

Details of Ongoing Projects

1. **Project Title-** Development and formulation of microbial metabolites for the management of root parasite weed *Orobanche* in mustard

Principal Investigator- Dr. C. Kannan

Executing Agency - DWSR, Jabalpur.

Proposed Work

- Extraction of crude fractions of secondary metabolites from the commonly occurring soil fungi viz., *Trichoderma* spp., *Fusarium* spp., *Alternaria* spp. antagonistic against *Orobanche* spp.
- Bioassay screening of *Trichoderma* spp. fungi and their crude fractions on *Orobanche* and to analyze the effect of systemic resistance in elicited in the host plants.
- Proteomics of the interactions of the host plant, parasitic weed and the microbial metabolite for better understanding of the resistance process of the host.
- Partial purification and formulation of the potential crude fraction for their sustained and safe release in the farmer's field.

Probable Outcomes

- Purified and characterized germination stimulant compound from host plants like mustard, cotton, sorghum, maize, tomato and sugarcane, obtained by collection of root exudates and solvent extraction.
- Purified and characterized secondary metabolites from *Trichoderma* spp., produced from cell free culture extracts that can suppress the infection process of the parasitic weeds in mustard.
- Elicitor compound from the microbial extracts that can induce systemic resistance in mustard against *Orobanche*.

2. **Project Title-** Development of Synthetic Seeds of *Hardwickia binata* (Anjan) by Tissue Culture

Principal Investigator- Dr. Satish Silawat

Executing Agency - Research & Extension Circle, Indore.

Proposed Work:

- For development of artificial seed of *Hardwickia Binata* (Anjan) .
- Regeneration of *Hardwickia Binata* (Anjan) plant form developed artificial seed

Probable Outcomes:

- The applications of artificial seed development will solve the problem of seed availability of *Hardwickia Binata* (Anjan) to a significant extent.
- The project will have a great implication on rural economy of Malwa & Nimar where Anjan leaves constitute most favorite fodder for milch and cattle .

3. **Project Title-** Relation of MHC genes polymorphism with coccidial resistance in chickens

Principal Investigator- Dr. Mohan Singh Thakur

Executing Agency – Nanaji Deshmukh Veterinary Science University, Jabalpur.

Proposed work:

- To study the polymorphism at MHC genes locus in different commercial lines and Kadaknath breeds of chicken.
- To study genetic differences in susceptibility due to coccidial challenge in different commercial lines and Kadaknath breeds of chicken.
- To determine the association of MHC genes with growth traits in different commercial lines and Kadaknath breeds of chicken.

Probable Outcome

The present investigation could help to understand how MHC polymorphism contributes to disease resistance and susceptibility to coccidiosis

4. **Project Title-** Optimization and scale up of process parameter for High Fructose Syrup (HFS) Production using *Aspergillus niger* OP-3 and *Penicillium sp.* NFCCI 2768 Inulinase

Principal Investigator- Dr. Naveen Kango

Executing Agency – Dr. Hari Singh Gour University, Sagar.

Proposed work:

- To study exo-inulinase production from selected fungal strains (primary screening).
- To examine various crude low-value carbon sources (Asparagus root, dahlia tubers) for exo-inulinase production.
- Application of selected fungi for checking suitability in shake flask level submerged fermentation and solid state fermentation (SSF).
- Check suitability and selection of low value carbon source for the high fructose syrup production by selected high exoinulinase producing fungal strains.
- Studies of fructose syrup production under optimized conditions in 5-litre laboratory fermenter.

Probable Outcome

Inulin containing crops like asparagus and dahlia (substrates for this study) grown in different fields of Madhya Pradesh because it contains some medicinal and nutritional properties. This study will help to make a novel process for the preparations of high-fructose syrup from cheap low grade substrate.

5. **Project Title-** Non-invasive biomarkers for assisted prognosis of Gliomas

Principal Investigator- Dr. Puneet Gandhi

Executing Agency – BMHRC, Bhopal.

Proposed Work

- To develop an understanding of malignant glioma & its molecular biology.
- Application of this understanding in establishing serum and tissue based biomarkers as prognostic indicators.

- To evolve a possible strategy for follow- ups using a 2 pronged approach viz.a.viz biomarkers in conjunction with conventional therapies.

Probable Outcome

This will be the first initiative of its kind from the state and can pave way for development of tools and techniques for various other communicable and non-communicable diseases that pose a challenge.

6. **Project Title-** Polymorphism at hypervariable microsatellite loci in three populations of Madhya Pradesh

Principal Investigator- Dr. Pankaj Shrivastava

Executing Agency - State Forensic Science Laboratory, Sagar.

Proposed Work

- To assess the nature and extent of variations in autosomal STR loci (on at least 16 markers or more)
- To examines the genetic diversity and affinity between five tribal population of MP
- To use genetic diversity data in calculation of match probabilities in forensic human identification
- To correlate any specific phenotypic feature with genotype
- To analyze genetic diversity among selected five tribal population of Madhya Pradesh
- To analyze genetic diversity in diplex markers in five tribal population of MP

Probable Outcome

- The study is expected to give the genetic pattern of the particular tribe of specific area.
- Occurrence of any specific phenotypic characteristics like skin colour, eye colour, scalp hair pattern and/or disease will be correlated.
- Occurrence of any specific genetic disorder found in that specific tribe will also be worked out which will be in the benefit to the tribes.
- Establish DNA database of tribal population of specified area.
- The outcome of this study will be useful for the routine casework examinations in forensic laboratories.

7. **Project Title-** Analysis of heat shock proteins (HSP70) expression during cyclic heat stress in broiler chickens and amelioration of heat stress by Ascorbic acid & supplementation

Principal Investigator- Dr. Aditya Mishra

Executing Agency - Nanaji Deshmukh Veterinary Science University, Jabalpur.

Proposed Work

- To quantify heat shock protein (HSP70) in tissue lysates and plasma corticosterone concentration in heat stressed and non - heat stressed broiler birds.
- To quantify the plasma ascorbic acid concentrations in both non-heat stressed and heat stressed broiler birds
- To study the inter-relationship of heat shock protein (HSP70) in tissue lysates and plasma corticosterone in heat stressed broiler birds

Probable Outcome

The present investigation attempts will be made to quantify and establish the correlation between heat shock proteins and plasma corticosterone and to alleviate the effect of thermal heat stress by ascorbic acid supplementation as per agro-climatic conditions of Madhya Pradesh.

8. **Project Title-** Molecular diagnosis and therapeutic strategies against contagious caprine pleuropneumonia (CCPP) in goats.

Principal Investigator- Dr. Devendra Kumar Gupta

Executing Agency - Nanaji Deshmukh Veterinary Science University, Jabalpur.

Proposed Work

- To apprise the sero-epidemiology of CCPP in goat's population in organized and unorganized goat farm in and around Jabalpur City
- Molecular diagnosis of sero-positive sample using polymerase chain reaction
- To evolve the most specific therapeutic approach by using different antimicrobials to combat CCPP in goats

Probable Outcome

This work will provide the avenues to know the status of CCPP and accordingly the suitable therapeutic strategy will be designed to decrease the morbidity and mortality which causes great economic losses to goat farmers'. Efforts will be made to establish the Mycoplasma lab for quick and appropriate diagnosis at college of Veterinary Science & A.H., NDVSU, Jabalpur (M.P.).

9. **Project Title-** *In vitro* regeneration and yield improvement of secondary metabolites from tissue culture of *Swertia chirayita* and *Celastrus paniculatus*

Principal Investigator- Dr. Monica Jain

Executing Agency - Maharaja Ranjit Singh College of Professional Science, Hemkunt Campus, Khandwa Road, Indore-17.

Proposed Work:

- Sample collection from Agriculture College, Indore and Maintenance of stock plants in green house.
- Establishment of primary cultures from different explants of *S. chirayita* and *C. paniculatus*.

- Regeneration of plants using different media and different combination of hormones favoring shoot and root induction.
- Hardening and Acclimatization of regenerated plantlets.
- Effect of different light sources a) white b) Red c) yellow d) blue light generated from light emitting diodes (LEDS) with light as positive control and dark as negative control, on growth and production of different secondary metabolites.
- Extraction and HPLC estimation of secondary metabolites from *in vitro* raised cultures of *S. chirayita* and *C. paniculatus*.

Probable Outcome:

- Develop a cost effective, high frequency reproducible *in vitro* regenerative protocol for replenishment of natural and depleting population of *S.chirayita* and *C.paniculatus* by producing their quality clones in short duration through tissue culture.
- The study will help in conservation and addition to the biodiversity of Madhya Pradesh region.
- The project proposed will provide a guideline for obtaining high yield of important secondary metabolites which is responsible for plant medicinal properties.
- Regeneration of these medicinal plants will create great potential to generate quality raw material. This will definitely open new ventures in commercial and research development for production of quality drug material. The regenerated plants will be clones of superior quality mother plants and hence rich germplasm can be obtained. Future studies can be targeted at the standardization of large scale production of secondary metabolites.

10. **Project Title-** Genome organization studies and development of cost effective diagnostics for Soyabean viruses

Principal Investigator- Dr. Neeraj Verma,

Executing Agency - AKS University, Satna (M.P.).

Proposed Work:

- Thorough survey of the soybean growing areas
- Isolation and maintenance of the causal virus (es) from the infected samples.
- To develop seriological diagnostic protocols to enable the plant growers to detect the virus at an early stage of infection.
- Identification and characterization of virus (es) infecting soybean through RT-PCR/PCR
- To develop nucleic acid based diagnostic protocols based on hybridization.
- Search for new/unknown virus (es)/viroids
- Molecular characterization of the most prevalent virus (es) infecting soybean

- Variability study in the various geographical isolates present in the infected samples
- Marking of true to type good quality apparently virus free mother plants

Probable Outcome:

Genome sequences for the Indian stains, diagnostics protocols and documentation for the presence of virus infection will be developed. The important research findings will be published in high impact factor journals. The meetings with local farmers will be held regularly and the information will be pass out to them. The primers, genomes sequenced will be submitted in GenBank.

11. **Project Title-** In-vitro propagation, photochemical and genetic analysis of *Sarcostemma brevistigma* Wight and Arnott. an important medicinal plant
Principal Investigator- Dr. Susmita Mishra,
Executing Agency - Society for the Conservation of Nature, Rewa, (M.P.)

Proposed Work:

- Collection of plant material and establishment of *in-vitro* propagation protocol.
- Development of synthetic seeds from in-vitro raised plants.
- Characterization of *in-vitro* developed plants using morphological and physiological parameters.
- Biochemical analysis of in-vitro developed plants.
- Assessment of genetic fidelity of tissue culture raised and synthetic seed derived plants using different molecular.

Probable Outcome:

The main objective of this project is to develop a cost effective, high frequency reproducible in vitro regenerative protocol for replacement of natural and depleting population of *S. brevistigma* by producing their quality clones in short duration through tissue culture and synthetic seed technology. The outcomes of the project will not only help to reduce the pressure on the species but also will help to conserve the biodiversity of Madhya Pradesh. The proposed project will provide a guideline for obtaining true to type plant. Synthetic seed technology will ensure the year round supply of the quality plant material and their easy transportation and conservation. Regeneration of these medicinal plants will create great potential to generate quality raw material. This will definitely open new ventures in commercial and research development for production of quality drug material. The regenerated plants will be clones of superior quality mother plants and hence rich germplasm can be obtained. Future studies can be targeted at the standardization of improved production of secondary metabolites.

12. **Project Title-** Augmentation of fracture healing in goat using regenerative medicine and bone substitutes

Principal Investigator- Dr. Randhir Singh

Executing Agency - Nanaji Deshmukh Veterinary Science University, Jabalpur

Proposed Work:

- To isolate and characterize the bone marrow derived mesenchymal stem cells (BMSCs) in goat.
- To evaluate the therapeutic response and economic feasibility of bone marrow derived mesenchymal stem cells (BMSCs) with beta-tricalcium phosphate (β -TCP) as bone substitute in fracture healing.

Probable Outcome:

- Present work will lead to rise in existing level of techniques adopted for treatment of fracture/ orthopedic diseases in animals at District Veterinary Polyclinics of the State.
- The health status of the goat will be improved by successful implementation of this technique resulting into socio-economic upliftment of the farmers of the State.
- The elite breeding stock of the goats which is not able to breed and have sub-optimal production due to orthopedic diseases can also be successfully treated by this technique. The culling lot of the goats will reduce significantly and will continue to serve to be an asset to the farmer.
- In future, the cryopreserved mesenchymal goat stem cells will be provided to the field Veterinarians or to an institute as and when required.
- The technique/ BMSCs may also be evaluated for treatment for an array of diseases (tendon injury, wound healing, and Degenerative Joint disease etc) in animals.

13. **Project Title-** Phenotypic studies and genetic characterization of weedy rice biotypes from Madhya Pradesh based on SSR markers

Principal Investigator- Dr. Meenal Rathore

Executing Agency - Directorate of Weed Sciences Research, Jabalpur

Proposed Work:

- Phenotyping and maintenance of collected germplasm of weedy, wild and cultivated rice.
- Molecular fingerprinting of weedy, wild and cultivated rice accessions using microsatellites.
- Electrophoretic profiling of total seed protein from weedy, wild and cultivated rice grains and assessment of diversity in them.
- Screening of weedy rice accessions for abiotic stress tolerant accessions.

Probable Outcome:

- Madhya Pradesh Biodiversity and Biotechnology Department, Madhya Pradesh can utilize the abiotic stress tolerant accessions, if any found.
- Madhya Pradesh State Biotech Council for use of database for futuristic in depth studies on the weed biology at molecular levels
- Madhya Pradesh state Agricultural Department for use of the database for developing management strategies against weedy rice
- Biodiversity and Biotechnology Department, Madhya Pradesh and Madhya Pradesh state Biodiversity Board for preservation of germplasm of weedy rice from MP