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Cover photos: Top two photos, left: Palmyrah fruit (top) and female (bottom) inflorescence (Ponnuswami *et al.*, pp 11-15); Center, left: Shoot induction of safflower mature embryos with (in mg l⁻¹) 2.0 BA + 0.5 NAA; 'Bhima' safflower mature embryo showing transient GUS expression (second photo from bottom, left) (Jyothi *et al.*, pp 31-36); Bottom, left: *In vitro* callus induction in cotton (Sanghera *et al.*, pp 37-42); Top right plate: Mizo baskets made from *Melocanna baccifera* Roxb. in Mizoram, India (Lalhruaitluanga and Prasad, pp 1-6). Bottom right plate: *Holarrhena antidysenterica* leaves, flowers and tree (Ganapathy *et al.*, pp 47-50).

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H. Lalhrualtuanga, M. N. V. Prasad (India) Traditional Uses, Economic Importance and Ecological Services of *Melocanna baccifera* Roxb. in Mizoram, India (pp 1-6)

ABSTRACT

Original Research Paper: The North Eastern Hill (NE) region of India possesses the largest species of bamboos in India. Among seven states of NE India, Mizoram has the largest bamboo-covered forest area. The bamboo forest area of Mizoram constitutes 14% of the total of India's bamboo area i.e. 8.96 million ha. Non-clump forming bamboo *Melocanna baccifera* is the most abundant, contributing about 95% of the growing stock of bamboo. Traditional living and lifestyle of the Mizo society, to a large extent, is dependent on bamboo for its variety of uses and this bamboo has much to offer by way of contributing to socio-economic advancement of modern Mizo society. The communities of the region use this potential resource for food, shelter, furniture, handicraft, medicines, musical instruments, agriculture implements and household items. *M. baccifera* and other bamboos from the Government of Mizoram state Notified Forests are sold under Mahal and Permit System outside and within the state; this helps the state income to a large extent. *M. baccifera* is extensively used for the production of bamboo ply boards. Many people earn their livelihood from this plant. It also contributes an amount to the state government income. *M. baccifera* forests and regrowth areas in critical mountain slopes and around village habitations shall be afforded protection to ensure environmental security.

Sadiq Majeed, Mudasir Sayeed, Rajinder Kaur, Monika Gupta, Aditi Kashyap, Dile Ram Sharma (India) Molecular Analysis of Genetic Diversity in Wild Accessions of *Bunium persicum* (Boiss.) Fedtsch – A Critically Endangered Medicinal Plant of Temperate Himalayas (pp 7-10)

ABSTRACT

Original Research Paper: Random amplified polymorphic DNA (RAPD) markers were used to assess genetic diversity in *Bunium persicum* (Boiss.) 'Fedtsch' (Apiaceae), a critically endangered medicinal plant collected from 15 locations in Himachal Pradesh and Jammu and Kashmir, India. A high level of genetic divergence was observed in the collected accessions. A total of 173 bands were generated by 36 random 10-mer primers, of which 168 were observed to be polymorphic indicating a high level (97.11%) of polymorphism among the accessions studied. Similarity, measurement using UPGMA followed by dendrogram analysis, resulted in two major clusters. The results of this preliminary investigation suggests that there is a lot of genetic diversity among the wild accessions of this endangered medicinal plant species which needs to be documented, characterized, conserved and used for its improvement.

Ponnuswami Vinayagam, Janarthani Dhandapani, Priya Raman, Ramesh Kumar Alagarsamy, Prabhu Muthusamy, Senthamizh Selvi Balaraman (India) Molecular Characterization for Genetic Diversity of Palmyrah (*Borassus flabellifer*) Accessions using Inter Simple Sequence Repeat (ISSR) Markers (pp 11-15)

ABSTRACT

Original Research Paper: Palms are woody monocotyledons in the family Arecaceae which is placed in the order Arecales. They are a natural group of plants with fossil records dating from the late Cretaceous and with a characteristic appearance that enables them to be recognized easily, despite occasional confusion with cycads or cordylines. Slow, tall-growing, hardy and non-branching, dioecious and perennial in nature, palmyrah palms have no distinguishing features to identify sex, stature and high *neera*-yielding types until flowering age of about 12 to 15 years. Thus tappers have shifted from the traditional risky job of palmyrah climbing and slowly shifted to other easy jobs. So trees whose sex can be determined and with higher quality post harvest qualities are desirable traits of palmyrah palm. Molecular markers can be effectively utilized to diagnose and select a genotype. In this study 20 palmyrah accessions were analysed using inter simple sequence repeats (ISSR) markers with 21 primers. A total of 130 ISSR markers were scored of which 65 were polymorphic, equivalent to 47.94% polymorphism. These markers were used to estimate the genetic similarity among accessions using Jaccard's similarity coefficient, with similarity values ranging from 71.6 to 95.7%. The average number of markers produced per primer was 6.11. For each of the 21 ISSR primers PIC value ranged between 0 and 0.46. Cluster analysis based on ISSR data grouped the 20 palmyrah accessions into two major clusters. PCA based on ISSR data clearly distinguish genotypes similar to the results of cluster analysis.

Lakki Reddy Prasanthi, Bommu Veera Bhaskara Reddy, Kokkanti Rekha Rani, Yeturu Sivaprasad, Thovi Rajeswari,

Kondreddy Raja Reddy (India) RAPD and SCAR Marker Linked to the Sterility Mosaic Disease Resistance Gene in Pigeon Pea (*Cajanus cajan* L. Millsp.) (pp 16-20)

ABSTRACT

Original Research Paper: The present study was undertaken to identify random amplified polymorphic DNA (RAPD) primers and to develop a sequence characterized amplified region (SCAR) marker associated with pigeon pea sterility mosaic disease (PPSMD) resistance in pigeonpea cross ICPL-7035 x ICPL-8863. Bulked segregant analysis was employed to identify the RAPD primer linked to PPSMD and to develop a SCAR for the PPSMD resistant gene of ICPL-7035, a known resistance source to different isolates of PPSMV and vector. A total of 200 random decamers were surveyed for identification of polymorphic markers between the DNA of resistant and susceptible parents. Amplification of individual DNA samples out of the bulk with putative marker, OPA18800 only revealed polymorphism in resistant and susceptible lines, indicating that the marker OPA18 was associated with PPSMD resistance in ICPL-7035. Their end sequences were used to design allele-specific sequence characterized amplified region (SCAR) marker SCAR 816(16f/r), which was present in all generations (parents, F₁ and F₂) and would help to identify the transfer of the SMD resistance gene to susceptible lines.

Raja Shankar, Balakrishna Govindrao Bagle, Tukaram Annapa More (India) Diversity Analysis of Bitter Gourd (*Momordica charantia* L.) Germplasm from Tribal Belts of India (pp 21-25)

ABSTRACT

Original Research Paper: Forty six landraces collected from tribal belts of Gujarat, Tamilnadu, Kerala, Karnataka and Maharashtra states of India were examined for 14 quantitative characters during vegetative and reproductive stages to assess the magnitude of genetic diversity. Data that were subjected to univariate and multivariate statistical analyses indicated ample variability for most traits. Correlation studies indicated a significant positive correlation of fruit length, fruit girth, seed weight and number of seeds per fruit with fruit yield. Accession MCC-23 collected from Gujarat was found to be the highest yielding landrace among the bitter gourd collection. Principal component analysis revealed that the first five principal components exhibited eigen values that explained 70% of the total variability. Hierarchical cluster analysis grouped the accessions into six clusters at the level of 5.10 euclidean distances. Clusters I to VI possessed 22, 12, 1, 9, 1 and 1 accessions, respectively. The major clusters, viz. I, II and IV possessed accessions of common geographical origin indicating that clinal variation still exists among the landraces of this under-exploited species and a lack of exchange of landraces between the tribal belts. Strategies for collection and conservation of this nutritionally and medicinally important vegetable are discussed.

Kastoori R. Raghuprakash, Lakkireddy Prasanthi, Mangala Reddysekhar (India) Studies on Selection Indices in Guar (*Cyamopsis tetragonaloba* (L.) Taub.) (pp 26-30)

ABSTRACT

Short Communication: The efficacy of the selection process is greatly enhanced by using appropriate selection indices. The knowledge of the relationship among various traits affecting grain yield is crucial to arrive at a potentially effective selection index. The present study was carried out to illuminate the nature and extent of interrelationships among various traits (including quality, physiological and yield related) affecting seed yield in guar (*Cyamopsis tetragonaloba* (L.) Taub.). Fifty guar accessions from different states Rajasthan, Gujarat, Haryana and Karnataka were evaluated in a randomized block design with three replications, during Kharif, 2005 at the Dryland Farm, RARS, Tirupati, India. Data was recorded on 21 quantitative traits and subjected to statistical analysis. The correlation studies revealed the positive and significant association of number of pods per plant, number of branches per plant, number of clusters per plant, number of seeds per pod, number of pods per cluster, harvest index, SCMR at 40 and 60 days after sowing with seed yield. Path analysis revealed that the number of pods per plant, SCMR at 40 DAS, number of seeds per pod and number of pods per cluster were important in formulating selection criteria for improvement of seed yield in guar.

Badri Jyothi, Nisar Ahmed Ansari, Mulpuri Sujatha (India) Plant Regeneration and Microprojectile-Mediated Transient β -glucuronidase (*gus*) Gene Expression in Mature Embryos of Safflower (*Carthamus tinctorius* L.) (pp 31-36)

ABSTRACT

Original Research Paper: An efficient *in-vitro* plant regeneration system is a basic necessity for any transgenic approach. *In-vitro* studies were carried out with the prime objective of developing a suitable protocol for high frequency *in-vitro*

regeneration from mature embryos of safflower (*Carthamus tinctorius*). Attempts were made to determine the variability and regeneration abilities among selected genotypes viz., 'Bhima', 'CO-1', 'A-1' and 'JSI-7' and to identify suitable hormonal combination for morphogenesis. Kinetin + 2,4-D combinations resulted in callus induction while BA + NAA combinations yielded direct regeneration. MS medium supplemented with 2.0 mg l⁻¹ BA + 0.5 mg l⁻¹ NAA and 0.1 mg l⁻¹ BA + 1.0 mg l⁻¹ NAA induced maximum caulogenesis and rhizogenesis, respectively. Prolonged culture period without sub-culture or transfer to the rooting medium resulted in development of callus at the base. Transient *Gus* gene expression in mature embryos was studied in comparison with other seedling explants. Percentage transient *gus* gene expression was maximum in mature embryos followed by cotyledonary leaf, hypocotyls and root. Mature embryos can be used as an ideal target tissue for transformation as direct regeneration is possible without the involvement of a callus phase. Among the cultivars studied, 'Bhima' was better both for morphogenesis and transient *gus* expression percentage.

Gulzar Singh Sanghera, Manjit Singh Gill, Jagdeep Singh Sandhu, Satbir Singh Gosal (India) Effects of Genotype, Plant Growth Regulators and Explant Source on Callus Induction in Cotton (*Gossypium hirsutum* L.) (pp 37-42)

ABSTRACT

Original Research Paper: In this study callus induction of 5 elite upland cotton genotypes ('PIL-8', 'F 1378', 'F 1861', 'LH 1995' and 'LH 2076') were tested on five different callus induction (MS + 1.0 mg/l Kin + 1.5 mg/l IAA; MS + 2.0 mg/l NAA + 0.1 mg/l Kin; MSB (MS + Vit. B5) + 1.0 mg/l ZT + 1.0 mg/l Kin + 560 mg/l proline; MSB +2.5 mg/l ZT + 1.0 mg/l 2,4-D; MS + 1.0 mg/l 2,4-D + 1.0 mg/l Kin + 560 mg/l proline) and somatic embryo initiation-maturation media that were previously found to be capable of inducing somatic embryogenesis in cotton. All genotypes tested produced callus on different media within 4 to 6 weeks. Analysis of variance revealed significant differences in callus induction, days taken to callus induction and callus growth index in different explants, genotypes and media composition. Of the two explants compared, hypocotyls and cotyledons, the former were most responsive to callus induction and proliferation than the latter. Hypocotyls showed a significantly higher percentage of callusing ranging from 35.05 to 78.44% with an average of 59.45% while the corresponding values for cotyledons were 27.75 to 59.92% and 45%, respectively. PIL-8 recorded the highest percentage of callus induction (78.44%) and was the only genotype that induced callus within 30 days. Different types of media tested revealed that plant growth regulator type had a significant effect on callus induction and physical appearance. The callus induced on MS medium containing 2,4-D was brown and of low quality compared to that produced on MS media containing NAA, Kin and ZT combinations. However, medium containing Kin resulted in the formation of compact callus with a number of roots emerging from it. The results of this study will pave the way for establishing a future *in vitro* regeneration system and transformation methods for elite Indian cultivars.

Selwyn Anitha, B. D. Ranjitha Kumari, M. Kamaraj (India) Changes in the Antioxidant Enzymes and Lipid Peroxidation in Betel Vine (*Piper betel* L.) Subjected to Water Stress (pp 43-46)

ABSTRACT

Original Research Paper: An experiment was conducted to study the effect of water deficit stress on the antioxidant enzyme activity in betel vine (*Piper betel* L.) cv. 'SGM1'. There was a significant increase in the activity of superoxide dismutase (SOD), ascorbate peroxidase (APX) and glutathione reductase (GR) in the leaves and roots subjected to water stress. The increased activity was higher in the leaves than the roots collected both on the 5th and 10th day after water deficit treatment. The activity of catalase was much higher in the roots than leaves suggesting that catalase activity was the major stress-coping mechanism in roots. With increasing stress levels and duration of stress, membrane damage (lipid peroxidation) increased.

P. S. Sujan Ganapathy, Y. L. Ramachandra, H. V. Sudeep, Pavan Kumar Bellamakondi, K. G. Somashekhara Achar, Padmalatha S. Rai (India) Pharmacognostic and Phytochemical Evaluation of *Holarrhena antidysenterica* Wall. (pp 47-50)

ABSTRACT

Original Research Paper: *Holarrhena antidysenterica* Wall. is an important plant employed in various indigenous systems of medicine against several diseases, and almost every part of the plant has diverse medicinal properties. The current communication provides a detailed account of the pharmacognostic investigation carried out on *H. antidysenterica*. The study includes macro- and micromorphological characters of leaf, quantitative leaf microscopy, fluorescence study of powder, physicochemical studies and preliminary phytochemical aspects. The results of the study could be useful in setting some diagnostic indices for the identification and preparation of a monograph of the plant.

Thayamini H. Seran, Krishanthy (Sri Lanka) Impact of Removal of Shoot Tips on Productivity of Greengram (*Vigna radiata* L.) (pp 51-54)

ABSTRACT

Original Research Paper: This experiment was carried out in 2007/2008 cropping seasons at the Agronomy farm of Eastern University, Sri Lanka to study the effect of decapitation on yield of greengram (*Vigna radiata* L.) 'MI 5'. In the control treatment (T₁), removal of the apical portion (1 cm long) of greengram plants was not practice while in other treatments (T₂, T₃, T₄ and T₅), apical portions of main stems were removed 3, 4, 5 and 6 weeks after planting respectively. Several morphological features were measured at regular intervals to evaluate the effect of decapitation while other parameters were measured at harvesting time. There were significant (P<0.01) differences between treatments in the number of pods per plant, dry weight of pods per plant and 1000-seed weight. Higher yield (2585 kg/ha) was obtained in T₂ than other treatments and T₁ gave the lowest yield (1687 kg/ha). In the present study, removal of the apical portion of the main stem at the 3rd week (T₂) would be most effective practice to obtain a high yield of greengram in sandy regosol.

P. Sreekala, M. Hemanth Kumar (India) Phenotypic Stability of Kernel and Protein Yield in Groundnut (*Arachis hypogaea* L.) (pp 55-60)

ABSTRACT

Original Research Paper: The present investigation was undertaken in groundnut (*Arachis hypogaea* L.) to identify the stable genotypes for characters that contribute to kernel yield. The study was conducted during 2005 and 2006 at the S. V. Agricultural College Farm, Tirupati, Andhra Pradesh, India using 22 groundnut prerelease and released genotypes. Kharif Inceptisols (Environment I), Rabi Inceptisols (Environment II) and Summer Alfisols (Environment III) served as the three contrasting environments for experimentation. Among the three environments, the genotypes ICG-7332, ICG-3245, ICG-7633, ICG-11386, ICG-2184, JL-24, TPT-4 and K-134 were highly responsive to Rabi Inceptisols in terms of yield and yield-contributing characters. Hence, they may be included as parents for developing a high-protein and kernel-yielding variety suitable for cultivation in all the environments studied.

Justin N. Okolle (Cameroon), Abu Hassan Ahmad, Mashhor Mansor (Malaysia) Infestation and Parasitism of Banana Skipper (*Erionota thrax*) (Lepidoptera: Hesperidae) in Relation to Banana Leaf Age, and Surface and Distance from Field Edge (pp 61-65)

ABSTRACT

Original Research Paper: Studies were carried out in a commercial plantation of Cavendish bananas and a local variety Pisang Mas in Malaysia. The numbers of *Erionota thrax* life stages and those parasitized were quantified in relation to banana leaf age, leaf surface and distance from field edge. Irrespective of the observation period (low or high density), a significantly higher mean number of eggs and younger instar larvae were found on older leaves while highest mean numbers of older instar larvae were recorded on younger leaves only during the low-density period. Generally, parasitism of eggs was relatively higher on older leaves while that of larvae and pupae was higher on younger leaves. For both Pisang Mas and Cavendish, mean number of egg batches and individual eggs were significantly more on lower than on upper leaf surfaces. With the exception of mean number and percent parasitism of pupae, infestation and parasitism of eggs and larvae were not significantly different between interiors (50 and 100 m) and perimeters (10 m) of the field.

Prem Lal Kashyap, Jagtar S. Dhiman (India) Induction of Resistance in Cauliflower against Alternaria Blight using Potassium and Phosphonic Salts (pp 66-70)

ABSTRACT

Original Research Paper: The effect of exogenous spray application of seven potassium and phosphonic resistance-inducer salts viz. KH₂PO₄, H₃PO₃, K₂HPO₄, K₂SO₄, salicylic acid (SA), NH₄H₂PO₄ and KOH at 0.5, 1.0, 2.0 and 4.0 ml/l dosages to cauliflower (*Brassica oleracea* L. var. *botrytis* subvar. *cauliflora*) leaves on induction of resistance against Alternaria blight (*A. brassicicola*) was studied. The resistance inducers evaluated in terms of incidence and intensity against the disease were found to suppress the disease outbreak to varying levels. The protection achieved was in the order of KH₂PO₄ > H₃PO₃ > K₂HPO₄ > K₂SO₄ > SA > NH₄H₂PO₄ > KOH. It was maximum up to three days of treatment but diluted with time, until 15 days. Smaller lesions of Alternaria blight were produced in the case of KH₂PO₄ (0.232 cm) followed by H₃PO₃ (0.304 cm). The minimum

number of lesions of leaf area was found in the case of KH_2PO_4 (1.46/2.5 cm^2) followed by K_2HPO_4 (2.03/2.5 cm^2). These salt solutions, at the dose tested were not phytotoxic to cauliflower foliage. The technology involving low dose application of salts offers an eco-friendly and cost effective plant protection approach. This study provides preliminary information that may facilitate the standardization of immunization technology, using these potassium and phosphonic salt solutions, for the protection of plants in field or greenhouses.

Pallem Chowdappa, Gaddam Subhash Reddy, Ashok Kumar, B. Madhusudhan Rao, Ram D. Rawal (India) Morphological and Molecular Characterization of *Colletotrichum* Species Causing Anthracnose of Grape in India (pp 71-77)

ABSTRACT

Original Research Paper: Anthracnose, caused by *Colletotrichum* sp., is a major disease causing severe yield losses. The objective of the present study was to understand diversity and distribution of *Colletotrichum* species prevalent in major grape-growing areas in India. A total of 30 isolates of *Colletotrichum*, collected from major grape growing regions of Andhra Pradesh, Karnataka and Maharashtra between 2003 and 2005, were characterized using morphological criteria, species-specific PCR and ITS sequencing. Three morphological types were distinguished based on colony growth rate and conidial morphology. Morphological type I (*C. gloeosporioides*) produced cylindrical conidia with both ends rounded and colony growth rates ranged from 11.21 to 12.08 mm/day. Morphological type II (*C. acutatum*) produced fusiform conidia with tapered/rounded ends and growth rate was 6.29 mm/day. Morphological type III (*C. acutatum*) had fusiform and elongated conidia with mostly tapered ends and colony growth rate was 4.66 mm/day. The universal primer pair ITS1 and ITS4 amplified, a 560-bp fragment from genomic DNA of isolates belonging to all three morphological types. Morphological type I isolates were identified as *C. gloeosporioides* on the basis of species-specific diagnostic PCR and rDNA-ITS sequences while morphological types II (isolate CG 5) and III (CG33) were identified as *C. acutatum*. All three morpho groups could also be distinguished based on ITS-RFLP profiles as generated by restriction enzyme, *Mbo*I. The present study, thus, clearly established *C. gloeosporioides* as the dominant pathogen (93.33%) with very limited occurrence of *C. acutatum* (6.66%). This is the first report of occurrence of *C. acutatum* and existence of diverse molecular groups among *C. gloeosporioides* and *C. acutatum* populations associated with grape anthracnose in India.