

Proceedings

**3rd International Conference on Advancement of
Science and Technology for Environment,
Society and People (ICASTESP-III)
(13-14 October 2023)**



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of the
3rd International Conference
On
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(13-14 October 2023)

Editors

Devi Dayal
Rupesh N. Nakar

Organised by



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Estimation of repeatability of lactation milk yield in different groups of crossbred cows

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ABSTRACT: The purpose of this study is to determine the repeatability of lactation milk yield in various classes of $\frac{1}{2}$ Jersey \times $\frac{1}{2}$ Red Sindhi, $\frac{1}{4}$ Jersey \times $\frac{3}{4}$ Red Sindhi, $\frac{3}{8}$ Jersey \times $\frac{5}{8}$ Red Sindhi, $\frac{1}{8}$ Jersey \times $\frac{7}{8}$ Red Sindhi crossbred of cows. The Department of Animal Husbandry and Dairy, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India, maintains a history sheet that was used to collect the data. Lactation milk yield from the first (L1), second (L2) and third (L3) lactations of 83 cows and 249 observations of various grades of Jersey x Red Sindhi crossbred were recorded in kilograms. The range of lactation milk yield from the first (L1), second (L2) and third (L3) lactations were 1243.205 - 2834.997 Kg of $\frac{1}{2}$ Jersey \times $\frac{1}{2}$ Red Sindhi crosses, 1208.73- 4064.36 Kg of $\frac{1}{4}$ Jersey \times $\frac{3}{4}$ Red Sindhi crosses, 1794.547493 - 3201.23541 kg of $\frac{3}{8}$ Jersey \times $\frac{5}{8}$ Red Sindhi crosses, 1397.601- 3015.209 kg of $\frac{1}{8}$ Jersey \times $\frac{7}{8}$ Red Sindhi crosses respectively. The overall mean of lactation milk yield was 2027.72 kg of $\frac{1}{2}$ Jersey \times $\frac{1}{2}$ Red Sindhi crosses, 2041.32 Kg of $\frac{1}{4}$ Jersey \times $\frac{3}{4}$ Red Sindhi crosses, 2286.53 kg of $\frac{3}{8}$ Jersey \times $\frac{5}{8}$ Red Sindhi crosses and 1872.81 kg of $\frac{1}{8}$ Jersey \times $\frac{7}{8}$ Red Sindhi crosses respectively. The repeatability of lactation milk yield for 0.72 ± 0.01 of $\frac{1}{2}$ Jersey \times $\frac{1}{2}$ Red Sindhi crosses, 0.65 ± 0.08 of $\frac{1}{4}$ Jersey \times $\frac{3}{4}$ Red Sindhi crosses, 0.68 ± 0.14 of $\frac{3}{8}$ Jersey \times $\frac{5}{8}$ Red Sindhi crosses, 0.61 ± 0.09 of $\frac{1}{8}$ Jersey \times $\frac{7}{8}$ Red Sindhi crosses. For different classes of crossbred dairy cattle, more repeatability indicates greater performance.

Keywords: Lactation milk yield, Crossbred, Cattle, Repeatability, Various grades.

Screening of sesame genotypes for different sowing windows of Andhra Pradesh

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ABSTRACT: Sesame (*Sesamum indicum* L.) is popularly known as queen of oil seeds and locally as Nuvvulu, til, gingelly. Sesame is photo and thermo sensitive crop. Sesame is grown mostly during Rabi-summer crop in Andhra Pradesh. In Andhra Pradesh brown seed varieties are generally grown. Most of the farmers generally go for sesame after harvest of Paddy crop. So based on harvesting of the paddy, sesame is grown, hence they start sowing of sesame from December to May months. Based on this, an experiment is formulated to evaluate the germplasm lines suitable to different months with sustainable yield. During 2021, an experiment is conducted at Agricultural Research Station, Yellamanchili, Anakapalle Dt. Andhra Pradesh. Twentytwo brown seed germplasm accessions of sesame (*Sesamum indicum* L.) are sown during January, February, March, April and May months. The experiments are sown in Randomized block design in each month with three replications. The plot size is four rows each of 4.5 m row length. Among all the sowing months tested, January recorded highest seed yields followed by May. It is observed that capsules are formed during all the months. But due to rains during preharvest time and harvesting time, the seed yields are drastically reduced. Among all the sesame brown seed entries tested, YLM-146, EC-370686, VZM-10, SKL-19 recorded significant seed yields found promising all through the months of testing. These accessions may be recommended to use in the breeding programme for development of sustainable varieties in sesame.

Key words: Sesame, screening, accessions, seed yields.

Predicting Cabbage Maturity at Harvest Using Deep Learning Technique

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ABSTRACT: This research paper explores the application of deep learning techniques to predict the optimal maturity stage for harvesting of cabbage. Traditional methods rely on human expertise for maturity assessment, leading to inconsistency in judgment. However, the use of deep learning techniques in image recognition has opened up new possibilities to classify cabbage maturity stages. In this study, teachable machine available on Google was used to develop a deep-learning model to detect the maturity of cabbage at the time of harvesting. This algorithm relies on RGB images to classify cabbage into two distinct stages: 'matured' (class 1) and 'not-matured' (class 2). A dataset consisting of 630 RGB images was collected from an experimental field using an RGB camera. The Teachable Machine randomly divided this image dataset into two segments: training set (85%) and a testing set (15%). In this study, the model was trained and tested for three batch sizes, three epochs, and three learning rates, i.e. 16, 32, and 64; 25, 50, and 75; and 0.01, 0.005, and 0.001, respectively. The combination of 64 batch sizes, 75 epochs, and a 0.005 learning rate has given the best classification accuracy (94%) for both classes. The identified deep learning architecture was found able to classify cabbages into mature and un-mature with 94% accuracy. The sensitivity (96%) was found higher than accuracy, which is a good indicator for performance of the model architecture. The type-II error of developed architecture was only 0.04, which is a better achievement. This showed the chances of wrongly classified a mature cabbage as an un-mature one. This study offers a non-invasive and effective solution that can significantly aid farmers in identifying the optimal

cabbage harvesting period, thereby reducing waste and augmenting the overall value of the crop.

Keywords: Deep learning, cabbage, maturity, prediction

Bio-efficacy of ready-mix insecticides against pod borer, *Maruca vitrata* (Fabricius) in cowpea

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ABSTRACT: The experiment was conducted at Main Vegetable Research Station, AAU, Anand on bio-efficacy of ready-mix insecticides against pod borer, *M. vitrata* in cowpea which indicated that all the ready-mix insecticide applications effectively reduced the populations of *M. vitrata* during first as well as second year of study. Results on pooled over year after spray application indicated that the lowest larval population was recorded in plots treated with T₄ Chlorantraniliprole 9.30%+Lambda-cyhalothrin 4.60% ZC [37.50 g a.i/ha; 0.75 larvae/plant] and T₅ Chlorantraniliprole 9.30%+Lambda-cyhalothrin 4.60% ZC [30 g a.i/ha; 0.92 larvae/plant] which were also found at par with each other. The next effective group based on larval population was T₇ Chlorantraniliprole 18.5 SC [30 g a.i/ha; 1.19 larvae/plant] and T₆ Chlorantraniliprole 9.30%+Lambda-cyhalothrin 4.60% ZC [22.50 g a.i/ha; 1.43 larvae/plant]. The population of spiders was uniform in all the treatments during first year, second year and pooled over year as treatment difference was non-significant which showed that all the insecticidal treatments found more or less equally safer to this predator. However, T₇ treatment was also found at par with T₅ and T₆. The rest of other insecticidal treatments were recorded larval population ranges from 2.88 to 1.57 per plant. The highest green pod yield (76.33 q/ha) was recorded in the treatment of T₄ which was equally effective with T₅ (75.53 q/ha), T₇ (73.37 q/ha) and T₆ (71.16 q/ha).

Effect of different organic nutrient sources on growth and yield of rice

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ABSTRACT: A field experiment was conducted during *kharif* season of 2021-22 at organic farm, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari, Gujarat, to study the effect of different organic nutrient sources on rice (*Oryza sativa* L.). The experiment was laid out in Factorial Randomized Block Design with 3 replications. The Factor-A comprised of soil application (S), *i.e.* S₁, 100% RDN through NADEP compost, S₂, 80% RDN through NADEP compost along with *Azospirillum* and PSB @ 2 l/ha each, S₃, 60% RDN through NADEP compost along with *Azospirillum* and PSB @ 2 l/ha each and S₄, Ghanjivamrut @ 500 kg/ha + Jivamrut @ 500 l/ha, and Factor-B comprised of foliar application (F), *i.e.* F₀, control, F₁, Novel Organic liquid nutrient @ 1% and F₂, *Moringa* leaf extract @ 3%, with 12 treatment combinations of soil and foliar application with organic rice variety 'GNR-7'. The results indicated that, the application of 100% RDN through NADEP compost recorded significantly higher plant height 60 DAT and at harvest, no. of tillers/m² at 60 DAT, panicle weight, and grain yield of rice crop. The application of F₂, *Moringa* leaf extract @ 3% recorded significantly higher plant height 60 DAT, no. of productive tillers/m² at 60 DAT, no. of grains/panicle, panicle length and grain yield of rice crop.

Safeguarding Traditions, Cultivating Wisdom: Indigenous Plant Protection Practices of Eastern Himalayan Region, India

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ABSTRACT: The state of Tripura in North Eastern India boasts a rich heritage and abundant biodiversity, where traditional plant protection strategies have long played a crucial role in the agricultural landscape. However, despite their historical significance, a comprehensive report on indigenous plant protection practices (IPPPs), particularly those aimed at managing insect and vertebrate pests, has been conspicuously absent. This study aimed at investigating, collecting, and documenting these vulnerable IPPPs, which have been passed down through generations in this region. The research methodology involved the meticulous documentation of IPPPs through semi-structured questionnaires, participatory interactions, and direct observations, engaging a diverse sample of more than 180 informants. The study unearthed a notable increase in the importance of IPPPs in mitigating pest-related challenges. Specifically, it recorded thirty-nine indigenous practices meticulously designed for pest management by the ethnic communities of Tripura, highlighting the profound knowledge inherited from their ancestors. The respondents exhibited remarkable ingenuity in developing innovative solutions for pest issues using locally available resources, offering cost-effective and eco-friendly alternatives. Among these practices, seed drying before storage emerged as the most frequently cited IPPP, with an RFC of 0.675. In terms of IPPP fields, the people predominantly engaged in the agriculture+horticulture+storage category. An essential implication of this study is the identification of two unique IPPP strategies in the region, hitherto unexplored. Moreover, the chosen IPPP field was significantly associated with various socio-demographic factors such as age, education, occupation, gender, location, and house type. This underscores the importance of understanding the cultural context in the adoption of specific IPPPs. In conclusion, the indigenous plant protection practices uncovered in this study reflect the wisdom and generosity of Tripura's ethnic growers. This study marks the initial stride in accessing the invaluable

technology of untapped Tripura in IPPPs, paving the way for their preservation, dissemination, and integration with advanced pest management options.

Keywords: Indigenous plant protection practices (IPPPs); Pest management; Traditional knowledge; Biodiversity conservation; Ethnobotany

Prevalence and antimicrobial resistance in *Enterococcus faecium* isolated from freshwater fish

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ABSTRACT: *Enterococcus faecium* is a clinically important organism that infect humans and cause nosocomial endocarditis, bacteremia, wound infections and urinary tract infections. Presence of vancomycin resistant *Enterococcus faecium* carrying plasmid -mediated *vanA* and *vanB* genes are one of the major issues in the food industry. The purpose of this study was to assess the prevalence of *Enterococcus faecium* in freshwater fish and screening of bacterial isolates for antimicrobial resistance. A total of 175 fish gill/muscle swabs from freshwater fish (at least ~ 200 g) were collected from retail markets and fish farms of Uttar Pradesh. The swabs were enriched in bile esculin azide broth for 24 hours followed by the isolation of enterococci on citrate-azide tween carbonate agar. The presence of *E. faecium* was confirmed by species-specific PCR in 26.8% (47/175) of the samples. Antimicrobial susceptibility test was performed to assess the antimicrobial resistance (AMR) in *E. faecium* for eight class of antimicrobial agents. Highest AMR was observed towards erythromycin 30/47 (63.8%) followed by Quinopristin- dalfopristin (QD) 12/47 (25.5%), tetracycline 5/47 (10.6%), quinolones 3/47 (6.38%) and chloramphenicol 1/47 (2.12%). Notably. no isolates showed

resistance towards glycopeptide, β -lactam, high-level resistance towards aminoglycoside (HLAR) and linezolid. Our findings suggest that AMR in *E. faecium* from freshwater fish emphasize the need of enhanced biosecurity in fish farms and retail markets.

Black pepper based mixed cropping system for sustainable productivity and food security

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ABSTRACT: The Konkan region of Maharashtra falls under the west-coast plains and ghat region which is highly suitable for the cultivation of spices. Black pepper is an important cash crop. It is called as low volume high value crop. Due to its perennial nature and slow growth, black pepper is often intercropped with seasonal crops for maximum utilisation of resources. Its helps to improve soil properties and get additional income to the farmers. In the absence of any intercrops in the field especially during the initial periods, lots of interspaces remain vacant which causes many problems such as soil and water erosion and excessive weed growth. High temperatures also lead to high mortality of young pepper vines. For tackling this problem in relation to increasing the production and quality we conducted an experiment entitled “Black pepper based mixed cropping system for sustainable productivity and food security”. The experiment was carried out with six different treatments (intercrops) namely T₁ – Black Pepper + Colocasia + Pineapple, T₂ – Black pepper + Arrowroot + Pineapple, T₃ – Black pepper + Elephant foot yam + Pineapple, T₄ – Black pepper + Tapioca + Pineapple, T₅ – Black pepper + Greater yam and T₆ – Black pepper alone with four replications. The average yield of intercrops obtained was, colocasia 3.04 t/ha, arrow root 4.69 t/ha, elephant foot yam 11.43 t/ha, tapioca 10.22 t/ha and greater yam 7.21 t/ha. The maximum yield of pine apple was found in

Elephant foot yam + Pineapple mixed cropping system (10.18 t/ha). The maximum yield of black pepper was reported in treatment T₃ i.e. 533.50 g/plot. As regard to the growth of black pepper the T₁ has shown maximum plant height (3.04 m). Among the different cropping systems T₃- black pepper + Elephant foot yam + Pineapple showed maximum net returns (2432983 Rs.) with highest B:C ratio (3.68).

Keywords: Black pepper, Intercropping and Tuber crops.

Evaluation of strobilurin fungicide and actinomycetes for the management of foot rot and slow decline in black pepper

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ABSTRACT: The Konkan region of Maharashtra is well known for cultivation spices. Among them black pepper is most important cash crop. It is called as low volume high value crop. Black pepper is severely affected by foot rot and slow decline which lead to high mortality and poor yield. Keeping this in view we conducted a filed experiment entitled “Evaluation of strobilurin fungicide and actinomycetes for the management of foot rot and slow decline in black pepper” during the year 2021-22 to 2022-23 at AICRP on Spices, College of Horticulture, Dapoli. The experiment was laid in Randomized Block Design (RBD) with six treatment and four replications. Total four combination of fungicides were used along with recommended package of practices and control. The morphological parameters, yield as well as pathological observations were recorded. From the pooled data, it was observed that the treatment T₂ (Foliar spray with Bordeaux mixture (1%) and soil application of *Trichoderma harzianum* (MTCC 5179) and *Pochonia chlamydosporia* (MTCC 5412) @ 50g/vine) has shown the maximum number of spikes per vine (56.36), maximum spike length (11.34 cm), more number of berries

per spike (72.2), maximum dry yield (358 g/vine) and maximum recovery (43.98 %). Also, this treatment showed least nematode population density (0.60 nos/g of soil), minimum leaf infection (9.20 %) and yellowing percentage (9.14 %). From the present findings, it is concluded that *Trichoderma harzianum* (MTCC 5179) and *Pochonia chlamydosporia* (MTCC 5412) @ 50g/vine) was best in terms of morphological and yield attributes. Also, this treatment shown least incidence of pest and diseases.

Keywords: Black pepper, Foot rot, Slow decline & Bio fungicide.

Encapsulation of Rosemary essential oil in chitosan carrier: characterization and investigation of bioactive properties of obtained nanoparticles

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ABSTRACT: In the present study, the essential oil extracted by steam distillation of *Rosemarinus officinalis* leaves was encapsulated in chitosan and sodium tripolyphosphate. The formulated ROEO-CS-TPP nanoparticles were characterized by using SEM, TEM, XRD and FTIR and accessed for their encapsulation efficiency, loading capacity, release kinetics; *In vitro* evaluation of antimicrobial and antioxidant activity of nano-encapsulated essential oils was done. chitosan-tripolyphosphate nanoparticles were synthesized and encapsulation of essential oils in these formulations was carried out revealing significant affinity for the essential oils with encapsulation efficiency ranging $62.8 \pm 1.17\%$ with loading capacity $18.38 \pm 0.5\%$ with sustained release for 48 h. Additionally, morphological analysis of nanostructures was done by SEM and TEM which revealed the spherical to oval shape of the chitosan nanoparticles with an average size of 40.66 nm. Furthermore, FTIR, XRD analysis confirmed the formation of nanoparticles. Moreover, the encapsulation of essential oils ameliorated their antioxidant and

antibacterial potential which was accessed by DPPH radical scavenging and broth dilution assay.

The lucrative progress in this field of synthesis and encapsulation of lyophilic compounds in different nanostructures can lead to their effective applications in different sectors and as a substitute or replacement therapy to combat multi drug resistant microbes.

Keywords: Antioxidant activity, Antimicrobial activity, FTIR, SEM, TEM, etc.

Mathematical modelling and polyculture fish feed optimisation

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ABSTRACT: Food is the third most extreme compulsory thing for life after air and water. All people, creatures and amphibian creatures need nourishment forever, development and upkeep. Food ordinarily, includes starches, proteins, fats as significant constituent and minerals, nutrients as minor constituent. These constituents are useful for development and great wellbeing. Feed detailing is the method involved with further developing the amount of feed parts which was connected to frame a solitary uniform eating routine that provisions each of the supplement's prerequisite. With this information numerical techniques are utilized to determine how much every fixing that should be remembered for the eating routine. Fisheries is one of the superb areas which have significant commitment in financial and social advancement of India. New water fish cultivating assumes a significant part in outside trade in various nations including India. It's known for its flexibility of giving food, nourishing, biological wellbeing and protections and work. In India, Haryana comes second in the normal yearly fish creation. The typical yearly fish creation in the state is 7000 kg for each hectare next to a public normal of 2900 kg per hectare and in fish cultivating, most costly part is the fish feed which costs around 60-70% of the complete consumption.

Key words: Consumption, Feed, Fish, Fisheries, Haryana and Supplements.

Effect of blossom thinning agents in plum

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ABSTRACT: Due to its effect on fruit size and the beginning of flower buds for the following season, thinning is necessary and vital for the quality of plum crops, but hand-thinning is an expensive procedure and an unsatisfactory alternative. For almost thirty years, researchers have worked to replace hand-thinning with novel thinners. The effects of several chemicals used as thinning agents were examined in terms of both quantity and quality in this study. This study has been carried out at experimental orchard, department of Horticulture and in Farm Laboratory of the department of Horticulture, CCS Haryana Agricultural University, Hisar. The temperature at the application time of treatments on plum trees was above 18°C and the sky was sunny. Treatments included spray of Ammonium thiosulfate @ 2 per cent and 4 per cent, Ethephon @ 75 ppm and 150 ppm, Hydrogen Cyanamide @ 0.4 per cent and 0.8 per cent, BA @ 150 ppm and 300 ppm and control (water spray) and Hand thinning. The minimum fruit drop (%) and maximum crop load was observed in treatment of control (57.12 % and 19.32 fruits/BCSA, respectively). All treatment gave their significant results.

Key words: Ammonium thiosulphate, Chemicals, Crop load, Hand thinning and Treatments

Nano technology for increasing productivity in horticulture

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ABSTRACT: Nanotechnology shows high promise in the improvement of agricultural productivity thus aiding future food security. In horticulture, maintaining quality as well as limiting the spoilage of harvested fruit and vegetables is a very challenging task. Various kinds

of nanomaterials have shown high potential for increasing productivity, enhancing shelf-life, reducing post-harvest damage and improving the quality of horticultural crops. Antimicrobial nanomaterials as nanofilm on harvested products and/or on packaging materials are suitable for the storage and transportation of vegetables and fruits. Nanomaterials also increase the vitality of the cut flower. Nano fertilizers are target-specific, slow releasing and highly efficient in increasing vegetative growth, pollination and fertility in flowers, resulting in increased yield and improved product quality for fruit trees and vegetables. Formulated nano pesticides are target-specific, eco-friendly and highly efficient. Nano sensors facilitate up-to-date monitoring of growth, plant disease, and pest attack in crop plants under field conditions. These novel sensors are used to precisely identify the soil moisture, humidity, population of crop pests, pesticide residues and figure out nutrient requirements. This review aimed to provide an update on the recent advancement of nanomaterials and their potential uses for enhancing productivity, quality of products, protection from pests and reduction of the postharvest losses of the horticultural crops. Nanotechnology could be used to generate cutting-edge techniques towards promoting productivity and quality of horticultural crops to ensure food and nutritional security of ever-increasing population of the world.

Keywords: nanoencapsulation, biosensor, nutrient use efficiency, nanofilm,

Novel advances in agriculture for food and nutritional security

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ABSTRACT: Agriculture is an integral part of the world's economy especially for developing countries like India with around 1.27 billion population. India occupies 170th rank out of 185 countries on prevalence of anaemia affecting 50 per cent of women and 60 per cent of children.

Present farming situation registered weak linkage in improving nutrition levels in major food crops. One of the major reasons is increase of chemical residues in the food produce because of indiscriminate usage of herbicides/insecticides/fungicides/growth regulators *etc.* Farmers or the crop producers simply rely on chemical usage to suppress the pest/weed/disease menace of their crop which led to pest resurgence, resistance among the pests and hike in residual levels of the crop produce. Excess use of agricultural chemicals contaminates the soil, water, turf and other vegetation resulting in many health-related tribulations in humans and livestock. It is the need of hour to shift from conventional farming to organic or integrated farming to curtail these ill effects. The pesticide usage can be minimized leaving less scope for residual affect besides, decrease of input cost if forewarned accurately. Application of Geographic Information System (GIS) tools like remote sensing, pest forecast modeling as a part of artificial intelligence are to be enhanced and made available to the farmers at base level. Besides, bio intensive based pest management concept in organic farming has to be encouraged among farmers through government by designing some polices like organic certification or providing subsidies on inputs and also through regular field visits, demonstrations and training programmes.

Nutritional Profiling and Genetic Relatedness among Indian mustard (*Brassica juncea* L.) Genotypes

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ABSTRACT: Indian mustard (*Brassica juncea* L.) is the most important source of oilseed in India among other cultivated Oleiferous Brassicas like *B. rapa* and *B. napus*. Development of genotypes with improved nutritional qualities like low erucic acid (<2 %), high oleic acid (>40%), reduced linolenic acid (<12%), a ratio of 2:1 for ω -6 to ω -3 in the oil and <30 micromoles glucosinolate per gram of defatted seed meal with high antioxidants highly

desirable in Indian mustard. A set of forty-four advanced breeding lines of Indian mustard derived from cross [EC564648×(Rajat×NUDHYJ3)], [NRCHB101×NUDHYJ5], [EC552573×(Varuna×NUDHYJ3)] and [NRCDR02×NUDHYJ5] were undergo nutritional profiling for oil and seed meal and molecular marker analysis using SSR markers for genetic relatedness among themselves. The genetic parameters for the nutritional traits have also been studied. The double zero advanced breeding lines, DRMRQ4-7-23 (high oleic acid), DRMRQ1-11-32 (moderate linoleic acid with high oleic/linoleic ratio), DRMRQ4-5-25 (low linolenic acid with high ω -6/ ω -3 ratio), DRMRQ4-1-58 (high β -carotene content), DRMRQ 2-3-17 (high flavonoid content) and DRMRQ1-16-27 (high antioxidant) were reported to be nutritionally improved lines. Trait flavonoid content exhibited highest GCV (34.74%) and oil content exhibited the lowest (0.83%) one. Traits like oleic acid, linoleic acid, linolenic acid, oleic/linoleic ratio, ω -6/ ω -3 ratio, antioxidant and β -carotene exhibited more than 90 percent heritability. Thirty polymorphic primers out of 135 SSR primers generating 76 alleles with two to four alleles per primer and PIC value ranging from 0.129 to 0.678 were used to calculate Jaccard's dissimilarity coefficients ranging from 0.09 to 0.74 with an average of 0.40. The UPGMA based dendrogram representing genetic dissimilarity among different genotypes grouped 44 double low advanced breeding lines into four clusters with fourth cluster divided into three sub-clusters. SSR based clustering showed that although these genotypes are derived from different crosses, yet they are genetically related to each other probably due to common double zero parentage. These nutritionally enriched double zero genotypes are important genetic resources for the mustard breeders.

Key words: Nutritional enrichment, SSR markers, Genetic diversity

Evaluation of four enrichment media for isolation of *E. tarda* from fish.

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ABSTRACT: Isolation of *Edwardsiella tarda* from fish is difficult and has very low recovery in general media due to overgrowth by commensal bacteria. The present study was conducted to evaluate four enrichment media for the isolation of *E. tarda* from the mixed bacterial population. The media selected in this study were Tetrathionate broth (TTB), Strontium chloride broth (SCB), Double-strength Salmonella Shigella broth (DSSB), and EC broth. A mixed bacterial population was formulated by mixing *E. tarda* with *E. coli*, *Klebsiella pneumoniae*, *Staphylococcus aureus*, and *Aeromonas hydrophila* in equal proportion. A mixed bacterial culture ($\sim 5 \times 10^5$ CFU) was inoculated in the test media and incubated for 24 hours at 37°C. A pure culture of *E. tarda* was also inoculated in the test broths at a similar concentration and served as the control. Total plate count (TPC) and presumptive *E. tarda* counts (ET) (small, translucent black-centered colonies) were recorded on SS agar from test and control after 24 h of incubation at 37°C. The TPC of TTB, SCB, DSSB and EC broth for the test was $9.07 \pm 0.66 \times 10^7$, $2.93 \pm 0.51 \times 10^6$, $7.77 \pm 0.25 \times 10^6$ and $1.37 \pm 0.15 \times 10^7$ CFU/ml, respectively. The % recovery of *E. tarda* (ET/TPC x 100) in TTB, SCB, DSSB and ECB was 43.01, 6.93, 3.26 and 10.56, respectively. These findings indicate that TTB had a significantly higher recovery ($p < 0.05$) of *E. tarda* as compared to the other three media. We suggest the use of TTB as enrichment media for the isolation of *E. tarda* from fish.

Delineation of priority zones for erosion control using morphometric parameters in conjunction with remote sensing and GIS technique

J. Himanshu Rao

ABSTRACT: Sustainable utilization of natural resources at watershed level requires an in-depth understanding of its hydrological response. The study of hydrological response of sub-watersheds for adopting suitable soil and water conservation measures is important in data scarce situations. The present study aims to identify critical sub-watersheds prone to soil erosion using morphometric parameters. In this study, ten sub-watersheds (SW-1 to SW-10) of Kanha nala watershed situated in Mandla district of Madhya Pradesh were prioritized using morphometric parameters in conjunction with remote sensing and GIS technique. Survey of India (SOI) Toposheet No. 64B/11 and 64B/12 were used for delineating the watershed and sub-watersheds boundary. For digitizing stream network, Strahler's scheme of stream ordering was adopted. The morphometric parameters such as mean bifurcation ratio (R_{bm}), drainage density (D_d), stream frequency (F_s), texture ratio (R_t), length of overland flow (L_o), form factor (F_f), circularity ratio (R_c), elongation ratio (R_e), and compactness coefficient (C_c) were considered for prioritization. The priority ranks were allocated to sub-watersheds based on the relative values of morphometric parameters. Final prioritization of sub-watersheds was done on the basis of compound parameter value. Through analysis of morphometric parameters and prioritization of sub-watersheds, SW-1 showed highest susceptibility towards soil erosion followed by SW-5 and SW-7, while SW-9 showed least susceptibility. Therefore, it is advisable to implement suitable soil and water conservation measures in SW-1, SW-5 and SW-7. This research could provide valuable insights to decision-makers and resource planners for effective management of natural resources.

Keywords: Morphometric parameters, sub-watershed prioritization, watershed management, remote sensing, Geographic Information System.

Phenotypic and genotypic characterization of extended spectrum beta-lactamase producing *Escherichia coli*, *Salmonella spp.*, and *Staphylococcus aureus* from clinical cases of backyard goats in Manipur

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ABSTRACT: A total of 179 isolates (*Escherichia coli*=126, *Salmonella spp.*= 12 and *Staphylococcus aureus*=41) from clinical samples of goats isolated between the year November 2021 to March, 2023 were characterized for their *bla*_{ESBL} genes, and other resistant genes respectively. A total of 42 isolates (23.46%) were confirmed as *bla*_{ESBL} producers, where, isolates 6 (14.28 %) for *bla*_{TEM}, 32 (76.19 %) for *bla*_{CTX-M}, and *bla*_{SHV} 4 (9.52%) were positive for *bla*_{ESBL} genes. For other resistant genes, isolates 3 (1.67%) for *tetA*, 1 (0.55%) for *tetB*, 5 (2.79 %) for *aac(3')IIa* and 2 (1.11%) for *aac(6')Ib* genes were positive gene. Antibiotic sensitivity test of all the isolates revealed that for *E. coli* 74.60% isolates were resistant to amoxicillin-clavulanic, for *Salmonella spp.*, 100 % isolates were resistant to ceftriaxone and streptomycin, and for *Staphylococcus aureus* 91.66% were resistant to tetracycline. Genotyping using Repetitive Extragenic Palindromic-Polymerase Chain Reaction (Rep-PCR) of the *bla*_{ESBL} isolates showed a distinct and similar clonality.

Keywords: *Escherichia coli*, ESBL, clinical isolates, Rep-PCR.

Commonly used extraction strategies for tetracyclines extraction from food samples

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ABSTRACT: For extraction of tetracyclines from food samples, commonly used strategies are homogenization, protein precipitation, fat removal, centrifugation, buffer/solvent-based extraction, evaporation, reconstitution, solid phase extraction etc. Extraction of tetracyclines from food samples is based on the principle of separation of tetracyclines from other components of the food sample, which might interfere by giving peaks at the same retention time as tetracyclines in HPLC chromatograms. The precipitation of proteins can be carried out by using different solutions such as trifluoroacetic acid, trichloroacetic acid, acetonitrile, acetone and hydrochloric acid as reported in the literature. Amount and type of protein precipitation agent is decided based on the protein content in sample, type of protein, consistency of sample etc. Generally used buffers/solvents for tetracyclines extraction are phosphate buffer, acetonitrile, citrate buffer and McIlvaine buffer. But, EDTA-McIlvaine buffer is most used buffer for tetracyclines extraction because tetracyclines tends to form chelate complex with cationic metals and solids of samples. So, extraction using mild acidic solvent containing EDTA to release protein-bound or sugar-bound tetracyclines is the efficient strategy to release tetracyclines from sample. Tetracyclines are found to be hydrophilic antibiotics and they have little or negligible solubility in lipids of samples. So, fat can be removed without decreasing the recovery of tetracyclines. Various reagents like n-hexane, diethyl ether, petroleum ether etc. can be used for this purpose. For further clean-up of sample, solid phase extraction is the strategy of choice as employed by most of the researchers. SPE with elution using solvents like methanol, acetonitrile is used commonly because tetracyclines have very high solubility in these solvents.

Keywords: tetracyclines, extraction, food samples

Groundwater markets: Evaluating their current status and sustainability implications

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ABSTRACT: Groundwater serves as a critical resource in India, supporting a substantial population and playing a predominant role in irrigation, where it caters to 90% of the demand. Informal and localized groundwater markets have emerged as essential institutions at the village level, facilitating the sale of water among well owners and water extraction machinery operators. These transactions involve various contract types, such as input-output sharing, output sharing, and labor contracts, with payments made in cash or kind. Despite their informal and unregulated nature, groundwater markets yield considerable benefits, promoting equity, efficiency, and sustainability. However, these markets also harbor a substantial risk – the rapid depletion of aquifers in the absence of effective regulatory mechanisms. This study focuses on the Bagalkot, Belagavi, and Vijayapura districts within the arid region of Karnataka, offering insight into the dynamics of groundwater markets. The research encompasses primary data collected from 120 respondents, employing methodologies like tabular analysis, percentage calculations, and ratio analysis. Participant categorization reveals that self-users, who employ water for their personal needs, constitute the majority in these markets. Notably, sellers and buyers display differences in landholding, with sellers having more substantial financial resources. Borewells stand out as the primary source of irrigation in the study area, with the significant prevalence of increasing well depths over time signifying groundwater depletion, particularly acute in Bagalkot. Failed wells, influenced by factors like rising water table depths and unsustainable water use, are more prevalent in this region. In light of these findings, integrated groundwater resource management and enhanced recharge facilities emerge as vital priorities for sustaining this critical resource. The study underscores the necessity for regulatory frameworks that formalize and govern informal groundwater markets in India. Additionally, it emphasizes the imperative of implementing sustainable water management practices and recharge measures to mitigate aquifer depletion, particularly in study area.

Keywords: Groundwater, Marketing, Irrigation, Efficiency

Biorational insecticides: an effective & reliable tool in IPM

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ABSTRACT: Global agriculture faces a significant challenge due to shifting insect infestations and changing climate conditions as it strives to meet the growing demand for food in a world with an expanding population. Extensive evidence suggests that the use of chemical pesticides has given rise to a host of serious problems, including ecological disturbances in pest species, environmental pollution, degradation, threats to biodiversity conservation, insecticide resistance, and harm to beneficial organisms like predators, parasites, and pollinators, among others. This has raised concerns for human health as well. In response to these challenges, a new generation of pesticides, known as "biorational pesticides" or "third-generation pesticides," has gained attention in recent years. These pesticides are derived from natural sources and pose minimal or no adverse threats to the environment and beneficial organisms. Biorational pesticides encompass a range of products, including the microbiological pesticide *Bacillus thuringiensis* (Kurstaki), neonicotinoids, avermectins, phenylpyrazoles, spinosyns, pyrroles, oxadiazines, and various insect growth regulators (IGRs). Their notable advantages include high efficacy, specific modes of action, and safety towards non-target species, making their impact on pest populations highly targeted. The development of insecticide resistance is primarily a result of the indiscriminate and frequent use of conventional insecticides, and biorational pesticides offer a solution to this problem. This new class of pesticides is designed to manage pest populations rather than completely eradicate them, functioning as "selective insecticides" that are highly compatible with biological control methods. They demonstrate a compelling cost-benefit ratio, help address ecological concerns, and contribute to food security

within a safer environment. The realm of biorational pesticides is vast, offering both promise and some concerns. However, these bio-based products are not only gaining trust in the market but also showcasing their value in long-term integrated pest management (IPM) programs, which aim to reduce the reliance on chemical pesticides while promoting sustainable and eco-friendly agricultural practices.

Hydroponics: An innovative approach to cultivating horticultural crops

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ABSTRACT: Hydroponic cultivation is rapidly gaining global recognition due to its efficient resource management and high-quality food production. Traditional open-field agriculture is facing significant challenges, primarily due to the dwindling availability of arable land per capita. Factors such as rapid urbanization, industrialization, and the melting of icebergs are further reducing the amount of cultivable land. Moreover, soil fertility has reached a saturation point, and increasing fertilizer use no longer boosts productivity. As a result, relying solely on open-field agriculture to feed the growing global population will become increasingly unfeasible in the near future. Hydroponics offers numerous advantages, the most significant being a substantial increase in plant growth rates. When properly implemented, plants can mature up to 25 percent faster and yield up to 30 percent more than their soil-grown counterparts. This technique has proven successful in producing a variety of vegetables, especially leafy greens, while conserving water—typically achieving water savings of 70 to 90 percent. Other benefits include shorter crop growing cycles, year-round production, minimal susceptibility to diseases and pests, and the elimination of tasks such as weeding, spraying, and manual watering. In soil-less cultivation, plants thrive without the need for traditional soil,

making use of advanced space-saving and water-conserving methods. These innovative approaches have shown promising results on a global scale, offering a sustainable solution to the challenges posed by traditional agriculture.

Impact of Pre-harvest fruit bagging on biochemical parameters of guava cultivars

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ABSTRACT: Guava (*Psidium guajava* L.) is a tropical fruit with high nutritional and economic value. However, its production and quality are affected by various biotic and abiotic factors, such as pests, diseases, sunburn, cracking, and uneven ripening. Preharvest fruit bagging is a technique that involves covering the fruits with different materials during their development to protect them from adverse environmental conditions and improve their quality attributes. This study aimed to evaluate the effect of preharvest fruit bagging different coloured paper, polythene and cloth bags in the rainy season guava crop during 2019-20. The results showed that fruit bagging significantly influenced the physical and chemical characteristics of guava fruits. Results showed that the fruits bagged with green polythene had the maximum pectin (0.80%) content, while the minimum pectin (0.57%) content was observed in unbagged fruits. Among the cultivars, the maximum pectin (0.69%) content of fruits was obtained in Hisar Safeda, which was at par with Hisar Surkha (0.68%) and Shweta (0.68%), while the minimum pectin (0.63%) content was observed in fruits of Allahabad Safeda. The maximum total sugars (7.28%), maximum reducing sugars (4.65%) and maximum non-reducing sugars (2.63%) were obtained in fruits bagged with blue polythene, while the minimum total sugars (5.69%), minimum reducing sugars (3.26%) and minimum non-reducing sugars (2.43%) were observed in unbagged fruits. Among the cultivars, the maximum total sugars (6.85%), maximum

reducing sugars (4.23%) and maximum non-reducing sugars (2.63%) were observed in fruits of Hisar Surkha, while the minimum total sugars (6.18%), minimum reducing sugars (3.72%) and minimum non-reducing sugars (2.46%) were observed in Shweta fruits. Bagging of fruits with blue and green polythene were found promising in enhancing the biochemical parameters of various guava cultivars taken in the study. However, further studies are needed to fully understand the effect of fruit bagging on different fruit species and to optimize bagging techniques for different agricultural settings.

Keywords: Guava, pectin, pre-harvest bagging, paper bag, polythene bag, sugars.

Development and characterization of an antioxidant drink from Spirulina hydrolysate and fish scale collagen peptide

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ABSTRACT: *Spirulina platensis* emerges as a potent reservoir of protein, vitamins, minerals, essential fatty acids and rich source of antioxidants. The hydrolysates derived from spirulina protein exhibit antioxidant activity and offer potential health benefits. This investigation aimed to produce spirulina hydrolysate (SPH) through enzyme hydrolysis, employing 1.0% papain enzyme followed by spray drying. Then, the spirulina hydrolysate was combined with collagen peptide (CP) to formulate an antioxidant drink composition. Comprehensive analyses encompassing the physical, functional, mineral profile, amino acid composition, and antioxidant attributes of SPH and CP mix powder were analyzed. The protein content in the derived hydrolysate was 62.42%, while collagen peptide displayed a protein content of 98.45%. The amino acid composition revealed a significant presence of essential and non-essential amino acids. Further, spirulina hydrolysate exhibited a 78.24% antioxidant

activity in the DPPH assay, in contrast to 38.8% in collagen peptide. Color analysis showed that L^* , a^* , b^* values for SPH recorded 71.91, -2.79, 13.82, and CP recorded 94.74%, -0.14%, 12.19, respectively. Functional properties revealed commendable characteristics for both the SPH and CP mix. Sensory analysis was carried out by incorporating a selected blend of SPH and CP mix (0.6:1.4) into tea, which yielded insights into its acceptance and comparison with control (without SPH and CP mix). Results of antioxidant and functional attributes establish SPH and CP mix as promising functional ingredients for various food products. The collective findings emphasize their potential to enhance nutritional value and bioactive impact across diverse formulations.

Keywords: Spirulina, Spirulina hydrolysate, collagen peptide, spray drying, antioxidant drink, sensory assessment

Nanotechnology in antimicrobial activity

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ABSTRACT: Several nanomaterials are used as antimicrobial agents in food packing in which silver nanoparticles are in great interest. This is because of its extended use. Some other nanoparticles currently used are titanium dioxide (TiO_2), Zinc oxide (Zno), Silicon oxide (SiO_2), magnesium oxide (Mgo), gold and silver. All of them have specific characteristics and functions, for example, zinc nanocrystal shows antimicrobial and antifungal activity. Silver was a disinfectant and sterilizing agent used by NASA and Russian Space station for water, silver zeolite and silver. Gold has high temperature stability and low volatility and good antifungal and antimicrobial effects against 150 different bacteria. The direct use of silver as

disinfectant in commercial water, since with effective result against microorganisms. The antimicrobial effect of these are *E. coli* and *Staphylococcus aureus*, and nanosilver particles coated with cellulose acetate phthalate also provided similar results. Some nanoparticles have shown their antifungal activity. These fungi include *Candida albicans*, *Aspergillus niger* and yeast. Silver nanoparticles are also found to be effective against methicillin resistant *Staphylococcus aureus*. Other nanoparticles besides silver are also found to have antimicrobial characteristics like titanium oxide (TiO₂). Its antimicrobial activity in UV light was obvious. Zinc oxide is reported to have antimicrobial activity in packaging material. Zinc oxide nanoparticles synthesized using *Punica granatum* peel aqueous extract has shown effectiveness as antibacterial agents against standard strains of Gram- positive *Staphylococcus aureus* and Gram-negative *Escherichia coli*.

Keywords: Nanoparticles, Zeolite, Antifungal, Antimicrobial, Microorganisms.

Value unveiled: pierced cocoon's artful entrepreneurship

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ABSTRACT: Sericulture is the process of cultivating silkworms and extracting silk from them. The caterpillars of the domestic silk moth (also called '*Bombyx mori*') are the most commonly used silkworm species in sericulture. India is the world's second largest producer of silk. Karnataka state is the country's largest silk-producing state, more than a million people earn their livelihood by making silk. The cocoon produced from silk as a waste in round and dumble shapes are usually discarded as waste or burnt away. The aim was to develop entrepreneurship through value addition from cocoon transforming it into valuable bio-craft would be the worthy option to earn subsidiary income for the farm families by the farm women and SHGs. The ICAR Krishi Vigyan Kendra, Chikkaballapura conducted Entrepreneurship

Development Program (EDP) on pierced cocoon bio-craft by selecting Self Help Group (SHG) of 20 farm women and method demonstrated on decorative cutting, garlands, wall hangings, frames, vases and bouquets preparation, dyeing, pricing of each product and also an Bio-craft unit was established. The advertisement of the developed products was conducted through stalling in district and state level Krishi melas. Within a span of 2 years the unit was able to draw an income of Rs. 75,100 per month by marketing the products to formal and informal ceremonies. The unit has also stretched its market in the metropolitan city like Bengaluru. The have boosted up the confidence or the farm women in taking up this as a home scale enterprise. The Grameen bank has lent its financial support to the group, by this they are setting high standards in the field of value addition.

Keywords: Cocoon bio craft, entrepreneurship, value addition, EDP and SHGs

Nanotechnology for increasing productivity in agriculture

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ABSTRACT: Nanotechnology has gained intense attention in the recent years due to its wide applications in several areas like medicine, medical drugs, catalysis, energy and materials. Those nanoparticles with small size to large surface area (1-100 nm) have several potential functions. These days, sustainable agriculture is needed. The development of nanochemicals has appeared as promising agents for the plant growth, fertilizers and pesticides. In recent years, the use of nanomaterials has been considered as an alternative solution to control plant pests including insects, fungi and weeds. Several nanomaterials are used as antimicrobial agents in food packing in which several nanoparticles such as silver nanomaterials are in great interest. Many nanoparticles (Ag, Fe, Cu, Si, Al, Zn, ZnO, TiO₂, CeO₂, Al₂O₃ and carbon nanotubes)

have been reported to have some adverse effects on plant growth apart from the antimicrobial properties. In food industries, nanoparticles are leading in forming the food with high quality and good nutritive value.

Keywords: Nanoparticles, Applications, Sustainable Agriculture, Plant growth, Fertilizers, Pesticides, Antimicrobial and Food industries

ABOUT THE EDITORS

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Dr. Devi Dayal is former Head, ICAR- Central Arid Zone Research Institute, Regional Station, Gujarat. He started Agricultural Research Service in January 1984 and has worked in different capacities in technology development and dissemination related to groundnut and other dryland crops for about 36 years in different institutes such as Directorate of Groundnut Research, Junagadh. He was instrumental in developing paired row planting pattern and in-situ moisture conservation technologies for groundnut and other dryland crops. During his career, he mobilised external funding from different agencies such as PPV&FRA, NATP, NAIP and NASF for various research activities and handled collaborative projects with international CGIAR institutions like ICRISAT, Hyderabad & ICARDA, Jordan. He conducted many national seminars in the capacity of organising secretary. He has edited 15 books and published more than 100 research papers in journals of national and international repute. He has also contributed to several book chapters to books and proceedings of the symposia apart from many technical bulletins and training manuals. He has received many awards including Fellow 2015 by the Indian Society of Oil Seeds Research and Gold Medal and Distinguished Plant Scientist Award-2013 by the Academy of Plant Sciences. He serves as member of Editorial Board for Indian Journal of Oil Seeds Research and Advances in Plant Sciences. He acts as external examiner for post-graduate and doctoral students for several universities Junagadh Agricultural University, Junagadh and MPKV, Rahuri, TNAU, Coimbatore and Osmania University, Hyderabad.

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His areas of interest include Physiology, Forestry, Agriculture and Ecology. He has obtained International Travel Grant from DST for presenting research work at Colombo, Sri Lanka. He has more than 40 publications including International and National journals. He has worked as SRF at Directorate of Groundnut Research, Junagadh for 3 years. He has also given his service as RA at CAZRI, RRS, Bhuj. He is currently guiding 4 PhD students from Shri Govind Guru University, Godhra-State University of Gujarat.

ABOUT THE BOOK

This book consists of compilation of abstracts and papers presented in the 3rd International Conference on Advancement of Science and Technology for Environment, Society and People (ICASTESP-III), Organised by the Society for Technology, Environment, Science & People, Kozhikode, Kerala during 13-14 October 2023. A number of topics covering natural resource management, crop production, post-harvest handling, farm empowerment and social science were some of the major highlights in the conference.

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