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VASANTRAO NAIK MARATHWADA KRISHI
VIDYAPEETH, PARBHANI**

Title	- Molecular characterization and identification of candidate markers for pod shattering in soybean [glycine max (l.) merr.]
Researcher	- Pawar, KomalRamchandra
Research Guide	- Dethe, A.M.
Department	- Agricultural Biotechnology
Subject	- Agricultural Biotechnology
Degree	- M.Sc
Thesis No.	- 17173
Krishikosh link	- http://krishikosh.egranth.ac.in/handle/1/5810034059
Abstract	-

The present investigation was carried out at VilasraoDeshmukh College of Agricultural Biotechnology, Latur (M.S.) with a view to characterize and validate the SSR markers linked to pod shattering trait at molecular-level in a given novel soybean germplasm during 2016-17. Efforts were made to study DNA polymorphism *via* SSR markers linked to pod shattering as well as agro-morpho-physiological performance in the given set of soybean accessions. The study revealed significant genotypic differences for all the agro-morphological traits evaluated in RBD indicated considerable amount of variations among these genotypes for all characters in field testing. Further, the percent pod shattering using oven dry method at 40°C for 7 days on 1-5 scale as devised by AVRDC was generated for each accession. Out of 35 soybean accessions, seventeen accessions found to be tolerant (0-10%) were MAUS1, MAUS2, MAUS32, MAUS61, MAUS162, cat872B, cat2115B, cat 2237B, cat3458, cat3459, cat3468, Harder, JS93-05, JS335, G11, VLS75 and cat3443; while 11 accessions were discovered as moderately resistant (11-25%) such as, cat1641A, cat1921A, cat1979A, cat2130, cat2134A , cat3442 , cat489A, cat492A, AGS25, PP6, LEE54. However, 6 accessions were observed as moderately susceptible (25-50%) cat1987, RI60cat2205B, cat3447, cat3502, cat700A, MAUS158 along with one highly susceptible (> 50%) wild soybean accession *Glycine soja*. The SSR analysis yielded 100 % polymorphism with corresponding 596 amplicons. PIC value ranged between 0.056 (Satt350) to 0.913(SRM0) with an average PIC value of 0.734 per primer. During this study, unique alleles were found for resistant genotypes (Satt244₁₆₃) and highly susceptible genotypes (SRM1₅₀₇) which can be directly advocative for identification of resistant and susceptible genotypes and also to generate mapping population towards fine mapping of these ‘qPDH’ QTLs in soybean functional genomics. The accessions with superior traits-

combinations, like earliness, yields and its components coupled with pod shattering tolerance can be directly used for the empirical soybean breeding.

Title	-	Molecular characterization and genetic fidelity testing in micropropagated banana (musa spp.) plantlets
Researcher	-	Manchare, RohiniNabaji
Research Guide	-	Dethe, A.M.
Department	-	Agricultural Biotechnology
Subject	-	Agricultural Biotechnology
Degree	-	M.Sc
Thesis No.	-	17217
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034205
Abstract	-	

The present investigation was carried out at VilasraoDeshmukh College of Agricultural Biotechnology, Latur (M.S.) during 2016-17 towards assessment of genetic diversity as well as early detection of genetic fidelity in micropropagated banana plantlets (G-9) to be aided in fine tuning of protocol parameters and gauge suitability of regeneration protocol for large scale applications. In the first attempt, the genetic identity of 18 different elite Indian banana varieties was evaluated by advocating two different molecular marker systems i.e. random amplified highly polymorphic DNA (RAPD) and inter-simple sequence repeats (ISSR) markers. A total of 342 (96%) polymorphic bands were detected from six polymorphic RAPD markers with PIC value of 0.774 and 563 (92.62%) polymorphic amplicons from eight ISSR primers, which revealed high PIC value (0.72). Two optimal clusters were inferred by the UPGMA combined dendrogram scaling from 35 to 76% similarity using RAPD and ISSR analysis, which revealed the genetic distance between various cultivars varied between 0.240 and 0.762 with an average of 0.548.

Further, in an another attempt, the micro-propagated banana plantlets of cv. Grand Naine from different successive subculturing stages, that were developed from suckers were screened for somaclonal variation using the 'genotype-specific' markers namely, OPA-13 and UBC-858, which revealed from earlier investigation on molecular characterization of G-9 and other cultivars by RAPD and ISSR markers systems, respectively. Additionally, pre-selected DNA markers viz., Ma-01 (RAPD) and P-17 (ISSR) were also used for genetic fidelity testing. A total of 255 RAPD and 79 ISSR fragments were generated with these 2 random and 2 ISSR primers in various 15 bulked lots of micropropagated subculture levels (8th to 10th) of G-9. Wherein, the percentage of polymorphic loci by RAPD and ISSR were found to be only 0.5% in the 10th level

of subculture only, which indicated the utility of such DNA markers to monitor the genetic fidelity of *in vitro* somaclonal variation in banana cv. G-9 with high degree of genetic uniformity amongst the regenerated plantlets existed; however the long-term practice of subculturing should be avoided towards 'true-to-type' quality plants mass production through banana tissue culture on commercial level and also during the conservation practices of genetic resources.

Title	-	Production of nutrabeverage by fermentation of <i>mahua</i> flower with pomegranate fruit juice
Researcher	-	Wadkute, Suresh Ankushrao
Research Guide	-	Surve, V.D.
Department	-	Agricultural Biotechnology
Subject	-	Agricultural Biotechnology
Degree	-	M.Sc
Thesis No.	-	17218
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034209
Abstract	-	

The term ‘nutrabeverage’ was applied to the product of alcoholic fermentation made by using yeast strains, in which sugar was converted into alcohol and carbon dioxide. Two strains of *S. cerevisiae*(NCIM-3215) and *S. cerevisiae*(NCIM-3205) were collected from National Chemical Laboratory, Pune. The same strains were used for nutrabeverage production from mixed *mahua* flower and pomegranate fruit juice. Nutrabeverage was produced from two different yeast strains and analyzed for qualitative parameters as changes in pH, titrable acidity, reducing sugar, alcohol content, and antioxidant compound during fermentation.

Fermentation of *mahua* flower extract with pomegranate fruit juice to produce nutrabeverage by using yeast strain of *S. cerevisiae*NCIM3205 and NCIM 3215 was optimized for different parameters i.e. temperatures (25⁰C, 30⁰C and 35⁰C), pH (3.5, 4.5 and 5.5), inoculum concentration (3%, 6% and 9%) and incubation period (24 hrs, 48 hrs and 72 hrs). After fermentation of 7 days it was observed that the yeast strain *S. cerevisiae*NCIM3205 shows the better result than the yeast strain NCIM 3215 in case of overall physicochemical characteristics at the pH 4.5, temperature 30⁰C, inoculum concentration 6% and incubation period 24 hr for production of nutrabeverage.

From this study it is concluded that mixed *mahua* flower:pomegranate fruit juice nutrabeverage produced is better in overall physicochemical characteristics than the *mahua* flower produced beverage, and also it can be concluded that *mahua* flower as a substrate has potential for making good quality fermented product. These studies would facilitate the development of a value added product which could serve as a new brand of potential cardio-protective *mahua* based products.

Title	-	Synthesis and evaluation of antimicrobial potential of copper nanoparticles on bacterial blight of pomegranate
Researcher	-	Chormule, KiranAnanda
Research Guide	-	Bhalerao, S.R.
Department	-	Agricultural Biotechnology
Subject	-	Agricultural Biotechnology
Degree	-	M.Sc
Thesis No.	-	17220
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034214
Abstract	-	

Pomegranate, *Punicagranatum* L., regarded as the “Fruit of Paradise” is subjected to various disease problems. Among diseases, bacterial blight caused by *Xanthomonasaxonopodispv. punicae* is one of the important disease, which caused a great havoc in recent years. The present investigation was undertaken to effective control disease through copper nanoparticles.

Synthesis of stable copper nanoparticles was achieved by chemical (reduction) as well by biological (green) method using Orange juice extract. These synthesized CuNPs were characterized by using UV-Vis spectroscopy, Fourier transform infrared spectroscopy (FTIR), Malvern Zeta Sizer, Particle size analyzer (NTA), X-Ray Diffraction (XRD), and Transmission Electron Microscopy (TEM).

The biologically and chemically synthesized CuNPs are effective in controlling Xap growth both at 50 ppm concentration respectively *in vitro* condition. Disease incidence And Disease Severity test was done for evaluation of *in vivo* CuNPs Effect on Xap test of isolate Xap-119 on var. Bhagawa. The disease started appearing 7 days after inoculation. The disease incidence and disease severity was found to be decrease with increase in concentration of CuNPs. Among tested CuNPs concentrations, less disease incidence was recorded at 400 ppm CuNPs (54.95%) as compared to 200 ppm (82.83%), and 300 ppm (55.56%) CuNPs concentration. The water sprayed control plant showed comparatively higher disease incidence, recording 85.98%.

The disease severity of bacterial blight infection was also decreased in CuNPs treated plants. The disease severity in control plant was 40.5%. The lowest disease severity (11.6%) was recorded at 400 ppm CuNPs treated plants, whereas slightly higher disease severity was measured at 200 ppm (19.6%) and 300 ppm (15.2%) CuNPs concentration.

Biologically synthesized CuNPs are effective in reducing disease incidence and severity of bacterial blight disease in pomegranate. Further study in this regard may helpful in developing formulations for effective management of this dreadful disease.

Title	-	Geographical diversity analysis of <i>trichoderma spp.</i> isolates based on sequence related amplified polymorphism (srp) marker
Researcher	-	Pawar, SomeshwarDigambar
Research Guide	-	Dhawale, R.N.
Department	-	Agricultural Biotechnology
Subject	-	Agricultural Biotechnology
Degree	-	M.Sc
Thesis No.	-	17221
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034217
Abstract	-	

Trichoderma species are used as biocontrol agents in agriculture. *Trichoderma*, a genus of asexually reproducing saprophytic fungi, frequently present in nearly all temperate and tropical soils, decaying plant tissues and root ecosystems. The strains of *Trichoderma* spp. are strong opportunistic invaders, fast growing, prolific producers of spores and powerful antibiotic producers. So, the present study was undertaken at Vilasrao Deshmukh College of Agricultural Biotechnology, Latur, to reveal the objectives of isolation, identification and molecular diversity analysis of *Trichoderma spp.* from seventy soil samples collected from different geographical locations of India. Out of these only eighteen *Trichoderma* isolates selected for this study on the basis of morphological characterization. PDA and *Trichoderma* Selective Medium were used for effective isolation of *Trichoderma spp.* Total eighteen *Trichoderma* isolates were isolated belonging to five different species. *Trichoderma* species were identified based on their colony colour, colony shape, colony size, and macroscopic and microscopic feature. The present investigation was carried out to study geographical diversity among *Trichoderma* isolates using SRAP primers. The thirty two pairs of SRAP primers were used for diversity analysis of eighteen *Trichoderma* isolates belonging to five different species. These thirty two pairs of SRAP primers produced 81.85 per cent polymorphism. All isolates were grouped into sixteen clusters, among which cluster A_{1b}, A_{2b}, A_{1b2} and A_{2a2-2} were solitary. The similarity coefficient (SD) was ranged from 0.63 to 0.90. VDCOAB-07 (Latur origin/ *T. harzianum*) isolate was found 100 % dissimilar with other seventeen isolates in SRAP clustering in UPGMA analysis. Also, *Trichoderma* isolate VDCOAB-15 isolated from Nagpur soil comes under major sub cluster B which were found solitary. Two groups were identified within which all 18 *Trichoderma* isolates share 100% similarity (VDCOAB-07 and VDCOAB-08), whereas (VDCOAB-12 and VDCOAB-14) for molecular (SRAP) data, and also one group was also identified contained

single line VDCOAB-15 isolate with 100% dissimilarity. Present study indicated that out of 18 *Trichoderma* isolates only two isolates (VDCOAB-14 and VDCOAB-12) and another group depicted (VDCOAB-07 and VDCOAB-08) 100% similar correlation with each other. It will be utilized for hybrid development and for future including map construction, gene tagging and genetic diversity studies.

Title	-	Studies on impact of <i>tridaxprocumbens</i>l. leaf extract mediated synthesis of silver nanoparticles on growth of <i>glycine max</i> l
Researcher	-	Kachave, ArunSantram
Research Guide	-	Dhawale, R.N.
Department	-	Agricultural Biotechnology
Subject	-	Agricultural Biotechnology
Degree	-	M.Sc
Thesis No.	-	17222
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034228
Abstract	-	

The present study was undertaken at the VilasraoDeshmukh College of Agricultural Biotechnology, Latur, to reveal the objectives of synthesis and characterization of Silver nanoparticles (AgNPs), and their application on Soybean and the effect of silver nanoparticle on growth parameters of soybean were investigated. Silver NPswere prepared by green synthesis process from AgNO₃ solution through the leaf extract of *Tridaxprocumbens*L. The detail characterization of the nanoparticles were carried out using UV-vis spectroscopy, transmission electron microscopy (TEM), fourier transform infrared (FTIR), X-ray diffraction (XRD), particle size distribution and zeta potential measurement analysis. From TEM image analysis, the average particle size was found to be 78 nm silver nanoparticles. From the analysis of UV-vis spectroscopy AgNPs embedded film had an absorbance centered at 485nm. The FTIR spectra showed absorption bands in regions 3435-561cm⁻¹. FTIR analysis of the silver nanoparticles revealed the presence of various compounds. The functional groups are detected on the basis of bond formation. The XRD pattern of dry powder of Ag nanoparticles shows clear diffraction line at low angles i.e., 10-80°. The intense peak of 20⁰ was found at 29°. The size distribution and zeta potential of the AgNPs were determined that particle size distribution curve reveals that AgNPs obtained are polydispersed in nature, and the corresponding average zeta potential value is -13.5 MeV or 78nm. Nanoparticles have potential to improve growth parameter of soybean crop. This study reports the significant effect of silver concentration in the growth parameters of soybean viz., germination percentage, shoot and root length, chlorophyll content, protein content and carbohydrate content. The number of soybean growth parameters were improved by increasing the concentration of silver nanoparticles (20, 40, 60 and 80ppm) while they were reduced by applying other silver nitrate concentration. The significant effects on growth parameters of the plant was obtained with the treatment of nano silver 20 and 40ppm, 60ppm and

80ppm while the lowest amount of this feature was seen with control and 100ppm concentration.