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National Seminar on CHALLENGES AND INNOVATIVE APPROACHES IN CROP IMPROVEMENT

Agricultural College & Research Institute, Madurai,
Tamil Nadu Agricultural University

December 16 & 17, 2014



Abstract

Organized by

Indian Society of Plant Breeders

Department of Plant Breeding & Genetics, AC&RI, Madurai

Department of Biotechnology, AC&RI, Madurai

National Seminar on
**Challenges and Innovative Approaches in
Crop Improvement**

On the eve of Golden Jubilee Celebrations at
**Agricultural College and Research Institute
Tamil Nadu Agricultural University
Madurai**

December 16 & 17, 2014

Seminar Abstracts

Organized by

Indian Society of Plant Breeders
Department of Plant Breeding & Genetics
and
Department of Biotechnology
AC & RI, Madurai

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TAMIL NADU AGRICULTURAL UNIVERSITY

Dr. K. Ramasamy, Ph. D.
Vice-Chancellor

Coimbatore - 641 003
Tamil Nadu, India

FOREWORD

Agricultural College and Research Institute, Madurai was started in 1965 and adjudged twice as the best college and is the second biggest, among the constituent colleges of Tamil Nadu Agricultural University to offer Agricultural education and to perform research pertaining to the Southern parts of Tamil Nadu. This institution has grown in leaps and bounds is now in its Golden Jubilee year and in the process of offering specialized courses in Biotechnology such as Tissue Culture, Recombinant DNA technology, Molecular Breeding and Genomics to students through the Department of Plant Breeding and Genetics and the newly created Department of Biotechnology.

I feel great pleasure that the Department of Plant Breeding and Genetics and the Department of Biotechnology supported by ISPB are organising the national seminar on “Challenges and Innovative Approaches in Crop Improvement” during 16th and 17th December 2014 on the eve of the golden jubilee celebrations of Agricultural College and Research Institute, Madurai.

A majority of the population in developing countries depend on agriculture for their livelihood. Green Revolution of the mid 1960s and 1970s was triggered by a yield enhancing breeding strategy. Sustaining and expanding the green revolution is an ecological necessity. If we were to achieve a “Second Green Revolution” or what has been termed by some as “Gene Revolution”, we have to seek the help of new and innovative tools of science. ‘Plant genomics’ is the application of the newly available vast amounts of genomic DNA sequence, using a range of novel high-throughput, parallel and other technologies. Molecular markers is a biotechnology tool for locating genes governing agronomically/horticulturally-important characters. The biotechnology revolution continues to affect nearly every sector of the economy. Today, the importance of Biotechnology to the economy is without doubt. Its practical benefits? Significant already? Continue to unfold will be discussed in this seminar.

The souvenir is a compilation of abstracts of papers and posters presented in the seminar. Thus the content of the souvenir will be a reference guide to the researchers, students and entrepreneurs associated in the field of innovative Plant breeding and Biotechnology.

I place my greetings to the contributors of technical papers, faculty members of various committees, sponsors, organizers towards the successful conduct of this event.

Place : Coimbatore
Date : 25-11-2014


(K. RAMASAMY)

TAMILNADU AGRICULTURAL UNIVERSITY

Dr. C. R. Anandakumar, Ph.D.,
Director i/c, Centre for Plant Breeding & Genetics and
President, Indian Society of Plant Breeders (ISPB)

Coimbatore - 641 003
Tamil Nadu, India.

FOREWORD

The Indian Society of Plant Breeders is organizing this years' National Seminar at the Agricultural College and Research Institute, Madurai, second largest constituent college of TNAU, located in the temple city of Madurai. Plant Breeders, mostly from southern part of India are gathering in the foot hills of Yanamalai to discuss various challenges and innovative techniques in crop improvement which includes conventional and innovative breeding tools and techniques used in crop improvement programmes. Researchers, state agricultural university professors and post-graduate students are contributing their scientific findings in the form of more than 300 registered conference abstracts. The crop improvement sessions is divided into multiple themes where leading breeders deliver the lead lectures. Additionally, selected abstracts of post-graduate students are given opportunities for oral presentations to enhance their presentation skills in front of bigger audience. The post graduate students of Plant Breeding & Biotechnology are presenting their posters and participating in the best poster competition. The society recognizes their research work by presenting the best poster award for various sessions.

I hope this seminar will give good exposure to the young plant breeders to start their research career with confidence and also with the guidance of the experienced plant breeders who are always the guiding force for the Plant Breeding programme in this country.

Sd/- C. R. Anandakumar

TAMIL NADU AGRICULTURAL UNIVERSITY

Dr. C. Chinnusamy
Dean

Agricultural College and Research Institute, Madurai
Tamil Nadu, India

FOREWORD

The National seminar on “Challenges and Innovative Approaches in Crop Improvement” is organised at AC & RI, Madurai to mark the Fifty illustrious years (1965-2014) of leadership in agricultural science, education / technology development and innovations. The Institution has gained a place of eminence in the State for spreading technical education to unreachable areas and at the same time bringing thousands of educationists, academicians, researchers, administrators, industrialists and students under its umbrella. Several alumni of this campus are also working as scientists in Indian Council of Agricultural Research (ICAR) and as Professors in State Agricultural Universities and as leading scientists in international laboratories and foreign universities. The national seminar will bring all the scientific man power generated from this great institution back to home institute and share their ideas to plant the novel ideas to young students and researchers of TNAU.

AC & RI, Madurai is always open to develop partnerships among the scientists to develop mutually beneficial relationships between the College and the wide ranging research institutes, international, national and local input industries and hence this seminar will definitely help to achieve the above mandate. The institute was upgraded as Post Graduate Centre in the year 1969 and as Research Institute during the year 1980. The Department of Plant Breeding and Genetics is one of the earliest department established at AC & RI, Madurai when it was upgraded as post graduate centre. It is noteworthy to mention about varieties released in the 50 years of research in Agricultural crops by the Department of Plant Breeding and Genetics that include, five paddy varieties (MDU 1 to 5), one black gram variety (MDU 1), one *Kolingi* variety (MDU 1). Pre-release Rice ACM 01010 is going to be released during the Golden Jubilee Year. The Department of Biotechnology is established during 2014 on the eve of Golden Jubilee celebrations in order to impart the Biotechnological skills to the agriculture graduates and to establish biotechnological research at AC & RI, Madurai.

I am happy to be part of the organization of National seminar on “Challenges and Innovative Approaches in Crop Improvement” during December 16 & 17, 2014. I wish and believe that this seminar venue will be a best platform to exchange the scientific ideas in the foot hills of Yanamalai and the temple city of Madurai where our college is located.

Sd/- C. Chinnusamy

National Seminar on
Challenges and Innovative Approaches in Crop Improvement
On the eve of Golden Jubilee Celebration
Agricultural College and Research Institute, Madurai,
Tamil Nadu Agricultural University

PROGRAMME

16th Dec 2014

12.00 noon-1.00 pm **Session I: Conventional and Marker Assisted Breeding for Crop Improvement**

1. Harnessing Sex Expression and Pollination Mechanism for Commercial Exploitation of Heterosis in Castor

Dr. Amala Joseph Prabhakaran,

Principal Scientist,

All India Co-ordinated Research Project on Castor

Directorate of Oilseeds Research, Hyderabad.

2. Molecular Approaches for the Horticulture Crops Improvement

Dr. Chenna Reddy Aswath,

Principal Scientist & Head, Department of Biotechnology,

Indian Institute of Horticulture Research, Bangalore

2.00 pm – 3.30 pm **Session II & III: Biotic and Abiotic Stress Management**

1. Understanding on the Host Plant Resistance to Herbivore Insects and its exploitation in Crop Improvement

Dr. M. Maheswaran,

Director of Research i/c,

Tamil Nadu Agricultural University, Coimbatore

2. Deployment of Rust Resistance Genes in Wheat Varieties Increased Wheat Production in India

Dr. M. Sivasamy,

Principal Scientist & Head

Indian Agricultural Research Institute, Regional Station, Wellington

3. Challenges and Opportunities in Development of Abiotic Stress Tolerance Rice Varieties

Dr. R. Chandrababu,

Director i/c, Centre for Plant Molecular Biology and Biotechnology,

Tamil Nadu Agricultural University, Coimbatore

Principal Scientist & Head

3.30 pm to 5.00 pm Concurrent sessions

5.00 pm to 6.00 pm Poster session

17th Dec 2014

09.00 am - 10.30 am Session IV: Innovative Breeding Methods, Tissue Culture and Genetic transformation

1. Role of Induced Mutation in Legume Improvement

Dr. J. Souframanian,

Principal Scientist,

Bhabha Atomic Research Centre (BARC), Trombay, Bombay

2. Challenges and Opportunities in Marker Assisted Breeding: A Critical Overview

Dr. H. E. Shashidhar,

Professor and Head, Department of Biotechnology, GKVK, Bangalore

3. Achievements Made Through Conventional Plant Breeding Techniques in Millet Improvement

Dr. M. V. Channabyre Gowda,

Project Co-ordinator (Small millets) ICAR, GKVK, Bangalore

11.00 am – 12.30 pm Session V: Horticulture and Plantation Crops Improvement

1. Improvement of Medicinal Plants: Challenges and Innovative Approaches

Dr. P. Manivel,

Principal Scientist (Plant Breeding),

Directorate of Medicinal and Aromatic Plants Research, Boriyavi, Gujarat

2. Current Status of Coconut Genetic Resources, Conservation and Utilization in India

Dr. V. Niral,

Principal Scientist, Division of Crop Improvement,

Central Plantation Crops Research Institute, Kasargod, Kerala

3. Germplasm Conservation in Oil Palm

Dr. P. Murugesan

Principal Scientist & Head,

Directorate of Oil Palm Research, Research Centre, Palode,

Thiruvananthapuram, Kerala

2.00 pm – 3.00 pm Session VI: Seed Industry & Valedictory function

1. Emerging Trends in Seed Industry

Dr. S.R. Sree Rangaswamy,

Former Director,

Centre for Plant Molecular Biology and Biotechnology,

Tamil Nadu Agricultural University, Coimbatore

**2. Towards Improvement of Oil Content in Safflower
(*Carthamustinctorius* L.)**

Dr. P. Kadirvel,

Directorate of Oil Seeds Research, Rajendranagar, Hyderabad

Valedictory Function

ORGANIZING COMMITTEES

Chief Patrons	Prof. Dr. K. Ramasamy, Vice-Chancellor
Technical Chair	Dr. C. R. Anandakumar, Director, CPBG <i>i/c</i> & President, Indian Society of Plant Breeders Dr. M. Maheswaran, Director of Research <i>i/c</i> , TNAU Dr. C. Chinnusamy Dean <i>i/c</i> , AC & RI, Madurai
Convener	Dr. Sayeed Moshin Ibrahim Dr. P. Nagarajan
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various morphological, floral and agronomical traits at PBS, TNAU, Coimbatore. High pollen sterility (99.00%-99.9%) was also observed in all the CMS lines. Maximum out crossing was observed for the CMS lines, COMS 29A and COMS 30A. Panicle exertion varied from 60.00% to 78.04% and more than 65% panicle exertion were observed for the CMS lines COMS 29 and COMS 30A. The CMS line COMS 29A and COMS 30A were early (115 days) in flowering. Dwarfism is a desirable trait in rice. The data revealed that semi dwarf plant height was observed in all CMS lines. Based on quality traits, all the lines recorded intermediate GC and alkali spreading value. From the present study, it is concluded that CMS lines COMS 27A/B, COMS 28A/B, COMS 29A/B and COMS 30A/B are found promising for good phenotypic acceptability which offer better scope for utilizing these CMS lines for the development of high yielding rice hybrids.

PI-171

RECURRENT SELECTION FOR YIELD IMPROVEMENT IN SUGARCANE (*Saccharum spp*)

Alarmelu, S., G.Hemaprabha and R.M.Shanthi

Division of Crop Improvement, Sugarcane Breeding Institute, Coimbatore
e-mail : alarmelu.s@gmail.com

With the increasing need for new sugarcane varieties and rapid increase in economic development, requirements for new sugarcane varieties gains utmost importance. Concerns exist that sugarcane yield may soon plateau or has already reached a plateau caused by exhaustion of genetic diversity. This study aims for population improvement through recurrent selection schemes with the aim of pyramiding desirable traits, particularly yield combining quality in required selection cycles. At Sugarcane breeding Institute, Coimbatore, population improvement programme for yield and quality through recurrent selection was initiated in 2007 with 40 diverse parents as base population. The mean cane yield increased with cycles of selection. Considerable phenotypic variation was found in the population as evidenced from the phenotypic standard deviation and the range increased from C_0 to C_3 . Genetic improvement was observed for both yield and quality traits. There was a substantial improvement for cane weight in four cycles of selection. Cycle 1 and Cycle 2 hybrids showed substantial improvement for cane height. C_3 hybrids showed an improvement of 12.21 %, 13.01%, 20.09% and 9.36 %, C_4 hybrids showed an improvement of 6.13 %, 9.19%, 22.21 % and 11.02% for cane height, cane thickness, cane weight and stalk number respectively in comparison to C_0 . This new populations developed for yield traits can be introduced into breeding programs. The study suggest that further cycles of selection would result in additional improvement for yield and also indicate the potential of the recurrent selection which will be a good alternative for improving quantitative traits in sugarcane.

markers were used to characterise the parental lines out of which 23 markers were polymorphic. Among these 23 markers, 6 SSR markers were found co-dominant across the hybrids and produced unique fingerprints. These SSR markers could support the data that the hybrids were genetically pure and true with respect to their parents. This study showed that SSR markers could provide a practical and efficient tool in assessment of genetic purity of the Guava hybrids which supplement the morphological information with the molecular data for identifying gene donors and in the identification of pedigree of the existing cultivars.

PIX-14

INHERITANCE OF MORPHOLOGICAL CHARACTERS IN SUGARCANE (*Saccharum spp*)

Karpagam, E and S. Alarmelu

Division of Crop Improvement, Sugarcane Breeding Institute, Coimbatore

Email:e.karpagam1987@yahoo.com

The directives of the international UPOV agreements, DUS guidelines are generally followed in morphological description of sugarcane clones. Morphologically different variants with distinct phenotypic expression can be utilized in breeding for indirect selection of clones when linked with desirable traits. Introgressed hybrids involving improved *S.officinarum*, improved *S.robustum* and CoC 671 with morphological variants were studied for DUS characters. The segregating populations screened for 30 morphological traits showed polymorphism and grouped in five clusters. Least inter-cluster difference was observed between the cluster I and V followed by the Cluster III and V. Clusters II and IV have minimum BC hybrids & maximum intra cluster distance which reflects the broad genetic distance. BC hybrids had prominent swollen growth ring, strap shaped ligule and bobbin shaped internode grouped in to the cluster II with the highest inter cluster distance. Most of BC hybrids possessed transistional auricles & greenish yellow dewlap as the common character and grouped in cluster V. BC hybrids with ovate bud shape & deltoid auricle were grouped in to the cluster VII. Cylindrical, green color internode, corky patches on rind surface, ovate, medium sized buds, deltoid auricles were dominant in the progenies. Most of the characters are under monogenic control with dominant expression in the parents. Being monogenic, the expression of these visible markers can be incorporated effectively as phenotypic tags in marker assisted selection. Introgressed hybrids identified distinct with the morphological clustering and with specific morphological trait can be further characterized with molecular markers to be utilized in selection.



सत्यमेव जयते
Department of Bio-Technology
Govt. of India



Indian Society of Plant Breeders (ISPB) was established during 1995. It has more than five hundred breeders as life members working in both State Agricultural Universities including Foreign Universities ICAR Institutes, Private Companies and Senior Plant Breeders. ISPB involved in conducting seminars and symposia and publication of research articles through its electronic journal.

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