

Journal of Plant Development Sciences

(An International Monthly Peer Reviewed Journal)

Volume 17

Number 4

April 2025

Content

REVIEW ARTICLE

Deciphering the mechanisms of reactive Oxygen species generation and their Multifaceted effects on plant Cellular Processes

—Vaishali Gangwar, Vijay Sharma, Mukul Kumar, C., M. Singh, Kamaludin and Om Prakash -- 141-156

RESEARCH ARTICLES

Auricularia sinodelicata (Auriculariaceae) Y.C. Dai & F. WU, a new record for the Indian Mycobiota

—Arvind Parihar ----- 157-160

Effect of blending ratio of Banana fruit with Pseudostem central core and storage period on nutritional and Physicochemical properties of Jam

—Raghavendra H.R. Desai Chirag, Siddharood Maragal, Sachin A.J. and Vani Kumbar ----- 161-167

Phytochemical screening of 70% Hydroalcoholic and Acetone extract of Rhizome of *Curcuma longa*

—Shweta Anandkumar Papshetwar, M. K. Patil, B.V. Ballurkar, A.V. Bhosale and S.G. Chavhan-169-181

5-Hydroxymethyl furfural from the fruit part of *Grewia asiatica* possesses anti-colon Cancer activity

—Vikas Sharma, Navneet Kour, Shashank K Singh, Prasoon Gupta and Shivangi Sharma----- 183-189

Effect of insecticidal seed treatment and foliar spray on early season insect pests of Soybean [*Glycine max* (L.) Merrill] and their natural enemies

—Kailash Chaukikar, Rakesh Singh Marabi and Shoumitra Bikash Das ----- 191-201

DECIPHERING THE MECHANISMS OF REACTIVE OXYGEN SPECIES GENERATION AND THEIR MULTIFACETED EFFECTS ON PLANT CELLULAR PROCESSES

Vaishali Gangwar^{1*}, Vijay Sharma², Mukul Kumar³, C., M. Singh⁴, Kammaludin⁵ and Om Prakash⁶

Department of Crop Physiology¹, Department of Genetics and Plant Breeding^{2,3,4,5}, Department of Fruit Science⁶
Banda University of Agriculture and Technology, Banda, Uttar Pradesh (India) 210001

Received-25.03.2025, Revised-10.04.2025, Accepted-22.04.2025

Abstract: Reactive Oxygen Species (ROS) play a significant role in plant development and cellular processes. ROS are molecules that are generated as by-products during various cellular reactions, including photosynthesis and respiration. While ROS are known to have harmful effects on plants in high concentrations, they are also essential signaling molecules that regulate many physiological processes in plants. ROS regulates plant development by controlling the balance between cell growth and death. For example, in roots, ROS promote cell elongation and differentiation, while in leaves, they regulate leaf size and shape. ROS also play a role in regulating the plant's response to environmental stressors, such as drought and salinity. In addition to regulating plant development, ROS also participate in various cellular processes, including hormone signalling, defence responses, and programmed cell death. ROS are involved in the synthesis and signalling of plant hormones, such as abscisic acid, which is critical in regulating plant responses to abiotic stress. ROS also play a role in the activation of defence responses, such as the synthesis of pathogenesis-related proteins and the induction of systemic acquired resistance. Furthermore, ROS are involved in programmed cell death, which is essential for plant growth and development, as well as for the defence against pathogens. In conclusion, ROS play a crucial role in plant development and cellular processes. While high levels of ROS can be harmful to plants, low levels of ROS are essential for regulating plant growth, development, and responses to environmental stressors. Understanding the role of ROS in plants is important for developing strategies to enhance plant growth and productivity in agricultural settings while also helping plants to cope with the challenges of changing environmental conditions.

Keywords: Cellular processes, Oxidative stress, Mitochondria, Developmental stages

Journal of Plant Development Sciences Vol. 17(4)

AURICULARIA SINODELICATA (AURICULARIACEAE) Y.C. DAI & F. WU, A NEW RECORD FOR THE INDIAN MYCOBIOTA

Arvind Parihar^{1*}

Botanical Survey of India, Arunachal Pradesh Regional Centre, Itanagar, Arunachal Pradesh, India
Email: arvind_peaec@rediffmail.com

Received-27.03.2025, Revised-15.04.2025, Accepted-26.04.2025

Abstract: *Auricularia*, a genus of macrofungi with broad geographical distribution, is highly valued for its edible and medicinal properties. It ranks as the third most extensively cultivated mushroom worldwide due to its remarkable nutritional and bioactive attributes. In the Present communication *Auricularia sinodelicata* is reported first time from the India with detailed descriptions and colour illustrations.

Keywords: Arunachal Pradesh, *Auricularia*, India, New Record, Taxonomy

Journal of Plant Development Sciences Vol. 17(4)

EFFECT OF BLENDING RATIO OF BANANA FRUIT WITH PSEUDOSTEM CENTRAL CORE AND STORAGE PERIOD ON NUTRITIONAL AND PHYSICO-CHEMICAL PROPERTIES OF JAM

Raghavendra H.R^{1*}, Desai Chirag², Siddharood Maragal³, Sachin A.J⁴ and Vani Kumbar⁵

¹ICAR-Indian Agricultural Research Institute, Dhemaji, Assam; ²Soil and Water Management Research Unit, Navsari Agricultural University, Navsari, Gujarat ³College of Horticulture and Forestry, CAU (I), Pasighat, Arunachal Pradesh; ⁴Bihar Agricultural University, Bhagalpur, Bihar, 813210; ⁵College of Horticulture, Mudigere, Karnataka, 577132
Email: raghuhorti53@gmail.com

Received-02.04.2025, Revised-16.04.2025, Accepted-29.04.2025

Abstract: The experiment was carried out to investigate the nutritional and physicochemical properties of blended jam made from banana fruit and pseudostem central core, focusing on various blending ratios and storage periods. Treatments ranged from 0:100 (banana fruit: pseudostem central core) to 100:0. Each combination were analyzed for key parameters such as iron, potassium, carbohydrates, protein, calorific value, and acidity, were analyzed at three-month intervals starting from immediately after processing and at three and six months of storage. Significant variation in nutrients was observed across the treatments, where T₁ (0:100) showing the highest iron content (3.13 mg/100g) and T₁₁ (100:0) exhibiting the highest calorific value (277.74 KCal). A general decreasing trend in protein, iron, and potassium was noted over the storage period, while slight increases in calorific value and carbohydrates were observed. The study concludes that the blending ratio significantly affects the nutritional composition, with the pseudostem central core contributing to higher mineral content, while banana fruit enhances caloric value. These findings offer valuable insights into the potential of utilizing banana by-products in food processing, contributing to the development of nutritious, sustainable food products.

Keywords: Banana, Pseudostem, Central core, Blended Jam, Storage

Journal of Plant Development Sciences Vol. 17(4)

PHYTOCHEMICAL SCREENING OF 70% HYDROALCOHOLIC AND ACETONE EXTRACT OF RHIZOME OF *CURCUMA LONGA*

Shweta Anandkumar Papshtwar*¹, M. K. Patil¹, B.V. Ballurkar¹, A.V. Bhosale² and S.G. Chavhan³

Department of Veterinary Pharmacology and Toxicology¹, College of Veterinary and Animal Sciences, Udgir

Department of Veterinary Microbiology², College of Veterinary and Animal Sciences, Udgir

Department of Veterinary Pathology³, College of Veterinary and Animal Sciences, Udgir

Email: papshtwarshweta@gmail.com

Received-01.04.2025, Revised-17.04.2025, Accepted-28.04.2025

Abstract: The genus *Curcuma* belongs to the family Zingiberaceae. *Curcuma longa*, commonly known as turmeric, rhizomatous herb is indigenous to the Indian subcontinent and Southeast Asia. The rhizomes can be utilized fresh or boiled, and when dried, they are ground into a vibrant orange-yellow powder that serves as both a coloring and flavoring agent in various Asian cuisines, particularly in curries. *C. longa* is frequently used in traditional medicine to treat a wide range of ailments, including diarrhoea, diabetes, skin infections and wounds. An experimental study was undertaken to assess the phytochemical constituents of *C. longa* by using 70% ethanol and acetone as solvent for the extraction of rhizomes. The sieved plant powder was soaked in 70% ethanol and acetone in glass containers for 48 hrs. and then filtered (maceration method). Finally obtained extract was used for phytochemical screening tests. All the tests were performed as per standard protocol using the chemicals and reagents procured from authenticated chemical manufacturers and results were recorded. The percent yield was 10.81% and 7.31%, dark brown and yellowish orange color and gummy-sticky and granular consistency of extract were also found respectively. The phytochemical screening of 70% hydroalcoholic extract of rhizome of *C. longa* revealed that the presence of phytoconstituents viz.: alkaloids, flavonoids, phenolic compounds, tannins, saponins, phytosterols, resins and triterpenoids. Preliminary phytochemical analysis of acetone extract of rhizome of *C. longa* revealed that the presence of phytoconstituents viz.: alkaloids, flavonoids, phenolic compounds, tannins, saponins, phytosterols, diterpenes, carboxylic acid, resins, triterpenoids, fixed oils and fat. Primary metabolites are absent in both the extracts of *Curcuma longa*. These phytoconstituents of the plant might play an important role in therapeutic properties.

Keywords: Hydroalcoholic extract, Acetone extract, *Curcuma longa*, Phytochemical, Rhizomes, Therapeutic

5-HYDROXYMETHYL FURFURAL FROM THE FRUIT PART OF *GREWIA ASIATICA* POSSESSES ANTI-COLON CANCER ACTIVITY

Vikas Sharma^{1*}, Navneet Kour¹, Shashank K Singh², Prasoon Gupta² and Shivangi Sharma³

¹Natural Products Laboratory, Division of Biochemistry, Faculty of Basic Sciences, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, Main Campus Chatha, Jammu-180 009, J&K, India

²Cancer Pharmacology Division and Natural Product Chemistry Division, Indian Institute of Integrative Medicine, Canal Road Jammu-180001, J&K, India

³Department of Chemistry, Govt. Degree College, RS Pura -181102, Jammu, Jammu & Kashmir, India

Email: vikas.skuast@gmail.com

Received-28.03.2025, Revised-12.04.2025, Accepted-25.04.2025

Abstract: The present research work aims to investigate the *in vitro* cytotoxic potential of *Grewia asiatica* (phalsa) fruit against human cancer cell lines and further isolation of active ingredient. The methanolic extract was prepared and further fractionated with hexane, chloroform and butanol in the order of increasing polarity. The extract and fractions were evaluated against eight human cancer cell lines (A-549, HCT-116, HT-29, SW-620, PC-3, MCF-7, MDAMB-231, MIAPACA) from five different tissues (lung, colon, prostate, breast, pancreatic) respectively at the conc. of 100 µg/ml *via* SRB assay. The results revealed that chloroform fraction of *G. asiatica* exhibited *in vitro* cytotoxicity against colon cancer cell line (SW-620) with growth inhibition of 70% whereas hexane fraction also inhibited the growth of same cell line by 76%. A compound namely 5-hydroxy methyl furfural (5-HMF) was isolated from chloroform fraction through column chromatography and characterized *via* NMR (¹H and ¹³C) and mass spectroscopy (HRMS). It was tested against SW-620 cancer cell line and the IC₅₀ value was calculated that showed growth inhibitory potential of the component against colon cancer cells.

Keywords: *Grewia asiatica*, 5-HMF, SRB assay, *In vitro* cytotoxicity, Cancer cell lines

Journal of Plant Development Sciences Vol. 17(4)

EFFECT OF INSECTICIDAL SEED TREATMENT AND FOLIAR SPRAY ON EARLY SEASON INSECT PESTS OF SOYBEAN [*GLYCINE MAX* (L.) MERRILL] AND THEIR NATURAL ENEMIES

Kailash Chaukikar, Rakesh Singh Marabi* and Shoumitra Bikash Das

Department of Entomology, College of Agriculture, JNKVV, Jabalpur-482004

Email: rsmarabi78@rediffmail.com

Received-20.03.2025, Revised-09.04.2025, Accepted-24.04.2025

Abstract: A field trial was conducted in RBD to know the efficacy of insecticidal seed treatment and foliar spray on insect pests of soybean and their natural enemies at Breeder Seed Production Farm, JNKVV, Jabalpur (MP) during *Kharif* season. All the insecticidal treatments were sprayed on 35 days old crop (DOC). Observations of insect pests and natural enemies was recorded on 35, 55 and 75 DOC. Observation of whitefly was taken by caging the individual plant, while larval (*S. litura* and *C. acuta*) and adult (spider and lady bird beetle) population was recorded in per meter row length (mrl) basis. Incidence of YMD, stemfly and girdle beetle was recorded in percent basis. The results revealed that T₇, T₈ and T₁₁ on 35, 55 and 75 DOC was significantly better than other treatments over the control. Seed treatment with Imidacloprid 48FS @ 1.25 ml / kg seed (T₁) and with Thiamethoxam 30FS @ 10 ml / kg seed (T₂) were effective in checking the YMD incidence during the early stage of the crop. Highest grain yield (2062.13 kg/ha) was registered in the treatment T₇- seed treatment with Imidacloprid 48FS @ 1.25 ml / kg seed followed by foliar spray of Triazophos 40EC @ 800 ml / ha. The next insecticidal treatments also yielded better than the control were T₁₁> T₈> T₁₂> T₁>T₂>T₆>T₅>T₉>T₁₀>T₁₃>T₁₄>T₃>T₄. Whereas, the lowest seed yield (8.54.70 kg/ha) was recorded from T₁₅ (control). Maximum net return (Rs. 33045.35/ha) was obtained from T₇-seed treatment with Imidacloprid 48 FS @ 1.25 ml / kg seed + Triazophos 40EC @ 800 ml / ha followed by T₁₁-seed treatment with Imidacloprid 48FS @ 1.25 ml / kg seed + Flonicamid 50WG @ 200 g / ha (Rs. 25088.94/ha). Highest ICBR was recorded from T₁ (1:0.97) followed by T₇ (1:0.96) and T₅ (1:0.94).

Keywords: Soybean, Whitefly, Stemfly, Girdle beetle, Infestation, Grain yield