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FOREWORD

"Let food be the medicine and the medicine be the food" is a famous saying by Hippocrates. The world population took a big leap from 2.5 billion from the second world war to 7 billion and it may reach the estimated population from 10 to 12 billion by the end of this century. The food production has to increase by at least 50 % to feed the Word. During the 19th century, the problem of starvation and poverty was overcame by the innovative breeding approaches which gave high yielding varieties with high input response in the name of "Green Revolution". In this modern era of shifting diets, malnutrition, emerging biotic and abiotic stresses, labour constraints and climate change, the plant breeders are challenged to reconcile sustainable agricultural productivity by developing resilient, high yielding crops with superior nutritional value that can be grown more resource efficiently. Therefore, integrating the latest molecular technology in plant breeding tool box had gained importance. This conference acts as a platform to deliberate and discuss the emerging challenges and prospects of recent innovations in plant breeding research.

The International Conference on "Future challenges and prospects in Plant Breeding" is jointly organized by Centre for Plant Breeding and Genetics and Indian Society of Plant Breeders (ISPB) in this Golden jubilee year of Tamil Nadu Agricultural University during 6-7 October 2021. The conference focuses on eight thematic areas such as utilization of plant genetic resources for food, feed and nutritional security, climate resilient breeding crops for biotic and abiotic stress management, breeding strategies for bio-fortification in crops, innovative breeding approaches for enhancing yield and quality, genetic improvement of crops for nutrient use efficiency, genetic improvement of plant types for farm mechanization, molecular breeding approaches for accelerated cultivar development, public and private partnership in plant breeding. This Conference is an amalgam of knowledge confining more than 400 abstract presentations from scientists and scholars all over the country.

I hope this Conference will serve as a base to propose and integrate ideas thereby igniting curiosity in the young minds. I appreciate the participants who have delivered their research papers in this Conference. I am pleased that the organizers have brought out a compendium as "Book of abstracts" and I am sure that this compilation would be useful to all the scientists and research scholars for their future research work. I congratulate the organizers for their tireless effort in organizing the Conference.

Innovate ! Integrate !! Ignite !!! Inculcate !!!!

(N.KUMAR)

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PREFACE

Plant breeding has evolved with human evolution and the needs of mankind. Initially it was practiced as simple selection followed by domestication of plants for food and feed needs, by nomads about 10,000 years ago. With the discovery of **sexual reproduction by Camerarius** and first systematic investigation on **plant hybridisation by Joseph Koelreuter**, the science of plant breeding moved from exploiting available variability to creating variability. But the **rediscovery of the principles of heredity by Mendel in 1900** and the use of physical and chemical agents to bring about variation in plants in 1920s were epoch making land mark in plant breeding. **The discovery of DNA as genetic material in 1944** and advent of **structure of DNA in 1953** brought about a paradigm shift in the way plant breeding was undertaken. The science of breeding has also undergone sweeping changes from employing conventional hybridisation-based techniques to usage of cutting-edge molecular tools like molecular markers, genome sequencing, site directed mutagenesis and next generation breeding methods like speed breeding to hasten the breeding process.

From the era of breeding plants to increase yield to feed the ever-increasing population, which ushered **Green revolution**, plant breeders have switched priority to breed for improved quality, nutritional content, biotic and abiotic stress resistance and better crop adaption. The changing demands of the end users and dynamic environmental conditions, pose several challenges and the evolution of new technological platforms provide better scenarios for crop breeding success.

The **Book of Abstracts** of the international conference on **"Future Challenges and Prospects in Plant Breeding"** organised by the Indian Society of Plant Breeders would be an excellent trove of information to researches to update their knowledge and broaden their vision. The book which has full length invited papers from internationally renowned scientists will be an eye opener for the readers, about the latest developments in crop breeding. The abstracts have been thoughtfully organised in to different sections namely utilisation of plant genetic resources for food, feed and nutritional security; breeding of crops for climate resilience; biotic and abiotic stress management; breeding strategies for biofortification in crops; Innovative breeding approaches for enhancing yield and quality; genetic improvement of plant types for farm mechanisation; Molecular breeding approaches for accelerated cultivar development and public and private partnership in plant breeding.

I can vouch for the fact that this compilation of lucid ideas of several researchers, has tremendous potential for educating young student minds and serve as a good resource of scientific information to researchers.

(S. GEETHA)

Lead and Oral Papers

PO 43

Invitro propagation protocols of *Hemidesmus indicus* (L) Br. (Indian Sarsaparilla)

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Hemidesmus indicus (L.) R. Br. is one of the important medicinal plants of the family *Apocynaceae*, commonly called as Indian Sarsaparilla. To meet the growing market demand and supply, *exsitu* conservation technique like plant tissue culture plays a vital role. Nodal segments and shoot tips as explants were cultured on Murashige & Skoog's (MS) medium supplemented with different concentrations and combinations of plant growth regulators. For shoot initiation, MS medium supplemented with cytokinins *viz.,* BAP, Kinetin, IAA with different concentrations was subjected to experimentation. Of which, MS + BAP (1.0 mg/l) and MS + BAP (2.0 mg/l) produced the highest percentage of shoot induction. For shoot multiplication, MS medium with different combinations of cytokinins *viz.,* BAP, Kinetin, IAA with different concentrations were tried. Maximum number of shoots per explant was observed in the media, MS + Kinetin (2 mg/l) + IAA (1 mg/l) and MS + BAP (2 mg/l) + Kinetin (1mg/l). For root multiplication, the *invitro* shooted plantlets were transferred to MS medium supplemented with different combinations of auxins *viz.,* IBA and NAA with different concentrations. A greater number of roots were developed in MS+IBA (3mg/L) and MS + Kinetin (2mg/L) + IBA (3mg/L). Moreover, MS + Kinetin (1mg/L) + IBA (3mg/L) and ½ MS + BAP (1mg/L) + IBA (3mg/L) was favouring more number of roots and root length. The medium with MS + IBA (3mg/L) + IAA (1mg/L) was also found to be the fruitful combination for root multiplication. For quicker development of roots, Poly Vinyl Pyrrolidone (PVP) with different concentrations was added to the medium with auxins. Among different combinations of PVP tried, the medium with MS + IBA (3mg/L) + PVP (2.5mg/L) showed root multiplication 20 days earlier than other combinations. The protocols for shoot induction, shoot multiplication and root multiplication of *Hemidesmus indicus* were standardized.

PO 44

Development of multiparent advance generation intercross (MAGIC) in sesame (*Sesamum indicum* L.)

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Sesame and its oil has numerous health and industrial benefits and is widely used for baking, medicine, cosmetics and animal feeds. In India sesame is grown in 15.8 lakh ha with a production of 7.92 lakh tons and with an average productivity of 500 kg/ha. (Department of Agriculture, Cooperation & Farmers welfare. *Third Advance Estimates of Production of Commercial Crops for* 2020-21). Sesame is predominantly cultivated during *kharif* season (Uttar Pradesh, Rajasthan, Madhya Pradesh, Maharashtra, Gujarat) followed by summer season (after late paddy or potato harvest in Odisha) and as pre kharif and *rabi* crop in parts of Southern India. The productivity is low during kharif season (150-800 kg/ha) when compared with summer season (650-1000 kg/ha). Photo and thermo sensitivity of the crop and genotype x environment interaction restrict the breeders to develop varieties specific to season and region. Development of sesame populations which have broad genetic base with favourable alleles is the need of the hour to obtain genotypes with photo and thermo insensitivity. Population developed involving diverse multiparents is expected to have higher recombination and consequent genetic diversity. In this regard, a MAGIC population was developed using eight diverse parents/varieties grown in different agro-ecological regions of India *viz*., E-8 (Karnataka ; *kharif*), GT-2 (Gujarat ;*kharif*), HT-1 (Haryana; *kharif*), Phule til (Maharashtra; *kharif*), RT-351 (Rajasthan; *kharif*), Swetha til (Telangana ;summer), TKG-22 (Madhya Pradesh; *kharif*) and VRI-3 (Tamil Nadu; summer) by single capsule descent approach. The F_5 RIL'$_s$ possess wide genetic base for most of the agronomic and yield traits. This MAGIC population would beuseful to map QTL's linked to traits of interest with higher resolution and can also serve as a source material for further molecular studies.