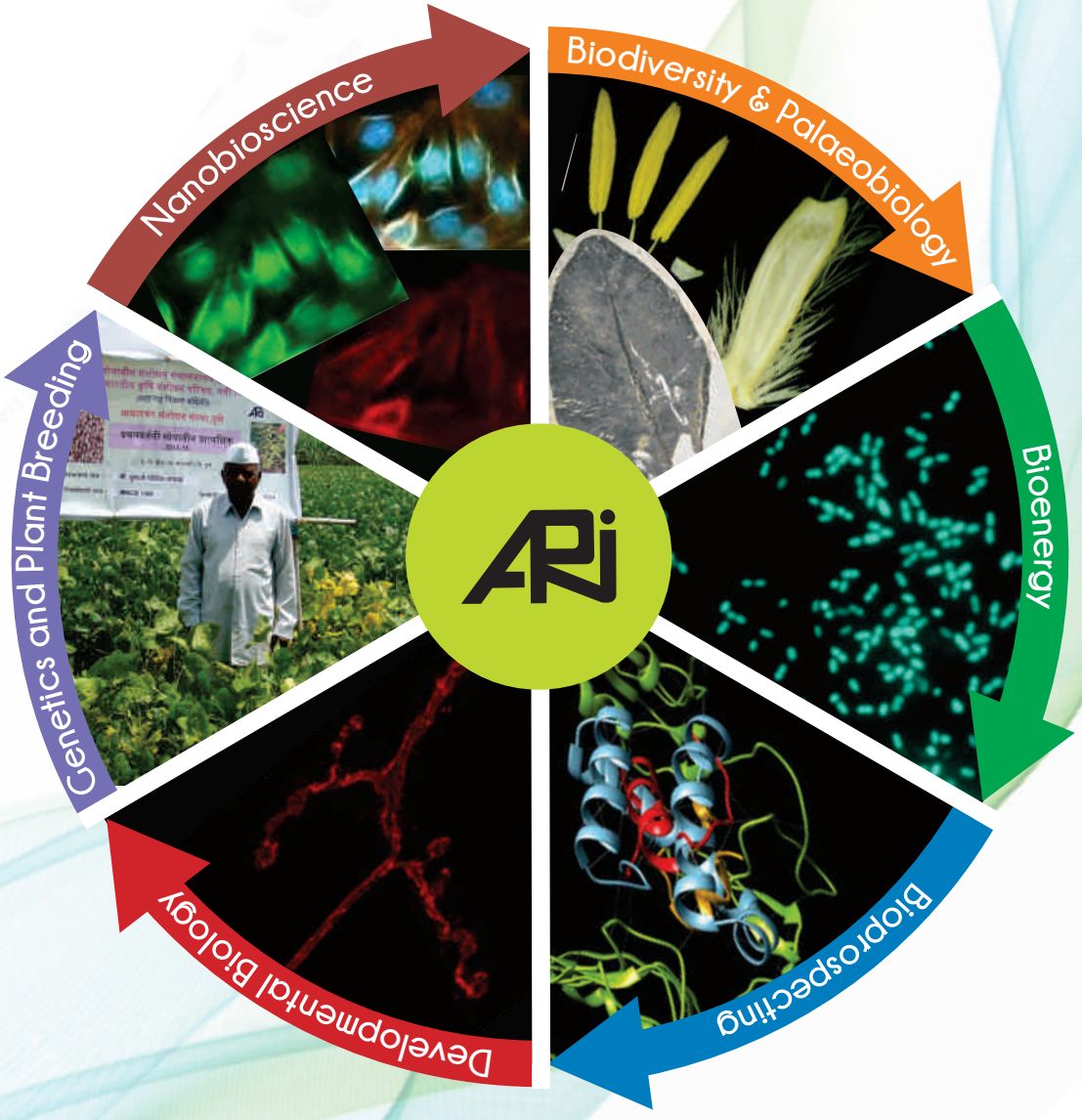
MACS

Annual Report 2014-15



Maharashtra Association for the Cultivation of Science
Agharkar Research Institute

Vision

Our goal is to excel as an internationally recognized centre of multi-disciplinary life science research that focuses on industrial development, human health and environment.

Mission

Conduct basic and applied research in life sciences and harness the genetic diversity of microbes, plants and animals towards a cleaner environment, sustainable agriculture and better health of the masses.

MACS

Annual Report 2014-15

Maharashtra Association for the Cultivation of Science
Agharkar Research Institute

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From the President's Desk

Dr DR Bapat
President
Maharashtra Association for the Cultivation of Science
Pune

Dear Friends,

I have the pleasure of presenting to you the MACS-ARI annual report 2014-15. Maharashtra Association for the Cultivation of Science has continued to contribute on its mandate objectives, viz. encouraging research, popularising science and reaching to society in a significant way.

Director, Agharkar Research Institute has made a mention of the research highlights in his 'Executive Summary'. However, I would like to briefly touch upon some of the most important research aspects.

- Extended distribution of an endemic and threatened grass *Ischaemum travancorense* Stapf, and two new species of diatoms from Lonar Crater Lake have been reported.
- Microbial diversity associated with methane hydrate deposits in the Krishna Godavari Basin was investigated for the first time ever using metagenome approach.
- Synthetic and naturally occurring molecules for the treatment of copper-induced oxidative stress in Alzheimer's disease were developed.
- Studies in zebrafish embryos revealed that around 20 % of ctgfa (an important protein of extracellular matrix) mutants that survived showed curved body axis and abnormal swimming at three months.
- Wheat variety MACS 6478 has been released and notified by Central Subcommittee on Crop Standards, for timely sown irrigated conditions of the Peninsular Zone.
- Waterborne pathogens were detected using a microfluidics based device developed in-house. A portable prototype of the same is ready for in-line detection of bacteria.

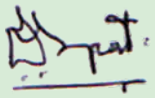
Coming to the popularisation of science and reaching to the society, topics of societal and scientific relevance were addressed in the memorial orations organized

by MACS. Dr GB Deodikar Memorial Oration was delivered by Dr JP Tandon, Former Project Director of Wheat, and Former Assistant Director General, Indian Council of Agricultural Research, New Delhi on 'Wheat improvement potential and current status'. Mr VM Ranade, Former Secretary Irrigation, Government of Maharashtra delivered Shri GB Joshi Memorial Oration on 'Interlinking of rivers and food security'. The 54th Prof. SP Agharkar Memorial Oration was delivered by Dr Achyuta Samanta, Founder and Mentor, Kalinga Institute of Industrial Technology, and Kalinga Institute of Social Sciences, Bhubaneswar on 'Building sustainable organization: A need for modern India'.

To encourage scientific aptitude different awards were instituted with financial support from NGO's and individuals. These include Dr RB Ekbote Award in recognition of significant research contribution in the various areas of Botany, Shri VP Gokhale Award in recognition of significant research contribution in the various areas of Phytopathology and Dr PP Kanekar Award for the best paper published by young scientist/s of MACS-ARI. Besides research, MACS has been promoting courses on Home Gardening and Field Botany.

I am proud to say that MACS-ARI whole heartedly responded to the appeal made by the Honourable Prime Minister of India to reach out to schools and voluntarily participate in teaching and thereby disseminating science both in the rural and urban areas. 'Swach Bharat Abhiyan' was also taken up in all sincerity. Details of both these activities are amply illustrated in this report.

I would appreciate receiving your suggestions for making MACS an even more vibrant organisation.



DR Bapat

22 September 2015, Pune

From the Director's Desk

Dear Readers,

Agharkar Research Institute has been undergoing a steady yet noticeable change since the year 2012-13. The trend has continued during 2014-15 too. ARI reorganised its expertise and human resource into six thematic groups, viz. Biodiversity and Palaeobiology (erstwhile Microbiology, Botany, Mycology, Virology, Geology and Palaeobiology); Bioenergy (erstwhile Microbiology); Bioprospecting (erstwhile Biometry and Nutrition, Chemistry, Microbiology, Botany, Mycology); Developmental Biology (erstwhile Zoology); Genetics and Plant Breeding, and Nanobioscience.

The reorganization was done on the recommendation of the Research Advisory Committee. It received the approval of the Institute Council and the Governing Body of Maharashtra Association for the Cultivation of Science. A lean structure was adopted to increase the efficiency and to carry out focussed research. The research highlights presented below are along the lines of the thematic groups mentioned above.

The Biodiversity and Palaeobiology Group has consolidated research activities related to diversity of plants, diatoms, viruses, fossils, bacteria, archaea as well as fungi associated with biodiversity hotspots such as Western Ghats. Major emphasis has been on identification of novel taxa. ARI Botanists have reported extended distribution of an endemic and threatened grass, *Ischaemum travancorense* Stapf and two new species of diatoms from Lonar Crater Lake. Rare Endangered Threatened (RET) species of *Ceropegia* from Western Ghats have been micropropogated and successfully reintroduced to their natural habitats. ARI Virologists have isolated several novel *Salmonella* phages and sequenced the whole genome of novel phages. Phylogenetic analysis based system was proposed for the classification of bacteriophages. Genomic characterization of newly sequenced phages provided new insights in life cycle of bacteriophages. ARI scientists working in Palaeobiology discovered fossil bivalves from upper Jurassic rocks of Marwar basin, Rajasthan for the first time. They have also found clastic injectites from lower cretaceous sediments of Cauvery basin, Tamil nadu. This finding is significant as their host sediments are surface equivalence of hydrocarbon source rocks. Mycologists in our institute have deposited authenticated cultures of 370 fungi in NFCCI as a part of conservation of fungal diversity, during the course of last one year.

The Bioenergy Group has focused on exploration of microbial diversity of extreme and pristine habitats for taxonomic novelty and industrial applications, mainly in the field of Bioenergy and Petroleum Biotechnology. Microbial diversity associated with methane hydrate deposits in the Krishna Godavari Basin was investigated for the first time ever using metagenome approach. Presence, prevalence and dominance of different microbial (including putative novel) species were investigated. Important insights into microbial metabolism leading to the formation of methane were obtained. Such information was used to develop a kinetic model to speculate the extent of methane

hydrate deposits in KG basin. Metagenomics studies were also performed to investigate the microbial diversity and metabolism associated with anaerobic digestion of agricultural residues. Such knowledge was used to cultivate rare anaerobic fibrolytic fungi which can be effectively used in the biomethanation of agricultural residues in place of alkali and heat treatment, thereby reducing environmental pollution. Microbial cultures obtained from extreme or pristine habitats were used to develop microbial technologies such as (i) Biomethanation of agricultural residue/ waste; (ii) Bioremediation of oil-contaminated produced water using a microbial consortium; and (iii) Microbial enhanced oil recovery.

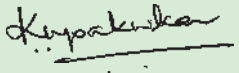
The Bioprospecting Group has developed formulations from flowers of *Swertia densifolia* for repelling honeybees. For anti-fouling applications on naval ships, plant based formulations were developed. Synthetic and naturally occurring molecules for the treatment of copper-induced oxidative stress in Alzheimer's disease were developed. The details of mechanism of the cellular targets of insulin-like protein from *Costus igneus* were elucidated. Monographs on quality standards of Indian medicinal plants- Wild crotons, Nagchampa, Karmarda and Medasakah, were published by Indian Council of Medical Research.

The Developmental Biology Group used antibodies raised against synthetic surface peptides of hydra Noggin to localize the expression of Noggin protein in hydra using immunofluorescence. Intact polyps showed prominent but scattered, punctate extra-nuclear expression of Noggin. Genetic analysis in *Drosophila* embryos indicated that TOR signalling is upregulated upon overexpression of the mutant VAP protein which is important in neural development. CTGFA is an important protein of extracellular matrix. Studies in zebrafish embryos revealed that around 20% of survived ctgfa mutants show curved body axis and abnormal swimming at three months.

The Genetics and Plant Breeding Group has in the past developed high yielding varieties of wheat, soybean and grape. Recently, wheat variety – MACS 6478 has been released and notified by Central Subcommittee on Crop Standards, for timely sown irrigated conditions of the Peninsular Zone. This variety is highly resistant to black and brown rusts, has lustrous attractive bold grains with high protein content (14%), excellent chapatti and good bread quality. The Indian Institute of Soil Science Bhopal has recently reported that due to deficiency of micronutrients like Zinc, Iron, and Bronze etc. the crop yields are decreasing and are also affecting human health. They have reported zinc and iron deficiency in Maharashtra and two other states, which could be corrected through organic and inorganic fertilizers and using varieties like MACS 6478 (zinc 44.1 ppm & iron 42.8 ppm) that can trap enough micronutrients even from deficient soils. By using Marker Assisted Selection, soybean scientists have developed improved soybean genotypes without Kunitz trypsin inhibitor (major anti-nutritional factor) and also having high oil content (MACS 1407, 1416 & 1585). Likewise, improved quality traits, stress resistance bread and durum wheat lines have been developed.

The Nanobioscience group is focussing on diagnostics and treatment of communicable and non-communicable diseases. For treatment of cancer, carbon nanospheres showed promise for the nuclear delivery of anti-cancer peptide. In another approach towards cancer treatment via hyperthermia, "Theranostic" Dextran coated Lanthanum Strontium Manganese Oxide nanoparticles were proved to be effective in *in-vivo* trials. In treatment of diabetes, zinc oxide nanoparticles appeared promising, acting through multiple mechanisms. Waterborne pathogens were detected using a microfluidics based device developed in-house. A portable prototype of the same is ready for in-line detection of bacteria.

I would appreciate receiving suggestions from the readers in further improving our performance.



(KM Paknikar)
Director (Officiating)
Agharkar Research Institute

22 September 2015, Pune

Biodiversity and Palaeobiology

Research activities of this group explore the biodiversity ranging from archaea to plants, and viruses to fossils.

Areas of focus

1) Archaea and bacteria
2) Fungi and lichens
3) Plants and diatoms
4) Viruses
5) Palaeobiology

1) Archaea and bacteria The microbial diversity associated with extreme and pristine habitats such as deep submarine methane hydrate deposits, and high-temperature oil reservoirs was investigated. Novel taxa and interesting metabolic pathways were documented through a metagenomic route using Ion Torrent Personal Genome Machine.

- **सागर मंथन - First documentation of microbial diversity of methane hydrate deposits from Krishna-Godavari Basin**

Methane hydrates are an ice-like structures with methane trapped in a lattice of water molecules. It possesses enormous potential for energy recovery. Deep submarine methane hydrate deposits from the Krishna-Godavari Basin were studied. Metagenome analysis of core (actual hydrate) and sediment (surrounding the hydrate) associated with methane hydrate deposits revealed that the bacterial population was more abundant and diverse as compared to the archaeal population (Table 1). The dominant phyla in bacterial populations were identified (Table 2).

Table 1 Metagenome analysis of core and sediment

Metagenome analysis	Bacteria (%)	Bacterial genera	Archaea (%)	Archaeal genera
Core	97.2	675	0.15	55
Sediment	98.14	665	0.37	62

Table 2 Dominance of bacterial populations

Sample	(%) Occurrence	
Core	Firmicutes, 58.7	Proteobacteria, 27.6
Sediment	Proteobacteria, 85.7	Actinobacteria, 9.7

The heat map analysis revealed that Methanomicrobia was the dominant class of methanogens and was prominently represented by the genus *Methanosarcina* in both the samples. The presence of metabolic pathways (representing catabolism of complex organic substrates such as chitin, cellulose, pectin, starch) and acetoclastic as well as hydrogenotrophic methanogenesis suggested biogenic methane formation in the deep submarine environment.

This analysis is the first documentation of the microbial diversity associated with methane hydrate sediments in Krishna-Godavari Basin. The analysis yielded important insights into microbial metabolism responsible for the generation of biogenic methane leading to the methane hydrate formation.

- ### Exploration of microbial community for microbial enhanced oil recovery

High-temperature oil reservoirs harbour a diverse microbial community. These were investigated to document novel taxa and to explore their potential for microbial enhanced oil recovery (MEOR). Metagenomic analysis of formation water sample, i.e. water coming out from the oil well revealed that bacteria, archaea and eukaryotes represented 96.5%, 2.9% and 0.3% of the microbial community, respectively. Further analyses revealed the presence of dominant phyla such as Proteobacteria, Firmicutes, Deinococcus-Thermus, Thermotogae and Bacteroides. Dominant genera were *Aromatoleum* (7.7%), *Thauera* (9.1%), *Azoarcus* (8.3%), *Dechloromonas* (3.7%) and *Marinobacter* (3.1%) which have been reported to possess genes coding for anaerobic and aerobic degradation of aromatic compounds. Metabolic pathways which are helpful in MEOR process, namely, solvents, acids and gas production, exopolysaccharide, biosurfactant production were found. Also, enzymes alkane monooxygenase and alkane hydroxylase were found indicating the potential of the microbial community to degrade petroleum hydrocarbons. Such bacteria could be used to convert heavy oil to light oil or for conversion of residual oil to methane in depleted reservoirs. Oil reservoir bacteria showed interesting microbial community structure, where metabolic pathways responsible for MEOR process were detected.

- ### Isolate from human gut

The role of novel isolate from human gut, *Clostridium* sp. BL8 was investigated in detail using genome sequencing tool. It has several adaptive features, viz. bile resistance and presence of sensory/regulatory systems, oxidative stress managing systems, membrane transport systems, virulence factors, adhesion factors, proteases, Type IV secretion system and antibiotic resistance genes. These suggest that *Clostridium* sp. BL8 could be a potential human pathogen. Further *in vivo* studies are necessary to ascertain this possibility.

2) Fungi and Lichens

Conventional and modern taxonomic approaches such as polyphasic taxonomic tools using multigene sequencing techniques and microsatellite markers for fungal taxonomy and authentication, besides bioprospecting of lichen metabolites, are being studied.

- ### Fungal taxonomy

Conventional and modern taxonomic approaches were employed to study the fungal taxonomy and phylogeny. Morphological and cultural characteristics, as well as internal transcribed spacer (ITS) rDNA sequence analysis, of twelve previously unidentified isolates of *Fusarium* was carried out. The study revealed generic and specific identity as *Fusarium equiseti, F. moniliforme, F. oxysporum, F. proliferatum, F. solani* and *F. lateritium.* Also, bioinformatics analysis of *Colletotrichum gloeosporioides* genome yielded eight novel microsatellite loci, which showed an apparent size variation on PAGE. These

microsatellites were found to be stable in preliminary experiments. A reappraisal of the genus *Phalangispora* was done with the rediscovery of *P. bharathensis* from the Northern Western Ghats. An obscure species of *Phalangispora* Nawawi & Webster was found on leaf litter of *Mangifera indica* collected from Tamhini Ghat.

- **Lichen metabolites**

While bio-prospecting the lichen metabolites antioxidant activity, angiotensin converting enzyme (ACE) inhibitory activity and HMG-CoA reductase inhibitory activity of two foliose lichens *Everniastrum cirrhatum* and *Parmotrema reticulatum* was studied (Table 3).

Table 3 Biological activities of *Everniastrum cirrhatum* and *Parmotrema reticulatum*

Activity	*Everniastrum cirrhatum*	*Parmotrema reticulatum*
Antioxidant		
Acetone extract	75-89 %, TEAC* 6.5 mM	44-97 %, TEAC 6.7 mM
Ethyl acetate extract	64-85 %, TEAC 6.0 mM	65-91 %, TEAC 6.5 mM
Methanol extract	56-94%, TEAC 6.7 mM	45-98 %, TEAC 6.7 mM
ACE inhibition	11.8-47 %	36-65 %
HMG-CoA reductase inhibition	61.98 % at 200 mg/ml	95.9 % at 150 mg/ml

*TEAC - Trolox Equivalent Antioxidant Capacity

The standard ACE inhibitor Captopril (100 µg/ml) had 20.3% activity while HMG-CoA reductase inhibitor Pravastatin (50 µg/ml) exhibited 32.4% activity. Thus, the studied lichens revealed strong antioxidative, ACE and HMG-CoA reductase inhibitory activities.

3) Plants and diatoms Screening and documentation of biodiversity includes survey, evaluation and conservation of flowering plants and diatoms. Studying important medicinal plant complexes using pharmacognosy tools, documenting profiles using HPTLC and their assessment with reverse pharmacology are also focussed. Besides, biotechnological tools like plant tissue culture and molecular markers are applied to conservation, authentication and phylogenetic studies. Repository (Herbarium and Crude drugs) and authentication service are the core activities that serve as the backbone for in-house and sponsored projects.

For screening and documenting biodiversity studies are carried out on germplasm of wild resources of grasses, rare endangered threatened species, wild edible plants, and diatoms.

- **Grasses**

Collection, conservation and multiplication of germplasm of wild resources included plant community studies on selected grasslands of Western Maharashtra. These studies covered three different rainfall (up to 1200 mm, 800-100 mm, < 500 mm) regions of Maharashtra. The study showed that grasslands exposed to the frequent burning show dominance of legumes during early months of monsoon owing to less availability of nitrogen in the soil, followed by the dominance of grasses.

When the distribution of C3 and C4 grasses in Maharashtra was investigated, it was found that the former grow in wetter (Konkan, Western Ghats) while the latter tend to grow in drier (Marathwada, Vidarbha, Khandesh, parts of Madhya Maharashtra) regions of the state.

During the work *Ischaemum travancorense* an endemic and threatened grass species earlier known only from the Western Ghats was reported for the first time from Central India- Vidarbha (Figure 1).

- ## Flora of Bhagwan Mahavir (Molem) National Park, Goa

Based largely on the contributions made by ARI, a monograph on the flora of Bhagwan Mahavir (Molem) National Park, Goa has been recently published by the Botanical Survey of India.

- ## Threatened species identified

Eriocaulons (Pipeworts) have highest threatened species percentage in the Western Ghats. Molecular phylogenetic studies of the genus *Eriocaulon* L. are being carried out to assess the congruence between morphological and molecular data to find the trend of morphological character evolution and to develop possible DNA barcodes. About 128 accessions of *Eriocaulon* were collected from different localities of the Western Ghats, and 42 species were identified after critical morphological examination. Morphometry was also done. Some interesting species (probably new) are being worked out for molecular details.

- ## कंद–मूल-Distribution maps of wild edible plants generated

Survey of wild edible plants and wild relatives of crop plants in the Western Ghats of Maharashtra is underway. Residents of the Northern Western Ghats utilise a large number of wild edible plants sustainably. Field work and herbarium survey revealed that local people consume 159 species of wild edible plants as a part of their daily diet. Leaves, fruits, seeds, tubers and stems are an integral element in the diet, consumed either raw or cooked as a vegetable or stored in dried form. Distribution maps for all these species are also generated.

- ## Back to nature

To recover the Rare Endangered Threatened (RET) species of *Ceropegia* from Western Ghats 4912 micropropagated plantlets of four species of *Ceropegia* were reintroduced in their natural habitats (Table 4). The mother plants are maintained in ARI nursery.

Table 4 Micropropagation and reintroduction of *Ceropegia* spp.

Species	Mother plants (no.)	Reintroduced plantlets (no.)
C. maccannii Ansari	50	1355
C. mahabalei Hemadri et Ansari	50	1305
C. rollae Hemadri	50	1212
C. odorata Hook.	50	1040

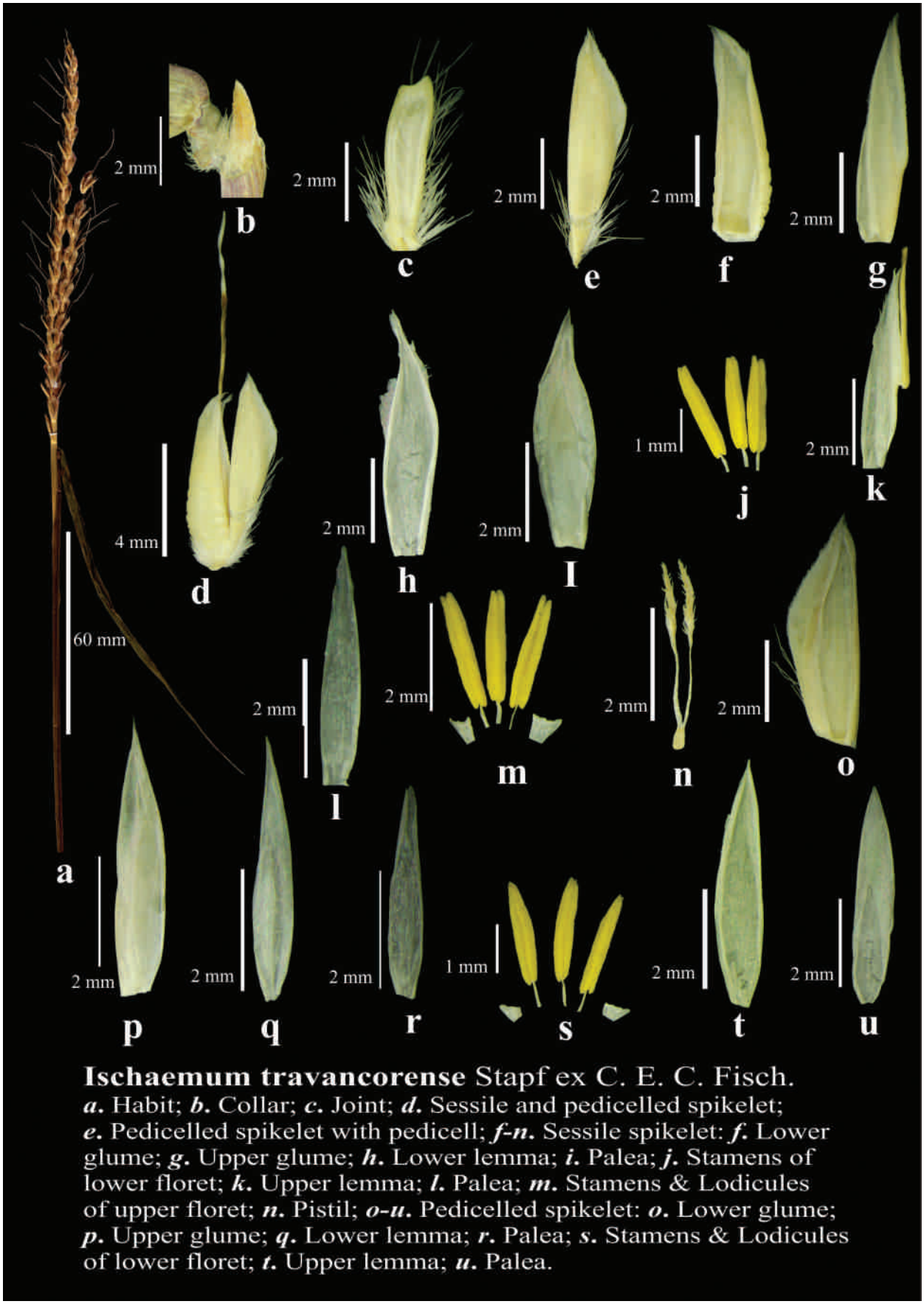


Figure 1 *Ischaemum travancorense* was reported for the first time from Central India

• Two new species of diatoms reported

The diversity of diatoms from semi-aquatic habitats in Peninsular India explores the biogeography of semi-aquatic diatoms from the Western Ghats and adjoining eco-regions. Our preliminary survey yielded two new species of diatoms (*Nitzschia kociolekii* and *Nitzschia tripudio*) from freshwater environs of Lonar Crater Lake (Figure 2).

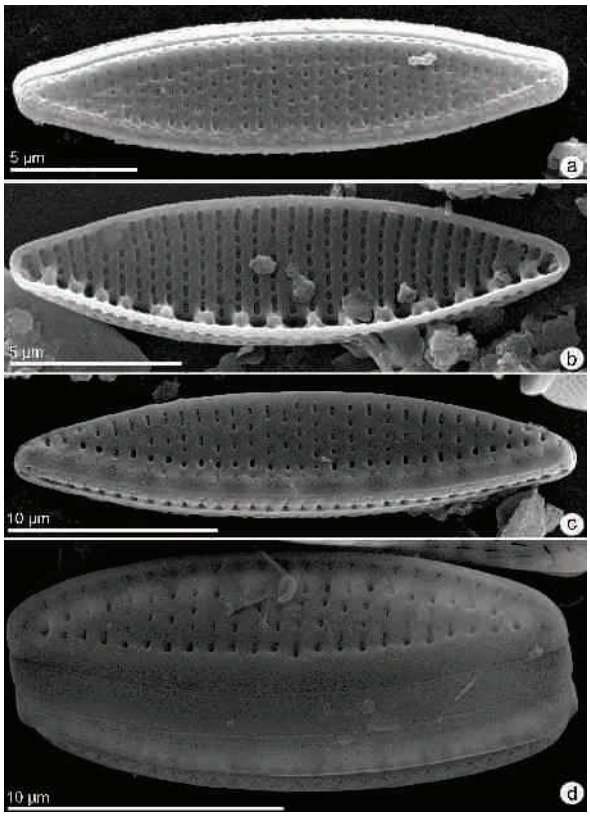


Figure 2 SEM images of *Nitzschia kociolekii* (a, b), *Nitzschia tripudio* (c, d)

• Medicinal plants

To study the medicinal plant complexes profiling of medicinally important species, and phytochemical reference standards were taken up.

While developing profiles for medicinally important species from genus *Solanum* L. eleven different taxa were identified under *Brahati*, *Kakamachi* and *Kantakari* complexes that are used for a wide array of disorders. The aim is to determine genuine resources of respective complexes using taxonomical, pharmacognostic and molecular tools.

Development of phytochemical reference standards library by HPTLC profiling for selected Indian medicinal plants is underway. Seven more spectra were added to the library taking the total to 25. The spectra library will be useful for quality standardization of medicinal plant resources.

4) Viruses

Salmonella is an important food-borne pathogen that causes Salmonellosis in humans. Efforts are on to find out alternative control measures such as the use of bacteriophages as bio-control agents against *Salmonella.*

• Bacteriophages as bio-control agents

Salmonella phages from sewage and sewage-polluted river water from *Salmonella* epidemic region were isolated. Genomic characterization of 13 *Salmonella* phages was carried out by using next generation sequencing platform. In newly sequenced phages, several virulence genes, DNA metabolism genes, tRNA genes, antibiotic resistance genes and genes which do not have any apparent role in phages life cycle were observed. Sequence analysis provided us new insights into the life cycle of *Salmonella* phages. Annotation identified the presence of polymyxin-b resistance gene and penicillin-binding protein. The presence of DNA metabolism genes and tRNA genes, which may have a significant role in phage life cycle were also identified. These genes may have a positive impact on the fitness of bacteriophages.

5) Palaeobiology

Palaeobiological research addresses Mesozoic and Paleogene ichnology, Holocene palynology and foraminifera, and neoichnology of the west coast.

Mesozoic and Paleogene ichnology involved the study of areas in Gujarat, Rajasthan and Tamil Nadu.

• Ichnogenera from geological formations

Studies of the Mesozoic – Upper Jurassic rocks of the Marwar Basin, Rajasthan have led to the identification of 14 ichnogenera from the Baisakhi Formation. Ichnodiversity increases from lower to upper lithounit (Figure3a). Heterodont bivalves from the unfossiliferous section were discovered for the first time (Figure3b). Taxonomic investigations of the star-shaped trace fossil *Asteriacites* (Figure3c) from the Jaisalmer Formation aided in revoking the status of generic epithet and bestowing taxonomic stability.

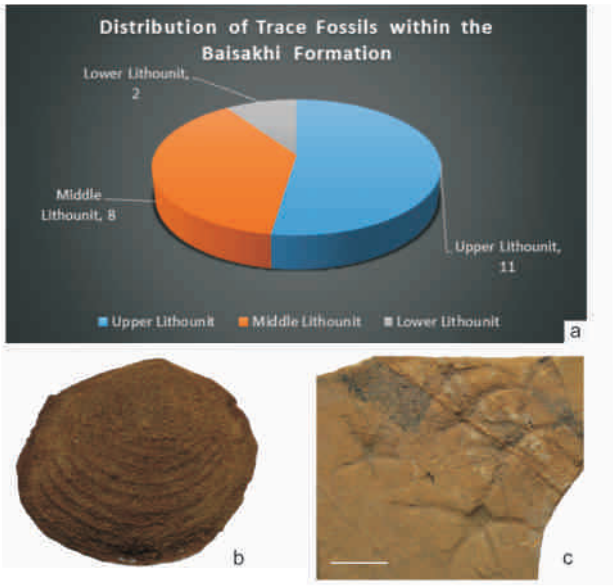


Figure 3 Ichnology – Mesozoic, Jaisalmer Formation, Rajasthan

a. Distribution of trace fossils within the three units of Baisakhi Formation

b. Heterodont bivalve, Chaudhariya village, Rajasthan

c. *Asteriacites lumbricalis* von Schlotheim, resting traces of ophiuroids

(Scale bar - 20 mm for b-c)

• Clastic injectites discovered

The sequence stratigraphy of the Cretaceous, Cauvery Basin, Tamil Nadu was studied. It was found that clastic injectites, discovered from the Sivaganga Formation (Figure4), for the first time, are formed due to episodic seismicity and rapid loading of sediments during rifting. These injectites are significant as their host sediments are equivalents of hydrocarbon source rocks in the subsurface.

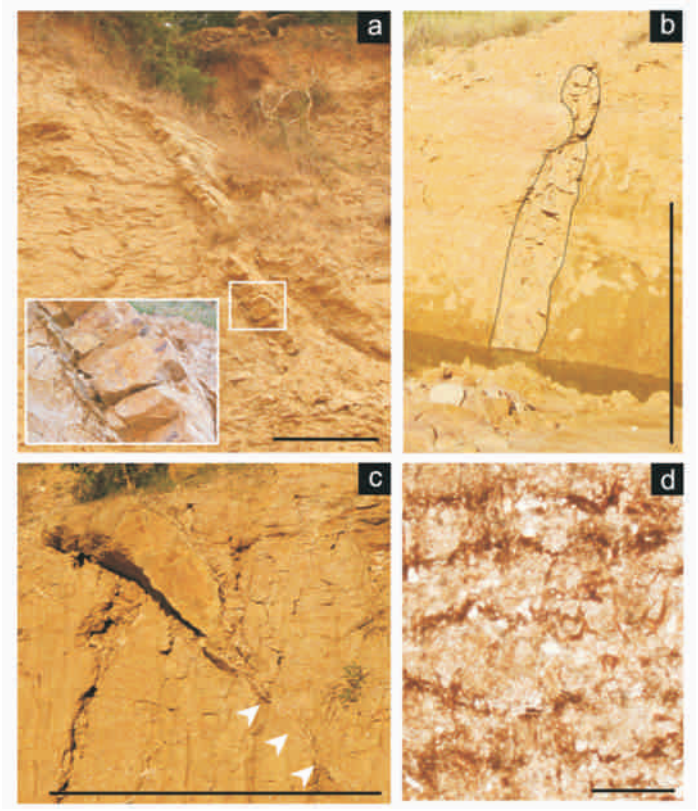


Figure 4 Sequence stratigraphy- Cretaceous, Cauvery Basin, Tamil Nadu

a. Sub-vertical clastic dyke exposed from the base of the quarry to the top. Inset shows thinly jointed margins on either wall of the dyke and compact inner core with horizontal joints

b. Clastic injectite terminating within the sandy clays with the terminal part separated from the main body by a narrow neck top

c. Clastic injectite originating with a thin root (marked by arrows) and expanding upwards into a bulbous lensoid body top

d. Photomicrograph of clastic dyke exhibiting the intruded material composed of sandy calcareous mudstone. Sheared surfaces are marked by dark clays while the sand size grains are floating in a clayey micritic matrix

(Scale bar = 1m for (a–c) and 500 µm for (d))

- ***Schaubcylindrichnus* reported for the first time from the Indian subcontinent**

While studying the Paleogene – Eocene of Kachchh, Gujarat *Schaubcylindrichnus* is reported for the first time from the Indian subcontinent augmenting its stratigraphical as well as geographical distribution.

Holocene palynology and foraminifera involved the study of vegetation dynamics and foraminifera.

- **West of Sahyadri was forested during the Holocene climatic optimum**

While studying the Late Quaternary vegetation dynamics of south-west India *Myristica* swamps indicate that Konkan had an extended period of rainfall due to the combined effects of SW and NE monsoons until Late Pleistocene. Fossil tree trunks from Kerala have yielded ages of pre-Holocene transgression; evidence suggests that entire terrain west of Sahyadri was forested during the Holocene climatic optimum (Figure 5).

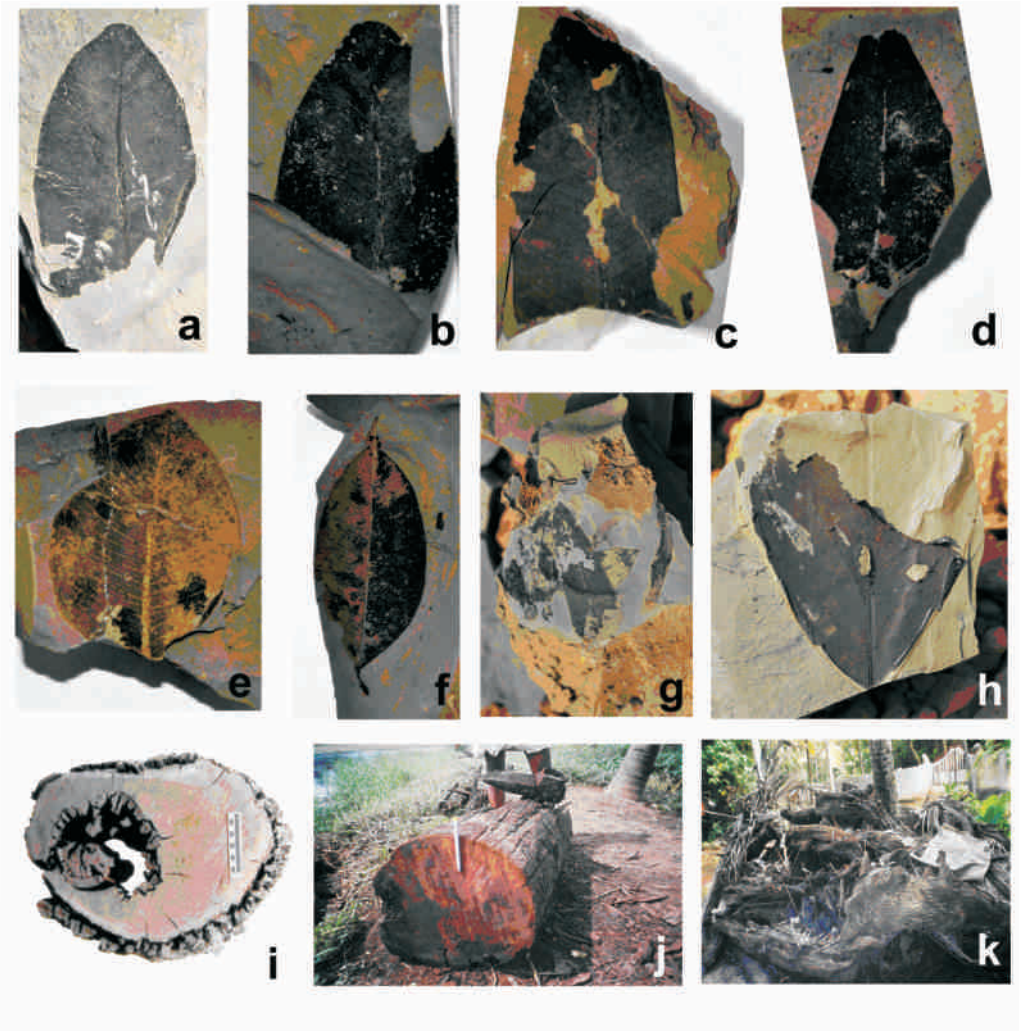


Figure 5 Fossil assemblage of tropical forests from southwestern India showing representatives of *Myristica* swamps from Konkan, buried woods from Kerala

a-c. *Semecarpus* sp., d. ? Carbonized *Semecarpus* sp., e. *Eugenia codyensis.*, f. *Syzigium cuminii.*, g. *Syzigium* sp., h. ? *Dipterocarpus* sp., i. Carbonized wood used for ^{14}C dating., j. Subfossil log from Pathiyur, Kerala., k. A heap of carbonized wood retrieved by local people from Vettiyar, Kerala

- **Kundalika estuary habitat deterioration due to industrial development and effluents**

To monitor the threatened ecosystems, environmental significance of intertidal mangrove foraminifera of Coastal Maharashtra was studied. Geochronology and down-core distribution of foraminifera in the Kundalika estuary attributes habitat deterioration to industrial development and effluents over the past 50 years. Changes in climatic parameters and adverse effects due to damming within the estuary were ruled out.

Neoichnological study of the west coast considered the biogenic sedimentary structures from the Kundalika estuary and adjacent sandy shores. Investigation of fecal pellets occurring within burrows of *Nereis* (Figure 6), as mounds, strings and several stacks of blankets on the surface aid ichnological assessment of fossil ichnogenera *Alcyonidiopsis*, *Tibikoia* and *Tomaculum*.

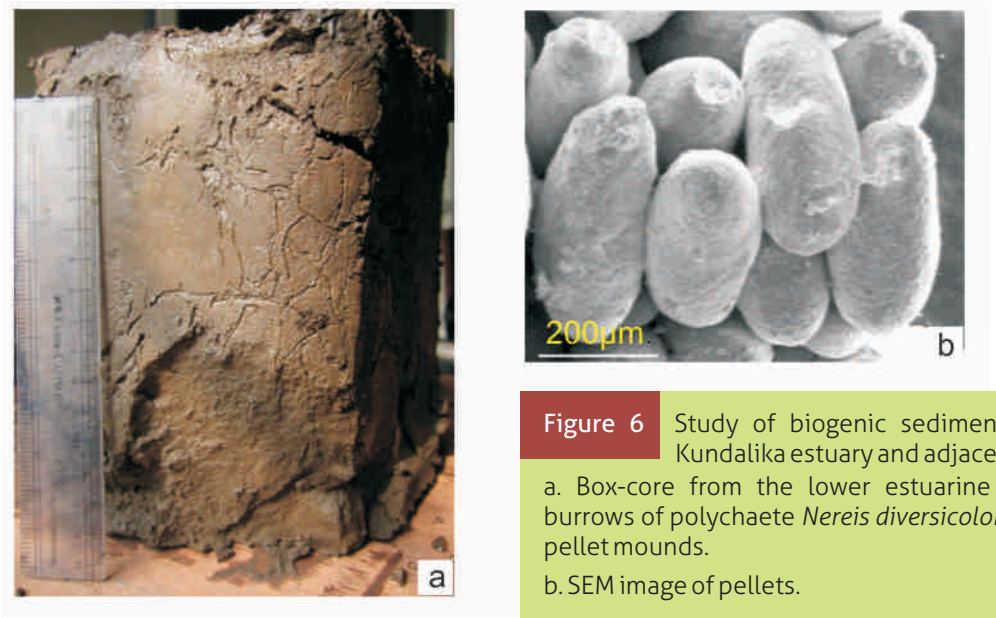


Figure 6 Study of biogenic sedimentary structures from Kundalika estuary and adjacent sandy shores

a. Box-core from the lower estuarine tidal flat exhibiting burrows of polychaete *Nereis diversicolor* and associated fecal pellet mounds.

b. SEM image of pellets.

Ichnotaxonomic studies strengthen the taxonomic status and spatio-temporal distribution of select ichnogenera. Modern analogs of ichnofossils suggested Holocene climatic changes evinced by subfossils.

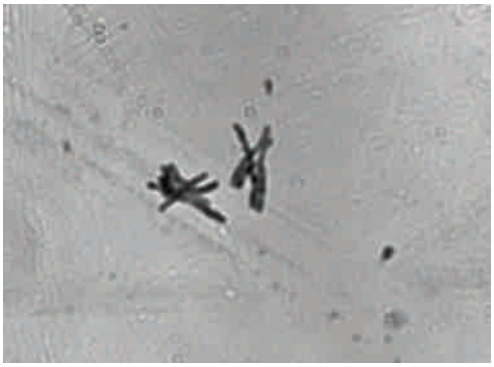
Bioenergy

Bioenergy group is focused on using microbial cultures (both aerobic and anaerobic bacteria and archaea) for increasing energy production from lignocellulosic agricultural wastes as well as from depleted oil reservoirs.

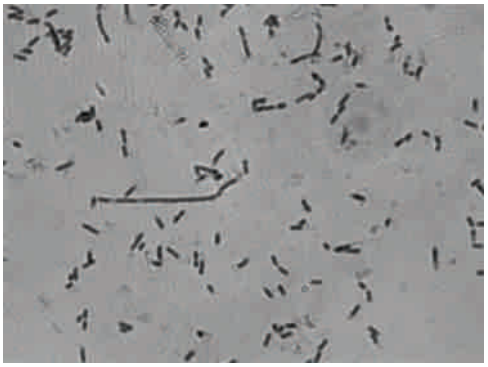
Areas of focus

1) Mining the anoxic ecosystems for efficient fibrolytic microbes
2) Bioremediation of oil contaminated produced water using a microbial consortium
3) Microbial enhanced oil recovery
4) Biomethanation of agricultural residue

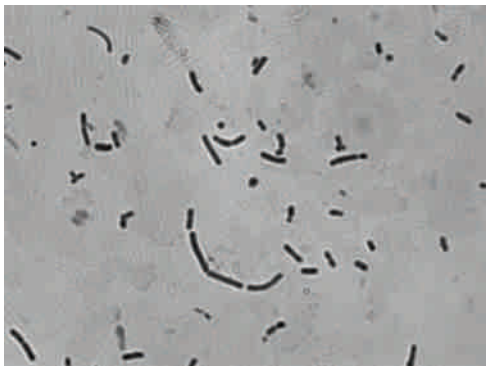
1) Mining the anoxic ecosystems for efficient fibrolytic microbes This work focusses on isolating and using lignocellulose degrading microorganisms towards the development of renewable fuels and energy. We have isolated several cultures of cellulolytic and/ or xylanolytic anaerobic bacteria and fungi, along with methanogenic archaea from different anoxic environments like pond sediments, feces of camel, rumen of cattle, buffalo, sheep and goat (Figures 7, 8, 9).



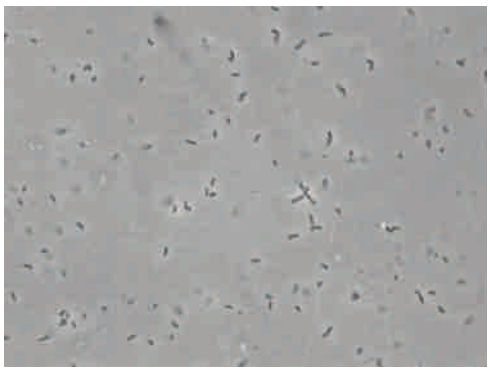
Actinomyces ruminicola



Bacteroides graminisolvens

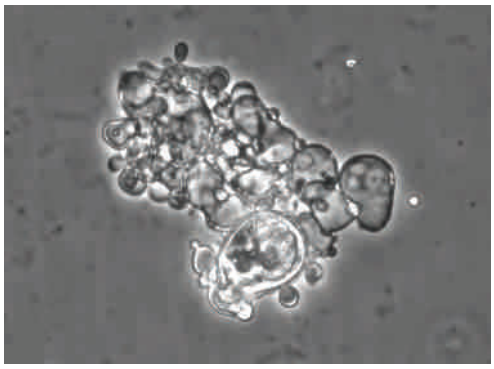


Parabacteroides chartae

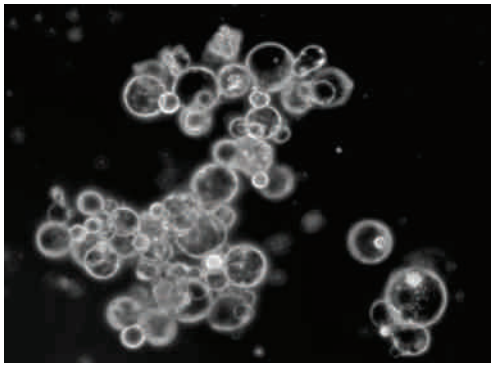


Enterococcus sp.

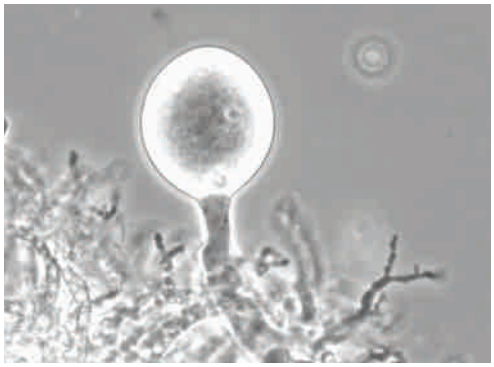
Figure 7 Microscopic images of some fibrolytic anaerobic bacteria from various enrichments



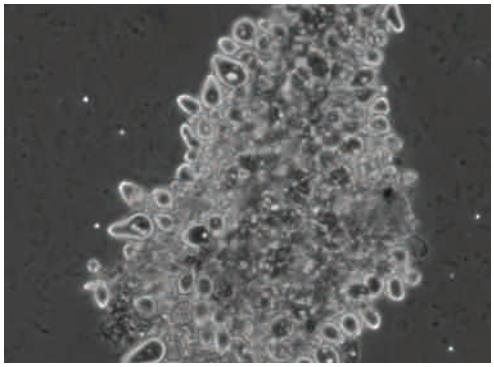
Bulbous type isolate I



Bulbous type isolate 2



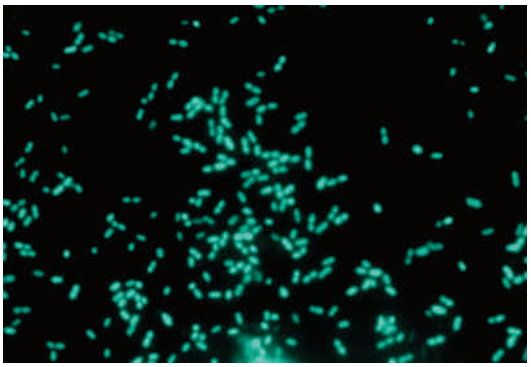
Filamentous type isolate I



Filamentous type isolate 2

Figure 8 Microscopic images of some fibrolytic anaerobic fungi

Methanogen species from pond enrichment



Methanobrevibacter sp. from camel

Figure 9 Microscopic images of methanogens

Further, functional metagenomics approach was used to investigate the microbial community structure as well as fibrolytic and methanogenic microbial metabolism in healthy and sour anaerobic digesters. The comparative analysis revealed that the microbial community within healthy digester was dominated by bacteria (~95%), followed by archaea/ methanogens (4.2%). Analysis of metabolic pathways revealed the microbial metabolism that converted complex biomass (cellulose and hemicellulose) into methane. Interestingly, the methanogenic population in the sour digester was almost negligible. The microbial metabolism (dominated by bacteria, especially Bacteroidetes) in sour digester converted biomass into organic acids and volatile fatty acids but not into methane (Figure 10).

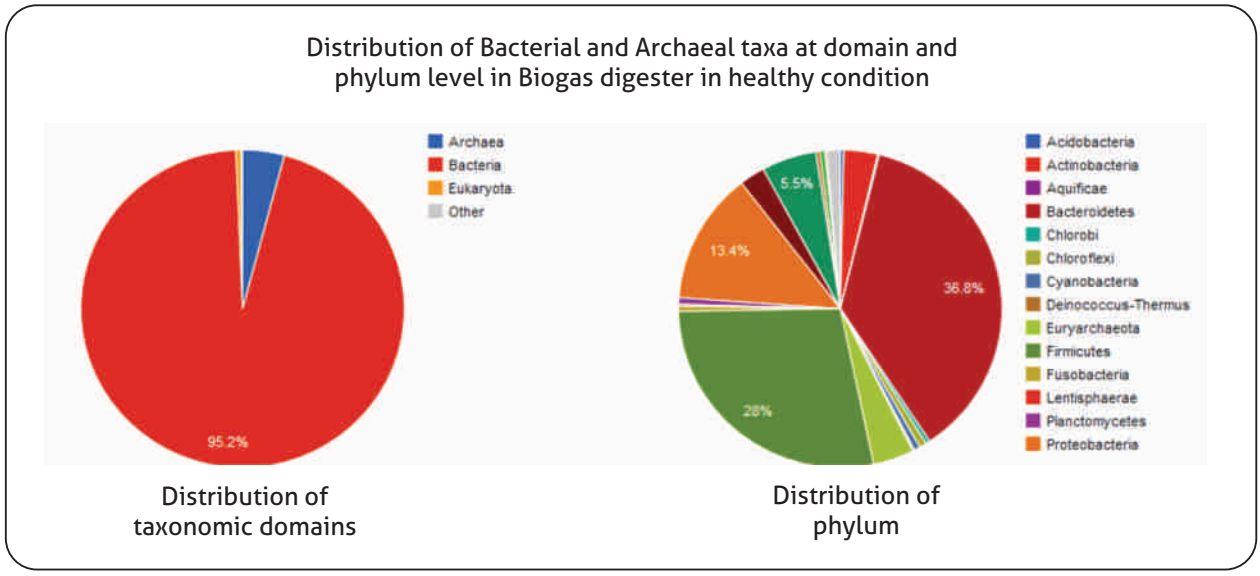


Figure 10 Distribution of bacterial and archaeal taxa at domain and phylum level in biogas digester in healthy (top) and sour condition (bottom)

2) Bioremediation of oil-contaminated produced water using a microbial consortium

Large volumes of oil field produced water is generated worldwide during petroleum exploration and processing. Such produced water has become a serious environmental hazard as it contains toxic hydrocarbon contaminants. The conventional methods used for removal of these contaminants are physical and chemical methods that are expensive but not efficient enough. ARI has developed a microbial process that is economical and efficient in removing the total petroleum hydrocarbon contents in the produced waters. The microbial consortium developed for this purpose is capable of removing the total petroleum hydrocarbon in produced water with >97% efficiency in an apparatus comprising of stirred reactor, clarifier and a biofilter. The process was developed in collaboration with Institute of Reservoir Studies, ONGC, Ahmedabad.

3) Microbial enhanced oil recovery

With increasing demand and escalating price of oil, petroleum companies are exploring the possibilities of having a sustainable technology to improve the recovery of residual oil. However, primary and secondary oil recovery processes can account for 30-40% oil production leaving behind about 55% residual oil in the reservoirs. Microbial Enhanced Oil Recovery (MEOR) is a promising novel approach that involves the in-situ application of microorganisms along with appropriate nutrient that facilitate growth and their metabolic products enhance oil production. A microbial process for the recovery of crude oil from depleted wells having temperatures exceeding 91°C was developed using a consortium of hyperthermophilic bacteria growing at temperatures 91°C and above (optimally at 96°C). Metabolites produced by consortium included volatile fatty acids, organic acids, surfactants, exopolysaccharides and CO_2, which reduced viscosity, emulsified crude oil and increased the pressure that facilitated displacement of emulsified oil towards the surface. Oil recovery in excess of 60% was achieved by using this consortium during simulated sand pack experiments.

4) Biomethanation of agricultural residue/ waste

Biomethane from agricultural waste is a valuable alternative source of energy. As an agricultural country, India has abundant lignocellulosic biomass resources, such as rice straw, corn stalks, wheat straw, etc. MACS-ARI has developed a microbial process for the biomethanation of rice straw. This process circumvents any conventional pre-treatments such as heating and use of polluting chemicals like acids and/or alkalis. The ARI process can generate >350 m^3 biogas per ton of rice straw.

Bioprospecting

Natural product chemistry involves isolation and synthesis of naturally occurring compounds.

Areas of focus

1) Understanding mechanisms in Alzheimer's, anemia, chikungunya, and diabetes
2) Attractant and repellent formulations

1) Understanding mechanisms

• Alzheimer's - Better platinum complexes to treat oxidative stress

In the present work on Alzheimer's, cisplatin was studied for its effect on the copper-catalyzed oxidation of amyloid β (Aβ) peptide. It was observed that cisplatin inhibits oxidative stress generated by copper-Aβ Peptide. The interaction of cisplatin with Aβ1-16 in the presence of copper was investigated using cyclic voltammetry and mass spectrometry. The positive shift in the E1/2 value of Aβ1-16-Cu^{2+} suggests that the interaction of cisplatin alters the copper-binding properties of Aβ1-16. The mass spectrometry data show complete inhibition of copper-catalyzed decarboxylation/ deamination of the Asp1 residue of Aβ1-16 while there is a significant decrease in the copper-catalyzed oxidation of Aβ1-16 in the presence of cisplatin. The results provide a novel mode by which cisplatin inhibits copper-catalyzed oxidation of Aβ. These findings may lead to the design of better platinum complexes to treat oxidative stress in Alzheimer's and other related neurological disorders.

• Anemia and inflammation

To study anemia and inflammation blood samples (n=166) were analyzed for serum iron, hepcidin, Total Iron Binding Capacity (TIBC), ferritin to assess anemia and for TNFα as an inflammatory marker. Simple correlation analysis showed that hepcidin was positively correlated with ferritin ($r = 0.190$, $p=0.014$). TIBC showed negative association with serum iron ($r = -0.588$, $p < 0.001$) and positive association with TNFα ($r = 0.162$, $p<0.01$). Among the anemic (n=53) and the normal (n=113) correlation was as shown in Table 5.

Table 5 Simple correlation analysis

Parameter	Correlation
Anemic (n=53)	
TIBC with TNFα	r = 0.317, p = 0.015
TIBC with serum iron	r = -0.649, p<0.001
Normal (n=113)	
hepcidin with Hb	r = -0.252, p = 0.009
hepcidin with ferritin	r = 0.225, p = 0.019
Serum iron with TNFα	r = 0.269, p<0.005
Serum iron with TIBC	r = - 0.558, p<0.000

- **Chikungunya virus - Potential of natural flavones being investigated for synthesizing bioactive molecules**

For synthesising bioactive molecules against chikungunya virus,the potential of natural flavones is being investigated. The synthesis of (2*S* or *2R*)-7-hydroxy-2-phenyl-5-[(*E*)-2-phenylethenyl]-2,3-dihydro-4*H*-chromen-4-one has been initiated. These compounds will be screened against the chikungunya virus. Synthesis of quercetin derivative has been initiated using 3,5-dihyroxy benzoic acid (1) as a starting material. Dimethoxy ester was obtained by the reaction of 1 with dimethyl sulphate and was reduced to an alcohol. Resulting compound was converted to 1-(bromomethyl)-3,5-dimethoxybenzene which was acylated using acetyl chloride/$AlCl_3$ to yield1-[2-(bromomethyl)-4, 6-dimethoxyphenyl] ethanone. Demethylation of the bromo compound yielded 1-[2-(bromomethyl)-4, 6-dihydroxyphenyl] ethanone.

- **Diabetes - Development of nutraceuticals**

Development of nutraceuticals to counter diabetes is being explored. The orally active insulin-like protein (ILP) showing cross-reactivity with anti-insulin antibodies has been purified from fresh leaves of *Costus igneus*. It is cultivated in the coastal areas of Karnataka. Leaves of this plant are traditionally consumed for the management of diabetes. Purified ILP showed good blood glucose lowering activity when fed orally to diabetic Swiss mice. ILP showed a significant increase in internalization of glucose when tested using fluorescently labeled glucose (2-NBDG) tracer in differentiated muscle fibroblast cells. The fluorescence diminished significantly when Glut-4 and insulin receptor were blocked indicating the mechanism of action of ILP is similar to insulin on muscle fibroblast cells (Figure 11). The simulation studies suggest the same binding site on insulin receptor for both ILP and insulin (Figure12).

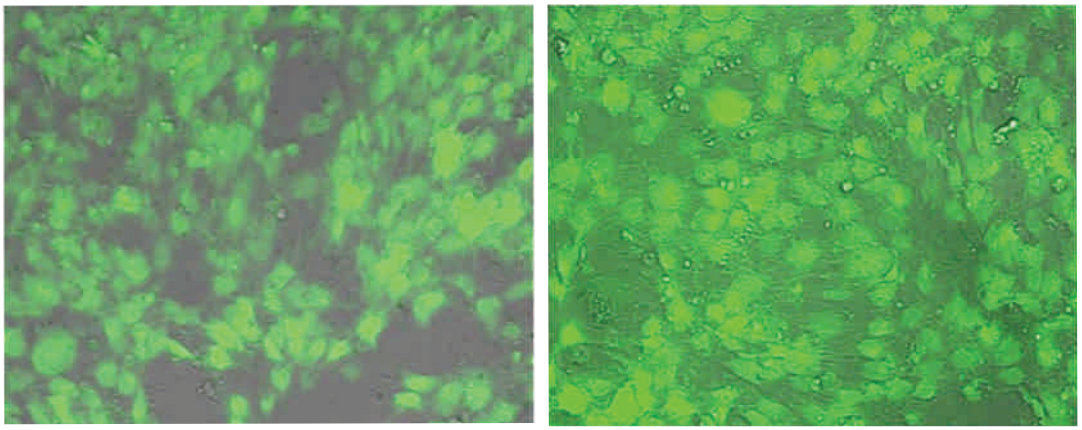


Figure 11 Glucose uptake in presence of ILP *in vitro* studies

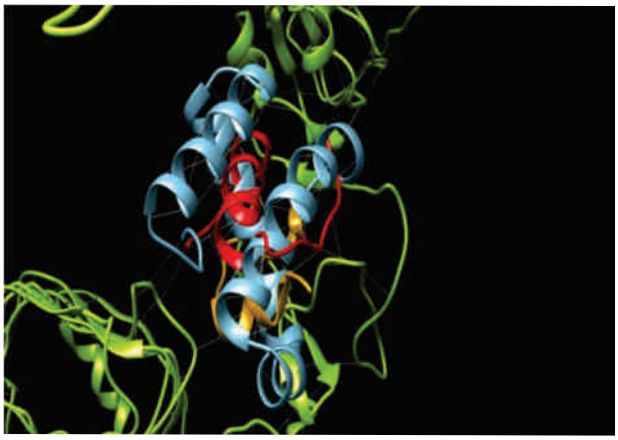


Figure 12 ILP and Insulin sharing same binding site on insulin receptor

2) Attractant and repellent formulations

• To bee or not to bee

Formulations of honeybee repellent compounds may be useful to keep honeybees away from areas treated with toxic insecticides. The essential oil from the flower of *Swertia densifolia* showed activity towards Indian honeybee *Apis florea* F. Rotating table bioassay established that repellency was dose-dependent up to 12 mg/ml and remained constant thereafter. Chemical constitution of the essential oil was examined by GC/MS. The major constituents (>10% of the oil) were linalool and octadecanoic acid. The constituents of intermediate concentration (5–10%), minor components (1–5%) and trace components (<1%) were identified. The response of *A. florea* foragers to mixtures of the major and intermediate constituents was studied (Table 6).

Table 6 Screening of formulations using *Apis florea*

Compound/ Formulation	Activity
linalool and α-terpeniol	repellent
n-octadecyl acetate	attractant
octadecanoic acid spirostan-3-ol	neither attractants nor repellents
Nerol (dose-dependent effects)	attractant or repellent

• No foul play

Fouling of ships is a serious problem faced by the Indian Navy. Use of paints containing tin and copper compounds is now restricted due to their toxic effects. Hence, there is a need to develop novel and environment-friendly anti-fouling coatings. Extracts of marine organism *Zoobotryon verticillatum*, terrestrial plants *Weedelia trilobata* and *Vitex negundo* were found to possess anti-fouling properties. Purification of the active fraction from *W. trilobata* yielded two crystalline compounds. Their structure elucidation is in progress.

Developmental Biology

Deciphering mechanisms underlying patterning of animal forms during development using a panoply of model organisms including the diploblastic cnidarian Hydra, a well worked out insect model *Drosophila* and a simple vertebrate model of zebrafish to unravel developmental processes at cellular and molecular levels is the mainstay of this Group.

Areas of focus

Mechanisms underlying patterning of animal forms:

1) Hydra
2) Drosophila
3) Zebrafish

1) Hydra To understand the processes of regeneration, continuous pattern formation and apparent lack of organismal ageing observed in Hydra, we study hydra homologues of various vertebrate embryonic patterning genes. Among these, we have identified Noggin, which is a secreted BMP inhibitory protein involved at multiple stages of vertebrate embryonic development including neural induction. Previously we have shown functional conservation of Hydra Noggin in vertebrates. To localize the expression of Noggin protein in Hydra using immunofluorescence, antibodies raised against synthetic surface peptides of Hydra Noggin (in collaboration with Dr Satyajit Rath, National Institute of Immunology, New Delhi) were used. Intact polyps showed prominent but scattered, punctate extra-nuclear expression of Noggin (Figure 13) at the base of tentacles and lower 1/4th of the body column, excluding the basal disc, and at a much lower intensity throughout the body column. The expression remained unchanged in the regenerating pieces immediately after mid-gastric bisection, while 48 hours after bisection the expression was diffused and spread uniformly throughout the cell. However, the punctate pattern of expression was restored 72 hours post bisection when regeneration nears completion. Present results reveal a dynamic pattern of expression of Noggin protein during head and foot regeneration, indicating a role of Noggin in the regeneration of Hydra.

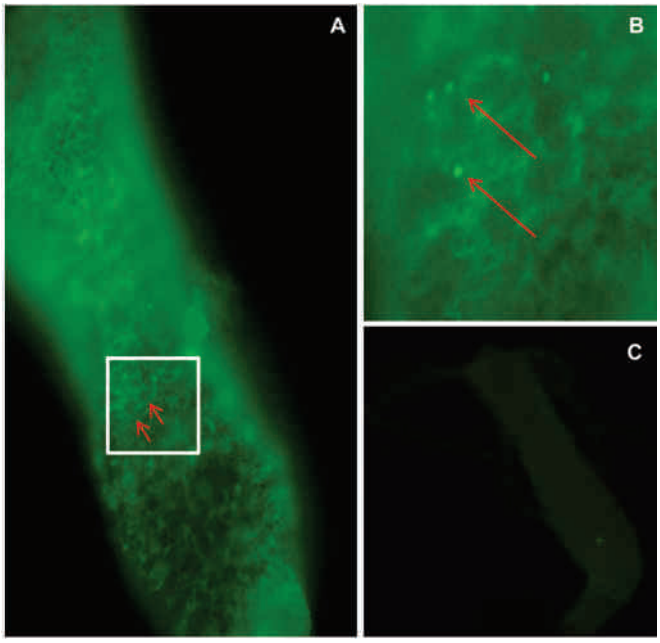


Figure 13 Immunolocalization of Noggin protein in hydra

2) Drosophila The *Drosophila* has been used extensively as a model system to study neural development and mechanisms leading to neurodegeneration. In a previous study, a *Drosophila* model for ALS8 had been generated by expressing *Drosophila* VAP carrying the ALS8 mutation. We are interested in the role of VAP during synaptic development and disease. We have examined the effect of VAP interacting proteins *rdgB and dCert* on synaptic morphology. Knockdown of *dCert* results in larger boutons similar to VAP mutants suggesting a possible interaction between the two genes in regulating synaptic development. A reverse genetic screen was carried out to identify genetic interactors of VAP (in collaboration with Dr Girish Ratnaparkhi, IISER, Pune). *Target-of-Rapamycin* or *tor* was identified as one of the genetic interactors of *Drosophila* VAP. Genetic analysis indicated that TOR signaling is upregulated upon over expression of the mutant VAP protein (Figure14). This finding suggests that dysregulation of TOR signaling is likely to contribute to the disease.

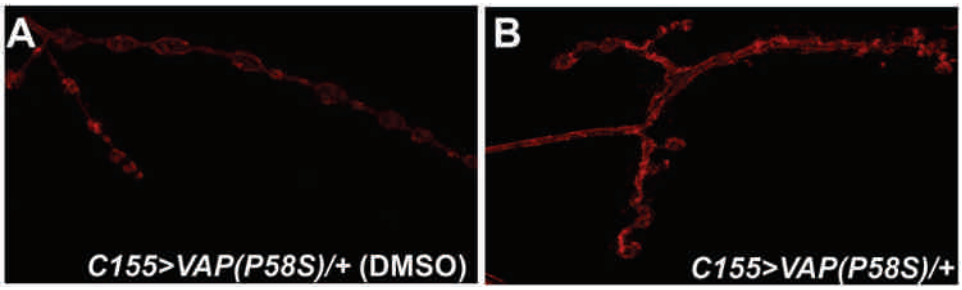


Figure 14 Inhibition of TOR signaling by Rapamycin suppresses VAP(P58S) bouton phenotype

The fundamental role of autophagy is that of adaptation response to starvation. Starvation-induced autophagy is important for maintaining the amino acid pool in the cytoplasm thereby allowing cells to survive until nutrients become available. Upon nutrient deprivation, multiple autophagy genes are transcriptionally upregulated. Our interest is to understand the genetic regulation of autophagy during nutrient limitation. *Atg8a*, a core autophagy gene, is essential for autophagosome formation and is highly upregulated during starvation. We have identified a 2kb upstream promoter of *Atg8a* that recapitulates *Atg8a* expression upon starvation *in-vivo* (Figure15). Transgenic *Drosophila* lines that carry 200bp sequential deletions in the 2kb *Atg8a* promoter are being generated. Further, using promoter deletions and bioinformatics analyses we aim to identify cis-regulatory regions and putative transcription factors that regulate *Atg8a* expression.

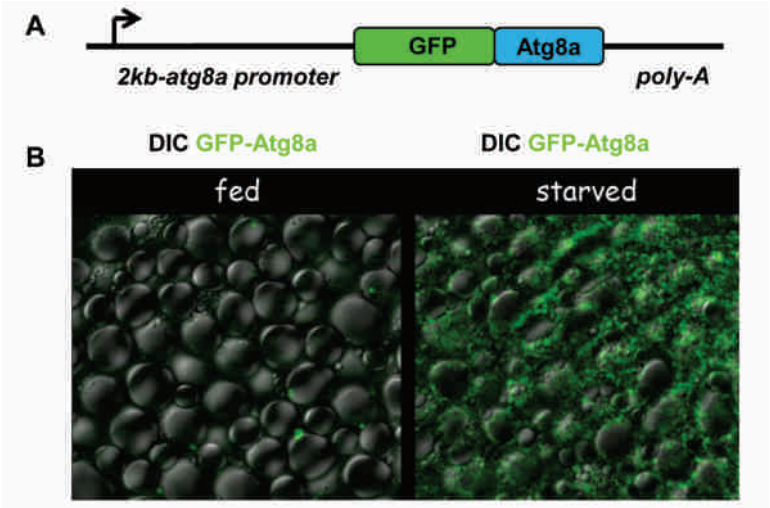


Figure 15 *2kb-Atg8a-promoter-GFP-Atg8a* reporter recapitulates Atg8a expression in starvation-induced autophagy assay

Stem cells are specialized cells present in metazoans that have the ability to self-renew and differentiate into a variety of cells. How autophagy influences stem cells and their behaviour during development is poorly understood. We are using the *Drosophila* female germ line stem cells (GSCs) as a model to decipher the role of autophagy in their maintenance, differentiation and aging. Role autophagy in cellular and tissue regeneration using hydra as a model system is also being investigated.

3) Zebrafish

• Fundamental studies with a bearing on human health

Heart disease remains the leading cause of mortality throughout the world. Mammals have an extremely limited capacity to repair lost or damaged heart tissue, thus encouraging biologists to seek out models for heart regeneration. Zebrafish exhibit a robust regenerative capacity in a variety of tissues including the fin, spinal cord, retina, and heart, making it the sole regenerative vertebrate organism currently amenable to genetic manipulation.

ARI scientists have begun a journey that will utilize functional approaches to tease apart zebrafish heart regeneration in the ultimate hope of unlocking regenerative potential of human heart.

The extracellular matrix (ECM) plays an essential role in morphogenesis, tissue repair and disease. However, the function of the cardiac ECM is still poorly understood. We hypothesize that ECM components, which exhibit a dynamic expression during heart development, regulate important processes like trabeculation, valve morphogenesis, as well as a cardiac function (Figure16). Based on proteomics data from mouse developing heart tissue and published report, we have selected *ctgf* gene for further studies. Zebrafish was chosen as a model organism due to its transparency, simple two-chambered heart, ease to generate mutant alleles, rapid early development and the availability of a number of reporter lines (Figure16). Zebrafish have two paralogues of the *ctgf* (*ctgfa* and *ctgfb*). To study the loss-of-function, we have generated TALEN based mutants for*ctgfa* and *ctgfb*. Recently, we looked at the *ctgfa* mutants, and our preliminary observation suggests that more than 40% *ctgfa* mutants carry bradycardia and die before reaching the juvenile stage. Around 20% of survived *ctgfa* mutants show curved body axis and abnormal swimming at three months. Currently, we are in the process of detailed characterization of the cardiac as well as a skeletal phenotype.

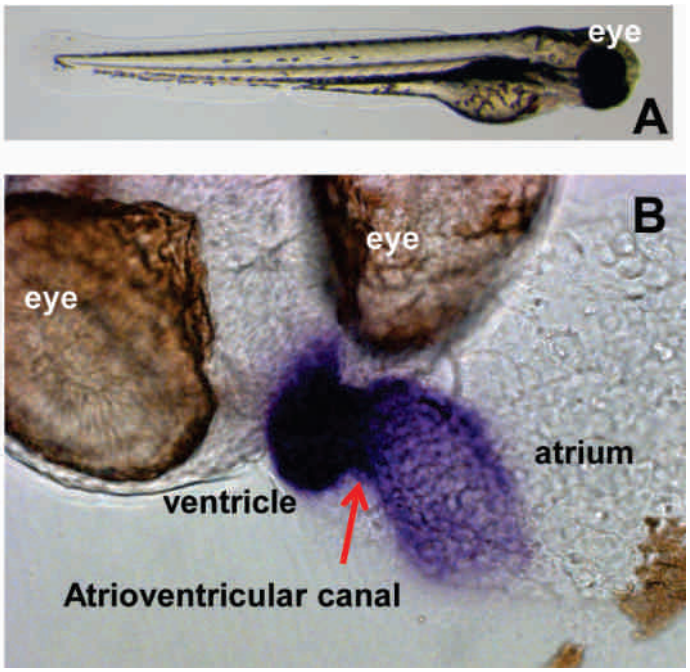


Figure 16 Zebrafish larva with two-chambered heart

Findings from the present studies show that molecules involved in vertebrate development like Noggin, *ctgf* and VAP are conserved and have significant roles in development and disease in lower organisms.

Genetics and Plant Breeding

ARI is probably the only centre outside the ICAR system that is part of the All-India Coordinated Projects. It has played a major role in developing a diverse range of improved breeding lines and parental lines of hybrids of wheat, soybean and grapes.

Areas of focus

1) Biotechnology
2) Wheat improvement
3) Soybean improvement
4) Grape improvement

1) Biotechnology

Development of functional markers using genomics and transcriptomics is on-going which may help in breeding next generation crop varieties. Study of markers and mapping of genes are the areas of focus.

• Marker assisted breeding

Marker assisted breeding was undertaken for the improvement of grain protein content and gluten strength in the popular bread wheat varieties NI 5439 and MACS 2496 of peninsular region, and grain protein and yellow pigment content in the durum wheat varieties MACS 3125 and HI 8498. Based on the two years data of replicated trials a few promising lines with high grain protein content and yellow pigment content were identified. Large scale field trials of promising lines were conducted for yield data, and the selected lines will be included in co-ordinated trial during next regular season. Development of biotic stress-resistant varieties by incorporating leaf rust resistance genes and stem rust resistance genes is also underway. For the majority of the resistance genes, introgressed lines for respective genes are being tested in field trials.

Considering the importance of GA-sensitive dwarfing genes in limited moisture conditions, mapping of GA-sensitive dwarfing genes in durum wheat is in progress. Based on a selective genotyping analysis for plant height in Bijaga yellow / Icaro population, a microsatellite map of chromosome 6A was generated which showed the presence of *Rht-18* in marker interval *Xgwm82- Xbarc118*. This locus was detected at LOD 26.97 with R^2 = 65.62 % and reduces plant height by 17.75 cm. In Bijaga Yellow / Castelporziano (*Rht-14*) population, markers *Xwmc807, Xwmc786 and Xbarc118* collectively explained 68.5% variation in plant height, suggesting co-location of *Rht-14* and *Rht-18* on chromosome 6A. Closely linked marker *Xbarc118* may be useful for marker-assisted selection for *Rht-14* and *Rht-18*.

• Mapping QTL

Spot blotch caused by *Bipolaris sorokiniana* (Sacc.) Shoem is a major biotic stress to wheat in India

causing up to 100% yield loss under severe disease conditions. Breeding for resistance to spot blotch provides an economical and eco-friendly strategy to manage the disease. However, information on the genetics of spot blotch resistance is inadequate particularly in durum wheat. Quantitative trait locus (QTL) mapping for spot blotch resistance is therefore undertaken in the recombinant inbred line (RIL) population developed from a cross of Bijaga yellow (Susceptible) × MACS 3125 (Resistant). In marker analysis, total 107 polymorphic markers were tested for bulk segregation analysis (BSA) and 12 promising markers were identified after selective genotyping. Based on the marker-trait association, putative chromosomal regions for spot blotch resistance in durum wheat have been identified on chromosome 2B.

2) Wheat Improvement

- ### Wheat variety MACS 6478 notified

Research on wheat has yielded encouraging results. A new wheat variety MACS 6478 has been notified by Central Sub-Committee on Crop Standards Notification and Release of Varieties for Agricultural Crops during its 69th Meeting for timely sown irrigated conditions. This is a high yielding variety (45–50 q/ha) for Peninsular zone with maximum potential to the tune of 65.7 q/ha.It exhibits high degree of resistance to leaf and stem rusts, bold grain, excellent chapati and bread-making qualities, and high nutritional quality.

MACS 6222 released by ARI in 2010 is the best performing variety in Peninsular Zone with early maturity and requires less irrigation. The variety is becoming popular among farmers of Maharashtra and Karnataka and demand for its breeders seed is increasing.

Varietal Trials : Based on the performance under coordinated trials in different zones, six entries were promoted to AVT trials while fourteen entries were included in the National Initial Varietal Trials (NIVT & Spl-trial-DIC) for further testing. MACS 3742, MACS 5022 (for leaf and stem rust resistance) and MACS 2864 (for long spike and high 1000-grain weight) have been identified and their proposal for registration as germplasm has been submitted to NBPGR.

Germplasm evaluation : We received 1483 cultures for evaluation under multilocation germplasm evaluation from NBPGR. Pathological observations were recorded for leaf rust and stem rust. A total of 18 cultures were resistant and 777 moderately resistant to black rust, while 56 were resistant and 391 moderately resistant to brown rust. Overall, 261 cultures were resistant to both leaf and stem rusts.

Quality and disease analysis : Sixty-seven wheat grain samples were collected from grain markets and farmers' fields of Pune, Satara and Ahmednagar in 2013-14 and sent to Karnal for quality and disease analysis in harvested grains.

FLDs : During *Rabi* 2013-14, ten frontline demonstrations (FLDs) were sown on farmers' fields in villages near Hol and Songaon farms in Pune district. MACS 6222, MACS 6478 (Aestivum), UAS 415 (Durum) and MACS 2971 (Dicoccum) were demonstrated against popular checks RAJ 4037, HD 2189, MACS 3125 and DDK 1029 (Figure 17). Recently released test varieties MACS 6222, MACS 6478, MACS 2971 and UAS 415 showed an average of 11.7 % yield gain over popular cultivars in farmers' fields.

Figure 17 Wheat frontline demonstrations

During 2014-15 crop season, there were seven FLDs in cluster at Phadatarwadi, Taluka Phaltan, District Satara which included MACS 6478 (*aestivum*) and MACS 6222 (*aestivum*) and MACS 2971(*dicoccum*), HW 1098 (*dicoccum*) as new improved variety against popular checks RAJ 4037, HD 2189, and DDK 1029.

- ## Breeders seed

During 2014-15 about 192 quintals of breeders seed was supplied to different seed multiplying agencies and farmers. For current crop season, breeder seed production program of MACS wheat varieties was taken up at Hol and Songaon farms.

- ## Public-private partnership

As a part of the public-private partnership, twenty wheat Choupal Pradarshan Khets (CPK) of MACS 6222 and MACS 6478 were conducted in Shrigonda, District Ahmednagar and Amarawati district of Maharashtra. Both varieties are found to be popular among farmers and are being preferred by the food processing and consumer industry. This initiative will speed up the spread of new varieties/technologies.

- ## Improving efficiency – photosynthetic, nitrogen use, water use, heat tolerance

In the BBSRC project to exploit wheat alien introgressions for increased photosynthetic productivity in contrasting environmental conditions screening of new amphidiploids is being done for improving photosynthetic efficiency and nitrogen use efficiency by using various physiological tools in breeding. Promising amphidiploid lines from Nottingham University have been received and are being evaluated. Promising Indian genotypes are also being evaluated for their potential in breeding for these traits.

In the experiment on molecular breeding and selection strategies to combine and validate QTLs for improving water-use-efficiency (WUE) and heat tolerance in wheat 49 wheat lines were sown in restricted irrigation conditions along with two replications. Different agronomical and physiological parameters such as early vigour, germination percent, chlorophyll content, biomass, 1000 grain weight, and yield were recorded.

In the Indo-Australian project on root and establishment traits for greater water use efficiency in wheat, seven high yielding lines were selected as high yielding genotypes for root character study, based on yield data of Hill trial 2014-15. Six low-yielding lines were chosen and root coring was performed for the comparative detailed study. Studies have also been conducted for identifying genotypes emerging from deeper soils and their phenotypic responses.

3) Soybean Improvement

• Best yield performance

Two soybean varieties developed by ARI, viz. MACS 1407 and MACS 1416 showed the best yield performance in the final year testing of All India Co-ordinated trials conducted in Northern Eastern Zone and Southern Zone, respectively. MACS 1407 gave the highest average yield of 2150 kg/ha in the trials conducted at six centres in Northern Eastern Zone. Likewise, MACS 1416 recorded average yield of 2506 kg/ha in the trials conducted at six centres across Southern Zone.

• Oil content

Screening of soybean for high oil content was done. Ten MACS soybean lines showed more than 20% oil content. Maximum oil content (21.52 %) was seen in MACS 1585.

Trials: Station trials were conducted for soybean improvement. Seventy-four elite breeding lines were developed and tested in three graded replicated trials. Of these, 38 lines gave significantly higher yield than the control variety JS 335.

Varietal trials : In the evaluation carried out under All India Co-ordinated soybean trials, MACS 1416 and MACS 1407 were promoted to AVT-II in Southern zone and North Eastern zone, respectively, while MACS 1410 and MACS 1370 were promoted to AVT-I of Southern zone and North Eastern zone, respectively. In the Initial Varietal Trial, (IVT) conducted at Hol Farm MACS 1460 gave significantly the highest yield (4316 kg/ha) followed by MACS 1442 (4203 kg/ha). MACS 1410 recorded maximum seed yield of 3903 kg/ha in Advanced Varietal Trial I (AVT I) and MACS 1416 (4443 kg/ha) ranked first in AVT II at Hol farm.

Agronomy : The results of an agronomy experiment on management of insect pests and weeds of soybean through insecticide-herbicide combinations indicated spray application of Rynaxypyre 20 SC @100 ml/ha+Imazathapyr 10 SL 1 L/ha at 15 days after germination to be the most effective, recording a maximum yield of 2719 kg/ha. In a demonstration on yield maximization with the use of optimum package of cultivation recommended for Southern Zone, newly released and notified soybean variety MACS 1188 gave 11.86% higher seed yield (3376 kg/ha) than check variety JS 335 (3018 kg/ha) when sown on 5th July.

Resistance : Entomological experiments indicated low to moderate infestation of stem fly on soybean. Categorization of the AVT test entries for resistance to stem fly revealed MACS 1340, MACS 1370 and MACS 1407 to be highly resistant to stem fly. Three entries, viz., MACS 1394, MACS 1410 and MACS 1416 were categorized as Resistant High Yielding (RHY) entries by using the maximin-minimax method. MACS 1460 (3521 kg/ha) and MACS 1442 (3255 kg/ha) recorded superior yield performance when evaluated under unprotected (without insecticide use) condition.

• Breeders seed

A total of 110 quintals of breeders seed of soybean was supplied to public and private seed multiplying agencies and farmers.

FLDs : Ten FLDs were conducted on farmers' fields in Baramati Taluka of Pune district to demonstrate and evaluate the impact of improved technology (IT) over farmers practice (FP) using MACS 1281, MACS 1188 and RKS 18 soybean varieties (Figure 18). Adoption of improved technology increased soybean yield compared to farmers' practice by 15.27% and gave additional net returns of Rs.7874 per hectare.

Figure 18 Soybean frontline demonstrations

- **Public-private partnership**

Demonstrations of recently developed soybean varieties MACS 1188 and MACS 1281 were conducted by ITC under MoU with ARI to popularize the varieties among farmers through Choupal Pradarshan Khet (CPK). Twelve demonstrations of MACS 1188 undertaken in Amravati district showed 21.95% increase in yield at CPK over control plots. Two demonstrations of PPMACS 1281 in Amravati district showed 14.29% and one demonstration of MACS 1188 conducted at Kota, Rajasthan gave 18.73% increase in yield at CPK over control plots, respectively.

4) Grape Improvement

Grape Hybrid H-516, developed by ARI and released by Punjab Agricultural University, Ludhiana is now renamed as Punjab-MACS purple.

In grape germplasm evaluation, fifty cultivars of *Vitis* were evaluated for 15 different bunch as well as berry characters. Highest significant yield was recorded in Catawba (3792 g/vine) followed by Concord (3541 g/vine). Catawba also showed the significantly higher number of bunches per vine (54.00) followed by Black Monukka (53.20). Though highest bunch weight (133.5 g) was recorded in Anab-e-Shahi, less number of bunches resulted into a poor yield of 747.6 g/vine. 100 berry weight was found highest in Anab-e-Shahi and Black Damascus (444 g) followed by Jawahar (430 g) whereas it was least in Cabernet Sauvignon. Syrah showed significantly higher performance with respect to per plant yield, bunch weight, berry size and less number of seeds/berry (0.48). The maximum TSS was recorded in Sharad Seedless (22.66 0B) followed by Country Bangalore (22.64 0B), and it was lowest in Jaos Beli 13.88 0B. Seed variability is presented in Figure 19.

Figure 19 Grape seed variability in cultivars

In the hybridization programme, 225 F1 hybrid seedlings raised in hybridization programme were transplanted in the field for evaluation of their performance. During the current season, total 15 inter- and intra-specific cross combinations were attempted involving six cultivars as female and four seedless male parents to incorporate desirable fruit qualities and disease resistance. Sixty hybrids were evaluated for their fruit quality during 2014-15. ARI-1308 (James x Kishmish belli) produced seedless berries with high T.S.S. (24° B) which could be used for table purpose.

Nanobioscience

Research carried out at Nanobioscience ranges from synthesis and characterization of nanomaterials to development of products, miniaturization of devices and understanding various biological phenomena.

Areas of focus

1) Nanomedicine
2) Microfabrication
3) Agricultural nanotechnology

1) Nanomedicine

• Ayurveda-inspired nanomedicine for diabetes

In Ayurveda, metals go through a purification and incineration process that turns them into 'bhasmas', which literally means 'ash'. They are indicated for the treatment of several diseases. For instance, zinc-based bhasma (*Jasada bhasma*) is mentioned in Ayurveda as the treatment of choice for diabetes. In a proof-of-concept study, inspired by *Jasada bhasma*, ARI scientists have shown that zinc-oxide nanoparticles can be used to treat both Type-1 and Type-2 diabetes in rats. Oral administration of zinc-oxide nanoparticles resulted in significant reduction in blood glucose levels comparable to the drug glibenclamide. Improved glucose tolerance, higher serum insulin and reduced triglycerides were also seen in diabetic rats. These results, reported for the first time, warrant further investigation for the development of zinc-oxide nanoparticles as a promising 'new chemical entity'for treating diabetes. ARI has filed a patent application for a drug formulation containing zinc oxide nanoparticles. The bhasma-inspired drug discovery approach followed by ARI could also be used to develop metal-based nanomedicines for several other diseases.

• ZON - novel agent for the treatment of diabetes

To study the antidiabetic activity of zinc oxide nanoparticles *in vitro* studies on the metabolic actions of zinc oxide nanoparticles (ZON) were carried out. ZON induced glucose transporter (GLUT4) translocation to plasma membrane in 3T3L1 cells (murine adipocyte cell line) and L6 cells (rat myoblast cell line) as evidenced by immunofluorescence staining of GLUT4 protein (Figure 20) suggested that ZON can enhance glucose uptake in cells, and therefore reduce blood glucose levels. Effect of ZON on the phosphorylation status of several key proteins involved in insulin signaling pathway was studied by western blotting. Results showed that ZON suppressed phosphorylation of hormone sensitive lipase (HSL), thereby inhibiting free fatty acid (FFA) release that in turn inhibits lipolysis. Also, ZON activated protein kinase B (a downstream target of PI3 kinase involved in insulin signaling) by inducing its phosphorylation at S473 residue. Activation of phosphokinase B (PKB) by ZON treatment suggests several beneficial effects on glucose and glycogen metabolism. Similar results were obtained with insulin, used as a positive control. Overall results suggest that zinc oxide nanoparticles exert insulinomimetic actions, and, therefore, can be developed further as a novel agent for the treatment of diabetes.

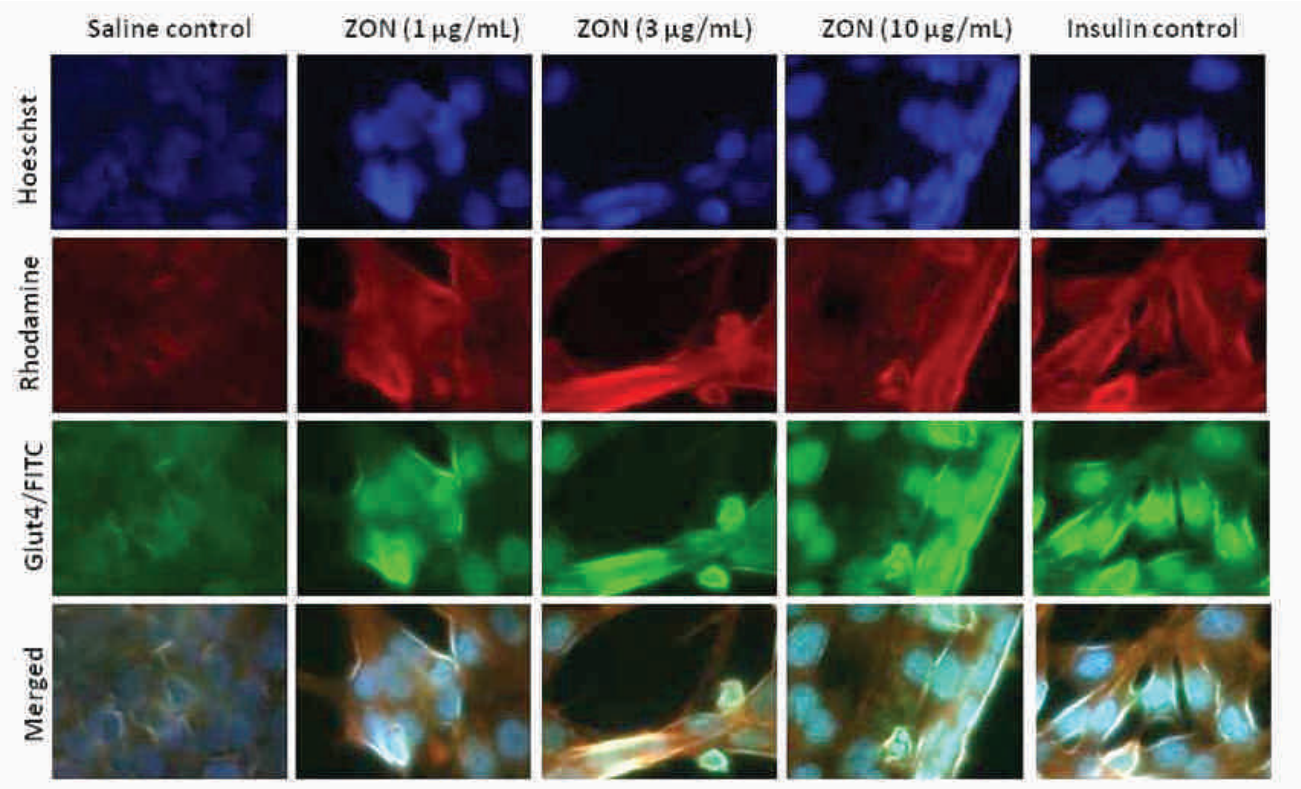


Figure 20 Immunofluorescence staining of GLUT4 protein in L6 cells

- **Treatment of cancers**

ARI scientists are working on some less conventional options for the treatment of cancers. One such approach is radiofrequency induced hyperthermia using magnetic nanoparticles of Lanthanum Strontium Manganese Oxide (LSMO). Recent studies on mouse melanoma model have shown 84% tumor regression and 50% increase in survival, after hyperthermia treatment, warranting further studies.

Another approach being pursued is protein therapeutics. Here, we have shown for the first time that a protein His-5 conjugated with carbon nanospheres can induce tumor regression in mouse breast cancer model. His-5 is the DNA binding domain of a matrix associated protein SMAR1. The work has been carried out in collaboration with National Centre for Cell Science, Pune.

2) Microfabrication

In this area we are developing devices for 3-D cell culture and scaffolds for bone tissue engineering.

- **3-D cell culture chip fabricated**

Studying cells in 3D enables researchers to 'mimic' physiological conditions that exist *in vivo*. A microfluidics based 3D cell culture chip has been fabricated by ARI scientists using a novel patented method. The technique enables simultaneous (one-step) fabrication of all the components, viz. a porous compartment supporting cell growth, connecting circular microchannels for supplying nutrients and removing metabolic wastes. The 3D cell culture chip can be used for testing the efficacy

of anticancer therapies. Once perfected, the technology is likely to reduce the use of animals in biomedical research.

MCF-7 cells have been successfully cultured in the device. Interconnected porous scaffolds ensure diffusion of nutrient medium till the core. The morphology of cultured cells was rounded, and reduction in size was obtained. Structures containing cultured cells resembled cancer cells in the body and many discrepancies resulting from cellular monolayer experiments could be bypassed. The development of the chip would reduce the use of animals in drug testing (Figure 21). A patent application has been filed (417/MUM/2014). Thus, the microfabricated device creates a biologically relevant cell environment suited for static as well as dynamic cell culture.

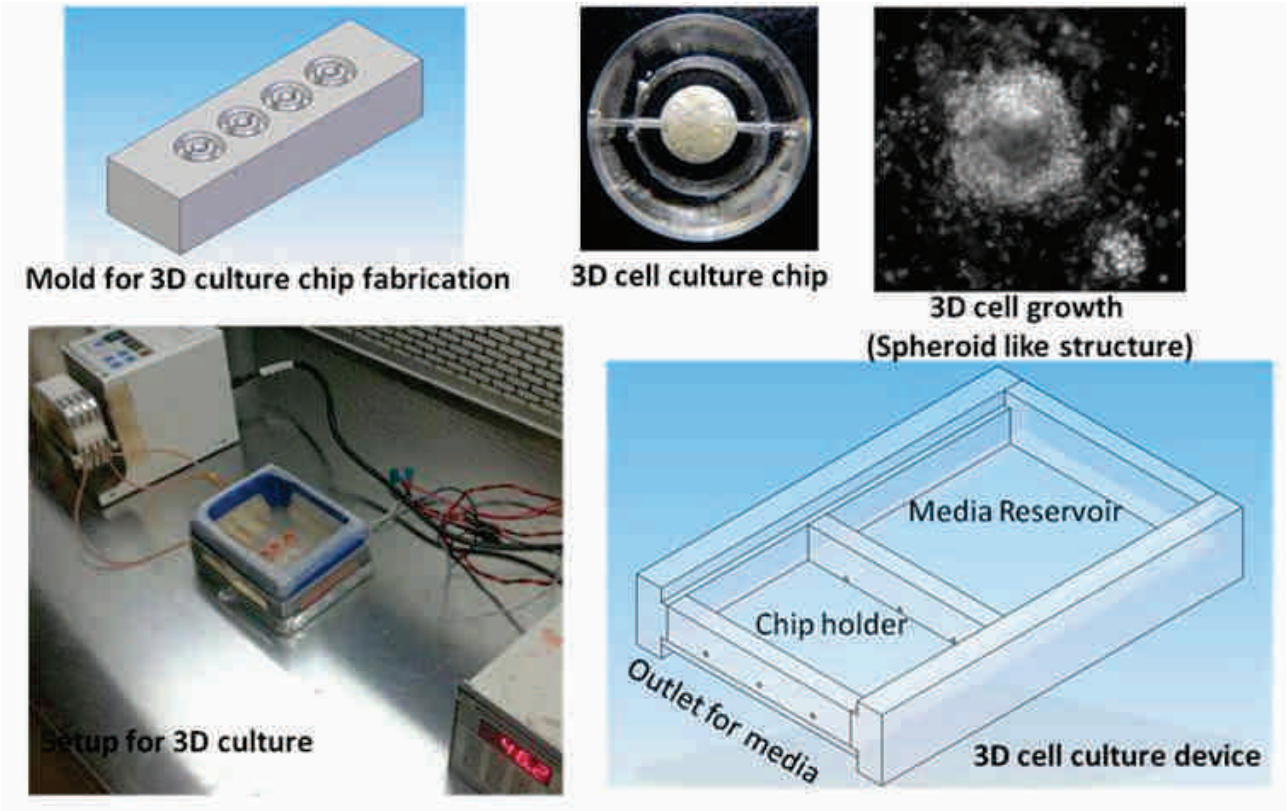


Figure 21 3D cell culture device

- ## Microfluidic device to detect water-borne pathogenic bacteria

Detection of *E. coli* and other coliform organisms is the gold standard test to determine potability of water. The conventional microbiological tests for detection of coliforms such as *E. coli* takes 24-48 h for a result.

ARI has developed a portable, microfluidic device for rapid detection of water-borne pathogens such as *E. coli*. The device is highly sensitive and the read-outs are fast. Typically, it is able to detecting 10 bacterial cells from 100 ml water samples, in 30 minutes. The device relies on a patented technology of capturing microbes using magnetic nanoparticles. Given the robustness, rapidity and affordability of the device, its use could extend to screening water, food and environmental samples for multiple pathogens on site and online.

- **Scaffolds for bone tissue engineering**

Bacterial cellulose based scaffolds for bone tissue engineering are being developed. Tissue engineering can be used to treat osteochondral defects by implantation of biocompatible scaffolds with/without cells and growth factors at the defect site. Our work explores bacterial cellulose obtained fermentatively using an indigenous isolate, viz.,*Komagataibacter hansenii* MCMB-967. Physicochemical characterization of bacterial cellulose revealed acid-alkali resistance, post-sterilization stability, nano-fibrillar and crystalline nature with high tensile strength and Young's modulus ~170 kPa. *In vitro* biocompatibility of bacterial cellulose was established as evidenced by the growth of fibroblast cells, keratinocytes and osteoblasts.

A bi-layered composite was prepared by surface modification of bacterial cellulose with hydroxyapatite (HA) and glycosaminoglycan (GAG) to mimic the bone and cartilage component. The *in-vivo* biocompatibility of these materials has been assessed in Wistar rats. Upon subcutaneous implantation, the scaffolds completely integrated with rat tissue without any adverse reactions. Histology of scaffolds showed blood vessel formation and presence of host cells as well as the extracellular matrix, proving biocompatibility (Figure 22). The utility of such scaffolds in the repair of osteochondral defects is being studied after implantation at the defect site.

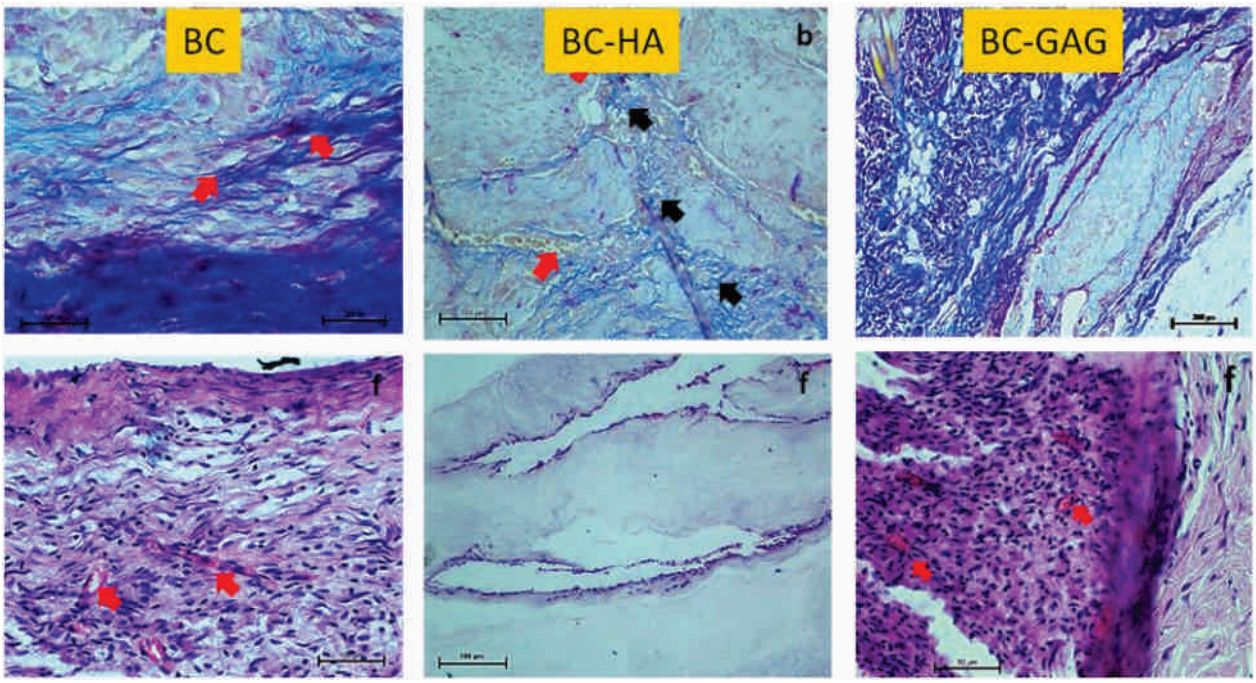


Figure 22 Biocompatibility of native bacterial cellulose and its composites

3) Agricultural nanotechnology

RNA interference for insect control, and enhancing seed germination efficiency in medicinal trees are the two areas being explored.

- **Fight against armyworm reaches decisive stage**

The insect pest *Helicoverpa armigera* or armyworm causes severe damage to crop plants and is resistant to chemical pesticides. RNAi has potential applications for insect control due to its high specificity.

Presently, effective dsRNA delivery is considered the bottleneck for application of dsRNA in insect control. Chitosan nanoparticles were synthesized as an alternative delivery system for RNAi. Chitosan nanoparticles were used to deliver dsRNA against the identified targets in insect metabolism namely, juvenile hormone acid methyl transferase, chitinase and acetylcholinesterase in insect bioassays against *H. armigera*. The nanoparticles delivered dsRNA showed a significant difference in body weight, size and showed morphological deformities during pupation when compared to control. The enzyme activities of the targeted genes were lower in chitosan nanoparticles-dsRNA treated larvae as compared to the control and bare siRNA treated larvae. This work demonstrates that chitosan nanoparticles can be used as a vehicle for delivery of dsRNA and can be effective in insect control.

- ## As you sow, so will you reap

Propagation of medicinal trees poses a major difficulty due to seed dormancy, poor and erratic germination of seeds and slow growth of seedlings. Natural reseeding is inadequate to guarantee the survival of these plants and, therefore, there is a need to develop newer and better methods for enhancing seed germination efficiency.

We report improved germination in *Stereospermum suaveolens* through seed pretreatment with multi-walled carbon nanotubes functionalized with carboxyl groups (MWCNT-COOH). Seeds treated with carbon nanotubes showed higher germination percentage and seedling survival. Increased water imbibition was observed leading to higher seed vigour indices (SVI I and II). Seeds treated with MWCNT (50 µg/mL) showed increased germination speed, improved physiological responses including plant biomass and a two-fold increase in relative growth index probably due to increased hydration of seed coat. The method appears to be simple and hence suitable for the large-scale propagation of *Stereospermum suaveolens* via seed.

Swachh Bharat/ Clean India

Bioprocess to contain diseases and stench associated with human defecation during annual pilgrimage of Pandharpur

Pandharpur is one of the most prominent pilgrimage places in Maharashtra with a population of around 1.2 lakh. The *Vithoba* temple in Pandharpur attracts about a million pilgrims (*Warkaris*) during the annual pilgrimage (*Ashadhi Ekadashi Yatra*) in the month of June–July. The devotees from different parts of Maharashtra walk to Pandharpur through processions (*Waris*). A vast majority of devotees resort to open defecation *en route* owing to a lack of toilet facilities. As the *Waris* leave, small towns and villages along the route are left grappling with tonnes of human waste. The entire situation results in foul odour for the locals besides posing a serious health hazard. The local authorities spray pesticides on the excreta, which is harmful to the people and the environment. ARI, in collaboration with Vikalpa Technologies, Pune has developed a patented formulation containing a concoction of microbes and an adsorbent to degrade the human excreta and to absorb associated malodours. This eco-friendly method has been successfully used during the pilgrimage for the last five years. As a result, a dramatic decrease in the incidence of enteric diseases and the stench associated with open defecation has been observed.

Cleaning of Institute Campus

Staff of ARI participated in cleaning the campus during 25 September - 2 October to 2014. ARI has been active in campus cleaning activities on a regular basis.

Annexure

Repositories

Agharkar Herbarium at MACS (AHMA)

One thousand specimens were added to AHMA after their taxonomic scrutiny, updating nomenclature and entries on cards, register and database. These additions are done through routine botanical excursions, specimen deposited by Ph. D. students and different sponsored projects. Additionally 2500 herbarium scans were added to the database. Presently the total number of specimens in AHMA database is 28,500.

Ajrekar Mycological Herbarium (AMH)

Ajrekar Mycological Herbarium holds 9664 exsiccatae specimens including 12 specimens received from other centres in India for deposit and accession during period under report.

Animal House

ARI has an animal house facility to meet the standard requirement of rodents. It is registered under CPCSEA for animal breeding and experimentation since 1999. The Institutional Animal Ethics Committee regularly arranges meetings and approves research proposals with full consideration to animal ethics. Currently strains of laboratory rat and mice are maintained at standard environmental conditions under the supervision of experienced and trained staff. Quality animals are supplied for in-house research work.

Crude Drug Repository

ARI has been rendering the Authentication Service of identification/authentication of crude drug samples/specimens for academic as well as industrial purposes. During the period of report total 225 authentication reports were generated; out of these, 36 were for industries. Total money generated: Rs. 1,91,612/-

Fossil Repository

Fossil repository hosts 7895 specimens of animal and plant fossils. These include ammonoidea, bivalvia, gastropoda, bryozoa, echinoidea, foraminifera, trace fossils, intertrappean fish, plant fossils, pollens and spores collected from various localities from Peninsular India.

MACS Collection of Microorganisms (MCM)

Specialized cultures of microorganisms used in various processes are being maintained in active form and supplied to researchers on demand. The specialized cultures include standard reference cultures, cultures used in metal-microbe interactions and industrial waste treatment, extremophiles such as halophilic, thermophilic, methanogenic archaea and alkaliphilic cultures.

National Fungal Culture Collection of India (NFCCI) National Facility

As a part of conservation of fungal diversity, live, pure and authenticated cultures of 372 interesting fungi received from various organizations in India were deposited and accessioned. The total number of fungal cultures comes to 3711. These fungal germplasm are maintained by following standard long term preservation techniques, like preservation in glycerol, mineral oil and liquid nitrogen, etc. A total 124 authentic fungal strains were supplied to various academia, research institution and industry.

Library and Information Center

The library is part of CSIR-DST consortium known as National Knowledge Resource Consortium (NKRC). It has provided access to several international online Full Text resources as well as to Databases like Web of Science, SCOPUS. Current holdings of the library are:

Particulars	Total	Particulars	Total
Books/Bound Volumes	26805	Maps and Atlases	562
Reference Books	1111	Microfilms/Fisches	636
PhD Theses	301	Annual Reports	463
MSc/MPhil Theses	97	Journals	189
ARI Reprints	3032	Digital collection/Documents	3050

Services Rendered/Offered

Crude drug authentication service

Total 225 authentication reports were generated. Of these, 36 were for industries.

Fungal Identification Service of NFCCI

During period of report 661 fungal cultures/other samples received from academic, research institution and industry were authenticated / identified. As such, 195 centres including 180 academic & research institutions and 15 private centres in India benefited by various services of National Facility.

Technical services

Services given for biogas (CH_4, CO_2 and H_2S) analysis to colleges, institutes and industries.

Indian Patent applications

Patent	Details	Inventor(s)
A method for continuous generation of hydrogen by biodegradation of organic matter using *Clostridium biohydrogenum* MCM B-509 sp nov.	412/MUM/2014	Ranade DR, Kamalaskar L, Lapsiya K, Kshirsagar PR, *Dhakephalkar PK*
Process for enhanced recovery of crude oil from oil-wells at 91°C or higher temperatures using hyperthermophilic indigenous or injected microorganisms / consortia.	751/MUM/2014	Dhakephalkar PK, Ranade DR, Bateja S,Biswas SK, Kukreti V, Rana DP
Nanomaterial composition for controlling phytopathogens and method to prepare the same	2393/MUM/2014	Rajwade JM, Chikte RG, Paknikar KM

Research papers/Monographs/ Book Chapters/ Bulletins/ Booklets

Monographs/ Books

Naik DG, Upadhye AS, Vaidya-Kannur H, Rajopadhye A and Namjoshi T. 2014. Phytochemical reference standards of selected Indian medicinal plants, Volume 3. Medicinal Plant Unit, Indian Council of Medical Research, New Delhi

Makhija Urmila, Chitale Gayatri and Dube Archana. 2014. Lichens of Maharashtra. Bishen Singh Mahendra Pal Singh, Dehradun. ISBN:978-81-211-0865-2

Sharma Bharati. 2014. Saxicolous lichens of India: Checklist and keys. Bishen Singh Mahendra Pal Singh, Dehra Dun. ISBN:976-81-211-0893-5

Chapters in Books, Proceedings

Engineer AS and Dhakephalkar PK. 2015. Data mining and bio prospecting: In pursuit of more efficient enantioselective hydantionases for synthesis of optically pure amino acids. In: Advances in Biotechnology. pp.217-238. Eds. NN Nawani, M Khetmalas, PN Razdan and A Pandey. IK International publishing house Pvt.Ltd., New Delhi

Gill MIS, Arora NK, Krishan Kumar, Karibasappa GS, Tetali Sujata, Karkamkar SP, Misra SC and Ghosh SN. 2014. In: Grapes Tropical and Sub-Tropical Fruit Crops: Crop Improvement and Varietal Wealth, Part 1. pp. 293-334. Ed. SN Ghosh. Jaya Publishing House, New Delhi

Limaye Ruta B and Kumaran KPN. 2014. Changing scenarios of mangrove habitat since Neogene along west coast of India: An eco bio geographical appraisal. Proceedings of the National Conference on modern trends in coastal and estuarine studies.pp. 121-133. (DOI: 10.13140/ 2.1.1394.1441)

Verma N and Behera BC. 2015. Future directions in the study of pharmaceutical potential of lichens. In: Lichen secondary metabolites: Bio active properties and pharmaceutical potential. pp. 179-202. Ed. B Rankovic. Springer International, Switzerland

Verma N and Behera BC. 2015. In-vitro culture of lichen partners: need and implications. In: Recent advance in lichen ology: Modern methods and approaches in lichen systematics and culture techniques. pp 147-159. Eds. DK Upreti, PKDivakar, V Shukla, R Bajpai. Volume 2. Springer International, India

Bulletins

Misra SC, Honrao BK, Chavan AM, Surve VD, Khade VM, Bagwan J, Gite VD, Khairnar SS and Bankar DN. 2015. Latest technology for wheat production. Bulletin no. 3, Agharkar Research Institute, Pune

Taware SP, Philips Varghese, Jaybhay SA, Idhol BH, Pulje BN and Salunkhe DH. 2015.Improved Soybean Production Technology for Maharashtra (Marathi). Bulletin no. 10. Agharkar Research Institute, Pune

Research Papers

Adhapure NN, Dhakephalkar PK, Dhakephalkar AP, Tembhurkar VR, Rajgure AV and Deshmukh AM. 2014. Use of large pieces of printed circuit boards for bioleaching to avoid precipitate contamination problem and to simplify overall metal recovery. MethodsX, 1:181-186

Agrawal N, Sarkar M, Chawda M, Ganesan V and Bodas D.2015. Room temperature magnetism and metal to semiconductor transition in dilute Sb1-xSex semiconducting alloy thin films. Materials Research Express, 2:025902

Agte VV, Bhute R, Pathare P and Nilegaonkar SS. 2014. Factors influencing the antioxidant potential of amla and its products. British Journal of Pharmaceutical Research, 4(22):2575-2584

Alakananda B, Karthick B, Taylor JC, Hamilton PB. Two new species of *Nitzschia* from freshwater environs of Lonar Crater Lake, India. Phycological Research. DOI: 10.1111/pre.12060

Ambavade SD, Misar AV, Ambavade PD. 2014. Pharmacological, nutritional, and analytical aspects of -sitosterol: A review. pp. 1-19. Oriental Pharmacy and Experimental Medicine. Springer Netherlands. DOI: 10.1007/s13596-014-0151-9

Bute M, Bodas D and Gosavi S. 2014. Surface studies on benzophenone doped PDMS microstructures fabricated using KrF excimer laser direct write lithography, Applied Surface Science, 314:292-300

Bute M, Shinde S, Bodas D, Foud H, Adhi K and Gosavi S. 2015. Benzophenone doped Polydimethylsiloxane: Self developable composite resist system for its use in direct write laser lithography application. Journal of Physics D, 48(17) 175301

Callaghan TM, Podmirseg SM, Hohlweck D, Edwards JE, Puniya AK, Dagar SS and Griffith GW. 2015. *Buwchfawromyces eastonii* gen. nov., sp. nov: a new anaerobic fungus (Neocallimastigomycota) isolated from buffalo faeces. MycoKeys 9: 11-28

Dabir AP, Honkalas VS, Arora P, Pore S, Ranade DR and Dhakephalkar PK. 2014. Draft genome sequence of *Methanoculleus* sp. MH98A, a novel methanogen isolated from sub-seafloor methane hydrate deposits in Krishna Godavari basin. Marine Genomics, DOI: 10.1016/j.margen. 2014.10.001

Dagar SS, Singh N, Goel N, Kumar S and Puniya AK. 2014. Role of anaerobic fungi in wheat straw degradation and effects of plant feed additives on rumen fermentation parameters *in vitro.* Beneficial Microbes, 12:1-8

Dangi R, Misar A, Tamhankar S and Rao S. 2014. Diosgenin content in some *Trigonella* species. Indian Journal of Advances in Plant Research, 1(2):47-51

Dangi R, Tamhankar S, Choudhary R and Rao S. 2015. Molecular phylogenetics and systematics of *Trigonella* L. Fabaceae based on nuclear ribosomal ITS and chloroplast trnL intron sequences. Genetic Resources and Crop Evolution, 62(3). DOI: 10.1007/s10722-015-0236-4

Datar MN, Gorade PD, Nadgir P and Bayani A. 2014. Extended distribution of endemic Travancore Muraina grass *Ischaemum travancorenses* Staph ex C.E.C. Fisch (Poaceae) to Central India. Journal of Threatened Taxa, 6(14): 6733-6736

Deivasigamani S, Verma HK, Ueda R, Ratnaparkhi A and Ratnaparkhi GS. 2014. A genetic screen identifies Tor as an interactor of VAPB in a *Drosophila model* of amyotrophic lateral sclerosis. Biol Open., 3(11):1127-38. DOI: 10.1242/bio.201410066

Gaikwad NS and Datar MN. 2015. Notes on the distribution of some angiosperms from Maharashtra, India. Journal of Threatened Taxa, 7(2):6940-6942

Gaikwad S, Verma N, Behera BC and Sharma BO. 2014. Growth promoting effects of some lichen metabolites on probiotic bacteria. Journal of Food Science Technology, 51:2624-2631

Ghormade V, Gholap H, Kale SA, Kulkarni V, Bhat S and Paknikar KM. 2015. Fluorescent cadmium telluride quantum dots embedded chitosan nano particles: a stable, bio compatible preparation for bio-imaging. Journal of Biomaterials Science. Polymer Edition, 26(1):42–56

Gite S, Yadav SA, Nilegaonkar SS and Agte VA. 2014. Evaluation of hepatoprotective potential of functional food formulations using in vitro and in vivo models of CCl4 radical induced toxicity. International Journal of Interdisciplinary and Multidisciplinary Studies, 1(10):6-13

Gorade PD and Datar MN. 2014. Checklist of palatable grass species from Peninsular India. Notulae Scientia Biologicae, 6(4): 131-137

Gruninger RJ, Puniya AK, Callaghan TM, Edwards JE, Youssef N and Dagar SS. 2014. Anaerobic fungi (phylum Neocallimastigomycota): advances in understanding their taxonomy, life cycle, ecology, role and biotechnological potential. FEMS Microbiology Ecology, 90(1):1-17

Gurav SS, Kulkarni KG, Paranjape AR and Borkar VD. 2014. Palaeoenvironmental implications of middle Jurassic trace fossils from the Jaisalmer Formation, India, with emphasis on the ichnogenus *Asteriacites lumbricalis* Von Schlotheim, 1820. Annales Societatis Geologorum Poloniae, 84:249–257

Haghniaz R, Umrani RD, and Paknikar KM. 2015. Temperature-dependent and time-dependent effects of hyperthermia mediated by dextran-coated La0.7Sr0.3MnO3: in vitro studies. International Journal of Nanomedicine, 10:1609–1623

Honkalas VS, Dabir AP, Arora P, Ranade DR and Dhakephalkar PK. 2015. Draft genome sequence of Clostridium sulfidigenes 113A isolated from sub-seafloor sediments associated with methane hydrate deposits. Marine Genomics,doi:10.1016/j.margen.2015.03.011

Honkalas VS, Dabir AP, Arora P, Ranade DR and Dhakephalkar PK. 2015. Draft genome sequence of *Clostridium celerecrescens* 152B isolated from sub-seafloor methane hydrate deposits. Marine Genomics, doi:10.1016/j.margen. 2015.01.008

Jain BP, Chauhan P, Tanti GK, Singarapu N, Ghaskadbi S and Goswami SK. 2015. Tissue specific expression of SG2NA is regulated by differential splicing, RNA editing and differential polyadenylation. Gene, 556 (2):119-126. DOI: 10.1016/j.gene.2014.11.045

Jaybhay SA, Taware SP and Philips Varghese. 2014. Optimization of seed rate and row spacing of soybean varieties. Soybean Research (Special Issue):67-71

Kasote MD, Nilegaonkar SS and Agte VV. 2014. Effect of different processing methods on resistant starch content and in vitro starch digestibility of some common Indian pulses. Journal of Scientific & Industrial Research, 73:541-546

Kulkarni SO, Kanekar PP, Jog JP, Sarnaik SS and Nilegaonkar SS. 2015. Production of copolymer, poly (hydroxybutyrate-co-hydroxyvalerate) by Halomonas campisalis MCM B-1027 using agro-wastes. International Journal of Biological Macromolecules, 72:784–789

Kulkarni A, Datar M, Awasarkar U, Upadhye A. 2014. Northernmost distribution of five tree species to the Western Ghats from the Sacred Groves of Pune district, Maharashtra, India. Journal of Threatened Taxa, 6(8):6093-6100

Kumar S, Dagar SS, Hadi S, Ebrahimi, Malik RK, Upadhyay RC and Puniya AK 2015. Prospective use of bacteriocinogenic Pediococcus pentosaceus as direct-fed microbial having methane reducing potential. Journal of Integrative Agriculture, 14: 561–566

Kumaran KPN and Limaye RB. 2014. Holocene palynology and tropical palaeoecology. Quaternary International, 325: 116-125. DOI: 10.1016/j.quaint. 2013.12.031

Lanjekar VB, Marathe NP, Shouche YS and Ranade DR. 2014. Megasphaera indica sp. nov., an obligate anaerobic bacteria isolated from human faeces. International Journal of Systematic And Evolutionary Microbiology, 64(7):2250-2256

Limaye Ruta B, Kumaran KPN and Padmalal D. 2014. Mangrove habitat dynamics in response to Holocene Sea level and climate changes along southwest coast of India. Quaternary International, 325:1-2

Marathe NP, Shetty SA, Lanjekar VB, Rasane MH, Ranade DR and Shouche YS. 2014. Genome sequencing of multi drug resistant novel Clostridium sp. BL8 reveals its potential for pathogenicity. Gut Pathogens, 6,30:1-5,doi:10.1186/1757-4749-6-30

Padmalal D, Kumaran KPN, Limaye Ruta B, Baburaj B, Maya K and Vishnu Mohan S. 2014. Effect of Holocene climate and sea level changes on land form evolution and human habitation: Central Kerala, India. Quaternary International, 325:162-178. DOI: 10.1016/j.quaint.2013.12.032

Padmalal D, Kumaran KPN, Nair KM, Limaye Ruta B, Vishnu Mohan S, Baijulal B and Anooja S. 2014. Consequences of sea level and climate changes on the morphodynamics of a tropical coastal lagoon during Holocene: An evolutionary model. Quaternary International, 333:156-172. DOI:10.1016/j.quaint.2013.12.018

Palande V, Meora R, Sonavale RM, Makashir M, Modak MS, Kapse N, Dhakephalkar PK, Ranjekar PK and Kunchiraman BN. 2015. Inhibition of pathogenic strains of Candida albicans and non-albicans by Bacillus species isolated from traditional Indian fermented food preparations. International Journal Current Microbiology and Applied Sciences, 4(3):691-699

Pandit GS. 2014. Lichens of the Mahabaleshwar-Panchgani ecosensitive zone (MPESZ), Maharashtra, India. Journal of Threatened Taxa,6:5784–5791

Pandit GS. 2014. Immersaria and Koerberiella, two new generic records to India. Current Research in Environmental & Applied Mycology, 4:137–140

Panchang R and Nigam R. 2014. Benthic ecological mapping of the Ayeyarwady delta shelf off Myanmar, using foraminiferal assemblages. Journal of the Palaeontological Society of India, 59(2):121-168

Panchang R. 2014. Sand mining and industrial effluents threaten mangroves along Central West Coast of Maharashtra, India. Open Journal of Ocean and Coastal Sciences, 1(1):35-49(Web: http://www.scipublish.com/journals/OCS/papers/534)

Paranjape AR, Kale AS and Kulkarni KG. 2014. Significance of clastic injectites in the syn-rift Terani Clay Member, Sivaganga Formation, Cauvery Basin, Tamil Nadu, India. Current Science,106(12):1641-1643

Paranjape AR, Kulkarni KG and Kale AS. 2015. Sea level changes in the upper Aptian- lower/ middle (?) Turonian sequence of Cauvery Basin, India - An ichnological perspective. Cretaceous Research, DOI: 10.1016/j.cretres.2014.11.005

Patil PV, Kulkarni DK and Taware SP. 2014. Evaluation of traditional knowledge of plant resources to control stored food grain pest – Callosobruchus maculatus F. Indian Journal of Fundamental and Applied Life Sciences 4(2) Online

Patil PV, Taware SP and Kulkarni DK. 2014. Traditional knowledge of broom preparation from Bhor and Mahad region of western Maharashtra, India. Bioscience Discovery, 5(2):218-220

Patra C, Boccaccini AR and Engel FB. 2014. Vascularization for cardiac tissue engineering: the extracellular matrix. Thrombosis and Haemostasis, 532-547

Pawle G, Singh SK. 2014. Antioxidant potential of endophytic fungus Colletotrichum species isolated from Polygala elongata. International Journal of Pharma and Bio Sciences, 5(3):(B) 313–319

Pore SD, Arora P and Dhakephalkar PK. 2014. Draft genome sequence of Geobacillus sp. strain FW23, isolated from a formation water sample. Genome announcements, 2: e00352-14

Puniya AK, Salem AZM, Kumar S, Dagar SS, Griffith GW, Puniya M, Ravella SR, Kumar N, Dhewa T and Kumar R. 2015. Role of live microbial feed supplements with reference to anaerobic fungi in ruminant productivity. Journal of Integrative Agriculture. Advance Online Publication, 14: 550–560

Quang BH, Chaudhary RK, Bach TT, Chinh VT, Khang NS, Lee C and Lee J. 2014. *Jasminum albicalyx*, a new record for the Flora of Vietnam. Korean Journal of Plant Taxonomy, 44(3):178-180

Quang BH, Choudhary RK, Tran Thi Phuong Anh, Bach TT and Lee J. 2014.Two new combinations in ChionanthusL. (Oleaceae). Bangladesh Journal of Plant Taxonomy, 21(2):197-198

Rajeshkumar KC. 2014. A reappraisal of the fungus genus Phalangispora with the rediscovery of P. bharathensis on leaf litter of Mangifera indica from the Northern Western Ghats, India. Journal of Threatened Taxa,6(9):6278–6281

Rajwade JM, Paknikar KM and Kumbhar JV. 2015. Applications of bacterial cellulose and its composites in biomedicine. Applied Microbiology and Biotechnology, 99: 2491-2511

Raut VM, Taware SP and Sandeepa Kanitkar. 2014. Response of bio-fertilizers and growth promoters on soybean (Glycine max L. Merrill) yield. Pestology, XXXVIII(9):31-35

Saxena N, Pore S, Arora P, Kapse N, Engineer A, Ranade DR and Dhakephalkar PK. 2015. Cultivable bacterial flora of Indian oil reservoir: isolation, identification and characterization of the biotechnological potential. Biologia, 70(1):1-10

Sen B, Dabir AP, Lanjekar VB and Ranade DR. 2015. Isolation and partial characterization of a new strain of Klebsiella pneumoniae capable of high 1, 3 propanediol production. Global Journal of Environmental Science and Management, 1(2):99-108

Sethy P, Pandit G and Sharma B. 2014. New records of lichens on mangrove in the Andaman Islands of India. Paripex - Indian Journal Of Research, 3:7-8

Singh P, Kapse N, Arora P, Singh SM and Dhakephalkar PK. 2015. Draft genome of Cryobacterium sp. MLB-32, an obligate psychrophile from glacier cryoconite holes of high Arctic. Marine Genomics, doi:10.1016/j.margen.2015.01.006

Sivaswamy M, Jagdish Kumar, Jayprakash P, Vikas VK, Vinod, Sanjay Kumar, Singh GP, Sharma RK, Yadav R, Sharma JB, Vinod Prabhu K, Bhagwat SG, Das BK, Misra SC, Honrao BK, Rudranaik V, Desai SA, Kalappanavar IK, Biradar SS, Punniakotti E, Sivan K, Meena ML, Meena RK and Arun Kumar. 2014. A high yielding semidwarf dicoccum wheat - Nilgiri Khapali (HW 1098) released for cultivation to dicoccum growing areas of India. Journal of Wheat Research, 6(2):173-175

Srivastava P, Wagh RS, Puranik NV, Puntambekar HM, Jahagirdar SS and Dhakephalkar PK. 2015. In vitro plasmid curing activity of aqueous extract of Terminalia chebula fruit against plasmids of Bacillus subtilis and Shigella sonnei. International Journal of Pharmacy and Pharmaceutical Sciences, 7(4):298-301

Taylor JC, Karthick B, Cocquyt C and Poulin L. 2014. Diploneisfenestrata (Bacillariophyta) spec. nov., a new aerophilic diatom species from Zambia, Central Africa. Phytotaxa, 167(1):79–88

Taylor JC, Karthick B, Kociolek JP, Wetzel CE and Cocquyt C. 2014. Actinellopsis murphyi gen. et spec. nov.: A new small celled freshwater diatom (Bacillariophyta, Ennotoales) from Zambia. Phytotaxa, 178(2):128-137

Tetali S, Karkamkar SP and Misra SC. 2014. Induction of rooting in grape (ARI–516). Bioinfolet, 11(3B):930-933

Thomas EW, Kociolek JP and Balasubramanian K. 2014. Four new Rhoicospheni a species from fossil deposits in India and North America. Diatom Research.http://dx.doi.org/10.1080/0269249X.2014.961554

Umrani RD and Paknikar KM. 2014. Jasada Bhasma, a zinc based ayurvedic preparation: contemporary evidence of antidiabetic activity inspires development of a nanomedicine. Evidence based complementary and alternative medicine. Article ID 193156, 9 pages

Upadhye AS, Waghmode PB, Dhavare PM and Gaikwad NS. 2015. Standardization and re-introduction of critically endangered Ceropegiamahabalei Hemadri and Ansari by in vitro propagation. Annals of Plant Sciences, 4(2):987-993

Veldurthi N, Chandel S and Bodas D. 2015. Computational fluid dynamic analysis of poly (dimethyl siloxane) magnetic actuator based micromixer. Sensors & Actuators B, 212:419-424

Yadav SA, Nilegaonkar SS and Agte VV. 2014. Enrichment of prebiotics in foods using green chemistry approach. Current Organic Chemistry, doi:10.2174/1385272819666140929204953

Yadav SA, Gite SS, Lanjekar VB, Nilegaonkar SS and Agte VV. 2014. In vitroscreening of indigenous plant materials for prebiotic potential. International Journal of Current Microbiology and Applied Sciences, 3(11):137-150

Zambare VP, Nilegaonkar SS, Kshirsagar PR and Kanekar PP. 2014. Scale up production of protease using Psuedomonas aeruginosa MCM B-327 and its detergent compatibility. Journal of Biochemical Technology, 5(2):698-707

Papers Presented at Conferences/ Symposia/ Seminars

Oral Presentation

Galande A, Ghaskadbi SS and Ghaskadbi SM. XPB and XPD in hydra. XXXVIII All India Cell Biology Conference & Symposium on Cellular Response to Drugs, CDRI, Lucknow, 10-12 December 2014

Gurav SS and Kulkarni KG. Entobian bioerosion in the Early Eocene Naredi Formation of Kachchh basin, India. 8th International workshop of Bioerosion, Eger, Hungary, 24-30 August 2014

Honkalas VS, Dabir AP, Ranade DR and Dhakephalkar PK. 2014. Diversity and prevalence of bacteria and archaea in sub sea floor sediments associated with methane deposits. Third Global Sustainable Biotech Congress 2014, International conference on innovations in biotechnology and their applications, North Maharashtra University, Jalgaon, 1-5 December 2014 (Best oral presentation award)

Karthick B. The earliest freshwater Gomphonemoid diatoms (Bacillariophyceae, Cymbellales, Gomphonematecear): A new freshwater Gomphonemoid diatom genus from India. 23rd International Diatom Symposium-IDS, Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences, China, 7-12 September 2014

Kshirsagar PR. 2014. Development of overall process flow sheet for processing of 100 tons/day rice straw using continuous NaOH pretreatment, biogas production 250 m^3/ ton/ day, and techno-economics of overall process. National Chemical Laboratory Venture Centre, Pune and DSM India Pvt. Ltd., Aundh, Pune

Kulkarni KG and Gurav SS. 2014. Mayfly nymph burrows: Indicators of water quality. National Conference on Climate Change: Past, Present and Future, Poona College, Pune, 12-13 January 2015

Kumaran KPN. Consequences of monsoon variation on tropical rainforests during the Late-Pleistocene and Holocene in southwestern India. International Conference of Plant culture and Environment, Jinan, China, August 2014

Lanjekar VB,Despande M, Ranade DR and Dhakephalkar PK. 2014.Development of a bioprocess to reduce pathogenic load and malodor of human night soil. Recent Advances in Biodegradation of Human Wastes, Defence Research Laboratory, DRDO Tezpur, Assam, 16-17 December 2014 (Best oral presentation award)

Paranjape AR, Kale AS and Kulkarni KG. 2015. First record of gravity flows from Cretaceous exposures Ariyalur-Pondicherry area, Cauvery Basin, India. GeoIndia 2015 - The 3rd South Asian Geoscience Conference and Exhibition, New Delhi, 11-14 January 2015

Patra C, Krüger M and Stainier DY. Extracellular matrix molecules in cardiovascular development. Weinstein Cardiovascular Development Conference, Madrid, Spain, 8-10 May 2014

Taware SP, Philips Varghese and Jaybhay SA. Changing scenario of insect-pests of soybean in western Maharashtra and their management. International Conference: Changing Scenario of Pest Problems in Agri-horti Ecosystem and their Management, Udaipur, 27-29 November 2014

National Conference on Sedimentation and Stratigraphy and XXXI Convention of Indian Association of Sedimentologists, University of Pune, 12-13November 2014

Gurav Shweta. Reworking of quaternary sediments by Mayfly (Family Ephemeridae), Narmada river valley Madhya Pradesh

Panchang Rajani. Foraminiferal signatures trace human climate interactions over the past century in Kundalika estuary, Konkan Maharashtra

Paranjape Amruta, Kulkarni KG and Kale AS. Biogenic response to changing depositional conditions: a case study from the upper part of the Karai Formation Cauvery Basin

National Seminar on New Frontiers in Plant Sciences and Biotechnology, Department of Botany, Goa University, 29-30 January 2015

Gorade P and Datar M. Community pastures of Maharashtra: Diversity, productivity, threats and conservation

Jadhav R, Datar M and Upadhye A. Wild relatives of crop plants from Northern Western Ghats of Maharashtra: Diversity and distribution

Poster presentation

Panchang R. Monitoring anthropogenic threat to mangroves along Central West Coast of India: A holistic approach. IMBER Summer School ClimEco 4, State Key Laboratory for Estuary and Coasts, East China Normal University, Shanghai, China, 4-9 August 2014

Jaybhay SA, Taware SP and Philips Varghese. Enhancement of soybean (*Glycine* max) yield through efficient use of water resource. National Symposium on Agricultural Diversification for Sustainable Livelihood and Environmental Security, Ludhiana, 17-20 November 2014

Umrani RD, Asani SC and Paknikar KM. Zinc oxide nanoparticles: A novel drug for the treatment of diabetes. The Ramanbhai Foundation 7th International Symposium on Current Trends in Pharmaceutical Sciences: Advances in New Drug Discovery and Development. Zydus Research Centre, Ahmedabad, 2-4 February 2015

Third Global Sustainable Biotech Congress 2014, International conference on innovations in biotechnology and their applications, North Maharashtra University, Jalgaon, 1-5 December 2014

Arora P, Kshirsagar P and Dhakephalkar P. Assessment of PCR enhancers/ additives for rectification of erroneous molecular profiling of microbial communities associated with oil reservoirs

Kapse N, Dhakephalkar A and Dhakephalkar PK. In vitro assessment of health promoting and disease preventing properties of three Lactobacilli for the development of probiotic oral adjuncts. (Best poster award)

Shetty D, Maheshwari S and Dhakephalkar PK. Assessing biochemical methane potential of agro-residues

XXXVIII All India Cell Biology Conference & Symposium on Cellular Response to Drugs, CDRI, Lucknow, 10-12 December 2014

Dixit N, Shravage BV and Ghaskadbi S. Elucidation of role of autophagy in regeneration using hydra as a model system

Patwardhan R, Surekha KL and Ghaskadbi S. *In silico* analysis of *gremlin* expression from hydra

Shravage B. Autophagy is essential for maintenance of germline stem cells in *Drosophila*

Surekha KL, Patwardhan R, Khade S and Ghaskadbi S. Pattern formation in hydra: Antagonism between Wnt and BMP pathways.

Participation in Conferences/Symposia/Seminars/Workshops

Basargekar A. National Workshop on Scientific/ Research Paper Writing, Department of Chemistry, SPPU, Pune, 16-17 December 2014

DatarM, Gorade P, Jadhav R. National Seminar on New Frontiers in Plant Sciences and Biotechnology, Department of Botany, Goa University, 29-30 January 2015

Ghaskadbi S. XXXVIII All India Cell Biology Conference & Symposium on Cellular Response to Drugs, CDRI, Lucknow, 10-12 December 2014

Ghaskadbi S. EMBO workshop on Upstream & Downstream of Hox genes, CCMB, Hyderabad, 14-17 December 2014

Gurav SS, Kulkarni KG, Panchang R, Paranjape AR. National Conference on Sedimentation and Stratigraphy, XXXI Convention of Indian Association of Sedimentologists, University of Pune, 12-13 November 2014

Jaybhay SA. National Symposium on Agricultural Diversification for Sustainable Livelihood and Environmental Security, Ludhiana, 17-20 November 2014

Kamble A. Workshop on Importance of Taxonomy in Conservation of Animals. Zoological Survey of India, Western Region Circle, Akurdi, Pune, 18-19 March 2015

Kulkarni KG. National Conference on Climate Change: Past, Present and Future, Poona College, Pune, 12-13 January 2015

Kumari Shweta. 8th SERB School in Neuroscience, IISER, Pune, 8-21December 2014

MisarA, Dias L. Symposium on application of chromatography and spectroscopy techniques in pharma and food analysis, SIES College of Management Studies, Sri Chandrasekarendra Saraswathy Vidyapuram, Navi Mumbai, 18-19 December 2014

Misra SC. Project meeting and discussions of BBSRC-DFID-DBT funded project on interspecific diversity in wheat, Nottingham University, London, UK, 5-11 July 2014

Misra SC, Honrao BK, Oak MD and Patil RM. 53rd Annual group meeting of AICRP Wheat, JNKVV, Jabalpur, 22-25 August 2014

Misra SC. Annual research meeting of BMZ Research Project on productivity of wheat crop, Kathmandu, Nepal, 10-14 September 2014

Misra SC. Annual Research Meeting of the GCP funded projects, Rayong, Thailand, 6-10 October 2014

Paranjape A. GEOINDIA 2015, 3rd South Asian Geoscience Conference and Exhibition, New Delhi, 11-14 January 2015

Patra C.1) 5th Bi-Annual meeting for Max-Planck-Society heads of Partner Group in India, IIT-Madras, Chennai, 12-14 March 2015. 2) 9thMahabaleshwar Seminar on Recent Advances in Zebrafish Genetics and Development, Alibaug, Maharashtra, 21-24 March 2015

Taware SP, Philips Varghese, Jaybhay SA. 44th Annual Group Meeting of AICRP on Soybean, Ranchi, Jharkhand, 25-27 May 2014

Taware SP. International Conference: Changing Scenario of Pest Problems in Agri-horti Ecosystem and their Management, Udaipur, 27-29 November 2014

Tetali S and Karkamkar SP. 54th Annual conference of Maharashtra Rajya Draksha Bagayatdar Sangh, Pune, 24-26 August 2014

Tetali S and Karkamkar SP. Group discussion of All India Coordinated Research Project on Fruits, Maharana Pratap University of Agriculture & Technology, Udaipur, Rajasthan, 26 February–1 March 2015

Tetali S and Phalake SV. Field day organized by NRC-Grapes at Farmer's field, Nasik, 8 February 2015

Turwankar A. 7th Bangalore Benny Shilo Course on Developmental Biology, National Centre for Biological Sciences, Bangalore, 12-23 January 2015

Umrani RD.Workshop, Leadership and career development for women scientists, NIAS, Bangalore, 8-12 September 2014

Abroad

Choudhary RK. Resource person, Korea Research Institute of Biosciences and Biotechnology, South Korea, 16-23 August 2014. Floristic survey, Nha-Trang, Vietnam, 26 November-6 December 2014

Gurav SS. 8th International workshop of Bioerosion, Eger, Hungary, 24-30 August 2014

Karthick Balasubramanian. 23rd International Diatom Symposium-IDS, Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences, Nanjing, China, 7-12 September 2014

Kumaran KPN. International Conference of Plant Culture and Environment, Jinan, China, 20-21 August 2014

Panchang Rajani. IMBER Summer School ClimEco4, State Key Laboratory for Estuary and Coasts, East China Normal University, Shanghai, China, 4-9 August 2014

Patra C. Experimental works, Max-Planck-Institute for Heart and Lung Research, Bad Nauheim, Germany, 27 March 2014 - 24 June 2014

Rajesh Kumar KC.Training Course on Microbial Resource Information Management for Developing Countries, World Data Center for Microorganisms, Institute of Microbiology, Chinese Academy of Sciences, Beijing, 2-15 September 2014

Tetali S. Integrated Breeding Multi-year Course (IB-MYC)-Year 3, Generation Challenge Programme (GCP), Mexico at Mediterranean Agronomic Institute of Zaragoza, Zaragoza, Spain,19-30 May 2014

PhD Degree award

Candidate	Title	Guide, Co-Guide
Chitrakoti MR	Exploration of bacterial diversity from high temperature oil reservoirs for the degradation of hydrocarbons at elevated temperature	Dhakephalkar PK, Ranade DR
Deshmukh S	Studies on catalytically inactivated enzymes as molecular recognition elements and their possible applications	Paknikar KM, Rajwade JM

Candidate	Title	Guide, Co-Guide
Engineer AS	Exploration of subsurface microbial flora for the production of valuable enzymes	Dhakephalkar PK
Haghniaz R	Radio frequency induced hyperthermia using dextran coated lanthanum strontium manganese oxide nanoparticles for tumor regression in mouse	Paknikar KM
Kumbhalkar BB	Pharmacognostic and molecular studies of some medicinal plants from family Cucurbitaceae	Upadhye AS
Lanjekar VB	Isolation, identification and functional characterization of obligate anaerobic bacteria from human gastro-intestinal tract	Ranade DR, Shouche Y
Nerlekar MR	Diversity of methanogens from oil reservoir in India	Ranade DR, Dhakephalkar PK
Shete S	Production of cerium sulfide pigment using *E.coli* expressing recombinant dsr genes	Dhakephalkar PK

Supervision of PhD students

(Guide, Co-Guide, Student, Thesis)

Dhakephalkar P K

Arora P. Hyperthermophiles from oil reservoir for application in Enhanced oil recovery

Dabir A. Investigation of biogenic methanogenesis leading to methane hydrate deposits in Krishna Godavari basin

Dahigaokar KV. Archaeal and bacterial diversity of mud volcanoes of Andaman

Kanekar SP. Biodiversity and biotechnological exploration of Halophiles from Andaman Islands and Lonar lake

Honkalas V. Taxonomy and metabolite analysis of bacterial flora contributing to methane hydrates in deep submarine sediments

Shetty D. Designing microbial/ physico-chemical pre-treatment for enhanced biogas production from rice straw

Tapadia S. Microbial community profiling and Transcriptome analysis to gain insight into biomethation of rice straw

Ghaskadbi SM

Galande A. Analysis of the homologues of nucleotide excision repair in hydra

Ghaskadbi SM, Patwardhan VG

Daware M. Elucidation of role of extracellular matrix protein periostin in zebrafish heart development

Turwankar A. Role of VEGF and FGF signaling in regeneration and pattern formation in hydra

Kulkarni KG

Gurav SS. Significance of bioturbation and bioerosion in the Paleogene of Kachchh, India

Paranjape AR. Sequence stratigraphic studies of the Cretaceous succession, Cauvery basin, Ariyalur area, Tamil Nadu, India

Paknikar KM

Agrawal S. Studies on phage based microfluidic assay for detection of food borne pathogens

Asani S. Mechanistic studies on anti-diabetic action of zinc oxide nanoparticles *in vitro*

Bhagat P. Nuclear delivery of SMAR-I using nanoparticles to modulate cancer

Choudhari M. Nanomaterial based rapid testing of antibacterial susceptibility and identification of clinical isolates

Kamat V. Micromixer assisted synthesis of nanoparticles: Assessment for their cellular toxicity and uptake

Kulabhusan PK. Phage display peptides for detection of pathogens

Kulkarni V. Studies on magnetic fluid hyperthermia and chemotherapy for treatment of breast cancer

Raval K. Studies in immunodiagnosis of invasive Aspergillosis

Rajwade J M

Chikte R. Development of nanomaterials based formulation for control of bacterial blight disease of pomegranate

Chowdhury S. Increasing seedling vigor in oil-seeds via nano-priming

Dapkekar A. Biopolymers based colloidal formulations for enhancing zinc use efficiency in wheat

Deshpande P. Nanocarriers mediated foliar delivery of zinc in wheat: studies on mechanisms of uptake and mobilization

Kumbhar J. Developing bacterial cellulose nanocomposites as scaffolds for osteochondral tissue engineering

Nimisha Singh. Studies on transcriptome profiling of biofilm bacteria treated with silver and copper nanoparticles

Ranade DR

Gophane R. Bioconversion of starch industry waste to n-Butanol (Co-guide Dhakephalkar PK)

Kajal Singh. Studies on anaerobic bacteria producing butyric acid and n-butanol from distillery waste. (Co-guide Paknikar KM)

Kamlaskar L. Investigation of a novel anaerobic strain MCM B-509 for polyphasic identification and bio-hydrogen production (Co-guide Dhakephalkar PK)

Ratnaparkhi A

Basargekar A. Investigation of the role of DMon1 in Drosophila nervous system

Kumari Shweta. Role of FGFR and Fog signaling pathways in embryonic glial cell development of *Drosophila melanogaster*

Upadhye AS

Dias L. Studies on selected Indian medicinal plants used in oral care for prevention of teeth caries

Honours

Bodas D

ISSS Young Scientist award - 2014 for his work on Bio MEMS and Microfluidics. 7th International conference, Smart structures materials and systems, IISc, Bangalore, 8-11 July 2014

Choudhari M

Received grant for his proposal 'An organic-inorganic nanoformulation for rapid wound healing', BIG (BIRAC), New Delhi, 27 October 2014

Lanjekar V

Dr PP Kanekar Award for best publication of the year by an young scientist (September 2014) from Agharkar Research Institute

Member, Nominee – National/ International Committees

Dhakephalkar PK

Member, Bio-safety Committee, Raj Biotech, Pune

DBT nominee, Bio-safety Committee, National Environmental Engineering Research Institute, Nagpur

DBT nominee, Bio-safety Committee, APT Research Foundation, Pune

DBT nominee, Bio-safety Committee, KDL Biotech Ltd, Mumbai

Ghaskadbi S

Member, Animal Sciences Program Advisory Committee under SERB, DST, June 2012-June 2015

Mentor, DBT-Ramalingaswami Re-entry Fellowship programme

Member, Editorial Board, Indian Journal of Experimental Biology (2011-2014)

Member, Editorial Board, International Journal of Cellular and Molecular Medicine

DBT Nominee, Institutional Bio-safety Committees of Lupin limited (Biotech Division), Pune, and InTox, Pune

Invited member, DBT Brain Storming Session on Marine Synthetic Biology, New Delhi, 24 November 2014

NilegaonkarS S

DBT nominee, Institutional Biosafety Committee, Praj Matrix, Pune

Patra C

Head of a Max Planck Partner Group (MPG) at ARI, co-funded by the Max Planck Society and the DST for 3 years extendable for two more years. Funding: €20,000 per year from the MPG and equivalent amount from the DST

Invited reviewer of one article for journal ACS Chemical Neuroscience and one article for journal Gene Expression Patterns

Shravage B

Invited reviewer for Journal of Biosciences

Tamhankar SA

Member, DBT Expert Committee on Crop Molecular Breeding, New Delhi, 2014-2017

Human Resource Development

Training in Micropalaeontological Techniques imparted to one MSc student of Geology. Guidance to a MSc student for summer project on *Fusarium* species. Two MSc students were guided for their dissertation in methanotrophic bacteria and one in bacteria from rice rhizospheres.

Seminar/Workshops/Training Courses Organized

National Technology Day

8 May 2014

The journey from an innovator to an entrepreneur

Dr Deepanwita Chattopadhyay, MD & CEO, IKP Knowledge Park, Secunderabad

हिन्दी दिवस

14 सितंबर 2014

कार्यालईन हिन्दी

डॉ ओंकारनाथ शुक्ला, हिन्दी अधिकारी
आईआईटीएम, पुणे

स्वच्छ भारत अभियान

25 सितंबर – 2 अक्तूबर 2014

भारत सरकार के विज्ञान और प्रौद्योगिकी विभाग ने स्वच्छ भारत अभियान क आयोजन करने संबंधी दिये दिशा निर्देशों के अनुसार संस्था में बड़ी उत्साह से यह अभियान चला या गया। संस्था के सभी कर्मचारियों ने इस में भाग लिया।

Vigilance Awareness

27 October - 1 November 2014

Vigilance and information technology

Mr Deepak Shikarpur
IT Technopreneur
Former President, Computer Society of India

Dr. GB Deodikar Memorial Oration

17 November 2014

Wheat Improvement Potential and Current Status

Dr JP Tandon
Ex Project Director of Wheat
Former Assistant Director General
Indian Council of Agricultural Research, New Delhi

Shri GB Joshi Memorial Oration

17 November 2014

Interlinking of Rivers and Food Security

Mr VM Ranade
Former Secretary Irrigation
Government of Maharashtra

54th Prof. SP Agharkar Memorial Oration

18 November 2014

Building Sustainable Organization: A Need for Modern India

Dr Achyuta Samanta
Founder and Mentor
Kalinga Institute of Industrial Technology
Kalinga Institute of Social Sciences
Bhubaneswar

Bridge between national S&T research institutions and national educational needs. Undergraduate/ school-level teaching.

December 2014 onwards

ARI scientists and staff whole heartedly participated in this programme and clocked over 100 hours of teaching in Standards V-X in schools of the Pune Municipal Corporation and also at Sortewadi Gram Vikas Mandal Madhyamik School, Taluka Baramati.

Golden Jubilee Celebrations – Geology and Palaeontology Group

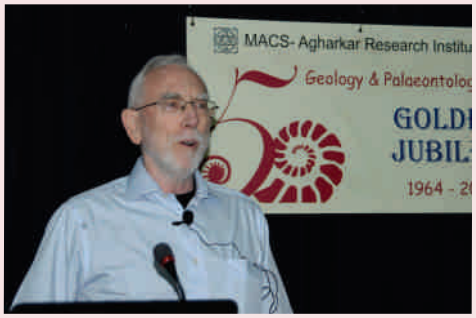
16 July 2014

Brachiopods: a view through the Jurassic window

Dr Debahuti Mukherjee, Senior Geologist, Palaeotnology Division, Gelogical Survey of India, CHQ, Kolkata.

Fossil exhibition - Stories in stone

19-20 September 2014



Fossils as palaeoenvironmental indicators - Potential and limitations

22 December 2014

Prof. Franz T Fuersich, Emeritus Professor, University of Erlangen-Nürnberg, Germany.

Farmer's Mela 18 February 2015

It was jointly organized with Department of Agriculture, Maharashtra State at the institute's Hol farm, Taluka Baramati. The theme of the mela was 'Wheat Production Technology and Water Management'. Around 100 farmers participated in the mela and had discussions on latest varieties, technology and cultivation practices for wheat, grape and soybean.

Dr DR Bapat, President, MACS addressed the gathering of farmers

Gathering of farmers

Government officials and farmers interacted with ARI scientists

Release of Workshop Manual (L-R)
Dr KM Paknikar, Director, ARI; Dr AK Sharma, Director, ICAR-NBAIM, Mau; Prof. Ajit Varma, Distinguished Scientist & Professor of Eminence, Amity Institute of Microbial Technology, Amity University, Noida

National Workshop

19-25 February 2015

Isolation, Characterization and Conservation of Endophytes and Their Potential Applications in Agriculture and Allied Disciplines

The aim was to build capacity in biology of endophytes, which have enormous potential for application in agriculture and other allied disciplines. One week intensive hands-on training was given to 20 candidates (PhD/ Post-Doctoral Researchers/ College and University Teachers/ PhD students) from various institutions. This workshop was organized jointly with ICAR-National Bureau of Agriculturally Important Microorganisms, Mau, Uttar Pradesh.

National Science Day programme

Training programme for science teachers of Pune Municipal Corporation schools
27 February 2015





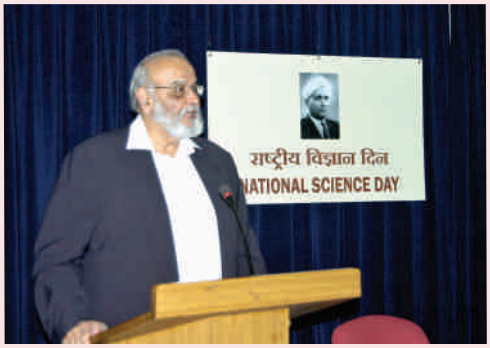

Twenty-five teachers of the Secondary and Technical Education Board, Pune Municipal Corporation participated in the training programme for teachers teaching Standards VIII-X. Dr KM Paknikar welcomed the guests. Mrs. MS Khardekar, Mrs. MB Raut of the Pune Municipal Corporation Shikshan Mandal were present on the occasion.

The day-long programme included lectures by Dr DG Naik, Dr BK Honrao, and Dr DS Bodas on topics in carbon chemistry, evolution, and light. It was followed by visits to laboratories and explanation of various laboratory equipments including confocal microscope, scanning electron microscope, SNOM.

'Science Based Innovation – Theory and Practice of Creating New Products and Processes for Societal Benefit'

28 February 2015

Dr Pradip P
Vice President, Chief Scientist and Head
TCS Innovation Labs – TRDDC (Process Engineering), Pune



'Leveraging Indian Innovativeness'

28 February 2015

Dr Abhay Firodia
Chairman, Force Motors, Pune

Exhibition at GMRT, Khodad, Narayangaon

28 February–1 March 2015

Posters, crop varieties, fossils were displayed. A large number of school students visited. Dr PG Gamre, Dr Vikram Lanjekar, Mr Mahadeo Daware, Mr Swapnil Savle, Mr Niraj Ghatpande, Mr Purushottam Borade, Mr Sudhir Phalake, Mr Junaid Bagwan, and Mr Vivek Kamat represented ARI at the exhibition.

Maharashtra Association for the Cultivation of Science

MACS innovates wine making

The project on wine making, approved by the Governing Council of MACS in January 2011, has been successful. An application for a patent (No. 2483/ MUM/ 2015) has been filed at the Mumbai Patent Office on 30 June 2015.

Mr Arvind S Kirloskar, Secretary, MACS, along with two ARI scientists Dr Sujata Tetali and Mr Pranav Kshirsagar experimented with the process to make it cost effective.

The highlights of the process are:

- It is ideal for cottage industry as the fermentation occurs at ambient temperature. Electricity is not required.
- Longer shelf life of the wine.
- The use of table grapes (cheaper) over wine grapes (costlier), sugar, and potable tap water.

Certificate course in Home Gardening

June 2014-January 2015

Institutional Research Projects

Sl no.	Project code	Project Title	Investigator(s)	Associated staff & students
1	New BIO-2	Hepcidin-a possible indicator for assessing iron status	Kulkarni PP Joshi BN	Ghatpande N Apte PP
2	New BIO-4	Functional foods for diabetes: Evaluation of oral hypoglycemic proteins from *Costus speciosus* (Koenig), insulin plant (Pushkarmula) from Western Ghats of India	Joshi BN	Hardikar M
3	BIO-24	Natural supplements for the treatment of inflammation associated anemia	Kulkarni PP Joshi BN	Ghatpande N Apte PP
4	BOT-15	Digitizing herbarium- AHMA	Datar MN	Gaikwad N Khaire R
5	BOT-17	Repository of crude drugs, authentication service and development of HPTLC profile library of PRS (Phytochemical Reference Standard)	Upadhye AS	Misar A Rajopadhye A Dias L
6	BOT 18	Plant community studies on selected grasslands of Western Maharashtra	Datar MN	Gorade P
7	BOT 21	Developing profiles for medicinally important species from genus *Solanum* L. and their application in identification of market samples	Upadhye AS Tamhankar SA Choudhary RK	Joshi R
8	BOT 22	Molecular phylogeny of Eriocaulon L. of the Northern Western Ghats, India	Choudhary RK Tamhankar SA Datar MN	Darshetkar A
9	BOT 23	Do semi-aquatic habitats act as refuge for endemic diatoms in Western Ghats?	Balasubramanian K	Kale A
10	CHM 1	Study of pheromones and semiochemicals	Naik DG	Dandge CN Puntambekar HM Deshpande PV
11	CHM 3	Chemical investigations of medicinal plants	Naik DG Upadhye AS	Waghole RJ Bharmal RB

Sl no.	Project code	Project Title	Investigator(s)	Associated staff & students
12	CHM 11	Design and synthesis of analogs of naturally occurring and pharmaceutically active molecules against Chikungunya virus	Srivastava P	Puranik NV
13	GEN 04	Tagging of some important disease resistance and quality traits in wheat	Tamhankar SA Misra SC, Oak MD	Gole C, Sneha Devi
14	GEN 14	Marker assisted selection for seedlessness in table grape breeding	Tetali S Tamhankar SA	Chintapalli N
15	GEN 15	Characterization of GA-sensitive dwarf durums at molecular level	Patil RM	Vikhe P
16	GEO 17	Role of ichnofauna in deciphering sequence of deposition of the Upper Jurassic rocks of the Marwar Basin	Kulkarni KG	Gurav S Salunkhe S
17	GEO 18	Study of biogenic sedimentary structures in the Kundalika estuary, West Coast of Maharashtra and their comparison with fossil Counterparts	Kulkarni KG Panchang R	Kamble A
18	MIC-10	Microbial diversity and conservation	Ranade DR Paknikar KM Dhakephalkar PK Rahalkar M Dagar SS	Kelkar AS Kapase N
19	MIC-26	Biological hydrogen production	Ranade DR	Lapsiya KL Kamalaskar LB
20	MIC-28	Isolation and characterization of obligate anaerobic bacteria from human gastrointestinal tract	Ranade DR	Lanjekar VB
21	MIC-30	Exploration of thermophiles for industrially important biomolecules and enzymes	Ranade DR Dhakephalkar PK	Pore S
22	MYC 02	Core Activities-National Facility - Repositories & Service (NFCCI, AMH,and Identification Service)	Singh SK, Singh PN Rajeshkumar KC Baghela A	Maurya D Maurya D Lad S Sadaf A

Sl no.	Project code	Project Title	Investigator(s)	Associated staff & students
23	MYC 07	Polyphasic taxonomy of fungal families *Nectriaceae, Mycosphaerellaceae* and *Trichocomaceae* with secondary metabolite profiling and database development for applied research	Rajeshkumar KC Singh SK Naik DG Umrani R	Marathe S
24	MYC 08	Taxonomy, multigene phylogeny and monographic documentation of Indian Fusaria	Singh SK Baghela A	Mehta N
25	MYC 09	Development of a multi-locus microsatellite typing (MLMT) method and an efficient gene targeting system for a devastating plant fungal pathogen *Colletotrichum gloeosporioides*	Baghela A Singh SK	Mehta N
26		Genome-wide transcriptional profiling of response of biofilm bacteria to antimicrobial nanoparticles and designing strategies for control of biofilms	Rajwade JM Paknikar KM	Baghel NS
27	NBS-03	RNAi for insect control	Ghormade V Paknikar KM	Kolge H
28	NBS-04	Miniature disposable PCR	Bodas D Paknikar KM	Kadlag R
29	NBS-05	Nanomaterials treatment to seeds for enhancing germination efficiency in medicinal trees	Rajwade JM Upadhye AS Paknikar KM	Kshirsagar P
30	NBS-06	Bacterial cellulose based scaffolds for osteochondral tissue engineering	Rajwade JM Paknikar KM	Kumbhar J
31	NBS-07	Studies on the biological fate of zinc oxide nanoparticles	Umrani RD Gajbhiye V Paknikar KM	Panchal S
32	NBS-08	Development of multitalented nano-platform for targeted siRNA delivery to LHRH overexpressed cancerous cells	Gajbhiye V Paknikar KM	Tambe P

Sl no.	Project code	Project Title	Investigator(s)	Associated staff & students
33	ZOO-14	*In- Vivo* binding assay as a tool to study neuronal development	Ratnaparkhi A	
34	ZOO-15	Structural and functional characterization of pattern-forming and DNA repair genes from hydra	Ghaskadbi S Patwardhan V	Kavimandan A Surekha KL
35	ZOO-16	Signaling pathways in glial cell development: the role of FGFR signaling	Ratnaparkhi A	
36	ZOO-17	Molecular investigations of autophagic process during starvation, tissue regeneration and protein aggregate clearance	Shravage B	Bali A
37	ZOO-18	Identification and functional analysis of novel regulators during heart development and regeneration	Patra C	Rayrikar A

Sponsored Projects

Sl no.	Project code	Project Title	Sponsored By	Investigator(s)
1	ARI/SP/001	All India Co-ordinated Research Project on Soybean (1.4.1968 onwards)	ICAR, New Delhi	Dr. S.P. Taware
2	ARI/SP/002	All India Co-ordinated Fruit Improvement Project (1.10.70 onwards)	ICAR, New Delhi	Dr. S.C. Misra
3	ARI/SP/003	All India Co-ordinated Wheat Improvement Project (1.4.1972 onwards)	ICAR, New Delhi	Dr. S.C. Misra
4	ARI/SP/033	Production of Soybean Breeder Seeds of Annual Oil Seed Crops (2.2.88 onwards)	ICAR, New Delhi	Dr. S.P. Taware
5	ARI/SP/034	Front-line Demonstrations of Annual Oil Seed Soybean (21.2.89 onwards)	ICAR, New Delhi	Dr. S.P. Taware
6	ARI/SP/043	Front-line Demonstrations in Wheat (1.4.1993 onwards)	ICAR, New Delhi	Dr. S.C. Misra
7	ARI/SP/096	Wheat Breeder Seed Scheme (1995 Onwards)	ICAR, New Delhi	Dr. S.C. Misra
8	ARI/SP/118	Collaborative multilocational evaluation for bread wheat germplasm, NBPGR (March-2006 onwards)	ICAR, Karnal	Dr. S.C. Misra Dr. B.K. Honrao
9	ARI/SP/166	Generating new wheat germplasm with enhanced drought/ heat tolerance using AB genomes genetic diversity (15.10.2008 onwards)	World Bank	Dr. S.C. Misra
10	ARI/SP/179	Mobilizing Qtl genes for quality traits into high yielding wheat varieties through marker-assisted selection (23.09.2009-22.09.2014) Extended upto 22.09.2016	DBT, New Delhi	Dr. S.A. Tamhankar
11	ARI/SP/180	Marker assisted selection for development of kunitz trypsin inhibitor free soybean varieties (29.9.2009 to 31.03.2015)	DBT, New Delhi	Dr. Philips Verghese & Dr. Manoj Oak
12	ARI/SP/181	Molecular marker assisted development of biotic stress resistant wheat varities (13.11.2009 to 12.11.2014) Extended w.e.f. 24.09.2014 to 23.09.2015	DBT, New Delhi	Dr. S.A. Tamhankar
13	ARI/SP/183	Network Project Physiological water use efficiency (root trains) (23.11.09-23.11.2017)	ICAR, Karnal	Dr. S.C. Misra

Sl no.	Project code	Project Title	Sponsored By	Investigator(s)
14	ARI/SP/185	Recovery of RET species of Ceropegia from Western Ghats (10.01.2010-09.01.2015)	DBT, New Delhi	Dr. A.S. Upadhye
15	ARI/SP/188	Epigenetics of regeneration in Hydra (19.03.2010 to 18.03.2015) Extended upto 30.09.2015	DBT, New Delhi	Dr. S.M. Ghaskadbi
16	ARI/SP/189	Transgenic Hydra facility for the study of molecular regulation of regeneration and pattern formation (19.03.2010 to 18.03.2015) Extended upto 30.09.2015	DBT, New Delhi	Dr. S.M. Ghaskadbi
17	ARI/SP/197	RNAI based genetic screen to identify interactors of VAPB and their VAPB mediated ALS (9.3.2011 to 8.3.2015)	DBT, New Delhi	Dr. Anuradha Ratnaparkhi
18	ARI/SP/198	Molecular breeding and selection strategies to combine and validate Qtl's for improving WVE and heat tolerance in wheat (New GCP) Ended on 31.03.2015	New GCP	Dr. S.C. Misra
19	ARI/SP/199	Development of two stage anaerobic bacterial process for butanol production from industrial wastes (2.6.2011-1.6.2014)	DBT	Dr. D.R. Ranade
20	ARI/SP/201	WOS-A - Documentation of mangrove forminifera of coastal Maharashtra with special reference to their environmental significance (21.12.2011-01.07.2015)	DST	Dr. Rajani Panchang
20	ARI/SP/203	Molecular investigation and cultivation of microbial diversity associated with methane hydrates with special emphasis on energetics of methanogenesis (12.1.2012-12.2.2015)	ONGC	Dr. P.K. Dhakephalkar
21	ARI/SP/204	Process for biomethane production from marine algae (7.3.2012-30.04.2014)	Reliance	Dr. D.R. Ranade
22	ARI/SP/205	IRS,ONGC – Water Treatment (21.3.2012-21.3.2014) Extended up to 15.07.2014	ONGC	Dr. P.K. Dhakephalkar
23	ARI/SP/206	Biofertication of wheat for micronutrients through conventional and molecular approaches-Phase II (22.03.2012-21.03.2017)	DBT	Dr. S.A. Tamhankar

Sl no.	Project code	Project Title	Sponsored By	Investigator(s)
24	ARI/SP/207	National network program on lichens: Bioprospecting its secondary compounds and establishing cultures and collections (21.03.2012-20.03.2017)	DBT	Dr. B.C. Behra
25	ARI/SP/208	Production of lichen secondary metabolities using bioreactor and study of their cytotoxic activity in vitro (01.06.2012-31.05.2015)	SERB	Dr. Niraj Verma
26	ARI/SP/210	Copper induced oxidative stress and neurotoxicity of AB peptides in cellular model of Alzheimer's Disease (09.5.2012-8.05.2015)	DBT	Dr. Prasad Kulkarni
27	ARI/SP/211	Enhancing use efficiency of micronutrients: Novel delivery systems (28.06.2012-19.06.2017)	ICAR	Dr. K.M. Paknikar
28	ARI/SP/212	Bioactive molecules for the treatment of Alzheimer's disease (03.09.2012-03.09.2015) Extended up to 28.12.2015	DBT	Dr. A.M. Bapat Dr. P.P. Kulkarni
29	ARI/SP/213	Developing rapid diagnostics for the detection of Aspergillosis (03.10.2012-2.10.2015)	DBT	Dr. K.M. Paknikar
30	ARI/SP/214	Isolation, purification and characterization of environment friendly plant and marine invertebrates based bioactive compounds for antifouling applications (28.8.2012-31.12.2014)	NMRL	Dr. D.G. Naik
31	ARI/SP/216	Survey of wild edible plants and wild relatives of edible plants found in Western Ghats of Maharashtra (28.01.2013-31.05.2015)	Forest	Dr. M.N. Datar
32	ARI/SP/218	Exploitation of inter-specific biodiversity for wheat improvement (01.03.2013-28.02.2018)	DBT	Dr. S.C. Misra
33	ARI/SP/219	Antimicrobial nanomaterials for control of bacterial blight of pomegranate (01.04.2013-31.03.2016)	Kan Biosys Pvt. Ltd.	Dr. K.M. Paknikar
34	ARI/SP/220	Ecological studies of lichens in the Deccan outcrops(14.06.2013-13.06.2016)	SERB	Dr. Gargee S. Pandit
35	ARI/SP/221	Microbial regulation of immune gene expression in Hydra (14.06.2013-13.06.2016)	SERB	Dr. S.M. Ghaskadbi

Sl no.	Project code	Project Title	Sponsored By	Investigator(s)
36	ARI/SP/222	Molecular mapping of GA-sensitive dwarfing genes and crop establishment traits in durum wheat (25.06.2013-24.06.2016)	SERB	Dr. R.M. Patil
37	ARI/SP/223	Increasing the productivity of wheat crop under conditions of rising temperatures and water scarcity in South Asia (01.07.2012-30.06.2015)	BMZ	Dr. S.C. Misra
38	ARI/SP/224	Microbial control of methane turnover in rice fields (19.07.2013-18.07.2016)	DBT	Dr. M.C. Rahalkar
39	ARI/SP/225	Biomethane of rice straw (30.12.2013-29.06.2014) up to 31.03.2015	DSM	Dr. P.K. Dhakephalkar
40	ARI/SP/226	Late Holocene vegetation, climate dynamics and human – environment iteraction along Konkan coast, India (01.05.2014-30.04.2017)	DST	Dr. R Limaye
41	ARI/SP/227	Chikungunya virus replication & ubiquity system DST-INSPIRE Faculty Award (01.01.2014-14.06.2017)	DST	Dr. Y. Karpe
42	ARI/SP/228	Cell-penetrating peptides as drug delivery agents for cancer & Alzheimer DST-INSPIRE Faculty Award (09.07.2014-08.10.2015)	DST	Dr. A. Jha
43	ARI/SP/229	Engineered nanocancer mediated targeted co-delivery of siRNA & anti-cancer drugs for effective gene silencing & tumor therapy DST-INSPIRE Faculty Award (09.07.2014-08.07.2015)	DST	Dr. V. Gajbhiye
44	ARI/SP/230	Development of microfluidics immunoassay for detection of Salmonella typhimurium (25.07.2014-24.07.2017)	DST	Dr. D. Bodas
45	ARI/SP/231	Development of crude drug repository of genuine samples from Maharashtra (16.08.14-15.08.2019)	RGSTC	Dr. A.S. Upadhye
46	ARI/SP/232	Safe healthy food - farm to table: new diagnostic tools for detection of mycotoxins and food borne microbial pathogens (10.10.2014-09.10.2017)	DBT	Dr. V. Ghormade

Sl no.	Project code	Project Title	Sponsored By	Investigator(s)
47	ARI/SP/233	Comparative evaluation of the antibacterial effect, adhesion of gingival fibroblast and epithelial attachment to titanium, zirconia and titanium with silver nano coatings (Oct 2014-Sept.2015) (Collaboration with DY Patil College, Pimpri)	ITI Switzerland	Dr. J. Rajwade
48	ARI/SP/234	Development of field level nanoparticles based immunodiagnostics for viral pathogens of shrimp and prawn (27.01.2015-26.01.2018)	DBT	Dr. K.M. Paknikar
49	ARI/SP/235	Isolation of hyperthermophiles for MEOR application for reservoirs above 90 deg C (10.02.2015-09.02.2017)	ONGC	Dr. P.K. Dhakephalkar
50	ARI/SP/236	Development of bioremediation process for petroleum hydrocarbon contaminated sites using powedered microbial formulations (10.02.2015-09.02.2017)	ONGC	Dr. P.K. Dhakephalkar
51	ARI/SP/237	Crosstalk between Wnt and BMP signalling pathways during regeneration and pattern formation in Hydra (25.03.2015-24.03.2018)	DST	Dr. K.L. Surekha
52	ARI/SP/238	Improvement of end use quality of 1BL/1RS translocation containing wheat varieties by removing of Sec-1 loci and Glu-B3 using marker assisted back cross breeding (MABB) (26.03.2015-25.03.2020)	DBT	Dr. M. Oak
53	ARI/SP/239	Identification and analysis of extracellular matrix components important for heart development using zebrafish as model organism (12.03.2015-11.03.2018)	Max Planck & DST	Dr. C. Patra
54		Late quaternary vegetation and climate changes in southwest India: Evidence from sediment archives of Kollam Alappuzha coastal plains of the south Kerala sedimentary basin	CSIR	Dr. K.P.N. Kumaran

Personnel (as of 31.03.2015)

Director (Officiating)

Dr. K.M. Paknikar, Sc. G,

Biodiversity & Paleobiology Group

Dr. S.M. Ghaskadbi, Sc. G, Coordinator
Dr. S.K. Singh, Sc. E
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Dr. Rajesh Kumar K.C., Sc. C
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Mrs. K.K. Patil, Technical Officer A
Dr. P.G. Gamre, Technical Officer A
Mr. V.N. Joshi, Technical Assistant B
Dr. (Mrs.) A.V. Misar, Technical Assistant B
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Ms. S.S. Lad, Lab Assistant C
Mrs. N.S. Gaikwad, Lab Assistant B
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Mr. S.N. Gajbhar, Attendant C
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Dr. (Mrs.) P.P. Apte, Technician B/ Lab Assistant B

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Mr. P.R. Kshirsagar, Sc. C
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Mrs. A.S. Kelkar, Technical Officer B
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Dr. B.K. Honrao, Sc. E
Dr. M.D. Oak, Sc. C
Dr. (Mrs.) S.P. Tetali, Sc. C

Dr. Philips Varghese, Sc.C
Dr. R.M. Patil, Sc.C
Mr. S.A. Jaybhay, Sc. B
Mr. A.M. Chavan, Technical Officer B
Mr. V.M. Khade, Technical Officer B
Mr. V.D. Surve, Technical Officer A
Mrs. S.P. Karkamkar, Technical Officer A
Mr. J.H. Bagwan, Technical Officer A
Mr. B.D. Idhol, Technical Assistant B
Mr. S.V. Phalake, Technical Assistant B
Shri V. D. Gite, Technical Assistant B
Mr. B.N. Pulaje, Technical Assistant B
Mr. S.S. Khairnar, Technical Assistant B
Mrs. A.A. Deshpande, Technical Assistant B
Mr. D.H. Salunkhe, Laboratory Assistant B
Mr. D.N. Bankar, Laboratory Assistant B
Mr. P.G. Lavand, Laboratory Assistant A
Mr. A.D. Sonvalkar, Driver (Special Grade)
Mr. S.S. Khamane, Attendant D
Mr. M.T. Gurav, Attendant C
Mr. T.A. Kolte, Attendant C
Mr. R.D. Shinde, Attendant C
Mr. S.L. Bhandalkar, Attendant A
Mr. S.V. Ghadge, Attendant A
Mr. S.R. Kachhi, Attendant A
Mr. D.L. Kolte, Attendant A

Centre for Nanobioscience

Dr. K.M. Paknikar, Sc. G, Coordinator
Dr. (Mrs.) J.M. Rajwade, Sc. D
Dr. D.S. Bodas, Sc. D
Dr. V. Ghormade, Sc. C
Dr. (Mrs.) R.D. Umrani, Sc. C
Dr. V. Gajbhiye, Sc. C
Dr. Y.A. Karpe, Sc. C
Mrs. R.G. Bambe, Technical Assistant B
Mr. S.S. Waghmare, Lab Assistant B

Animal House

Shri K.V. Tiwari, Attendant A
Shri V.M. Gosavi, Attendant A

Administration Unit

Mr. G. Barik, Administrative Officer
Mr. P.S. Pujari, Officer B
Mr. V.B. Bhalerao, Officer A
Mr. C.D. Nagpure, Officer A
Mrs. J.V. Deshpande, Pvt. Secretary
Mr. D.S. Zade, Assistant B
Mrs. M.B. Tiwari, Assistant B
Mrs. M.V. Patke, Assistant A
Mr. S.A. Shaikh, Assistant A
Mr. R.M. Salunke, Attendant B
Mr. A.B. Kusalkar, Driver
Mr. R.M. Dhandhore, Attendant B

Accounts Unit

(under charge of Shri G. Barik, A.O.)

Mr. H.N. Mate, Officer B
Mrs. P.P. Pathak, Officer A
Mr. A.D. Joshi, Assistant B
Mr. S.V. Kulkarni, Assistant B
Ms. T.V. Kurhade, Assistant A
Mr. A.V. Wable, Assistant A
Ms. S.R. Jagtap, Assistant A
Mr. K.R. Sathe, Attendant A

Purchase Unit

Mr. P.V. Gosavi, Officer C/ Stores & Purchase Officer
Mr. A.G. Dhongade, Sr. Pvt. Secretary
Mrs. U.S. Kulkarni, Assistant B
Mr. R. Dhobale, Assistant A
Mr. A.T. Salvi, Attendant B

Stores Unit

Mrs. S.A. Tembe, Officer B
Mrs. V.G. Tallu, Officer A
Mrs. S.S. Kalekar, Assistant A
Ms. D.V. Gavade, Assistant A
Mr. S.S. Chavan, Assistant A

Director's Officer

Mrs. R.S. Shinde, Asst. A
Shri S.P. Balsane, Attendant A

Engineering Unit

Mr. A.V. Chaudhari, Technical Officer C
Ms. Manisha Kharade, Technical Officer B
Mrs. P.D. Gagare, Assistant A
Shri R.G. Murade, Technician A
Shri D.S. Shinde, Technician A
Shri S.B. Karanjekar, Attendant D

Library

Dr. S.N. Kulkarni, Pr. Lib. & Info. Officer
Mr. R.P. Janrao, Asst. Lib. & Info. Officer
Mr. A.D. Patil, Assistant B
Mr. R.R. Kale, Attendant A

Other Technical Staff

Mr. R.K. Dongre, Technical Officer D
Dr. G.K. Wagh, Technical Officer D
Mr. B.A. Kawthekar, Technician D
Mr. A.S. Waghole, Technician D

Promotions

Scientific Staff

Dr. A. Ratnaparkhi, Sc. E
Dr. D.S. Bodas, Sc. D
Dr. K.G. Kulkarni, Sc. D
Mr. P.R. Kshirsagar, Sc. C

Technical Staff

Dr. C.N. Dandge, Technical Officer C
Dr. H.M. Puntambekar, Technical Officer C
Dr. D.C. Kshirsagar, Technical Officer C
Mr. A.M. Chavan, Technical Officer B
Mr. V.M. Khade, Technical Officer B
Mrs. A.S. Kelkar, Technical Officer B
Dr. P.G. Gamre, Technical Officer A
Mr. B.N. Pulje, Technical Assistant B
Dr. A.V. Misar, Technical Assistant B
Mrs. R.G. Bambe, Technical Assistant B
Mrs. A.A. Deshpande, Technical Assistant B
Mr. S.S. Deshmukh, Lab Assistant E
Dr. P.P. Apte, Lab Assistant B

Administrative Staff

Mrs. S.A. Tembe, Officer B
Mr. C.D. Nagpure, Officer A

Financial upgradation under MACP Scheme

Mr. R.M. Salunkhe, Attendant B

Appointments

Name & Designation	Group/ Unit	Date
Scientific		
Dr. B.V. Shravage, Sc. C	Developmental Biology	29.12.2014
Technical		
Mr. S.S. Khairnar, Technical Assistant B	Genetics & Plant Breeding	10.07.2014
Mr. R.G. Murade, Technician A	Engineering Unit	22.10.2014
Mr. D. S. Shinde, Technician A	Engineering Unit	22.10.2014
Driver		
Mr. A.V. Kusalkar, Driver Ord. Grade	Administration	18.02.2015

Superannuation

Dr. D.R. Ranade, Sc. G, 30.04.2014
Mr. R.R. Deshpande, Technician A, 31.05.2014
Mr. B.N. Shinde, Technician D, 31.05.2014
Mr. L.M. Kale, Lab. Asst. B, 31.05.2014
Mrs. S.A. Bibikar, Officer A, 31.05.2014
Mr. B.B. Gawali, Driver Spl. Grade, 30.06.2014
Mr. P.C. Bora, Officer B, 31.07.2014
Mr. K.D. Gole, Lab. Asst. B, 31.07.2014
Mr. S.K. Walambe, Officer B, 31.08.2014
Mr. V.B. Sindol, Tech. Asst. B, 31.08.2014
Mrs. V.V. Dunakhe, Officer A, 31.10.2014

Compulsory Retirement

Sqn. Ldr. S. Francis (Retd.), FAO, 28.02.2015

Resignation

Dr. Bhoopendra Tiwari, Sc. D, 24.04.2014
Ms. R.B. Bharmal, Tech. Asst. A, 30.06.2014

Completion of Contract Service

Dr. R.R. Chitte, Sc. C, 31.12.2014

Termination of Service

Shri T.N. Pardeshi, Technical Officer A, 16.11.2014

Reservations & Concessions

To provide adequate representation of SCs, STs and OBCs in direct recruitment posts instructions given by the Govt. of India, Dept. of Per. & Trg. OM NO.36012/2/96-Estt. (Res.), dated 2 July 1997 have been implemented.

Details of posts filled during 2014-2015

Group	SC	ST	OBC	General	Total
A	-	-	1	-	1
B	--	--	1	-	1
C	1	-	-	2	3
Total	1	-	2	2	5

Fellows (as of 31.03.2015)

Research Associates

ARI Projects

1 Dr. (Mrs.) Anagha Rajopadhye
2 Dr. (Mrs.) Prachi Kshirsagar
3 Ms. Sarita Gund
4 Dr. (Ms.) K.L. Surekha

Senior Research Fellows

1 Ms. Jyoti Kumbhar
2 Ms. Shruti Sawantdesai

Junior Research Fellows

1 Ms. Nimisha Singh
2 Mr. Henry Vincent Kolge
3 Mr. Shashikant Panchal
4 Ms. Gayatri Kanade
5 Mr. Parimal Vikhe
6 Ms. Suhasini Venkatesan
7 Mr. Amey Rayarikar
8 Mr. Dnyanesh Ranade
9 Ms. Anjali Bhat
10 Ms. Samiksha Khade
11 Ms. Prachi Boraste

Research Students

1 Ms. Manasi Hardikar
2 Mr. Niraj Ghatpande

3	Ms. Radhika Khaire (ad-hoc)
4	Ms. Lourelle Dias
5	Mr. Purushottam Gorade
6	Ms. Renuka Joshi
7	Ms. Ashwini Darshetkar
8	Ms. Renuka Joshi
9	Mr. Ninad Puranik
10	Mr. Rahul Kadlag
11	Ms. Prajakta V. Tambe
12	Ms. Neerjakshi Chintapalli
13	Mr. Sohan Salunkhe
14	Mr. Amar Kamble
15	Ms. Neha Saxena
16	Ms. Neelam Kapse
17	Mr. Akshay Joshi
18	Ms. Sadaf Aamir
19	Ms. Sherin Varghese
20	Ms. S.D. Marathe
21	Ms. Nikita Mehta
22	Ms. Aditi Kavimandan
23	Ms. Anagha Basargekar
24	Ms. Arundhati Bali
25	Mr. Gulshan Walke
26	Ms. Rohini Jadhav
27	Ms. Vishakha Somawanshi
28	Ms. Anagha Ghadge
29	Mr. Girish Pathak
31	Ms. Amruta Alwaris
32	Ms. Padmaja Shete
33	Ms. Chaitrali Jadhav
34	Mr. Kunal Pingale
35	Ms. Sulaxna Pandey
36	Ms. Priyanka Choudhari
37	Ms. Rekha Gophane
38	Ms. Pranitha Pandit
39	Mr. Soham Pore
40	Mr. Swapnil Savale
41	Ms. Chaitrali Pol
43	Ms. Sukhada Sangekar

Fellows with own Fellowship

1	Dr. KPN Kumaran	Emeritus Scientist
2	Dr. Neeraj Verma	PI-Young Scientist
3	Dr. (Mrs.) Gargee Pandit	PI-Young Scientist
4	Dr. (Mrs.) Ruta Limaye	CSIR-SRA
5	Ms. Leena Kamalaskar	CSIR-SRF
6	Ms. Bhagyashree Kumbhalkar	CSIR-SRF
7	Ms. Yamini Ginotra	CSIR-SRF
8	Ms. Mokshada Verma	CSIR-JRF
9	Ms. Amruta Paranjape	CSIR-SRF
10	Ms. Preeti Arora	CSIR-JRF
11	Mr. Prasad Bhagat	CSIR-SRF
12	Mr. Swati Asani	CSIR-JRF
13	Mr. Paresh Deshpande	CSIR-SRF
14	Mr. Rohan Patwardhan	CSIR-JRF
15	Ms. Shweta Gurav	CSIR-SRF
16	Ms. Shefali Ramteke	UGC-JRF
17	Ms. Sneha Maheshwari (Tapadia)	UGC-JRF
18	Ms. Aditi Kale	UGC-JRF
19	Ms. Pradnya Nagkirti	UGC-JRF
20	Ms. Alisha Galande	UGC-JRF
21	Ms. Anuprita Turwankar	UGC-JRF
22	Ms. Komal Raval	UGC-JRF
23	Mr. Ashwin Dapkekar	UGC-SRF
24	Mr. Vivek Kamat	UGC-JRF
25	Ms. Kumari Shweta	UGC-JRF
26	Ms. Rohini Chikte	UGC-JRF
27	Mr. P.K. Kulbhusan	ICMR-SRF
28	Mr. Nishikant Dixit	ICMR-JRF
29	Ms. Pankuri Kawadiwale	INSPIRE-FELLOW
30	Dr. Anjali Jha	INSPIRE-FACULTY
31	Ms. Kajal Singh	PAF-MACS
32	Ms. Mayuri Shah	DST-INSPIRE
33	Dr. Archika Bapat	DBT-PI
34	Mr. Pramod Kumar	DBT-JRF
35	Dr. Rajani Panchang	DST-WOS-A, YOUNG SCIENTIST

राजभाषा का दर्जा 2014-15

भारत सरकार के राजभाषा सम्बंधी आदेशों पर हमारे संस्थान में निम्नलिखित प्रयास जारी हैं।

- हमारे संस्थान का नाम नगर राजभाषा कार्यान्वयन समिति में शामिल हुआ है।
- हररोज आज का शब्द हिन्दी तथा अंग्रेजी में लिखा जाता है। हिन्दी शब्दोंसे परिचित करवाने हेतु एक शब्द और उसका अंग्रेजी समशब्द लिखा जाता है।
- हिन्दी और अंग्रेजी में(व्दिभाषी) वार्षिक प्रतिवेदन प्रकाशित किया जाता है।
- संस्थान की वेबसाइट में हिन्दी का प्रयोग
- सभी कम्प्यूटरों पर सारांश हिन्दी सॉफ्टवेअर का उपयोग
- राजभाषा अधिनियम 1963 की धारा 3(3) के तहत परिपत्रक, सामान्य आदेश, ज्ञापन, संकल्प, अधिसूचनाएं, नियम, करार, संविदा, टेंडर नोटिस, संसदीय प्रश्न आदि हिन्दी में भेजे जाते है। संस्थान से भेजे जानेवाले पत्रों में हिन्दी में पत्राचार बढ़ाने पर विशेष जोर दिया जाता है।
- संस्थान में भिन्न सभाओं का कार्यवृत्त हिन्दी में बनाया जाता है।
- संस्थान को प्राप्त तथा संस्थान से जानेवाले सभी पत्रों की प्रविष्ठियाँ हिन्दी में की जाती है।
- सभी वैज्ञानिक, कर्मचारी अपनी टिप्पणियाँ हिन्दी में लिखते है।
- हाजिरी रजिस्टर में किए जानेवाले हस्ताक्षर भी हिन्दी में किए जाते है।
- राष्ट्रीय विज्ञान दिवस के दौरान हुए प्रदर्शनी में ज्यादा से ज्यादा हिन्दी का उपयोग किया जाता है।
- हिन्दी समिती का गठन किया गया है।
- हिन्दी दिवस और पखवाड़े का आयोजन किया जाता है।
- सभी अधिकारियों के विजिटिंग कार्ड हिन्दी में छपवाएँ गए हैं।
- रबड़ की मोहरें, साइनबोर्ड, सीलें, पत्र शीर्ष, नाम पट्ट हिन्दी में किए गए है।
- हिन्दी पुस्तकों की खरीद में वृध्दि हुई है।
- व्दिभाषी शब्दकोष/शब्दावली तथा सहायक साहित्य खरीदे गए है।
- संस्थान में भर्ती तथा पदोन्नति आदि के लिए आयोजित साक्षात्कार हिन्दी में लिए जाते है, तथा उम्मीदवारों को हिन्दी में जबाब देने की छूट दी जाती है।
- सभी वैज्ञानिक तथा कर्मचारी, अपना अधिकांश कार्य हिन्दी में करते है।

Audit Report 2014-15

Maharashtra Association for the Cultivation of Science

Auditor's Report

We have audited the attached Balance sheet of Maharashtra Association for the Cultivation of Science, Pune as at 31st March, 2015 and the Income and Expenditure Account for the year ended on that date, annexed there to.

These financial statements are responsibility of the Institute's Management. Our responsibility is to express opinion on these financial statements based on our Audit. We conducted our Audit in accordance with Auditing Standards generally accepted in India & Provisions of Bombay Public Trust Act, 1950 (Wherever necessary). Those standards require that we plan and perform the Audit to obtain reasonable assurance about whether the financial statements are free of material misstatements. An Audit includes examining on a test basis, evidence supporting the amounts and disclosures in the financial statements. An Audit also includes assessing the accounting principles used and significant estimates made by the management, as well as evaluating the overall financial statement presentation & reporting. We believe that our Audit provides a reasonable basis for our opinion.

Subject to above, we report that:

1) We have obtained all the information and explanations, which to the best of ourknowledge and belief were necessary for the purpose of our Audit.
2) In our opinion, proper books of accounts as required by law have been kept by the institute so far as it appears from our examination of those books.
3) The Balance Sheet and Income and Expenditure Account dealt with by the report are in agreement with the books of accounts.
4) In our opinion and to the best of our information and according to the explanations given to us, subject to our comments in annexure to this report, the said accounts give a true and fair view.
    (i) In the case of the Balance Sheet, of the state of affairs of the Centre as at 31st March 2015
    (ii) In the case of the Income and Expenditure Account, of the Surplus for the year ended on the date.

For MARATHE PADHYE & ATHALYE
Chartered Accountants,

Sd/-
Milind S. Padhye
Partner

Place: Pune
Date: 04/09/2015

REPORT OF AN AUDITOR RELATING TO ACCOUNTS AUDITED UNDER SUB-SECTION (2) OF SECTION 33 & 34 AND RULE 19 OF THE BOMBAY PUBLIC TRUSTS ACT

Name of the Public Trust:- **MAHARASHTRA ASSOCIATION FOR THE CULTIVATION OF SCIENCE**

For year ending: **31st March, 2015**

Sr.No.	Particulars	Remarks
A	Whether accounts are maintained regularly and in accordance with the provisions of the Act and the rules	YES
B	Whether receipts and disbursements are properly and correctlyshown in the accounts	YES
C	Whether the cash balance and vouchers in the custody of the manageror trustee on the date of audit were in agreement with the accounts	YES
D	Whether all books, deeds, accounts, vouchers or other documents records required by the auditor were produced before him	YES
E	Whether a register of movable and immovable properties is properly maintained, the changes therein are communicated from time to time to the regional office and the defects and inaccuracies mentioned in the previous audit report have been duly complied within	YES
F	Whether the manager or trustee or any other person required by the auditor to appear before him did so and furnished the necessary information required by him	YES
G	Whether any property or funds of the Trust were applied for any object or purpose other than the object or purpose of the Trust	NO
H	Whether tenders were invited for repairs or construction involving expenditure exceeding Rs. 5000/-	YES
I	Whether any money of the public trust has been invested contrary to the provisions of Section 35	NO
J	Alienation, if any of the immovable property contrary to the provisions of Section 36 which have come to the notice of the auditor	NO
K	All cases of irregular, illegal or improper expenditure or failure or omission to recover monies or other property belonging to the public trust or of loss or waste of money or other property thereof and whether such expenditure, failure, omission loss or waste was caused in consequence of breach of trust or misapplication or any other misconduct on the part of the trustees or any other person while in the management of the trust	NO
L	Whether the minutes books of the proceedings of the meeting is maintained	YES
M	Whether any of the trustees has any interest in the investment of the trust	NO
N	Whether the irregularities pointed out by the auditors in the accounts of the previous year have been duly complied with by the trustees during the period of audit	YES
O	Any special matter which the auditor may think fit or necessary to bring to the notice of the Deputy or Assistant Charity Commissioner	NO

For MARATHE PADHYE & ATHALYE
Chartered Accountants,

Sd/-
Milind S. Padhye
Partner

Place: Pune
Date: 04/09/2015

MAHARASHTRA ASSOCIATION FOR THE CULTIVATION OF SCIENCE: PUNE-411 004.

Balance Sheet as on 31st March 2015

FUNDS AND LIABILITIES	SCH.	AMOUNT Rs.	PROPERTY AND ASSETS	SCH.	AMOUNT Rs.
CAPITAL ACCOUNTS	A	10,761,721	FIXED ASSETS	C	9,337,884
OTHER LIABILITIES	B	24,589	Investments	D	12,842,580
INCOME & EXP.A/C (Sub Schedule 4)		13,166,256	Deposits & Advances	E	1,262,602
			Cash & Bank Balances	F	509,500
TOTAL		**23,952,566**	**TOTAL**		**23,952,566**

The above Balance Sheet to the best of our knowledge and belief contains a true account of the Funds, Liabilities and of the Property and Assets of the Association.

As per our Report of even date
For MARATHE PADHYE & ATHALYE
Chartered Accountants,

Sd/-

Milind S. Padhye
Partner

Sd/-	Sd/-	Sd/-
HON.F.& A.O.	HON.TREASURER	HON.SECRETARY
M.A.C.S.	M.A.C.S.	M.A.C.S.

Date: 04/09/2015

MAHARASHTRA ASSOCIATION FOR THE CULTIVATION OF SCIENCE: PUNE-411 004.

Income and Expenditure Account For The Year Ended on 31st March 2015

EXPENDITURE	AMOUNT Rs.	INCOME	AMOUNT Rs.
Depreciation : Immovable Properties (By way of provision or adjustment)	2,965	Interest (Realised) on S.B. A/c	60,683
		On Investments	915,862
Establishment Expenses (As per Schedule H)	95,450	Donation in Cash	21,000
Audit fees	3,371	Income from other Sources (As per Schedule L)	102,590
Legal Fees	27,000		
Professional fees	12,825		
Depreciation : Furniture & Dead Stock	13,504		
Expenditure on the object of The Trust (As per Schedule I)	543,017		
Surplus carried over to Balane sheet	402,004		
TOTAL	1,100,135	TOTAL	1,100,135

We hereby certify that the above income and Expenditure Account is correct to the best of our knowledge and belief.

As per our Report of even date
For MARATHE PADHYE & ATHALYE
Chartered Accountants,

Sd/-

Milind S. Padhye
Partner

Sd/-	Sd/-	Sd/-
HON.F.& A.O.	HON.TREASURER	HON.SECRETARY
M.A.C.S.	M.A.C.S.	M.A.C.S.

Date: 04/09/2015

MAHARASHTRA ASSOCIATION FOR THE CULTIVATION OF SCIENCE: PUNE-411 004.

Statement of Receipts & Payents For The Year Ended on 31.3.2015

RECEIPTS	SCH.	AMOUNT Rs.	PAYMENTS	SCH.	AMOUNT Rs.
Opening Balances	F	480,878	Establishment Expenses	H	95,450
Interest Received On Savings Bank A/c		60,683	Expenditure on Object of Trust	K	543,017
Interest on Investments		734,110	Audit Fees		3,371
Encashment of FDR with Bank		1,202,809	Legal Fees		27,000
		-	Professional fees		12,825
Donation Recceived for Dr. R.B. Ekbote Award		21,000	Fixed Deposit with Banks		1,380,755
Income from Other Sources	G	102,590	Indirect Receipt & Payment	J	164,298,890
Indirect Receipt & Payment	J	164,268,737	Closing Balances	F	509,500
TOTAL		166,870,808	TOTAL		166,870,808

We hereby certify that the aforesaid statement to be true and correct to the best of our knowledge and belief.

As per our Report of even date
For MARATHE PADHYE & ATHALYE
Chartered Accountants,

Sd/-

Milind S. Padhye
Partner

Sd/-
HON.F.& A.O.
M.A.C.S.

Sd/-
HON.TREASURER
M.A.C.S.

Sd/-
HON.SECRETARY
M.A.C.S.

Date: 04/09/2015

MAHARASHTRA ASSOCIATION FOR THE CULTIVATION OF SCIENCE: PUNE-411 004.

Schedules to and forming part of Balance sheet as on 31.3.2015

Schedule "A" : Capital Account

PARTICULARS	SUB-SCH	AMOUNT Rs.
TRUST FUND OR CORPUS	1	10,377,874
OTHER EARMARKED FUNDS	2	383,847
TOTAL(RS.)		10,761,721

Schedule "B" : Current Liabilities

PARTICULARS	SUB-SCH	AMOUNT Rs.
OTHER LIABILITIES	3	24,589
TOTAL(RS.)		24,589

Schedule "C" : Fixed Assets

PARTICULARS	SUB-SCH	AMOUNT Rs.
IMMOVABLE PROPERTIES	5	9,144,267
FURNITURE AND DEAD STOCK	6	193,617
TOTAL(RS.)		9,337,884

MAHARASHTRA ASSOCIATION FOR THE CULTIVATION OF SCIENCE: PUNE-411 004.

Schedules to and forming part of Balance Sheet as on 31.3.2015

Schedule "D" : Investments

Sr. No.	Name of the Company	Particulars		Date of Investment	Date of maturity	Total Rs.
	SHARES					1,325
1	Central Potteries Ltd. Nagpur	Share of Rs. 25 each		Not quoted		
	Certificate No.1343 bearing Sr.No.29114 to 29126		13 ordinary	21.01.1949		
	Certificate No. 551 bearing Sr.No. 3717 to 3756		40 ordinary	10.06.1940		
2	HINDUSTAN MOTORS LTD.	Share certificate No.33932 Shares of Rs. 10/- each 4632651-4632700	50 ordinary			500
	FIXED DEPOSITS					
1	BANK OF MAHARASHTRA	6008467793		30.12.2014	30.12.2017	300,000
		60088467534		30.12.2014	30.12.2017	300,000
		60126451909		01.03.2015	01.03.2016	200,000
		60152059714		08.11.2013	08.11.2015	1,660,000
		60150708401		24.10.2013	23.10.2015	800,000
		60161620207		08.02.2014	06.02.2016	400,000
		60137302953		09.07.2013	0.5.07.2015	1,300,000
		60137302238		09.07.2013	0.5.07.2015	2,800,000
2	INDIAN BANK	741859		07.03.2015	07.03.2018	500,000
		741860		07.03.2015	07.03.2018	500,000
		9225971		09.08.2012	06.08.2015	200,000
		6201547509		24.02.2015	24.02.2016	1,000,000
		6201547485		24.02.2015	24.02.2016	500,000
		6201547532		24.02.2015	24.02.2016	1,000,000
3	BANK OF BARODA	249183		02.03.2015	02.03.2016	77,924
4	BANK OF INDIA	7246		24.11.2014	24.11.2016	1,302,831
7	**GRAND TOTAL**					**12,842,580**

MAHARASHTRA ASSOCIATION FOR THE CULTIVATION OF SCIENCE: PUNE-411 004.

Schedules to and forming part of Balance sheet as on 31.3.2015

Schedule "E" : Deposits & Advances

PARTICULARS	AMOUNT Rs.	AMOUNT Rs.
DEPOSITS : (As per last Balance Sheet)		
Telephone Deposit	15,000	
Deposit with Court	15,000	30,000
ADVANCES :		
Income Tax Deducted at Source (As per last Balance Sheet)	-	132,365
amount paid to Adv. JAYADE		40,000
Interest accrued on Investments (Subject to confirmation from bank & other agencies)		
As per last Balance Sheet	878,481	
Less Realised during the year	199,008	679,473
Accrued Interest during the year		380,764
TOTAL Rs.		**1,262,602**

Schedule "F" : Cash & Bank Balances

PARTICULARS	AMOUNT Rs.	AMOUNT Rs.
Cash in Hand	6,468	4,877
BANK :-		
With Bank of Maharashtra Erandwana Branch in Savings A/c No.9709	381,257	409,873
With State Bank of India Deccan Gymkhana Branch in S.B. A/c No. 01100005452	33,072	33,072
With Union Bank of India, F.C.Road Branch in S.B.A/c 48941261091951	60,081	61,678
TOTAL (RS.)	**480,878**	**509,500**

MAHARASHTRA ASSOCIATION FOR THE CULTIVATION OF SCIENCE: PUNE-411 004.

Schedules to and forming part of Statement of Receipts & Payments
and Income & Expenditure Account for the year ended on 31.3.2015

Schedule "G" : Income From Other Sources

PARTICULARS	INCOME & EXP. ACCOUNT AMOUNT RS.	RECEIPT & ACCOUNT AMOUNT RS.
Sale of Publication	-	590
Fee for Home Gardening Course	-	102,000
TOTAL (RS.)	-	102,590

Schedule "H" : Establishment Expenses

PARTICULARS	INCOME & EXP. ACCOUNT AMOUNT RS.	RECEIPT & ACCOUNT AMOUNT RS.
Contribution to welfare fund	-	
Honorarium to Staff	66,755	66,755
Meeting Expenses	13,040	13,040
Miscellaneous Expenses (includes Advt.Expenses)	5,250	5,250
Postage Expenses	-	-
Travelling & Conveyance	5,417	5,417
Printing & Stationery	4,988	4,988
TOTAL (RS.)	95,450	95,450

Schedule "I" : Expenditure on the Object of the Trust

PARTICULARS	AMOUNT RS.
Expenditure out of Earmerked Donations	
Prof. V.P Gokhale Award Expenses	-
Dr. R.B.Ekbote Award Expenses	6,424
Dr. P.P. Kanekar Award Expenses	-
Donation Expenses Prof. P.V.Sukhatme	750
Prof.S.P.Agharkar Chair Expenses	300,000
Home Garden Course Expenses	59,999
Prof. S.P. Agharkar Memorial Day expenses	-
Science promotion Exps.	45,600
Publice Lecture	1,500
Seminar Exps. Geology	24,074
Smt. Parvatibai Agharkar fellowship award	104,670
TOTAL (RS.)	543,017

MAHARASHTRA ASSOCIATION FOR THE CULTIVATION OF SCIENCE: PUNE-411 004.

Schedules to and forming part of Statement of Receipts & Payments
and Income & Expenditure Account for the year ended on 31.3.2015

Schedule "J" : Indirect Receipts & Payments

PARTICULARS	RECEIPTS RS.	PAYMENTS RS.
ARI Account	156,366,221	156,354,169
Schemes Account	7,804,524	7,804,524
Advance to staff	94,000	94,000
TDS Professional fees & Contractor	3,992	6,197
Advance paid to R V Jayade	40,000	
TOTAL	**164,268,737**	**164,298,890**

Schedule "K" : Expenditure on the Object of the Trust

PARTICULARS	AMOUNT RS.
Expenditure out of Earmerked Donations	
Dr. R.B.Ekbote Award Expenses	6,424
Dr. P.P. Kanekar Award Expenses	-
Donation Expenses Prof. P.V.Sukhatme	750
Prof.S.P.Agharkar Chair Expenses	300,000
Home Garden Course Expenses	59,999
Prof. S.P. Agharkar Memorial Day expenses	-
Science promotion Exps.	45,600
Public Lecture	1,500
Seminar Exps. Geology	24,074
Smt. Parvatibai Agharkar fellowship award	104,670
TOTAL (RS.)	**543,017**

Schedule"L" : Income From Other Sources

PARTICULARS	AMOUNT RS.	AMOUNT RS.
Sale of Publication	-	590
Fee for Home Gardening Course	-	102,000
TOTAL (RS.)		**102,590**

For MARATHE PADHYE & ATHALYE
Chartered Accountants,
Sd/-
Milind S. Padhye
Partner

Sd/-
HON.F.& A.O.
M.A.C.S.

Sd/-
HON.TREASURER
M.A.C.S.

Sd/-
HON.SECRETARY
M.A.C.S.

Date: 04/09/2015

MAHARASHTRA ASSOCIATION FOR THE CULTIVATION OF SCIENCE: PUNE-411 004.

Schedules to and forming part of Balance sheet as on 31.3.2015

Schedule "1" : Trust Fund or Corpus

PARTICULARS	AMOUNT RS.
As per Last Balance Sheet	10,377,874
TOTAL(RS.)	**10,377,874**

Schedule "2" : Other Earmarked Funds

PARTICULARS	AMOUNT RS.
Reserve Fund (Created vide resolution No. 16 dated 12.4.1984) (As per Last Balance Sheet)	36,926
Museum Fund (As per Last Balance Sheet)	888
Prof. S.P. Agharkar Fund (As per Last Balance Sheet)	14,000
Prof. S.P. Agharkar Birth Centenary Fund (As per last Balance Sheet)	332,033
TOTAL (RS.)	**383,847**

Schedule "3" : Other Liabilities

PARTICULARS	AMOUNT RS.
Advance payable to Mr B.K. Kale (As per Last Balance Sheet)	886
ARI Account	20,332
Audit fees payable	3,371
TOTAL (RS.)	**24,589**

Schedule "4" : Income & Expenditure Account

PARTICULARS		AMOUNT RS.
Opening Balance	12,764,252	
Surplus carried over to Balance seet	402,004	
		13,166,256
TOTAL (RS.)		**13,166,256**

MAHARASHTRA ASSOCIATION FOR THE CULTIVATION OF SCIENCE: PUNE-411 004.

Schedules to and forming part of Balance Sheet as on 31.3.2015

Sub Schedule "5" : Immovable Properties

Amount - Rs.

SR No.	Particulars	Rate of Depreciation	GROSS BLOCK			DEPRECIATION BLOCK					WDV
			Cost as on 01.04.14	Additions during the year	Total Cost as on 31.3.2015	Upto 31.3.2014	Dep. On opening Balance	Dep. On the Additions during the year	Total for the Year	Dep. as on 31.3.2015	Total as on 31.3.2015
1	Land at Pune		96,500	-	96,500	-	-	-	-	-	96,500
2	Land at Songaon		8,819,437		8,819,437		-	-	-	-	8,819,437
3	Biometry Building	2.50%	115,200	-	115,200	87,230	2,880	-	2,880	90,110	25,090
							-	-	-		
4	Microbiology Building (Refer Note A)	2.50%	3,389	-	3,389	2,647	85	-	85	2,732	657
							-	-	-		
							-	-	-		
5	Land Development Expenses at Hol		202,583	-	202,583	-	-	-	-	-	202,583
							-	-	-		
							-	-	-	-	
	TOTAL (RS.)		9,237,109	-	9,237,109	89,877	2,965	-	2,965	92,842	9,144,267

Note :

A. Only excess expenditure against grant received from DST is shown.

MAHARASHTRA ASSOCIATION FOR THE CULTIVATION OF SCIENCE: PUNE-411 004.

Schedules to and forming part of Balance Sheet as on 31.3.2015

Sub Schedule "6" Furniture and Dead Stock

Amount - Rs.

SR No.	Particulars	GROSS BLOCK				DEPRECIATION BLOCK					WDV
		Cost as on 01.04.14	Additions during the year	Total Cost as on 31.3.2015	Rate of Depreciation	Upto 31.3.2014	Dep. On opening Balance	Dep. On the Additions during the year	Total for the Year	Dep. as on 31.3.2015	Total as on 31.3.2015
A) (I) GENERAL											
1.	Office Equipments & Furniture & Sports Items	392,943	-	392,943	10%	389,096	-	-	-	389,096	3,847
2.	Apparatus & Equipments	247,036		247,036	20%	213,210	1	-	1	213,211	33,825
3.	Electric Fittings	9,870	-	9,870	10%	9,869	-	-	-	9,869	1
4.	Books	119,522	-	119,522	20%	116,438	1		1	116,439	3,083
5.	Y Type System for Grapes-Hol	110,497	-	110,497	10%	44,200	11,050	-	11,050	55,250	55,248
							-	-			
6.	Construction of Statute	98,090		98,090	3%	2,452	2,452	-	2,452	4,904	93,186
	SUB TOTAL (A)(I)	977,958	-	977,958		775,265	13,504	-	13,504	788,769	189,190
A) (II) SPECIAL PUBLICATIONS											
1.	Marathi Publication by Prof. M.N.Kamat (Cost of Rs. 1.54)	4,428		4,428	0	2,367		-		2,367	2,061
2.	Enumeration of Plants from Gomantak by Dr.V.D.Vartak (Cost of Rs. 3.60)	3,154		3,154	0	1,100		-		1,100	2,054
	SUB-TOTAL (A)(II)	7,582	0	7,582		3,467		-		3,467	4,115
	TOTAL A (I+II)	985,540	-	985,540		778,732	13,504	-	13,504	792,236	193,305
B)	UNIVERSITY OF PUNE										
1.	Office Equipment & Furniture	1,300		1,300	-	1,242		-		1,242	58
2.	Books	25,538		25,538	-	25,341		-		25,341	197
3.	Aparatus & Equipments	9,914		9,914	-	9,891		-		9,891	23
	TOTAL (B)	36,752	0	36,752		36,474		-		36,474	278
C)	GOVT.OF MAHARASHTRA										
1.	Office Equipment & Furniture	1,008		1,008	10%	993				993	15
2.	Apparatus & Equipments	21,363		21,363	20%	21,345				21,345	18
3.	Books	1,210		1,210	20%	1,209				1,209	1
	TOTAL (C)	23,581	0	23,581		23,547		-		23,547	34
	GRAND TOTAL (A+B+C)	1,045,873	-	1,045,873	-	838,753	13,504	-	13,504	852,257	193,617

Agharkar Research Institute of Maharashtra Association for the Cultivation of Science

Auditor's Report

We have audited the attached Balance Sheet of Agharkar Research Institute of Maharashtra Association for the Cultivation of Science, situated at GC Agharkar Road, Pune as at 31st March, 2015 and Income and Expenditure Account for the year ended on that date annexed there to.

These financial statements are the responsibility of the Institute's management. Our responsibility is to express an opinion on these financial statements based on our Audit. We conducted our Audit in accordance with Auditing Standards generally accepted in India & Provisions of Bombay Public Trust Act, 1950. Those standards require that we plan and perform the Audit to obtain reasonable assurance about whether the financial statements are free of material misstatements. An Audit includes examining on a test basis, evidence supporting the amounts and disclosures in the financial statements. An Audit also includes assessing the accounting principles used and significant estimates made by the management, as well as evaluating the overall financial statement presentation& reporting. We believe that our Audit provides a reasonable basis for our opinion.

Closing stock as on 31st March,2015 has been included in the financial statements as valued and certified by the management of the Institute. Valuation has not been verified by us and reliance has been placed on the value of closing stock certified by the management.

Subject to above, we report that:

1) We have obtained all the information and explanations, which to the best of our knowledge and belief were necessary for the purpose of our Audit.

2) In our opinion, proper books of accounts as required by law have been kept by the institute so far as it appears from our examination of those books.

3) The Balance Sheet, Income and Expenditure Account and the Receipts and Payments Account dealt with by the report are in agreement with the books of accounts.

4) In our opinion and to the best of our information and according to the explanations given to us, subject to our comments in annexure to this report, the said accounts give a true and fair view.

(i) In the case of the Balance Sheet, of the state of affairs of the Centre as at 31st March 2015

(ii) In the case of the Income and Expenditure Account, of the deficit for the year ended on the date.

5) In our opinion, the Balance sheet & Income & Expenditure Account dealt with by this report, are in compliance with the accounting standards prescribed by the Institute of Chartered Accountants of India except the Accounting Standards – 1 "Disclosure of Accounting Policies", Accounting Standards – 2 "Valuation of Inventories", Accounting Standards – 5 – "Net Profit or Loss for the Period, Prior Period items and changes in Accounting Policies", Accounting Standards – 11 – "The effects of changes in Foreign Exchange Rate", Accounting Standards – 12 – Accounting for Government Grants". Exceptions can be referred to Significant Accounting Policies & Notes to Account followed by the Institute and impact of the same on Financial Statement cannot be quantified.

For MARATHE PADHYE & ATHALYE
Chartered Accountants,

Sd/-
Milind S. Padhye
Partner

Place: Pune
Date: 04/09/2015

M.A.C.S'S AGHARKAR RESEARCH INSTITUTE, PUNE-411 004.

Schedules Forming Part of Balance Sheet as at 31.03.2015

Balance Sheet as on 31.03.2015

Particulars	Sch	Current Year (Rs.)	Previous Year (Rs.)
CORPUS/CAPITAL FUND AND LIABILITIES:			
CORPUS/CAPITAL FUND	1	31,787,896	26,476,774
RESERVES AND SURPLUS	2	-	-
EARMARKED/ENDOWMENT FUNDS	3	54,869,091	48,809,530
SECURED LOANS AND BORROWINGS	4	-	-
UNSECURED LOANS AND BORROWINGS	5	-	-
DEFERRED CREDIT LIABILITIES	6		-
CURRENT LIABILITIES AND PROVISIONS	7	143,594,397	122,614,139
TOTAL		**230,251,384**	**197,900,443**
ASSETS:			
FIXED ASSETS	8	127,715,679	88,403,346
INVESTMENTS-FROM EARMARKED/ ENDOWMENT FUNDS	9	69,706,291	49,635,730
INVESTMENTS-OTHERS	10	-	-
CURRENT ASSETS,LOANS,ADVANCES ETC. MISCELLANEOUS EXPENDITURES (to the extent not written off or adjusted)	11	32,829,414	59,861,367
TOTAL		**230,251,384**	**197,900,443**
SIGNIFICANT ACCOUNTING POLICIES	24		
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS	25		

The above Balance Sheet to the best of our knowledge & belief contains a True Account of the Funds and Liabilities of the Property and Assets of the Agharkar Research Institute.

Note : Previous year's figures are regrouped wherever necessary

As per our Report of even date
For MARATHE PADHYE & ATHALYE
Chartered Accountants,

Sd/-
Partner

Sd/-
FINANCE & ACCOUNTS OFFICER
A.R.I.

Sd/-
OFFICIATING DIRECTOR
A.R.I.

Date: 04/09/2015

M.A.C.S'S AGHARKAR RESEARCH INSTITUTE, PUNE-411 004.

Schedules Forming Part of Balance Sheet as at 31.03.2015

Income & Expenditure Account for the Year ended 31.03.2015

Particulars	Sch	Current Year (Rs.)	Previous Year (Rs.)
Income			
Income from Sales/Services	12	1,068,444	647,744
Grants/Subsidies	13	134,352,350	171,834,012
Fees/Subscriptions	14	133,365	191,189
Income from Investments(Income on Invest. From endowment Funds transferred to Funds)	15	-	- earmarked/
Income from Royalty, Publications etc.	16	79,272	70,170
Interest Earned	17	6,080,882	5,665,607
Other Income	18	405,978	1,037,520
Increase/(decrease) in stock of Laboratory consumables	19	(44,518)	(8,885)
Donation Received in kind (Equipment)			-
Total (A)		**142,075,773**	**179,437,357**
Expenditure			
Establishment Expenses	20	111,648,588	107,928,920
Other Administrative Expenses etc.	21	34,820,116	39,451,442
Expenditure on Grants, Subsidies etc.	22	-	-
Interest	23	-	-
Depreciation (Net Total at the year-end-corresponding to schedule 8)	8	12,801,294	52,441,189 -
Total (B)		**159,269,998**	**199,821,551**
Balance being excess of Income over Expenditure (A-B)		(17,194,225)	(20,384,194)
Extra Ordinary Items: Depreciation of earlier periods		22,505,347	
Transfer to Trust fund (for capital expenditure Schedule D)		40,820,049	64,552,030
BALANCE BEING SURPLUS/(DEFICIT)CARRIED TO		40,820,049	64,552,030
CORPUS/CAPITAL FUND		**(35,508,927)**	**(84,936,224)**
SIGNIFICANT ACCOUNTING POLICIES	24		
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS	25		

Note: We hereby certify that the above Income & Expenditure account is correct to the best of our knowledge and belief.

Note : Previous year's figures are regrouped wherever necessary

As per our Report of even date
For MARATHE PADHYE & ATHALYE
Chartered Accountants,

Sd/-
FINANCE & ACCOUNTS OFFICER
A.R.I.

Sd/-
OFFICIATING DIRECTOR
A.R.I.

Sd/-
Partner
Date: 04/09/2015

M.A.C.S'S AGHARKAR RESEARCH INSTITUTE, PUNE-411 004.

Schedules Forming Part of Balance Sheet as at 31.03.2015

Schedule 1: Corpus/Capital Fund

Particulars	Current Year (Rs.)	(Rs.)	Previous Year (Rs.)	(Rs.)
Balance as the beginning of the year	26,476,774		46,860,968	
Add : Contributions towards Corpus/ Capital Fund (Schedule D)	40,820,049		64,552,030	
Add/ (Deduct) : Balance of Net Income/(Expenditure)	(35,508,927)		(84,936,224)	
		31,787,896		26,476,774
Balance at the end of the year		**31,787,896**		**26,476,774**

Schedule 2: Reserves & Surplus

Particulars	Current Year (Rs.)	(Rs.)	Previous Year (Rs.)	(Rs.)
1. Capital Reserve :-				
As per last Account	-		-	
Addition during the year	-		-	
Less: Transfer to Establishment expenses	-	-	-	-
2. Revaluation Reserve :-				
As per last Account	-		-	
Addition during the year	-		-	
Less: Deductions during the year	-	-	-	-
3. Special Reserve : A.R.I. Reserve Fund :-				
As per last Account	-		-	
Addition during the year	-		-	
Add: Interest accrued	-		-	
Less: Deductions during the year	-	-	-	-
4. General Reserve :				
As per last Account	-		-	
Addition during the year	-		-	
Less: Deductions during the year	-	-	-	-
Total (Rs.)	**-**	**-**		**-**

M.A.C.S'S AGHARKAR RESEARCH INSTITUTE, PUNE-411 004.

Schedules Forming Part of Balance Sheet as at 31.03.2015

Schedule: 3 Earmarked/Endowment Funds

Amount - Rs.

	FUND-WISE BREAK UP				TOTALS	
	Tech.Dev. Fund	Dr. A. B. Joshi	Dr. A. D. Agate	Welfare fund	Current Year	Previous Year
a) Opening balance of the funds	48,076,603	596,675	4,210	132,042	48,809,530	39,258,104
b) Additions to the funds:					-	-
i) Donations/grants					-	
ii) Income from investments made on account of funds.	2,239,043	17,814	175	-	2,257,032	1,930,985
					-	
iii) Culture Identification Charges	1,057,883				1,057,883	3,517,534
iv) Overhead Charges from Scheme	2,697,252				2,697,252	3,047,252
v) Interest received on Funds from various projects	-				-	628,235
vi) Refund from scheme for fellowship advance made	-				-	
vii) Other Misc. Income	23,252				23,252	404,941
viii) Contribution from MACS	-				-	5,000
ix) Unspent Balance of HCJMRI Project	27,524				27,524	27,524
TOTAL (a+b)	**54,121,557**	**614,489**	**4,385**	**132,042**	**54,872,473**	**48,819,575**
c) Utilisation/Expenditure towards objectives of funds						
i) Capital Expenditure						
Fixed Assets	939,640					
Others						
Advance paid to ARI						
ii) Revenue Expenditure						
Salaries, Wages and allowances etc.						
Rent						
Other Administrative Expense (Payment to CSIR, ICMR fellows- Temp. Advance	-	-	500	2,882	3,382	10,045
TOTAL (C)	**939,640**	**-**	**500**	**2,882**	**3,382**	**10,045**
NET BALANCE AS AT THE YEAR-END (a+b-c)	**53,181,917**	**614,489**	**3,885**	**129,160**	**54,869,091**	**48,809,530**

M.A.C.S'S AGHARKAR RESEARCH INSTITUTE, PUNE-411 004.

Schedules Forming Part of Balance Sheet as at 31.03.2015

Schedule 4: Secured Loans and Borrowings

Particulars	Current Year (Rs.)	(Rs.)	Previous Year (Rs.)	(Rs.)
1. Central Government		0.00		0.00
2. State Government (Specify)		0.00		0.00
3. Financial Institutions				
a) Term Loans	0.00		0.00	
b) Interest Accrued and due	0.00	0.00	0.00	0.00
4. Banks:				
a) Term Loans	0.00		0.00	
- Interest accrued and due	0.00		0.00	
b) Other Loans (Specify)	0.00		0.00	
- Interest accrued and due	0.00	0.00	0.00	0.00
5. Other Institutions and Agencies		0.00		0.00
6. Debentures and Bonds		0.00		0.00
7. Others (Specify)		0.00		0.00
TOTAL (Rs.)		**0.00**		**0.00**

Note: Amounts due within one year Nil

Schedule 5: Unsecured Loans and Borrowings

Particulars	Current Year (Rs.)	(Rs.)	Previous Year (Rs.)	(Rs.)
1 Central Government		0.00		0.00
2 State Government (specify)		0.00		0.00
3 Financial Institutions		0.00		0.00
4 Banks	0.00	0.00	0.00	0.00
a) Term Loans	0.00	0.00	0.00	0.00
b) Other Loans (Specify)		0.00		0.00
5 Other Intitutions and Agencies		0.00		0.00
6 Debentures and Bonds		0.00		0.00
7 Fixed Deposits		0.00		0.00
8 Others (Specify)		0.00		0.00
TOTAL (Rs.)		**0.00**		**0.00**

Schedule 6: Deferred Credit Liabilities

Particulars	Current Year (Rs.)	(Rs.)	Previous Year (Rs.)	(Rs.)
a) Acceptance secured by hypothication of capital equipment and other assets	0.00	0.00	0.00	0.00
b) Others (Specify)	0.00	0.00	0.00	0.00
TOTAL (Rs.)		**0.00**		**0.00**

M.A.C.S'S AGHARKAR RESEARCH INSTITUTE, PUNE-411 004.

Schedules Forming Part of Balance Sheet as at 31.03.2015

Schedule 7: Current Liablities & Provisions

Particulars	Current Year (Rs.)	(Rs.)	Previous Year (Rs.)	(Rs.)
A. Current Liabilities :-				
1. Acceptances	-		-	
2. Sundry Creditors:				
a) For Goods		17,719		102,627
3. Advances Received				
4. Interest Accrued but not due on:				
a) Secured Loans/borrowings				
b) Unsecured Loans/borrowings				
5. Sundry Liabilities:				
a) Sales Tax				
b) Culture Identification charges	1,057,883			
c) Unpaid Salary	433,160		737,464	
d) Income Tax (Contractor)	20,890		57,838	
e) Income tax for (Hired Labour charges)	130		115	
f) Service Tax Payable				
g) Group Insurance	38,383		67,636	
h) LIC	243		71,371	
i) PF Commissioner A/c	293,659		392,469	
j) P.F.New Pension Scheme	31,587		401,737	
k) State Profession Tax	1,200		29,000	
l) Income tax (salary)	23,315	1,900,450	676,587	2,434,217
6. Other current Liabilities (Various Consultancies)	1,047,396		620,810	
Self Contribution - P.F.				
7. Unspent Balance of Grant	22,382,000		464,350	
8. Earnest Money Deposit for Construction and Equipments	2,239,395		3,074,590	
9. Security deposit	1,040,996		1,150,416	
10. Other Tution Fees	58,990		46,819	
11. Recovery of Bank Loan	1,500		20,635	
12. DST PAC Meeting	163,610		163,610	
13. FIST Programme	546,809		546,809	
14. DST Straigernt Meeting	58,406		58,406	

Particulars	Current Year (Rs.)	(Rs.)	Previous Year (Rs.)	(Rs.)
15. DST Solar Meeting	128,254		128,254	
16. HCJMRI Project (Unspent Balance)				
17. Doodhpapeshwar Ltd. Project				
18. Organizing Group Meeting & Monitoring Committee	540		540	
19. DST Good Lab Practice Seminar	51,860		51,860	
20. Scheme	4,740,939		1,912,217	
21. Retention Money	152,967		152,967	
22. Organising Meeting of Task Force				
23. Technology Transfer - Robonik India Pvt.Ltd.	1,343,250	33,956,912	1,400,000	9,792,283
Total (A)		**35,875,081**		**12,329,127**
B. PROVISIONS				
1. For Taxation				-
2. Gratuity	56,958,950		60,800,257	
3. Superannuation/Pension				-
4. Accumulated Leave Encashment	42,071,888		41,853,996	
5. Trade Warranties/Claims				-
6. Others				
- Salary payable for March	7,320,760		5,606,223	
- Audit fees	16,854		16,854	
- Electricity & Power	393,630		578,470	
- Postage & Telephone	30,472		18,905	
- Vehicle maintainance	-		11,762	
- Campus maintainance	114,174		324,893	
- Security Service Charges	154,029		123,488	
- Water Charges	206,600		121,262	
- Farm Expenses			599	
- Hired Labour Charges	174,081		332,229	
- P.F. & N.P.S.	274,058		452,021	
- P.F. & N.P.S. Adm. Charges	3,820		44,053	
- Stipend				
- Reimbursement of Telephone Expenses				
- Provision for Books				
- ARI Staff TDS Refundable				
	-			
Total (B)		**107,719,316**		**110,285,012**
Total (A+B)		**143,594,397**	-	**122,614,139**

M.A.C.S'S AGHARKAR RESEARCH INSTITUTE, PUNE-411 004.

Schedules Forming Part of Balance Sheet as at 31.03.2015

Schedule 8: Fixed Assets

Amount - Rs.

Description	Gross Block						Depreciation					Net Block		
	Cost/valuation As at beginning of the year	Rate of Dep.	Additions during the year	Deletions during the year	Net cost as on 31.3.2014	Cost valua-tion at the year-end	As at the beginning of the year	Depreciation on the open ing cost	Dep. on Add itions dur ing the year	Total dep. during the year	Excess dep charged in earlier year	Total up to the Year-end	As at the Current year-end	As at the Previous year-end
A. FIXED ASSETS:														
1. LAND														
a) Freehold	174,914	Nil			-	174,914	-	-				-	174,914	174,914
b) Leasehold	-	Nil	-		-	-	-	-				-	-	
2. BUILDINGS:					-	-	-	-						
a) On Freehold	64,351,753	2.5%	65,720		65,720	64,417,473	14,118,338	1,608,794	1,643	1,610,437		5,728,775	48,688,698	50,233,415
b) On Leasehold	-	Nil			-	-	-	-	-	-		-	-	
c) Ownership Flats/Premises	-				-	-	-	-	-	-		-	-	
d) Superstructures on Land and not beloging to the entity	-	Nil			-	-	-	-	-	-		-	-	
e) Temprory Structures	1,941,457	2.5%			-	1,941,457	578,608	48,536	-	48,536		627,144	1,314,313	1,362,849
f)Shed and glasshouse at Hol	628	2.'5%			-	628	627	-	-	-		627	1	1
3. PLANT MACHINERY & EQUIPMENT	-				-	-		-	-	-		-		
a) Equipment at Hol	175,895	10%	691,600		691,600	867,495	72,168	17,590	69,160	86,750		158,918	708,578	103,728
b) Equipments at Pune	243,195,986	20%	23,510,545	1,238,677	22,271,868	265,467,854	233,205,853	1	4,454,374	4,454,375	22,027,680	215,632,548	49,835,306	9,990,133
4. VEHICLES	1,791,407	20%	939,640	282,190	657,450	2,448,857	1	1	131,490	131,491	(1,791,405)	1,922,897	525,960	-
5.FURNITURE,FIXTURES	13,338,113	10%	160,679	36,634	124,045	13,462,158	12,763,462	1	12,405	12,406		12,775,868	686,291	574,651
MODULAR FURNITURE-NEW LAB	8,239,764	10%			-	8,239,764	1,647,953	823,976	-	823,976		2,471,929	5,767,835	6,591,811
6.COMPUTER/PERIPHERALS	11,501,443	20%	3,507,439		3,507,439	15,008,882	9,962,559	2,300,289	701,488	3,001,776	1,470,181	11,494,154	3,514,728	1,538,884
7.ELECTRIC INSTALLATIONS	2,983,737	10%			-	2,983,737	2,776,700	-	-	-		2,776,700	207,037	207,037
8.TRANSFORMER / DIESEL GENERATOR	3,758,288	15%			-	3,758,288	2,055,292	563,743	-	563,743		2,619,035	1,139,253	1,702,996
9. LIBRARY BOOKS	7,309,931	20%	498,750		498,750	7,808,681	6,146,390	1,461,986	99,750	1,561,736	798,891	6,909,235	899,446	1,163,541
10.TUBEWELLS& W.SUPPLY	112,538	2.5%			-	112,538	72,683	2,813	-	2,813		75,496	37,042	39,855
11.SOLAR SYSTEM HOSTEL	167,379	10%			-	167,379	126,713	16,738	-	16,738		143,451	23,928	40,666
12.OTHER FIXED ASSETS	6,172,170	2.5%			-	6,172,170	1,509,977	154,304	-	154,304		1,664,281	4,507,889	4,662,193
13 RE-CARPATING OF EXISTING ROADS	3,012,790	2.50%			-	3,012,790	121,888	75,320	-	75,320		197,208	2,815,582	2,890,902
14. RENOVATION CANTEEN	1,329,408	2.50%			-	1,329,408	33,235	33,235	-	33,235		66,470	1,262,938	1,296,173
15. CC TV WOKS AT ARI CAMPUS	517,114	15%			-	517,114	12,928	77,567	-	77,567		90,495	426,619	504,186
16.CONSTRUCTION OF TEMPERORY SHED AT SONGAON	515,458	2.50%		-	515,458	12,886	12,886	-	12,886		25,772	489,686	502,572	
17.CONST.OF H.T.SUBSTATION	5,328,142	2.5%			-	5,328,142	505,300	133,204	-	133,204		638,504	4,689,638	4,822,842
TOTAL OF CURRENT YEAR	**375,918,315**		**29,374,373**	**1,557,501**		**403,735,187**	**285,723,562**	**7,330,985**	**5,470,309**	**12,801,294**	**22,505,347**	**276,019,508**	**127,715,679**	**88,403,346**
PREVIOUS YEAR	**322,227,717**		**53,690,598**	**-**		**375,918,315**	**235,073,779**	**42,644,752**	**9,796,437**	**52,441,189**		**287,514,968**	**88,403,346**	**87,153,939**
TOTAL	**375,918,315**		**29,374,373**	**1,557,501**	**-**	**403,735,187**	**285,723,562**	**7,330,985**	**5,470,309**	**12,801,294**	**22,505,347**	**276,019,508**	**127,715,679**	**88,403,346**

Note : The afforsaid expenditure is incurred out of Govt. Grants, disposal of which is subject to conditions attached to these Grants

M.A.C.S'S AGHARKAR RESEARCH INSTITUTE, PUNE-411 004.

Schedules Forming Part of Balance Sheet as at 31.03.2015

Schedule 9: Investments from Earmarked/ Endowment Funds (Long Term)

Amount - Rs.

PARTICULARS	Current Year	Previous Year
1. In Government Securities	-	-
2. Other approved Securities(Templeton Mutual Fund)	-	-
3. Shares	-	-
4. F.D.R. with Indian Bank (Dr. A.B. Joshi Donation)	250,000	250,000
5. Subsidiaries and Joint Ventures		
6. Others (Fixed Deposits) (Dr. A.D.Agate Donation)	5,001	5,001
7. Others (Fixed Deposits from Technology Development Fund A/c:SBI & UBI)	69,451,290	49,380,729
8. Others(Fixed Deposit with Union Bank of India) (includes accrued interest)	-	-
TOTAL	69,706,291	49,635,730

Schedule 10: Investments - Others

Particulars		Current Year (Rs.)	(Rs.)	Previous Year (Rs.)	(Rs.)
1	In Government Securities	0.00	0.00	0.00	0.00
2	Other approved Securities	0.00	0.00	0.00	0.00
3	Shares	0.00	0.00	0.00	0.00
4	Debentures and Bonds	0.00	0.00	0.00	0.00
5	Subsidiaries and Joint Ventures	0.00	0.00	0.00	0.00
	TOTAL (Rs.)	0.00	0.00	0.00	0.00

Schedule 11: Current Assets, Loans & Advances

Particulars	Current Year (Rs.)	(Rs.)	Previous Year (Rs.)	(Rs.)
A. CURRENT ASSETS:				
1. Inventories:				
a) Stores and Spares				
b) Publications	25,120		21,527	
c) Stock-in-trade of consumables (as taken valued and certified by the Management)	96,396	121,516	144,507	166,034
2. Sundry Debtors:	1,047		2,325	
a) Debts Outstanding for a period exceeding six months				
b) DBT Monitoring Meeting	48,156		48,156	
-Receivable from staff(Animal house Tender form)	3,140		3,140	
c) Brain storming Session	166,602		166,602	
3. Cash balances in hand(including	127,114	346,059	12,365	232,588

Particulars	Current Year (Rs.)	(Rs.)	Previous Year (Rs.)	(Rs.)
cheques/drafts and imprest)				
4. Bank Balances:				
a) With scheduled Banks				
-On Current Accounts	1,617,765		4,024,615	
-On Deposit Accounts(CLTD A/c)				
-On Savings Accounts	8,705,025		11,791,990	
- On Current Accounts(TDF)	2,563,949	12,886,739	31,854	15,848,459
b) With non-Scheduled Banks:				
-On Current Accounts				
-On Deposit Accounts				
-On Savings Accounts				
5. F.D. Against L/C.	-		21,730,296	
6. Dr. Acharya	181	181	181	
7. Amount receivable from Schemes	-	-	-	21,730,477
TOTAL (A)		**13,354,495**		**37,977,558**
B. LOANS,ADVANCES AND OTHER ASSETS				
1. Loans:				
a) Staff (For HBA, Vehicle Advance and Computer)	1,154,567		1,531,968	
b) Other Entities engaged in activities/objectives similar to that of the Entity				
c) Amount receivable from Schemes - NPS				
d) Amount receivable from Schemes (Overhead Charges)	3,500,000	4,654,567	2,697,252	4,229,220
2. Advances and other amounts recoverable in cash or in kind or for value to be received:				
a) On Capital & Revenue Expenditure	11,445,676		10,861,432	
b) Prepayments(Cash Insurance)	1,265		1,092	
c) Advances to staff (For TA etc)	532,027		1,233,490	
d) Prepaid Medical Insurance Premium	145,087		145,087	
e) Festival Advance	115,500			
f) Prepaid subscriptions for journals	270,000		3,852,300	
g) Deposits kept with Govt. Agencies (MSEB, TELPHONE, GAS Cylinder etc.)	936,541	13,446,096	872,941	16,966,342
3. Income Accrued:				
a) On Investments from Earmarked/ Endowment Funds			-	
c) On Loans and Advances(HBA, Vehicle Adv. & Computer Adv.)	137,397		129,618	
d) Accured int on Technology Dev Fund Account				
e) Amount receivable from INDO-TUNISIA	56,400		56,400	
f) Interest on F.D.R. - Union Bank of India				
4. Claims Receivable (TDS)	715,037		452,668	
5. Amount Receivable -Adv.given to MEF Scheme Staff				
6. Kumar Krishi Mitra Fellowship	31,281		31,281	
7. Royalty Receivable	10,000		10,000	
8. Vigyan Prasar				
9. Amount Receivable from MACS	12,537		8,280	
10. Parlimentary Standing Committee	411,604	1,374,256		688,247
TOTAL (B)		**19,474,919**		**21,883,809**
TOTAL (A+B)		**32,829,414**		**59,861,367**

M.A.C.S'S AGHARKAR RESEARCH INSTITUTE, PUNE-411 004.

Schedules forming part of Income & Expenditure Account for the year ended 31.03.2015

Schedule 12: Income From Sales/Services

Amount - Rs.

PARTICULARS	Current Year	Previous Year
1. Income from Sales		
a) Sales of Finished Goods (Farm Produce)	920,166	645,683
b) Sale of Raw Material		-
c) Sale of Scraps	77,768	-
2. Income from Services		
a) Service Charges	390	1,059
b) SEM Charges		
c) Maintenance Services (Equipment/Property)		
d) Others	70,000	
e) Fees for Information (Right to Information Act)	120	1,002
Total (Rs.)	**1,068,444**	**647,744**

Schedule 13: Grants/Subsidies

Amount - Rs.

PARTICULARS	Current Year	Previous Year
1. Central Government	156,270,000	120,690,000
Add: Unspent balance at the beginning of the year	464,350	51,608,362
Less: Unspent balance at the year end	22,382,000	464,350
	134,352,350	171,834,012
2. State Government	-	-
3. Government Agencies	-	-
4. Institutions/Welfare Bodies	-	-
5. International Organisations	-	
6. Others (Specify)	-	-
Net Surplus of sale of Assets		
Total (Rs.)	**134,352,350**	**171,834,012**

Schedule 14: Fees/Subscriptions

Amount - Rs.

PARTICULARS	Current Year	Previous Year
1. Entrance Fees (Library Membership fees)	5,238	24,932
2. Annual Fees(Licence fees)/Subscriptions	7,613	9,975
3. Seminar/Program Fees		
4. Others (Ph.D.Tuition fee, Ph..D.Provisional Admission fee)	120,514	156,282
Total (Rs.)	**133,365**	**191,189**

M.A.C.S'S AGHARKAR RESEARCH INSTITUTE, PUNE-411 004.

Schedules forming part of Income & Expenditure Account for the year ended 31.03.2015

Schedule 15: Income From Investments

(Income on Invest. From Earmarked/Endowment Funds transferred to Funds.)

Amount - Rs.

Particulars	Investment from Earmarked Fund		Investment - Others	
	Current Year	Previous Year	Current Year	Previous Year
1. Interest				
a) On Govt. Securities	0.00	0.00	0.00	0.00
b) Other Bonds/Debentures	0.00	0.00	0.00	0.00
2. Dividends				
a) On Shares	0.00	0.00	0.00	0.00
b) On Mutual Fund Securities	0.00	0.00	0.00	0.00
3. Rents	0.00	0.00	0.00	0.00
4. Others(Interest on bank deposits)	0.00	0.00	0.00	0.00
TOTAL	**0.00**	**0.00**	**0.00**	**0.00**
TRANSFERRED TO EARMARKED/ ENDOWMENTFUND	**0.00**	**0.00**	**0.00**	**0.00**

Schedule 16: Income From Royalty, Publications, etc.

Amount - Rs.

PARTICULARS	Current Year	Previous Year
1. Income from Royalty	-	-
2. Income from Publications	1,947	8,970
3. Others (Sale of Tender Forms/I Cards)	8,800	20,000
4. Application Money	68,525	41,200
Total (Rs.)	**79,272**	**70,170**

Schedule 17: Interest Earned

Amount - Rs.

PARTICULARS	Current Year	Previous Year
1. On Term Deposits		
a) With Scheduled Banks	-	-
b) With Non-Scheduled Banks	1,809,015	4,843,232
c) With Bank (TDF Account)	3,584,439	
2. On Saving Accounts	526,410	531,456
a) With Scheduled Banks		
b) With Non-Scheduled Banks		
c) Post Office Savings Accounts		
d) Others M.S.E.B Deposit	31,400	43,672
3. On Loans		
a) Employees/Staff (On HBA, Vehicle and Computer Advance)	129,618	247,247
4. Interest on Debtors and Other Receivables	-	-
Total (Rs.)	**6,080,882**	**5,665,607**

M.A.C.S'S AGHARKAR RESEARCH INSTITUTE, PUNE-411 004.

Schedules forming part of Income & Expenditure Account for the year ended 31.03.2015

Schedule 18: Other Income

Amount - Rs.

PARTICULARS	Current Year	Previous Year
1) Profit on Sale/Disposal of Assets:		
a) Owned Assets (Sale of Mahindra Jeep)		-
b) Assets acquired out of grants, or received free of cost		
2) Export Incentives realized		
3) Fees for Miscellaneous Services (Training Charges)		
4) Miscellaneous Income	8,828	1,015
5) Lab Space Usage Charge	-	
6) Guest House Receipts	30,525	15,750
7) Hostel Fees Received	15,425	29,625
8) Medical Scheme for Retired staff	342,000	88,500
9) Late Fee for Ph.D.Tuition Fee	1,200	750
10) Laboratory Fees	8,000	42,000
11) F.D.Against L.C.	-	859,880
Total (Rs.)	**405,978**	**1,037,520**

Schedule 19: Increase/(decrease) in the Stock of Finished Goods & Work in Progress

Amount - Rs.

PARTICULARS	Current Year	Previous Year
a) Closing stock		
- Laboratory Consumables	96,396	144,507
- Finished Goods		
- Publications	25,120	21,527
	121,516	166,034
b) Less: Opening Stock		
- Laboratory Consumables	144,507	151,000
- Finished Goods		
- Publications	21,527	23,919
	166,034	174,919
Net Increase/(Decrease)	**(44,518)**	**(8,885)**

Schedule 20: Establishment Expenses

Amount - Rs.

PARTICULARS	Current Year	Previous Year
1) Salaries and Wages	85,563,359	76,185,526
2) Allowances and Bonus	189,970	657,851
3) Contribution to Provident Fund & New Pension Scheme	4,581,003	6,122,418
4) Contribution to Other Fund (D.L.I.F.)	43,444	30,993
5) Staff Welfare Expenses	2,673,179	4,121,900
6) Expenses on Employees Reitrement and Terminal Benefits	12,442,118	15,110,106
7) Stipend to Trainees	3,436,212	3,273,346
8) Encashment of Earned Leave for LTC	562,426	377,799
9) Reimbursement of Residential Telephone Expenses	201,353	208,936
10) Fellowship & Research Associateship	1,499,468	1,322,059
11) P.F. and N.P.S. Admn.Charges	456,056	517,986
	111,648,588	**107,928,920**

M.A.C.S'S AGHARKAR RESEARCH INSTITUTE, PUNE-411 004.

Schedules forming part of Income & Expenditure Account for the year ended 31.03.2015

Schedule 21: Other Administrative Expenses

Amount - Rs.

PARTICULARS	Current Year	Previous Year
ADVERTISEMENT & PUBLICITY	263,139	115,427
AUDITORS REMUNERATION	16,854	16,854
BANK CHARGES	46,597	29,697
CAMPUS MAINT. EXPS	1,208,672	1,309,720
CASH INSURANCE	3,386	3,559
DATA BASE EXPENSES	-	236,775
ELECTRICITY & POWER	6,417,710	5,628,786
FARM EXPS	840,472	943,969
FIELD TOUR	465,385	131,842
GARDEN EXPS	93,631	79,601
HIRED LABOUR CHARGES	2,430,679	4,121,035
HINDI DAY EXPENSES	-	2,160
HONORARIUM	194,500	218,000
HOSPITALITY EXPS	266,353	379,677
INFORMATION TECH & NETWORKING	489,493	638,137
LABOUR & PROCESSING EXPS	178,210	210,988
LEGAL FEES	54,700	26,500
LIB MISC EXPS	457	165,815
LIVERIES	3,000	50,232
NATIONAL TECHNOLOGY DAY EXPENSES	11,928	12,792
OFFICE EXPS MISC	111,983	94,895
PATENT RENEWAL CHARGES	259,250	8,000
PARLIMENTARY STANDING COMMITTEE EXPENSES	-	411,604
POSTAGE, TELEPHONE & COMMUNICATION CHARGES	502,997	430,823
PRINTING & STATIONERY	731,648	806,789
PROF S P AGHARKAR DAY EXPS	182,531	168,477
PROFESSIONAL FEES	41,346	58,500
PROPERTY TAX	1,445,418	1,445,418
Balance C/D	16,260,339	17,746,072
PURCHASES OF CHEMICALS & GLASSWARE	7,747,591	10,675,409
REPAIRS AND MAINTANANCE	2,358,983	3,503,351
SCIENCE DAY EXPS	16,772	12,182
SECURITY SERVICE CHARGES	1,635,166	1,319,569
SEM CHARGES	-	6,400
SEMINAR EXPS	25,164	46,504
SERVICE TAX PAYMENT (NET)	782,166	156,937
SUBSCRIPTION EXPS	4,215,566	4,095,904
TA/CONVEYANCE--INDIAN AND FOREIGN TOUR	633,187	1,006,680
VEHICLE RUNNING AND MAINT EXPS	133,983	165,050
PUBLICATIONS	187,189	-
WATER CHARGES	824,010	717,384
TOTAL (Rs.)	**34,820,116**	**39,451,442**

M.A.C.S'S AGHARKAR RESEARCH INSTITUTE, PUNE-411 004.

Schedules Forming Part of Balance Sheet as at 31.03.2015

Schedule D: Transfer to Trust Fund (Capital Account)

Particulars	Current Year (Rs.)	(Rs.)	Previous Year (Rs.)	(Rs.)
Other Fixed Assets	-		-	
Temporaty Structures	-		-	
Modular furniture for New Lab Bldg	-		-	
Books	498,750		449,176	
Construction of Buildings	65,720		212,131	
Computer / Peripherials/Softwares	3,507,439		893,780	
Office Furniture & Dead Stock	160,679		293,292	
Other Fixed Assets	-		772,318	
Vehical	939,640		-	
App. & Equipments	23,510,545		45,169,811	
Equipments at Hol	691,600		121317	
Transformer / Generator	-		2266739	
CC TV Works at ARI Campus	-		517114	
Recarpeting of Existing Roads	-		1,150,054	
Construction of Temperary shed at Songaon	-		515458	
Renovation of Canteen	-		1329408	
		29,374,373		**53,690,598**
Advance to Supplier for Equipments				
Applied Separations Inc.	2,113,139		2,113,139	
Bruker Axs Analytical Inst.Pvt.Ltd.	140,000		140,000	
C. DAC	158,673		158,673	
CPWD	5,845,000		5,845,000	
Easy Comp Solutions	11,250		11,250	
FlyJac Logistics	352,516		352,516	
Freight Express	158,349		158,349	
Heidolph Instruments GmbH & Co.	277,446		-	
Inkroma	1,809,600		1,809,600	
Mapple ESM Technologies Ltd.	121,500		121,500	
PSP Freight Lines Pvt. Ltd.	151,405		151,405	
LCICA Microsystems	1,450		-	
ESCO Micro Pte Ltd., Singapore	305,348		-	
		11,445,676		**10,861,432**
TOTAL		**40,820,049**		**64,552,030**

For MARATHE PADHYE & ATHALYE
Chartered Accountants,

Sd/-
Partner
Date: 04/09/2015

Sd/-
FINANCE & ACCOUNTS OFFICER
A.R.I.

Sd/-
OFFICIATING DIRECTOR
A.R.I.

FORM OF FINANCIAL STATEMENTS: Non –profit making organization
Name of Entity: M.A.C.S'S AGHARKAR RESEARCH INSTITUTE, PUNE-411 004.

Schedules forming part of the Accounts for the period ended 31st March 2015

Schedule: 24 Significant Accounting Policies

a. Accounting Convention :

The Financial statements are prepared under the historical cost convention and in accordance with the applicable Accounting Standards except where otherwise stated. Accrual system of accounting is generally followed to record the transaction in the financial statements.

b. Fixed Assets :

Fixed assets are stated at their original cost of acquisition, less depreciation.

c. Method of Depreciation:

Depreciation on fixed assets has been provided on straight line basis (SLM) as per the rates prescribed under the Bombay Public Trust Act, 1950.

It is not possible for us to verify the actual date of asset put to use and hence the same has been taken on the basis of information and explanation given by the management. Accordingly depreciation is calculated irrespective of put to use for the whole year.

d. Extra-ordinary Items, Prior Period Items, Changes in Accounting Policies :

On the basis of information and explanation given by the management Extra-ordinary Items, Prior Period Items, Changes in Accounting Policies are separately disclosed in the financial Statement but are integrated through various items appearing under the same.

e. Foreign Currency Transactions:

Transactions denominated in foreign currency are accounted as the exchange rate prevailing at the date of the transaction; however foreign exchange gain loss is not calculated and accounted for.

f. Investments:

1. Long term investments are valued at cost and where required, provision is made for permanent diminution in the value of such investment.
2. Investment classified as "Current" are valued at cost and market value.
3. Cost means acquisition cost which includes acquisition expenses like brokerage, transfer stamp, etc.

g. Revenue Recognition:

1. All Revenue receipts are on accrual basis.
2. All Expenses are generally accounted for on accrual basis.

h. Accounting for Government Grants:

1. Government grants of the nature of contribution towards capital cost of setting projects as capital reserve
2. Grant in respect of specific assets acquired are shown as a deduction from the cost of related assets.
3. Government grants/subsidies are generally accounted on accrual basis.
4. Government grants are taken for seminars in revenue nature but directly taken to Current asset and expenditure is booked against it so as to determine shortage or excess if any.

i. Retirement Benefits:

1. Generally, liability towards gratuity payable on death/retirement and leave encashment of the employees is provided based on Actuarial Valuation.
2. Provision for accumulated leave encashment benefit to the employees is accrued and computed on the assumption that the employees are entitled to receive the benefit as each year end which is also done on Actuarial Valuation.

j. Capitalization:

All direct expenses attributable to fixed asset acquired are capitalized.

For MARATHE PADHYE & ATHALYE
Chartered Accountants,

Sd/-
Partner
Date: 04/09/2015

Sd/-
FINANCE & ACCOUNTS OFFICER

Sd/-
K.M. Paknikar
OFFICIATING DIRECTOR

FORM OF FINANCIAL STATEMENTS: Non –profit making organization
Name of Entity: M.A.C.S'S AGHARKAR RESEARCH INSTITUTE, PUNE-411 004.

Schedules forming part of the Accounts for the period ended 31st March 2015

Schedule: 25 Contingent liabilities and Notes on Accounts (Illustrative)

1. **Contingent liability:**

   a) Claims against the entity not acknowledge as debts-Nil (Previous Year-Nil)

   b) In respect of:

   - Bank guarantee given by on behalf of the entity -N.A.(Previous Year-Nil)
   - Letters of credit opened by bank behalf of the entity -Nil(Previous Year-Rs.Nil)
   - Bill discounted with banks -Nil (Previous Year-Nil)

   c) Disputed demands in respect of:

   - Income tax -Nil (previous Year-Nil) Sales tax -Nil (Previous Year-Nil)
   - Municipal Taxes -Nil (Previous Year-Nil)

d) In respect of claims from parties for non-execution of orders, but contested by the entity Nil (Previous Year-Nil)

2. **Capital Commitments:**

   Estimated value of contracts remaining to be executed on capital account and not provided for (Net of Advances)-Nil (Previous Year)-Nil

3. **Lease obligation**

   Further obligation for rental under finance lease arrangements for plant and machinery is Nil (previous Year Nil)

4. **Current Assets, Loans and Advances:**

   In the opinion of the management, the current assets, loans and advances have a value on realization in the ordinary course of business, equal to the aggregate amount shown in the Balance Sheet. Some of balance of sundry debtors, deposits, loans and advances are subject to confirmation from the respective parties and consequential reconciliation adjustments arising there from, if any.

5. **Taxation**

   In view of there being no taxable income under Income Tax Act 1961, No provision for income tax has been considered necessary. In view of this, no disclosure is required as per accounting standards -22 issued by The Institute of Chartered Accountants of India (ICAI).

6. **Grants:**

   During the year, The Institute has received revenue as well as capital grants from government. The accounts of such grants are disclosed in financial statements as per AS-12 issued by Institute of Chartered Accountants India (ICAI) except grants which are received from DST for meetings/seminar which are of revenue nature are routed through Balance Sheet rather than Income & Expenditure.

7. **Retirement Benefit:**

   Generally, liability towards gratuity payable on death/retirement of employees is provided based on Actuarial Valuation and provision for accumulated leave encashment benefit to the employees is accrued and computed on the assumption that employees are entitled to receive the benefit at each year end which is also done on Actuarial Valuation.

The principle assumption used in determining the gratuity obligation are as below:-

Sr. No.	Particulars	For year ended 31st March, 2015
1.	Withdrawal Rate	2.00%
2.	Discounting Rate	7.92%
3.	Future Salary Rate	5.00%

The position of gratuity payable on death/retirement of employees and leave encashment as on 31st March, 2015 is as below

Particulars	Provision for Gratuity	Provision for Leave Encashment
Opening balance as on 31st March 2014	6,08,00,257	4,18,53,996
Add:- Addition during the year 2014-15.	-	2,17,892
Less:- Deduction during the year 2014-15.	38,41,307	-
Closing Balance as on 31st March 2015.	5,69,58,950	4,20,71,888

8. Impairment of Assets:

As per Accounting Standard-28 "Impairment of Assets" issued by the institute of Chartered India, comes in to effect, in respect of accounting commencing on or after 1st April, 2005. We have relied upon the management on the matters related to impairment of assets, in view of management there are no impairment losses.

9. Previous year figure are rearranged, recast or regrouped wherever necessary, to make them comparable which those of the year under audit.

10. Third party confirmation are necessary for confirming the bz. lances appearing in the books of account and also long outstanding of balances as at the Balance Sheet date, but institute was not able to provide any of such confirmation to us. Hence, we are unable to comment on the accuracy of such third party balances.

11. Provisions are recognized when the firm has present obligation as a result of past event; it is more likely that an outflow resources will be required to settle the obligation; and the amount has been reliably estimated.

12. Opening Inter balances of ARI-MACS – SCHEMES ARE NOT matching. Also during the year transactions are not matching. No reply has been received from the Institute in this regard.

13. In case of items debited to Income and Expenditure account, it was informed to us that the expenditure is not of capital nature.

14. Depreciation on fixed assets has been provided on straight line basis (SLM) as per the rates prescribed under the Bombay Public Trust Act, 1950. During the course of our Audit, we found that, in earlier years Depreciation on Equipments, Vehicles, Library Books & Computers were wrongly calculated on Total Gross Block of Asset, instead of only on Additions made during previous years. As per Instructions from Management, Depreciation for earlier years on above mentioned assets was recalculated and difference of excess charged Depreciation of Rs. 2,25,05,347/- was shown as extraordinary item in Income & Expenditure Account.

For MARATHE PADHYE & ATHALYE
Chartered Accountants,

Sd/-
FINANCE & ACCOUNTS OFFICER

Sd/-
K.M. Paknikar
OFFICIATING DIRECTOR

Sd/-
Partner
Date: 04/09/2015

स्वच्छ भारत अभियान

25 सितंबर – 2 अक्तूबर 2014

स्कूल चले हम

दिसंबर 2014

Maharashtra Association for the Cultivation of Science
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