge is that the seed industry in Zimbabwe is becoming less competitive. In 2016, the top four seed companies controlled 95% of the maize seed and soya bean seed markets. The high market concentration is due to industry consolidation. Between 2014 and 2016, the seed industry witnessed three mergers and acquisitions, which contributed to the consolidation of market power. As a result, the number of seed companies producing maize seed reduced from 15 in 2014 to 13 in 2016; and the number producing soya bean seed reduced from 7 to 6 over the same period. This trend is also similar in South Africa. However, in most of the other countries, the number of active seed companies is either stable or increasing over time.

In conclusion, Zimbabwe's seed sector is mature and strong, the evidence of which is two-fold. On the one hand, the industry has a vibrant private sector, where most companies are active at different levels of the value chain, including seed production and marketing, as well as breeding and variety development. On the other hand, the industry has well-defined and for the most part, well-implemented policy instruments. However, these positive aspects are countered by several industry challenges including the prevalence of fake seed, long durations for seed imports and exports, and reduced levels of industry competition. In order to sustain the industry's vibrancy, the Zimbabwe government, in close collaboration with the stakeholders in the industry, needs to deliberately address these challenges.

TASAI is a collaborative initiative of the Emerging Markets Program at Cornell University and Market Matters Incorporated. The authors of this article are Dr. Ed Mabaya (em37@cornell.edu) and Mainza Mugoya (mmugoya@marketmattersinc.org).

The TASAI Zimbabwe research was conducted by Mrs. Patience Nyakanda and Dr. Claid Mujaju. For more information on TASAI, including the Zimbabwe TASAI Policy Brief which summarizes the full TASAI report, please visit the TASAI website (www.tasai.org).



3. UPCOMING EVENTS

a. THE PROF. PANGIRAYI TONGOONA SYMPOSIUM- From Art to Science in the Crop Seed Sector- Thursday 25 January 2018

Come expecting the following

- Morning presentations- Lined up are Dr Cosmos Magorokosho's Advances in phenotyping methodologies, Dr Dzingai Rukuni's Seed-related issues, Prof Charles Mutengwa's Community seed production, and more
- Before Lunch- ZPBA Ordinary General meeting where reports from the President and Treasurer are tabled, Presentation & adoption of ZPBA Trust, Election of Office bearers for the period 2018-2019,
- Afternoon- Prof Tongoona Award Ceremony where Prof Tongoona will give a presentation and be awarded the ZPBA Honorary life membership

Detailed Program to be emailed by Monday 8 January, 2018

b. Demand-led Plant Breeding Approaches training workshop in South Africa- early 2018 (exact dates to be advised)

c. Variety Release Proposal preparation & presentation one day training workshop in Harare – March/ April 2018 (exact date to be advised)

4. ZPBA MEMBERSHIP

Membership benefits include

Professional and personal development; **Shared costs on human resource development**; Networking; **Timely Communication (especially for events, internships, job vacancies, scholarships)**; Voting rights; **Discounted rates for events**; Sense of pride in the profession and industry

Read more <http://zimbabweplantbreedersassociation.org.zw/membership/>

5. ZPBA CONTACT DETAILS

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