

## JSS COLLEGE OF PHARMACY, OOTACAMUND

# TIFAC CORE in Herbal Drugs

**“India should tap Global Market for Herbal Medicine” APJ Abdul Kalam**



### **TIFAC CORE in Herbal Drugs**

**JSS College of Pharmacy, Ooty**

(An ISO 9001:2015 Certified Institution)

*Our Milestones, Strengths and Journey with Herbal Medicines.....*

Jan 2001 to July 2017  
(by Dr. Nanjan)

&

Sept 2017 to Sep 2018  
(by Dr. Sureshkumar)

## Program Progress Report

## Key Milestones & Impact of TIFAC CORE- HD

### National Recognition



**Re:Think INDIA**, a Nationalist think tank has conferred upon JSS College of Pharmacy, Ootacamund, the **Bharat Ratna Atal Bihari Vajpayee Award for Innovation 2017**, on May 11, 2017, the National Technology Day, at India International Centre, New Delhi, for the patented Herbal Drugs, namely **Hapenz & NSF-3** developed by **TIFAC Centre of Relevance and Excellence in Herbal Drugs**, JSS College of Pharmacy, Ootacamund and marketed by **M/s Tablets (India) Ltd., Chennai**.

### Product Development and Transfer

- **HAPENZ™**, a polyherbal syrup formulation (natural appetizer) for children was developed and the technology transferred to our industrial partner. The product was commercialized by M/S TABLETS INDIA Ltd., Chennai and it is well received by the market.
- **“NSF-3”**, a polyherbal tablet formulation for sleep was developed and the technology was transferred to our industrial partner, TABLETS INDIA Ltd., Chennai. It has been commercialized.



### Globalisation and Networks



- The centre has hosted and trained **ELEVEN (11) International Research Fellows** from **Ivory Coast, Uganda, Kenya, Rwanda and Potland**, supported by **CV Raman, NAM S&T and INSA JRD TATA** fellowships.
- The centre organised **SIX (6) International Conferences**, jointly with **Canada, Australia, South Africa** and others.

### Human Resource/Skill Development

- **Twenty-five (25) research scholars** have obtained their **doctoral degree in Phytopharmacy (Ph.D)** and they were well placed either in industries, academic institutions or contract research laboratories in India and abroad.
- The centre has been conducting **M.Pharm.**, programme in **Phytopharmacy & Phytomedicine**. **TWELVE (12)** batches of students (108) have successfully graduated and well employed in various industries and institutions.
- A **Diploma** programme in '**Production and Quality Control of Medicinal Plants**', conducted in collaboration with Tamil Nadu Agriculture University, Coimbatore, and **THIRDTTEEN (13)** students have graduated under this programme.

### Patents & Publications

- The centre has filed **FIVE** patents to its credit, out of which **THREE** have been awarded.
- The centre has published **~100 scientific papers** in indexed journals and presented **300 scientific abstracts** in International /International / National Seminars / Conferences.
- A book "**ENGAL KUDUMBA MARUTHUVAM**" authored by Mrs. A.P.J. Nazeema Begum was published by TIFAC CORE-HD. The book describes the herbal remedies used by the forefathers of Dr. APJ Abdul Kalam.
- TIFAC CORE in HD faculties authored a handbook that carries information on 300 medicinal plants of Nilgiris Biosphere, namely "**Medicinal Plants Information Hand Book**" published in association with Nilgiris Medicinal Plant Promoters' Society, Ooty.

### Industrial Partners/Links/Consultancies



- Apart from the above partners, the centre has been rendering project consultancies and trainings to various phytopharmaceutical industries and institutions



**TIFAC CORE in Herbal Drugs will meet the specialized demands of the human resource requirements of pharmaceutical industries and organizations engaged in the development of herbal drugs / traditional medicine. It would undertake research for industries in the area of herbal drugs / traditional medicine. The centre will also endeavour to document the herbal medicinal practices and the medicinal plants of the region to protect the heritage of our country from piracy.**

## EXECUTIVE SUMMARY

This programme completion report gives a brief account of the activities and the achievements of TIFAC CORE in Herbal Drugs, JSS College of Pharmacy, Ootacamund, for the past more than 17 years.

Technology Information Forecasting and Assessment Council (TIFAC) has been carrying out Missions and programmes under the Technology Vision 2020 projects. One of these missions, REACH (Relevance and Excellence in ACHieving new heights in educational institutions), aims at upgrading select technical institutions in the country as “Centres of Relevance and Excellence” to broaden the level of education and also to meet the scientific and technological manpower requirements of India in advanced areas promising to show up on the horizon in the years to come. Mission REACH was formally inaugurated by Dr A P J Abdul Kalam, on October 04, 2000 at New Delhi. The Apex Committee appointed by TIFAC, selected JSS College of Pharmacy, Ootacamund, to locate a Centre of Relevance and Excellence (CORE) in Herbal Drugs under the TIFAC Mission REACH projects.

The CORE started functioning from January 2001. Initially certain unique facilities were created in the CORE with the generous grant from TIFAC, New Delhi, and contributions from JSS Mahavidyapeetha, Mysuru, and our industrial partners, namely, M/s Tablets India Ltd., Chennai and M/s Apex Laboratories, Chennai. The entire recurring expenditure was met by the funds provided by JSS Mahavidyapeetha, Mysuru and the funds generated through consultancy.

The CORE has been conducting an M.Pharm., programme in Phytopharmacy & Phytomedicine. Twelve (12) batches of students (108) have successfully graduated and well employed in various industries and institutions. A Diploma programme in ‘Production and Quality Control of Medicinal Plants’, conducted in collaboration with Tamil Nadu Agriculture University, Coimbatore, and 13 students have graduated under this programme and either setup their medicinal plants cultivation units and/or analytical laboratories to cater to the needs of herbal industries. Twenty-five (25) research scholars have obtained their doctoral degree in Phytopharmacy and phytomedicine (Ph.D) and they

were well placed either in industries, academic institutions or contract research laboratories in India and abroad. The TIFAC CORE has been working on developing standardized herbal products for various therapeutic activities after carrying out pharmacological and toxicological studies to ascertain their safety and efficacy.

Recently, Re:Think INDIA, a Nationalist think tank has conferred upon JSS College of Pharmacy, Ootacamund, the Bharat Ratna Atal Bihari Vajpayee Award for Innovation 2017, on May 11, 2017, the National Technology Day, at India International Centre, New Delhi, for the patented Herbal Drugs, namely Hapenz, an Appetite stimulant for children & NSF-3, a Natural Sleep Tablet developed by TIFAC Centre of Relevance and Excellence in Herbal Drugs, JSS College of Pharmacy, Ootacamund and marketed by M/s Tablets (India) Ltd., Chennai. Other products for antidepressant, antiobesity, aphrodisiac, lactagogue are in the final stages of development and are to be commercialized soon.

The CORE has been involved in documenting the macroscopic and microscopic diagnostic features of the medicinal plants of Nilgiris biospheres including chromatographic and chemoprofiling studies, to prepare an illustrated atlas. The CORE is also engaged in the development of marker compounds for medicinal plants of importance as they are critical for standardization of herbal drugs and traditional medicine.

The CORE has been conducting consultancy for several industries and generated considerable funds to meet its recurring expenditure. It is also conducting training programmes for industries in the area of standardization techniques for herbal products using GC, HPTLC, HPLC and LCMS. The CORE has conducted several Conferences, Seminars and Workshops in medicinal plants and herbal products. For instance, a five-day Workshop on Plant Nutraceuticals and Bioactive Molecules: A growth opportunity for the Pharmaceutical Industry in Australia and India”, a collaborative activity between Sydney University and JSS College of Pharmacy, was held during June 2-6, 2009 at JSS College of Pharmacy, under Indo-Australian Strategic Research Fund.

The CORE has published more than 100 scientific papers in indexed journals and presented more than 300 scientific papers in International /

National Seminars / Conferences. It has filed five patents to its credit, out of which two have been granted. Based on his publications the Co-ordinator was invited to talk on various aspects of herbal drugs / traditional medicines in 12 International Conferences. The CORE has developed considerable expertise in different areas of herbal products. An increased interaction with the industries has led to the improvement in the quality of research being done at the CORE. Teachers with better knowledge and exposure to herbal drug research are challenging the students to reach their full potential rather than minimum competency. There is a definite improvement in the administrative skills and also in the overall handling and implementation of projects by the faculty. JSS College of Pharmacy, Ooty, is known today as a place where advanced research is being done on medicinal plants and herbal products.

On behalf of the CORE and JSS College of Pharmacy, I would like to express our sincere gratitude to the Department of Science & Technology, Mission REACH, Govt. of India and our industrial partners for their financial contributions. The CORE is indebted to the President of JSS Mahavidyapeetha, Mysuru, His Holiness Jagadguru Sri Sri Shivarathri Deshikendra Mahaswamiji, the Late Executive Secretary, Sri B N Betkerur, (IAS), Retd., the Vice-Chancellor, JSS University, Mysuru, Dr B Suresh and the Principal, JSS College of Pharmacy, Ooty, Dr S P Dhanabal for all the encouragement and support given to the Co-ordinator. In particular the CORE would like to thank the members of Reach Monitoring Committee (Dr G V Satyavati, Dr M D Nair, Dr Neeraj Saxena and Dr B Suresh) for their valuable suggestions.

The CORE, today is focussing on continued revenue generation by strengthening its R & D and consultancy activity, in addition to conducting the on-going academic programmes on a continuous basis. We seek the cooperation of all our mentors and advisers in our continued mission.

**Prof M J Nanjan**  
**Co-ordinator, TIFAC CORE-HD**  
**JSS College of Pharmacy, Ootacamund - 643 001**  
**The Nilgiris, Tamil Nadu**



# Genesis





## 1. Mission REACH, TIFAC CORE and Relevance of the area for industry – India and Globally.



Technology Information Forecasting and Assessment Council (TIFAC) has been carrying out Missions and Programmes under the Technology Vision 2020 projects. One of these missions, REACH (Relevance and Excellence in ACHieving new heights in educational institutions), aims at upgrading select technical institutions in the country as 'Centres of Relevance and Excellence' to broaden the level of education and also to meet the scientific and technological manpower requirements of India in advanced areas promising to show-up on the horizon in the years to come. Mission REACH was formally inaugurated by Dr A P J Abdul Kalam, the then The Principal Scientific Adviser to Government of India, on October 04, 2000 at New Delhi.

The methodology adopted by TIFAC is to upgrade selected departments in a few science and engineering colleges / institutions to international standards towards the creation of Centres of Relevance and Excellence (CORE) around these departments. This would in turn is expected to enable these centres to attract Indian industries to solve specific scientific / technical problems. This would also facilitate meeting the specialized demands of human resource requirements in the emerging advanced areas of technology. The Apex Committee appointed by TIFAC selected JSS College of Pharmacy, Ootacamund, to locate a Centre of Relevance

and Excellence (CORE) in Herbal Drugs under TIFAC MISSION REACH projects.

A CORE in Herbal Drugs is of relevance to Indian industries in view of requirements for the standardization of raw materials, extraction and drying techniques, toxicity studies as per the OCED guidelines, stability studies as per the ICH guidelines, development of marker compounds, screening of medicinal plants as per their ethnopharmacological claims and development of herbal pharmaceuticals, nutraceuticals and cosmeceuticals for various applications.

Further, the estimated world market today for herbal products is US \$ 80 billion and this market is growing at the rate of 15% per annum. China's share is US \$ 50 billion and India's share is only US \$ 10 billion. WHO has forecasted a global market of US \$ 5 trillion by the year 2050. There is thus an ever-increasing demand for herbal products in developed countries and the consumers are advised in these countries to look for only standardized products.

India has one of the 12 mega biodiversity's in the world. India, therefore, has a tremendous potential to become a world leader in herbal products. Unfortunately, our share is only around 15% of the global market, in spite of the hub of our traditional medicine like Ayurveda, Siddha, etc. This is because our products are not backed by rigorous scientific studies to establish their safety, efficacy and standards.

If one looks at the list of herbs that are marketed in Europe and US, one finds names like St. John Wort, Saw Palmetto, Ginkgo Biloba, Ginseng, Kava Kava, Echinacea, etc., and the sales turnover for these herbs is US \$ 500 million per annum. It is surprising that the list does not contain a single herb of Indian origin. This is because our methods of validation, quality control and manufacturing are not according to the currently understood methodologies. In this context, the CORE has an important role to play to help the Indian Herbal and Traditional Medicine industries.

## 2. Institution and TIFAC CORE



The JSS College of Pharmacy, Ooty, is a constituent college of JSS Academy of Higher Education and Research, Mysuru (Deemed to be University; Accredited A<sup>+</sup> by NAAC), is dedicated to excellence in Pharmacy Education, Research, Training and Practice. In the recent survey published by National Institutional Ranking Framework (NIRF), Ministry of Human Resource & Development, Govt. of India, New Delhi, has ranked our college as 15th among Pharmacy Colleges in India (2018). The programs offered promote intellectual growth, professional skills and lifelong learning in students. The college has been successful in maintaining a high level of research activity recognized at national and international levels. It has been conducting sponsored research projects for various national and state statutory bodies, Universities and research organizations.

The college is approved by the State Drugs Control authorities for carrying out the analysis of drugs and pharmaceuticals to cater to the needs of pharmaceutical industries. It is also recognized by the Directorate of General Health Services (Drugs Control Department, Govt. of India, New Delhi) for conducting bioavailability studies on drugs. A Centre of Advanced Drug Research And Testing (CADRAT) functioning under the aegis of JSS Consultancy Trust, Mysuru has come into being to make effective of the expertise and facilities available with the institute for the benefit of the Government, public and private bodies in the country.



TIFAC CORE in Herbal Drugs, functioning since January 2001 has been conducting a specialized

M. Pharm. in Phytopharmacy & Phytomedicine, the first of its kind in India. Twelve batches of students have already passed out with 100% results and all of them have been absorbed in various herbal industries / academic institutions. The CORE is also conducting a Postgraduate Diploma programme in 'Production and Quality Control of Medicinal Plants ' in collaboration with Tamil Nadu Agriculture University, Coimbatore. Several batches of students have already passed out and some of them have set up their own laboratories and herbal gardens. The CORE has conducted several training programmes for the benefit of teachers / scientists working at various academic institutions and industries. The CORE is presently engaged in documenting the medicinal plants of the region, development of standardized extracts, development of standardized herbal formulations, toxicity and efficacy studies on

herbal / traditional formulations, stability studies of herbal products, development of marker compounds and development of standardized herbal pharmaceutical, nutraceutical and cosmeceutical products.

### 3. Our Industrial Partners



#### **Tablets (India) Limited**

M/s Tablets (India) Ltd., Chennai, is one of the Jhaver Group of companies whose turnover today is Rs.350/- Crores. The company has tie-ups with Japan and Switzerland and it deals in prescription drugs, generic drugs and drugs for export. A quarter of its turnover comes from exports alone. It has unique formulations based on amino acid nutraceuticals end products, meant for GI related problems. Recently, the company has expanded its activity in the area of herbal drugs and is a partnering industry of TIFAC CORE in Herbal Drugs. The company looks to introducing herbal drugs for the treatment of chronic ailments such as hypertension, arthritis and metabolic disorders.



**Apex Laboratories, Chennai**, established in 1978 launched for the first time in India, a zinc-based product, 'Zincofer' and in quick succession became the pioneers in the use of Zinc in pharmaceutical formulations. At present Apex has a fully automated modern manufacturing complex, conforming to WHO-GMP standards with a turnover in Rs. 700 millions. Next in line to be launched are Ayurvedic products. Apex is also into nutraceuticals aimed

at providing relief to patients from osteoarthritis with products such as Caravit and Sulfovit.

Several herbal products launched by the company have been already subjected to efficacy and toxicity studies at TIFAC CORE HD. Techniques have been evolved for the standardization of the individual ingredients of the herbal extracts used in the polyherbal formulations to conform the authenticity, purity and quality of the products. The company has also under its control about 1600 acres of Private Reserve Forest in Agastia Hills in Tirunelveli District of Tamil Nadu in South India, which is being surveyed for identifying the plants of medicinal value.

#### **4. Faculty**

The CORE is adapting a multidisciplinary approach to achieve its objectives. In addition to the following core faculty appointed exclusively for the centre, participating faculty come from other departments.

- i) Prof. M.J. Nanjan, Ph.D., Director / Co-ordinator
- ii) Dr. S. P Dhanabal
- iii) Mr. S. Manimaran
- iv) Mr. T.K. Praveen
- v) Dr. D. Anil Kumar
- vi) Mr.K. Krishnaraj
- vii) Mr. N. Muruganathan
- viii) Mr. P. Gopal
- ix) Mr. P. Subramaniam&
- x) Mr. Madappa

## 5. REACH Monitoring Committee

A REACH Monitoring Committee (RMC) was appointed by TIFAC, New Delhi, for reviewing and monitoring the progress of the CORE. The RMC has been monitoring the programmes of the CORE every six months with free access to the premises and records of the programme. The baseline document given by the coordinator to TIFAC, New Delhi, at the time of signing the agreement is the basis for assessing the progress made by the CORE. Several RMC meetings have been held to monitor and review the progress made by the CORE. The following is the RMC Committee;

### **Dr. G.V. Satyavati (Chairperson)**

Ex-Director General, ICMR,  
'Prasada Nilayam',  
D55/82, East End 'B' Main Road,  
9<sup>th</sup> Block, Jaya Nagar, Bangalore-560 069.



### **Dr. M.D. Nair, (Member)**

Consultant to Pharmaceutical Industry,  
A-11, 'Sagarika', 15-3<sup>rd</sup> Seaward Road  
Valmiki Nagar, Chennai - 600 041.



### **Dr. B. Suresh, (Member)**

Principal  
JSS College of Pharmacy  
Ootacamund-643 001.



### **Dr. Neeraj Saxena, (Member Secretary)**

Coordinator, Mission REACH, TIFAC  
Department of Science & Technology,  
E-4, qutab Hotel, New Mehrauli Roadk,  
New Delhi - 110 016.



**Dr. M.J. Nanjan, (Member-Convenor)**  
Coordinator, TIFAC CORE HD  
JSS College of Pharmacy  
Ootacamund-643 001.



The Executive Secretary of J.S.S. Mahavidyapeetha, Mysuru, is regularly invited to the RMC meeting as a permanent invitee. It should be mentioned here that TIFAC CORE HD has always enjoyed the full support of J.S.S. Mahavidyapeetha including the full patronage and the blessings of **His Holiness Jagadguru Sri Shivarathri Deshikendra Mahaswamigalavaru, the President of J.S.S. Mahavidyapetha, Mysuru.** The Administrative Officers of the College have always been very helpful and cooperative in running the CORE.



# **Sixteen years of TIFAC CORE in HD**

**(January 2001 to July 2017)**



**By**

**Prof. Nanjan**

## 1. Infrastructure Developed



a. A well-equipped new laboratory for conducting M. Pharm. (Phytopharmacy & Phytomedicine) and research leading to Ph.D., degree, has been developed at a cost of Rs. 10 lakhs.

b. A building for Extraction and Spray Drying of Medicinal Plants has been created at a cost of Rs. 9 lakhs.



c. An Animal House facility has been developed at a cost of Rs. 5 lakhs for conducting toxicological and pharmacological studies.

## 2. Infrastructure created/ equipment utilization



Several equipments were purchased with the funds provided by TIFAC, New Delhi, Industries and the Management of J.S.S. Mahavidyapeetha, Mysuru (Annexure-II). The equipment purchased are being well utilized for academic and industrial activities.



### **3. Academic programmes introduced/offered**

#### **(a). M. Pharm. Degree (Phytopharmacy & Phytomedicine)**

It is the first of its kind in India and was introduced in September 2001 with a syllabus specially developed in consultation with industries. Several batches of students have passed out so far and are well placed in industries and academic institutions (Annexure-III).

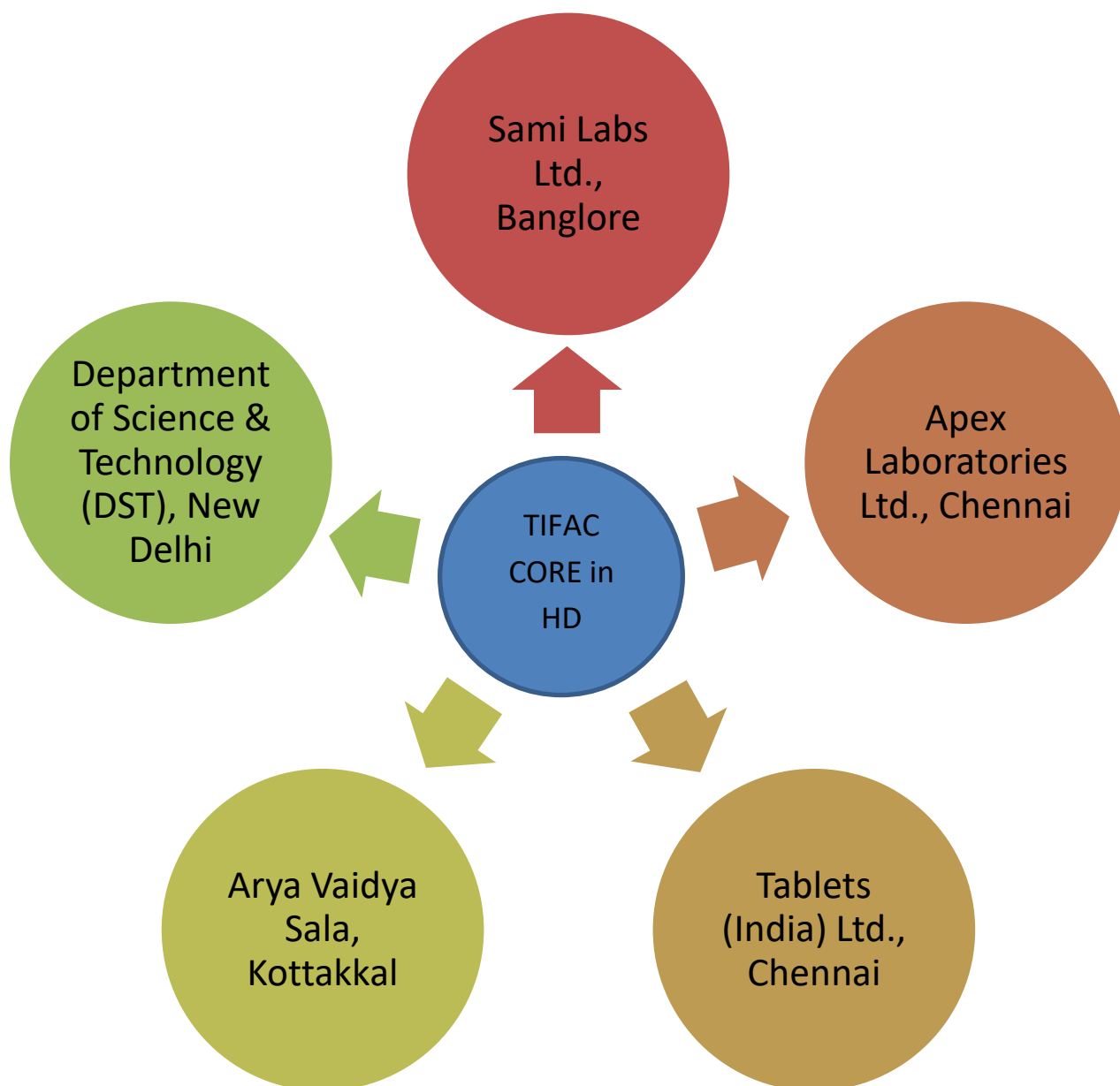
**(b). PG Diploma course in Production and Quality Control of Medicinal Plants**, in collaboration with Tamil Nadu Agriculture University, Coimbatore, was introduced from September 2005 with syllabi drafted in consultation with The Tamil Nadu Agriculture University, Coimbatore. Totally nine students have passed out. These students are either doing consultancy or have set up their own laboratory for conducting sponsored research.

**(c). Ph.D., Programme:** Several candidates received their Ph.D., degree and are well placed in industries and academic institutions (Annexure-IV).

#### 4. Research & Development Projects Executed

##### 5 Research and Development projects executed

The following are some of the R & D projects executed:



<b>Name of the Project</b>	<b>In-house or Sponsored</b>	<b>Name of sponsoring/funding agency</b>	<b>Principal Investigator &amp; Team members</b>	<b>Papers published, Name of the Journal</b>
Anti Diabetic studies of Memordica charantia	Sponsored	Sami Labs Ltd., Bangalore	Dr. M.J. Nanjan(PI), Dr. D. Anil Kumar	Report given to the Sponsorer
Dsign & Develop-ment of controlled release formulations for certain Herbal Drugs	Sponsored	Sami Labs Ltd., Bangalore	Dr. M.J. Nanjan (PI), Dr. S. Mahesh Kumar Mr. K. Krishnaraj.	Report given to Sponsorer
Toxicological and Pharmacological studies on Immunit TM, LiveraITM and CardilonTM, Herbex kidTM	Sponsored	Apex Laboratories Ltd., Chennai.	Dr. M.J. Nanjan (PI), Dr. D. Anil Kumar, Mr. DB Srinivasarav	Report given to the Sponsorer
Developing NSF-3, Sleeping formulation	Sponsored	Tablets (India)Ltd., Chennai.	Dr. M.J. Nanjan(PI), Dr. S. Manimaran	Report given to the Sponsorer
Toxicological and Pharmacological studies on AF-1-04, AF-2-04, AF-3-04, AF-4-04	Sponsored	Arya Vaidya Sala, Kottakkal	Dr. M.J. Nanjan(PI), Dr. D. Anil Kumar, Mr. T.K. Praveen	Report given to the Sponsorer
Design and Development of Controlled Release Formulations for certain drugs	Sponsored	Department of Science & Technology (DST), New Delhi.	Dr. M.J. Nanjan(PI), Mr. Praveen Bommu Mr. R. Srinivasan, Dr.S. Mahesh Kumar	A Paper, <i>In vitro</i> and <i>In vivo</i> studies on HPMC-K-100 M Matrics containing Naproxen Sodium in Drug Delivery, 14(3), 2007, has been published

## 5. Products/Technology developed

Product/Prototype/ Technology	Agency / Industry	Revenue Generated
“HAPENZ”, a polyherbal syrup formulation (natural appetizer) for children was developed and the technology transferred to our industrial partner. The product was commercialized by the company and it is well received by the market.	TABLETS INDIA Ltd., Chennai	10.00 lakhs
“NSF-3”, Polyherbal tablet formulation for sleep was developed and the technology was transferred to our industrial partner. It has been commercialized.	TABLETS INDIA Ltd., Chennai	3.5 lakhs.



## 6. Patents (India)

**Awarded: 03 (Filed: 6)**

1. “Novel Glitazones incorporated with tyrosine: synthesis and antidiabetic activity” Patent No. 284768 Granted on 29.06.2017
2. “Process for isolation of bergenin from Caesalpinia digyna rottler” Patent No. 286441, Granted on 18.08.2017.
3. “Thiazolidine-2,4 Diones and Process thereof” Patent No 245830 (TIFAC CORE in HD)

APPLICATION NUMBER	2550/che/2011
APPLICANT NAME	TIFAC CORE IN HERBAL DRUGS
DATE OF FILING	26/07/2011
PRIORITY DATE	NA
TITLE OF INVENTION	NOVEL GLITAZONES HAVING TYROSINE GROUP: SYNTHESIS AND ANTIDIABETIC ACTIVITY
PUBLICATION DATE (U/S 11A)	30/09/2011
POST GRANT JOURNAL DATE (U/S 43(2))	07/07/2017
<b>Application Status</b>	
Date Of Certificate Issue	29/06/2017
Status	Granted Application, Patent Number : 284768

APPLICATION NUMBER	631/che/2006
APPLICANT NAME	TIFAC CORE IN HERBAL DRUGS
DATE OF FILING	06/04/2006
PRIORITY DATE	NA
TITLE OF INVENTION	PROCESS FOR ISOLATION OF BERGENIN FROM CAESALPINIA DIGYNA ROTTLER
PUBLICATION DATE (U/S 11A)	07/12/2007
POST GRANT JOURNAL DATE (U/S 43(2))	25/08/2017
<b>Application Status</b>	
Date Of Certificate Issue	18/08/2017
Status	Granted Application, Patent Number : 286441



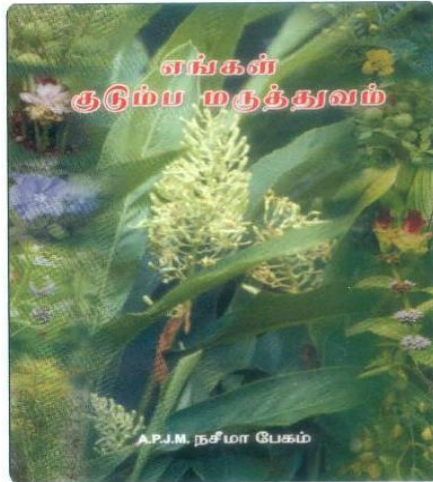
## 7. Publications (Annexure VII)

TIFAC CORE in HD has published more than 100 scientific papers in indexed journals (Annexure

**H-index: ~14**

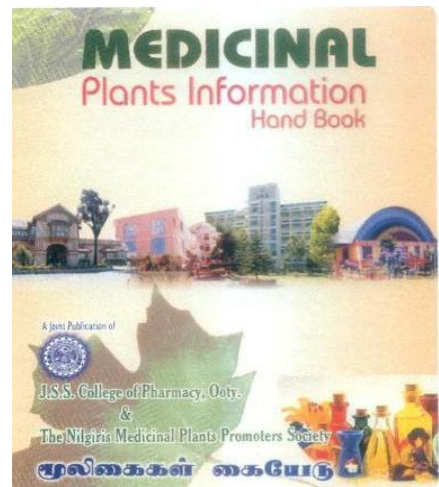
**Citations: >1000**

## 8. Text Books/Monographs



A book “ENGAL KUDUMBA MARUTHUVAM” authored by Mrs. A.P.J. Nazeema Begum was published by TIFAC CORE-HD. The book describes the herbal remedies used by the forefathers of Dr. APJ Abdul Kalam.

TIFAC CORE in HD faculties authored a handbook that carries information on 300 medicinal plants of Nilgiris Biosphere, namely “Medicinal Plants Information Hand Book” published in association with Nilgiris Medicinal Plant Promoters’ Society, Ooty.



## 9. Training Programmes organized for Industry

Name of the Training Programme	Name of the Industry Participants	Number of Participants
A 3 day short term training programme on "Standardization techniques for Herbal Formulations" during April 30, 2003.	<ol style="list-style-type: none"> <li>1. Jagdale Scientific Research Foundation, Bangalore.</li> <li>2. Ayurchem Products, Dombivli (E), Maharashtra</li> <li>3. Rathna Krishna Pharmaceuticals, Pondicherry.</li> <li>4. Arya Vaidya Pharmacy, Coimbatore.</li> <li>5. J &amp; J Dechane Labs. Pvt. Ltd., Hyderabad.</li> <li>6. Amruthanjan Ltd., Chennai.</li> <li>7. S.G. Phyto-Pharma Pvt. Ltd., Kolhapur.</li> </ol>	9
A 3 day Short Term training programme on "GC, HPLC & HPTLC Analytical techniques for Herbal products" during August 23-25, 2004	<ol style="list-style-type: none"> <li>1. Apex Laboratories, Chennai</li> <li>2. Arya Vaidya Nilayam, Madurai.</li> <li>3. Arvind Remedies, Chennai.</li> <li>4. Ayush Herb &amp; Pharmaceutical, Nagrota, (HP).</li> <li>5. Cholayil Pharmaceuticals Pvt.Ltd., Chennai.</li> <li>6. Sandu Bros Pvt.Ltd., Mumbai.</li> <li>7. Universal Pharmaceuticals, Chennai.</li> </ol>	8
3 days short term training programme on "Formulation of Herbal Products" during October 27-29, 2005.	Small Industries Service Institute, Coimbatore, Govt. of India.	25

## **10. Industrial Visits / Training for M. Pharm., Students**

M. Pharm., Students visited industries and other laboratories for practical training:

- M. Pharm., Students visits to several industries like Sami Labs., Natural Remedies, Remidex Pharma, Johnson & Smith Co. and Bayir Extracts & Chemicals, Bangalore.
- Practical training on Plant Tissue Culture was organized for M. Pharm., Students during November 29 - December 06, 2006, February 6 and 7, 2007 and September 6 - 7, 2007 at the laboratories of the Department of Horticulture, Government Botanical Garden, Ooty.

## **11. Scientific Paper Presentations - International/National Conference/ Seminars.**

Several scientific papers were presented by the staff and students of the CORE in International/National Conferences/Seminars (Annexure V).

## 12.Consultancy Rendered

The CORE has rendered consultancy for several industries and generated more than 200 lakhs (Annexure V). Our clients are;

- M/s. Apex Laboratories, Chennai
- M/s. Tablets India Ltd., Chennai
- M/s. Sami Laboratories, Bangalore.
- M/s. Natural Remedies, Bangalore
- M/s. FRLHT, Bangalore
- M/s. Cavinkare, Chennai
- M/s. Hindustan Lever Ltd., Mumbai
- M/s. Arya Vaidya Sala, Kottakkal
- M/s. Arya Vaidya Pharmacy, Coimbatore
- M/s. Arya Vaidya Nilayam, Madurai
- M/s. Vedic Life Sciences, Mumbai
- M/s. Centaur Pharmaceuticals, Mumbai
- M/s. Biorigin, Bangalore.

The CORE has interacted with Ayurvedic medicine companies, M/s. Arya Vaidya Sala, (Kottakkal), M/s. Arya Vaidya Nilayam (Madurai), and M/s. Arya Vaidya Pharmacy (Coimbatore) and carried out toxicological and pharmacological studies on several of their products so as to validate them. The reports given to these companies have been helpful to them to market their products, especially in developed countries.

### 13. International Collaborations/Fellowships

Sl. No	Name of collaborating agency with contact details	Name of the participant	Source of financial support	Year of collaboration	Duration	Nature of activity	Title of collaborative activity
1.	Ms C J Henely Smith Research scholar c/o Dr Namrita Lal Plant Sciences Complex, Office 3-39 Medicinal Plant Science (Department of Plant Science) University of Pretoria Pretoria 0002, South Africa	Ms C J Henely Smith (2015)	DST-Indo south Africa	2013- 2017	4 years	Genotoxicity and antioxidant activity of traditional herbs of south africa	Pharmacological evaluation of medicinal plants from India and South Africa based on Indigenous Knowledge for anticancer and antitubercular potential.
2.	Ms D K C/o Dr. Namrita Lal Plant Sciences Complex, Office 3-39 Medicinal Plant Science (Department of Plant Science) University of Pretoria Pretoria 0002, South Africa	Ms D K (2015)	DST-Indo south Africa	2013- 2017	4 years	Antioxidant screening of traditional herbs of south africa	Pharmacological evaluation of medicinal plants from India and South Africa based on Indigenous Knowledge for anticancer and antitubercular potential.

3.	Traditional healer University of Pretoria EMAIL: <a href="mailto:namrita.lall@up.ac.za">namrita.lall@up.ac.za</a>	Dr. Lulama (2016)	DST- Indo south Africa	2013- 2017	4 years	To interact tribal people of Nilgiris and to know about tribal healing systems	Pharmacological evaluation of medicinal plants from India and South Africa based on Indigenous Knowledge for anticancer and antitubercular potential.
4.	c/ o Dr . Namrita Lal Department of Plant Science) University of Pretoria Pretoria 0002, South Africa EMAIL: <a href="mailto:kaykays@gmail.com">kaykays@gmail.com</a>	Ms Karina	DST- Indo south Africa	2013- 2017	4 years	Interaction with traditional healers / tribal people and to carry out genotoxicity of 5 plant extracts	Pharmacological evaluation of medicinal plants from India and South Africa based on Indigenous Knowledge for anticancer and antitubercular potential.
5.	c/ o Dr . Namrita Lal Department of Plant Science) University of Pretoria Pretoria 0002, South Africa EMAIL: <a href="mailto:murunwa.madzinga@gmail.com">murunwa.madzinga@gmail.com</a>	Ms Murnawa	DST- Indo south Africa	2013- 2017	4 years	Heavy metal analysis of plant extracts Hplc/ lcms finger print	Pharmacological evaluation of medicinal plants from India and South Africa based on

						of anticancer plant extracts	Indigenous Knowledge for anticancer and antitubercular potentia
6.	National Industrial development agency (Nirda), Ruwanda Email : andrewnirda@gmail.com	Mr. Andre Ndagijimana	NAM S&T fellowship	January 2016 to July 2016	6 months	Formulation development and standardisation of cough syrup	Development and standardisation of an antitussive formulation
7.	Nutritional and Industrial Biochemistry , University of Ibadan , Nigeria	Mr. Adewale Michael ESAN	INSA JRD TATA	February 2016 to May 2016	3 months	Antihyperlipidemic screening	Antihyperlipidemic and glucose lowering effect of hydroalcoholic extract of bioregulator treated okra ( <i>Abelmoschus esculentus</i> )
8.	Oregon Health and Science university, Portland	Ms Tanya Denne tanyadenne@gmail.com	Self	December 2015 to February 2016	3 months	Antiparkinsonism	Traditional documentation and collection of <i>Mucuna purpurens</i>
9.	Habib Medical school, IUIU ( Islamic International University in Uganda), Lecturer, Biochemistry	Mr. Awotunde Oluwasegun Samson	NAM S&T fellowship	August 2017 to January 2017	6 months	Aprodisiac activity	Pharmacological screening of terminalia species for its antioxidant ,

							anticancer and aprodhisiac activity
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#### 14. Conferences/Seminars/Workshops organized

##### Indo-Canadian conferences on natural products

- The first Indo-Canadian conference on natural products was held at CDRI, Lucknow, for which Prof. M.J. Nanjan was invited to make a presentation on obesity and its complications.
- The Second Indo-Canadian conference on Natural Products was held during February 24-26, 2007 along with the International Conference in Pharmaceutical Sciences, Technology and Practice at JSS College of Pharmacy, Ooty. This was a run-away success in the sense 24 invited lectures were delivered by experts coming from all over the world and 201 posters were presented by researchers from Indian and abroad on Natural Products.

Seminars/Conferences	Date(s)	Co-sponsors	Number of Participants
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A two week, Quality Improvement Programme on (Standardization techniques for Herbal formulations".	Nov. 25 to Dec. 5, 2002	AICTE, New Delhi	Academic - 30 Industry - 02
A two week Quality Improvement Programme on "Extraction and Standardization of Plant based Medicine".	March 23-27, 2004	AICTE, New Delhi	Academic - 30
A one week Quality Improvement Programme on "Challenges in Standardizing Herbal/Traditional formulations".	March 01-08, 2006	AICTE, New Delhi	Academic - 30
A two week Staff Development Programme on "Current trends in Herbal research, formulation development and standardization criteria".	March 05-17, 2007	AICTE, New Delhi	Academic - 30
A two week Staff Development Programme on "New Frontiers in Herbal Drug Research based on Traditional Practices".	Feb. 25 to March 08, 2007	AICTE, New Delhi	Academic - 30
Second International Conference and Indo-Canadian Satellite Symposium on "Pharmaceutical Sciences, Technology, Practice and Natural Products".	Feb 24-26, 2007	JSS College of Pharmacy and JSS Mahavidya Peetha, Mysuru	Industry - 50 Academic-2000
National Seminar on "Pharmaceutical Sciences, Practice and Education".	March 01 - 03, 2008	JSS College of Pharmacy and JSS Mahavidya Peetha, Mysuru, AICTE, New Delhi	Industry - 30 Academic - 500
A two week Staff Development Programme on "Emerging Trends and Future Prospects IN Herbal Drug Technology".	Mar. 02 - 14, 2009		Academic - 30
Indo-South Africa Workshop on "Traditional Medicine System : Sharing Knowledge and Experience"	29 <sup>th</sup> to 31 <sup>st</sup> October 2012	Dept. of Science & Technology, Govt. of India & Republic of South Africa.	
A "Tribal Women Empowerment Programme on Utilization and Validation of Traditional Knowledge of Indigenous Fruits in	December 6th& 7th 2012	Council of Scientific & Industrial Research (HRD Group), New Delhi.	

Food Application and Home Remedies”.			
03 Weeks Training Course for African Researchers on “Traditional Knowledge Systems - Review, Revitalisation and Modern Scientific Approach”.	3rd – 22nd March 2014	JSS University, Mysuru.	
One Day Workshop on “The Nutritional and Medicinal Value of the Culinary herbs and Fruits to the Tribal Population of The Nilgiris District”.	2nd April 2015	Hill Area Development Programme, Ooty.	
Joint International Training Workshop on “Herbal Medicine - Drug Discovery from Herbs - Approaches, Innovations and Applications”.	30th and 31st March 2015	JSS University, Mysuru & Centre for Science and Technology of the nNon-Aligned and other Developing Countries.	
03 Days National Workshop on “Need of Regulatory perspective (Intellectual Property Rights) to conserve the Western Ghats vital medicinal plants and tribal indigenous practice knowledge”.	29th to 31st March 2016	JSS University, Mysuru.	
1 Day Training Workshop on “Human Rights “	24th March 2017	Human Rights Resources, New Delhi & Jagadguru Sri Shivarathreeshwara University, Mysuru	
02 Days International Seminar & exhibition on Phytopharmaceuticals: Emerging Challenges and Opportunities	11 <sup>th</sup> and 12 <sup>th</sup> December 2017	AICTE, New Delhi	

## **15. Showcasing TIFAC CORE in HD at International forums abroad/Invited talks**

Prof. Dr. M.J. Nanjan gave invited talks at several International Conferences abroad. Some of them are;

- i) Bringing Asian Herbal and Traditional Medicines to the modern mainstream pharmaceutical world – May 28-30, 2001, Singapore.
- ii) Global Summit on Medicinal Plants, Mauritius, September 25-30, 2003.
- iii) Twenty fourth conferences of the Arab Pharmacists Union, Khartoum, Sudan, December 10-12, 2005.
- iv) International Symposium on Herbal Medicine, Phhtopharmaceuticals and other Natural Products; Trends and Advances, Colombo, Sri Lanka, June 03-21, 2005.
- v) Global NHP Research, March 26-29, 2008, Toronto, Canada.
- vi) The 3rd International Congress on Complementary Medicine Research, Sydney, March 21-29, 2008.
- vii) Advanced Technologicos en Liberacion Controlada de Farmacos, Rosario, Argentina, September 25-27, 2009.

## **16. International/National Conferences/Seminars attended by the Faculty.**

The staff of TIFAC CORE attended several International/National Conferences/Seminars (Annexure-VI). This has helped them to interact with several experts in their field of specialization so as to update their CORE capabilities.

## 17. Certificates/Awards Received

TIFAC CORE staff and students received several Certificates/Awards/Appreciation for their scientific papers presented and invited talks.

- i) Dr. S. Manimaran received the **Best Paper Award** with First Place for his paper entitled "Estimation of Hypericin Content from the Different Extracts of Hypericum hookerianum by HPLC Technique" presented in the National Conference on "Herbal Pharmaceutical Entrepreneur Development " held at PSG College of Pharmacy, Coimbatore, during October 29-30, 2004.
  
- ii) Mr. L. Ramanathan received the **Best Paper Award** for his paper entitled "Antidermatophytic and Wound Healing Activity of Volatile Oil Based Cream formulation of Cupressus Sempervirens" presented in the International Conference on "Drug Development from Medicinal Plants - Issues and Problems" held at C.L. Baid Mehta College of Pharmacy, Chennai, during October 20-22, 2005.
  
- iii) Dr. M.J. Nanjan received **Certificate of Appreciation** from the Secretary General of the Arab Pharmacist Union, for conducting workshops on "Drug Discovery from Plant Sources", "Standardization of Herbal Drugs" and "Herbal Drugs: Regulatory aspects of Quality Control" at the 25<sup>th</sup> Scientific Conference of the Arab Pharmacists Union, Sudanese Pharmacists Union, held at Khartoum, Sudan, during December 10-12, 2005.
  
- iv) Dr. S. Manimaran received the **Best Paper Award** with First Place (oral) for his paper entitled "Phytoconstituents and Antimicrobial activity of

Volatile Oil of *Cupressus glauca*” presented in the National Symposium on “Phytopharmaceuticals – In Indian scenario” held at Periyar College of Pharmaceutical Sciences, Trichy, during January 5-6, 2007.

- v) Mr. P. Hariharan (student) received the **Best Paper Award with First Place** (Poster) for his paper entitled “Development of Polyherbal formulation from Antiasthmatic Plants and its HPTLC Standardization” presented in the National Symposium on “Phytopharmaceuticals – In Indian Scenario” held at Periyar College of Pharmaceutical Sciences, Trichy, during January 5-6, 2007.
- vi) Ms. D.L. Priyanka (student) received the **Best Paper Award with First Place** for her paper entitled “Hepatoprotective Activity of Isolated Terpenoids and Terpenoid Fractions of *Scoparia dulcis* L.” presented in the International Conference on “Industrialization of Institutional Research on Phytomedicines” held at PSGR Krishnammal College for Women, Coimbatore, during January 8-9, 2009.
- vii) Dr. S. Manimaran and co-workers received **Al-Ameen College of Pharmacy Award for the Best Research Article** for the article entitled “Estimation of Harmaline Content in *Passiflora edulis* by HPTLC Technique” published in Indian Pharmaceutical Education and Research (IJPER) Journal in the Pharmacognosy Section during the year January-December 2007.
- viii) Dr. S.P. Dhanabal and Dr. S. Manimaran received Diploma of the Institute of Chemists India, Kolkatta, with Fellowship for Life.

## 18.Funds Flow

TIFAC CORE was started with the grant of Rupees 110 lakhs from TIFAC, New Delhi. M/s. Tablets India, Chennai, came forward to contribute Rs. 10 lakhs. Later M/s. Apex Laboratories, Chennai, came as a partner with a grant of Rs, 10 lakhs. The Management, JSS Mahavidyapeetha, Mysuru, made a contribution of Rs. 30.20 lakhs towards equipment purchase.

	<u>Rs. In Lakhs</u>
TIFAC, New Delhi	110.00
M/s. Tablets India	10.00
M/s. Apex Laboratories	10.00
JSS Mahavidyapeetha	42.00
<b>Total</b>	<b>172.00</b>

Equipment to the tune of Rs. 172.00 lakhs were purchased and installed (Annexure I)

The entire recurring expenditure was met by the funds provided by JSS Mahavidyapeetha, Mysuru, and the funds generated through fees and consultancy.

## 19.Impact of TIFAC CORE in HD

### National Recognition

**Re:Think INDIA**, a Nationalist think tank has conferred upon JSS College of Pharmacy, Ootacamund, the **Bharat Ratna Atal Bihari Vajpayee Award for Innovation 2017**, on May 11, 2017, the National Technology Day, at India International Centre, New Delhi, for the patented Herbal Drugs, namely **Hapenz & NSF-3** developed by **TIFAC Centre of Relevance and Excellence in Herbal Drugs**, JSS College of Pharmacy, Ootacamund





### **On Students / Research Scholars**

- Exposure of Students and Research Scholars to advanced research methodologies in the field of herbal drug research such as extraction, isolation, characterization and pharmacological and toxicological evaluation of herbal extracts.
- Exposure to large scale cultivation and production of herbal drugs through interactions with the industries and the Horticulture Department, Tamilnadu Agricultural University, Coimbatore.
- Exposure to herbal formulation development through collaborations with the industries.

The above activities have led to the overall improvement in the skill levels and the understanding of research methodologies in the field of herbal drug research. It has also made the students better employable.

### **On Faculty**

- Increased interactions with the industries led to the improvement in the quality of research being done at the CORE.
- Teachers with better knowledge and exposure to herbal drug research are challenging the students to reach their full potential rather than minimum competency.
- Improvement in the administrative skills and also in the overall handling and implementation of projects by collaborating with industries and other funding agencies.

## **On Institution**

- A good infrastructure has been created by the CORE for carrying out research.
- As a result of their good infrastructure and facilities created, increased interaction with the industries was achieved, resulting in the generation of more funds.
- Better showcasing of the Institution and its capabilities among the research and teaching communities in the country and abroad.
- Improvement in the employability of the students coming out of this Institution.

## **On Industry**

- It has improved the employability of students in the Industries.
- Provided a place for quality research for Industries looking to outsource their research projects.
- Provided a facility to train, both academic and industrial personnel, in the field of herbal drug research.
- Provided infrastructure for the Industries to carry out their research work.

## **On Society**

- Ooty is known today as a place where advanced research is being done on herbal products. The students of this region have increased employment opportunities.
- Mr. Adewale Michael ESAN, Lecturer, Nutritional and Industrial Biochemistry, University of Ibadan, Nigeria, has carried out part of his

research work entitled “Antihyperlipidemic and glucose lowering effect of hydroalcoholic extract of bioregulator treated okra (*Abelmoschus esculentus*) fruit in triton-induced hyperlipidemia rats” for 03 months under INSA JRD-TATA training fellowship under the supervision of Dr. S.P. Dhanabal under TIFAC CORE HD.

- Mr. Ndagijimana Andre, Research Assistant, Pharmaceutical and Chemical Industrial Division (PCID), National Industrial Research & Development Agency (NIRDA), Rwanda, carried out his research activities, entitled “Study of Formulation and Quality Analysis of Medicament Products” for 6 months under NAM S&T Fellowship Research Training for Developing Country Scientists (RTF-DCS), Govt. of India, under the supervision of Dr. S.P. Dhanabal under TIFAC CORE HD

### **Education system, Curriculum and Delivery**

The CORE has become aware of the decline in our education system due to a rise in mediocrity. The faculty is, therefore, aiming at the mastery of the subject rather than minimum competency.

### Annexure I: The list of Equipment purchased

S. No.	Name of the Equipment	Cost in Rupees
1	Freeze Dryer	6,21,327.00
2	Fermentor	8,25,000.00
3	Incinerator	1,67,034.00
4	Spray Dryer	5,76,000.00
5	Herbal Extraction Unit	16,27,560.00
6	JPLC System	13,56,774.00
7	Voscp,eter	3,32,000.00
8	Blister Packing Machine	3,65,000.00
9	PCR Machine	3,27,920.00
10	Fluorescence Microscope	4,51,000.00
11	Extruder+Spheroidiser	4,04,759.00
12	LCMS	88,20,000.00
13	Tablet Dissolution Tester	1,60,385.00
14	Cell Analyzer	4,50,000.00
15	Fluidized Bed Processor	7,50,000.00
	<b>Total</b>	<b>1,72,34,759.00</b>

## Annexure II: Equipment Utilization at TIFAC CORE

Sl. No.	Name of the Equipment	Academic Activities		Industrial Activities		Revenue Earned (In Rs.)	Any other form of utilization & outcome (Including research)
		Name of the Course	No. of Students Benefited	Name of the Industry	Service Rendered		
1.	Semi Commercial Extraction Plant	Phytopharmacy &Phytomedicine Pharmacognosy B. Pharm.	70 70 500	--	--	--	Ph.D. Students utilized the facility for their research purposes.
2.	Pilot Spray Drying Unit	Phytopharmacy & Phytomedicine Pharmacognosy Pharmaceutics B. Pharm.	70 70 30 500	M/s. Shasun Chemicals  M/s. Orchid Health Care, M/s. Unitea, Coimbatore, M/s. FRLHT, Bangalore	Method development for Spray Drying of Polymer drugs Spray Drying  Spray drying of Green Tea Spray drying	16,885.00  7,000.00 2,000.00 5,000.00	Ph.D. Students utilised the facility for their research purposes.

3.	Freeze Dryer	Pharmacognosy Phytopharmacy & Phytomedicine Pharma. Chemistry B. Pharm.	70 70 70 500				Ph.D. Students utilised the facility for their research purposes
4.	Fermentor	Pharma.Biotechnology Pharmacognosy Phytopharmacy & Phytomedicine B. Pharm.	70 70 70 500				Ph.D. Students utilised the facility for their research purposes
5.	Incinerator	Pharmacology	70				Ph.D. Students utilised the facility for their research purposes
6.	HPLC System	Pharma. Analysis	50	M/s. Neo Pharma,. Abu Dhabi, M/s. Torrent Pharmaceuticals, Mumbai M/s. RPG Life Science	BA/BE studies	3,00,000.00	Ph.D. Students utilized the facility for their research purposes.
7.	Viscometer	Pharmaceutics	70				Ph.D. Students utilised the facility for their research purposes.

8.	Blister Packing Machine	Pharmaceutics Phytopharmacy & Phytomedicine B. Pharm.	70 70 500				Ph.D. Students utilised the facility for their research purposes
9.	PCR Machine	Pharmaceutical Biotechnology	70				Ph.D. Students utilised the facility for their research purposes
10.	Flourescence Microscope	Pharmaceutical Biotechnology	70				Ph.D. Students utilised the facility for their research purposes
11.	Extruder + Spherodiser	Pharmaceutics	70				Ph.D. Students utilised the facility for their research purposes
12.	Cell Analyser	Pharmacology TIFAC CRE HD	70 70	M/s. Arya Vaidya Sala, Kottakkal M/s. Tablets India, Chennai M/s. Apex Lab., Chennai	Heamatology Parameters for toxicological studies	5,00,000.00	Ph.D. Students utilised the facility for their research purposes
13.	LCMS	Pharmaceutical Analysis	50	M/s. Neo Pharma,. Abu Dhabi, M/s. Torrent Pharmaceuticals,Mumbai M/s. RPG Life Science, Mumbai.	BA/BE Studies	30,00,000.00	Ph.D. Students utilised the facility for their research purposes

- Equipment purchased out of TIFAC, JSS Mahavidyapeetha and Industry contribution funds.



### Annexure III: Candidates who obtained their M. Pharm. Degree

1.	Mr. Sudhakar Raja	Research Scholar	Strathclyde Institute of Pharmacy and Biomedical Sciences, University of Strathclyde, Glasgow, United Kingdom G1 1XW
2.	Mr. A. Saravanan	Research Scientist, R&D	F.D.C. Ltd., Ashok Nagar, Hyderabad-500 020, A.P.
3.	Mr. P. Senthil Kumar	Research Associate, R&D	Orchid Pharmaceuticals, Chennai.
4.	Mr. K. Rajendran	Lecturer	Dept. of Allied Health, Masters Kill College of Nursing and Health, Selangor Darul Ehsan, Malaysia.
5.	Mr. M.H. Nagendrrappa	Lecturer	S.D. College of Pharmacy, Muzaffarnagar, U.P.
6.	Mr. Dhirendra B. Sanghai	Lecturer	G.S.P.S. Institute of Pharmacy, Akola, Maharashtra.
7.	Mr. C. Saravana Babu	Research Scientist	Sri Ramachandra University, Porur, Chennai.
8.	Mr. K.N. Harsha	Associate Research Scientist	ADVINUS Therapeutics Pvt. Ltd., Bangalore.
9.	Mr. K. Kripesh	Research Assistant	Quintiles Technologies Pvt.Ltd., 3 <sup>rd</sup> Floor, South Bridge Parade, 10, MG Road, Bangalore-560 001.
10.	Mr. H.C. Manjunath	Research Assistant	Strides Arcolab Ltd., Strides House, Bilekahalli, Bannerghatta Road, Bangalore-76.
11.	Mr. Gulshan Setia	Lecturer	Doon Valley Institute of Pharmacy & Medicine, Near Jundla Gate, Karnal, Haryana.
12.	Ms. Parul Luthra	Lecturer	R.K.S.D. College of Pharmacy, 5, Ambala Road, Kaithal, Haryana.
13.	Mr. Vaibhav Garg	Lecturer	Dr. K.N. Modi Institute of Pharmaceutical Education & Research, Modi Nagar, Ghaziabad, U.P.
14.	Mr. Alok Sharma	Sr. Research Fellow	Division of Pharmacognosy & Ethnopharmacology, N.B.R.I. Lucknow, U.P.
15.	Mr. R. Nandeesh	Asst. Professor	Sree Siddaganga College of Pharmacy, Tumkur, Karnataka.

16.	Bikash Ch. Deb	Sr. Lecturer	Institute of Pharmacy, Assam Medical College, Dibrugarh, Assam-786 002.
17.	Mr. Durkesh Kumar Patel	Pharmacist	Canada.
18.	Mr. JoJo Joseph	Lecturer	Crescent B. Pharm. College, Madayi Para, P.O. Payangadi R.S., Kannur-670 358.
19.	Mr. Anil Funde Ramnath	Jr. Research Fellow	FRLHT, 74/2, Jarakabande Kaval, Attur P.O., Via. Yelahanka, Bangalore
20.	Mr. Aditya Arya	Principal	Shri Ram Pharmacy College (D. Pharm.), Chicholi Dt. Betur,MP.
21.	Mr. Channa Basavaraj	Lecturer	K.L.E. Society's College of Pharmacy, GIB Campus, Nipari, Chikodi (Tk.), Belgaum Dt., Karnataka.
22.	Mr. Subhrangshu Datta	Lecturer	Bharat Institute of Technology, Bypass Road, Partapur, Meerut, UP.
23.	Mr. Ghawate Vilas Bhausahab	Lecturer	MES College of Pharmacy, Sonai, Tal-Newasa.
24.	Mr. Sunil Sharma	Lecturer	R.K.D.F. College of Pharmacy, NH-12, Hoshangabad, Bhopal, M.P
25.	Mr. Gyeswar M. Shep	Lecturer	Bharat Institute of Technology, Bypass Road, Partapur, Meerut, UP
26.	Mr. Ashok Kumar	Lecturer	Sri K.V. College of Pharmacy, Chickballapur, Kolar, Karnataka.
27.	Ms. Thenmozhi S.	Lecturer	Vinayaka Missions College of Pharmacy, Sankari Main Road, NH-47, Ariyanoor, Salem.
28.	Mr. Kalpesh Kumar Panchal	Q.A. Executive	Biodeal Laboratories Pvt.Ltd., Surendra Nagar, Gujarat-30.
29.	Mr. N. Muruganantham	Asst. Professor	St. Peters Institute of Pharma Science, Vidyanagar, Hanamkonda, Warangal- 506 001.
30.	Mr. Patrakar Ramling Gangadhar	Lecturer	Shivalingeshwar College of Pharmacy, Hasegaon TG AUSA, Latur (Dt.), Maharashtra.
31.	Mr. L. Ramanathan	Research Scholar	MK University, Madurai.

32.	Mr. P. Selvakumar	Research Associate	Herbal Drug Research, Ranbaxy Research Laboratories, Gurgaon, Haryana.
33.	Ms. T. Dhanalakshmi	Lecturer	Sri K.V. College of Pharmacy, Chickballapur, Kolar.
34.	Mr. A. Veerakumar	Pharmacist	SVMP Production, Apotex Research Pvt.Ltd., Bangalore-560 099.
35.	Mr. Vijeesh Govindan	Lecturer	St. John's Pharmacy College, Bangalore-40.
36.	Ms. Yasodha M. Sasikiran	Research Associate	Herbal Drug Research, Ranbaxy Research Laboratories, Gurgaon, Haryana.
37.	Mr. Bibhilesh Bhayyaram Mendhe	Lecturer	Manoharbai Patel Institute of Pharmacy, Kudwa, Gondia.
38.	Mr. Prakash K. Sahu	Lecturer	Near HSADL, Anand Nagar, Bhopal.
39.	Mr. Aditya Arya	Ph.D. Scholar	Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia.
40.	Mr. G. Ramu	Lecturer	Sri K.V. College of Pharmacy, Chickballapur, Kolar, Karnataka.
41.	Mr. P. Hariharan	Executive	Dept. of Regulatory Affairs, Archid Chemicals, Chennai.
42.	Mr. NVL Chaitanya	Lecturer	Geetham University, A.P.
43.	Mr. Tulsidas Parsaram Nimbekar	Lecturer	Shri Hhagwan College of Pharmacy, Aurangabad-01, M.P.
44.	Mr. Anil Makwana	F&D Officer	Plethico Pharmaceuticals Ltd., Kalaria, Indore-01
45.	Mr. B. Sivakumar	Lecturer	Rural College of Pharmacy, Bangalore.
46.	Mr. R. Chandrasekar	Lecturter	M.N.R. College of Pharmacy, Fasalwadi, Hyderabad, A.P.
47.	Mr. R. Kumanan	Lecturer	Dept. of Pharmacognosy, Nalanda College of Pharmacy, Nalgonda-01, A.P.
48.	Ms. A. Manohari	Lecturer	Seven Hills College of Pharmacy, Thirupathi, A.P.
49.	Mr. Jitendra Bajaj	Lecturer	Seven Hills College of Pharmacy, Thirupathi, A.P.
50.	Mr. Subharangshu Datta	Lecturer	Bharat Institute of Technology, Meerut-03.
51.	Mr. Channabasawaraj Sompur	Lecturer	K.L.E Society's College of Pharmacy, Belgaum.

**Annexure IV: Candidates who obtained their Ph.D., degree**

Sl.No	Title of the Ph.D Dissertation	Name of the Student	Name of the Guide	Department	Year
1.	Design and Development of certain Oral Sustained Release Products of Flurbiprofen and Nimesulide	Mr. S.M. Vijayendrar Swamy	Dr. M.J. Nanjan	Pharmaceutics	2003
2.	Synthesis, Characterization and Pharmacological Evaluation of some Hetrocyclic compounds	Mr. V.H. Bhaskar	Dr. M.J. Nanjan	Pharmaceutical Chemistry	2004
3.	Synthesis and evaluation of a new polymeric pro-drug for sustained and site -specific delivery	Mr. B. Duraiswamy	Dr. M.J.Nanajan	Pharmaceutical chemistry	2004
4.	Synthesis and Evaluation of some Non steriidal Anti inflammatory polymeric pro - Drugs for Sustained drug Delivery	Mr. Bigal Big Rajkamal	Dr. M.J. nanjan	Pharmaceutical Chemistry	2004
5.	Development of some Herbal formulations for Hepatic Disorders and Hyperlipidemia	Mr. N. Mahadevan	Dr. M.J. Nanjan,	Pharmacognosy	2004
6.	Development and Validation of in Vitro -in vivo correlations FOR SOME Modified Release formulations	Mr. J.R. Aravindraaj	Dr. M.J. Nanjan	Pharmaceutical Analysis	2005
7.	Pharmacognostical and Pharmacological investigations on <i>Anaphalis neelgeriana</i> DC and <i>Cnicus wallichii</i> Dc	Mrs. S. Vijayalakshmi	Dr.M.J. Nanjan	Pharmacognosy	2007

Sl.No	Title of the Ph.D Dissertation	Name of the Student	Name of the Guide	Department	Year
8.	CNS activity of <i>Benincasa hispida</i> (Thunb) cogn in animal models	Mr.D Anilkumar	Dr. M.J. Nanajan	Pharmacognosy	2007
9.	Evaluation of some of the Indigenous plants for Psoriasis	Mr. N. Muruganatham	Dr. S.P. Dhanabal	Pharmacognosy	2011
10.	Studies on Indigenous plants for Antidiabetic activity	Ms.V.Maithili	Dr.S.P. Dhanabal	Pharmacognosy	2011
11.	Computer Assisted Design, synthesis and Biological Evaluation of some Novel Heterocyclic compounds	Mr. Prashantha Kumar.B.R.	Dr. M.J. Nanjan	Pharmaceutical Chemisry	2009
12.	Health Outcome Mesures and vascular Risk factors in patients with Type 2 diabetes mellitus receiving Vitamin C and Resveratrol supplementation	Mr. Jayesh Kumar Bhatt	Dr. M.j. Nanjan	Pharmaceutical Chemistry	2012
13.	Investigations on <i>Ipomoea Leari</i> for its Anticancer Potential	Mr. Omji Porwal	Dr. M.J. Nanjan	Pharmaceutical Chemisty	2012
14.	A Comparative study on Genotoxic activity of Hydro Alcoholic extract of <i>Curcuma Aromatica</i> and <i>Curcuma Zedoaria Rhizomes</i>	Mrs. A.R. Srividya	Dr. S.P. Dhanabal	Pharmaceutical Biotechnology	2012
15.	Newer Approaches in Herbal Drug Development Quality Control, standardization , Bioavialability and herb -Drug	Ms. Bhagyashree B Kamble	Dr. B. Duraiswmay	Pharmacognosy	2012

Sl.No	Title of the Ph.D Dissertation	Name of the Student	Name of the Guide	Department	Year
	Interaction studies on <i>Gymnema sylvestre</i>				
16.	Attenuation of Allergy Induced Astham in Murine Models by Glorisal L and pothos scandensL.; A Biochemical and Molecular perspective	Mr. Saurabh Gupta	Dr. B. Duraiswamy	Pharmacognosy	2013
17.	Synthesis , characterization and biological evaluation of a polymeric Drug Conjugate for cancer chemotherapy	Ms. Rubha Saxena	Dr. M.J. Nanajan	Pharmaceuticalchemistry	2013
18.	Design , synthesis and evaluation of some Novel Pyrazoloquinolines as Anticancer agents	Ms. Roshini Chandrasekar	Dr. M.J. Nanjan	Pharmaceutical chemistry	
19.	Development of Nano -based Drug Delivery system for Azithromycin and docetaxel	Mr. D. Manikadan	Dr. Dr. M.J. Nanajan	Pharmaceutical Chemistry	2013
20.	Pharmacognostical phytochemical and biological evaluation of ventilago madersptana and Ziziphus xylopyrus for their Anti Asthamatic activity	Mr. Upendra B. Gandugule	Dr. B. Duraiswamy	Pharmacognosy	2013
21.	Dipepttidyl peptidase -4 inhibition by <i>Pterocarpus marsupium</i> and <i>Eugenia</i>	Mr. Jayasankar Kosaraju	Dr. B. Duraiswamy	Pharmacognosy	2014

Sl.No	Title of the Ph.D Dissertation	Name of the Student	Name of the Guide	Department	Year
	<i>jambolana ameliorates</i> streptozotocin induced Alzheimers Disease				
22.	Formulation and Development of Dual Release multiparticulate systems for Aceclofenac	Mr. G.N.K. Ganesh	Dr. S.P. Dhanabal	Phamaceutics	2014
23.	Investigations of anti cancer activity of ethanol extract frqctions of <i>Cardiospermum halicacabum</i> Linn and <i>Combretum albidum</i> G.Don	Mr. Ashish Suresh Zalke	Dr. Duraiswamy	Pharmacognosy	2014
24.	Phytochemical and Pharmacological Exploration of Common weeds in Different cropping systems / fallow lands of the Nilgiris and its commercial utilization	Mr. M.V.N.L. Chaitanya	Dr. S.P. Dhanabal	Pharmacognosy	2015
25.	Herbal Mediated Activation of ParaoxonaseEnzyme in preventingatherosclerosis : An alternative therapeutic Approach	Ms. B. Vanitha	Dr. B. Duraiswamy	Pharmacognosy	2018





## Annexure V: Industries for which consultancy rendered

Name of the Industry / Agency	Particulars of services rendered
M/s. Orchid Health Care, Aurangabad	Spray drying of samples
M/s. Rosea Ayurvedic Laboratories, Kottayam	Acute toxicity study
M/s. Sami Labs., Bangalore	Ocular safety studies
M/s. Apex Laboratories Ltd., Chennai	Acute & sub-acute toxicity studies
M/s. Tablets (India) Ltd., Chennai	Herbal formulation development
M/s. Sami Labs. Ltd., Bangalore	Antidiabetic studies of momordica charantia
M/s. Apex Laboratories Ltd., Chennai	Acute & sub-acute toxicity studies
M/s. Shasun Chemicals & Dyes Ltd., Chennai	Spray drying - Shacryl 30D
M/s. Apex Laboratories Ltd., Chennai	Acute and sub-acute toxicity studies
M/s. Sami Labs. Ltd., Bangalore	Formulation development
M/s. Unitea, Coimbatore	Spray drying of tea extract
M/s. Prabhat Herbal Research Centre, Nagercoil	Clinical trials of Back pain Oil
Ms. A. Aruna, Chennai	Dicerma biarticulation: Antiulcer activity
M/s. Shasun Chemicals & Drugs Ltd., Chennai	Spray drying of Eastacryl 30D and Drugcoat
M/s. Apex Laboratories Ltd., Chennai	Acute & sub-acute toxicity studies
M/s. Apex Laboratories Ltd., Chennai	Efficacy studies of products
M/s. Natural Remedies, Bangalore	Anxiolytic evaluation studies
M/s. Vedic Life Sciences, Mumbai	Conducting bronchial study
M/s. Natural Remedies, Bangalore	AAxiolytic evaluation of BRBM/10
M/s. Arya Vaidya Nilayam, Madurai	Acute toxicity study of Cofavin
M/s. Arya Vaidya Nilayam, Madurai	Study of expectorant activity of Cofavin
M/s. Vedic Life Sciences, Mumbai	Dose level anorectic study
M/s. Arya Vaidya Pharmacy, Coimbatore	Studies of anti-fantique property
M/s. Vadic Life Sciences, Mumbai	Evaluation of the inhibitory potential of COX (I & II) and 5 COX of EO by ELISA method
M/s. Arya Vaidya Nilayam, Madurai	Acute toxicity of cofavin
M/s. FRLHT, Bangalore	Acute dermal toxicity studies of a cream
Ms. Beula Vijayakumar, Research Scholar	Analgesic in mice
M/s. University of Madras, Chennai	Antiinflammatory in rats experiments
M/s. Vedic Life Sciences, Mumbai	COX and LO inhibitory study

M/s. Arya Viadya Nilayam, Madurai	Expctorant activity & Bronchospasmolytic activity of 'Cofavin'
M/s. Hindustan Lever Ltd., Mumbai	Toxicity studies
M/s. Arya Vaidya Nilayam, Madurai	Mucoscretalytic activity of cofavin cough syrup
M/s. Arya Vaidya Nilayam, Madurai	Study on effect of AVNROC-01 on frog
Ms. Beula Vijayakumar, Research Scholr	Analgesic in mice
M/s. University of Madras, Chennai	Antiinflammatory in rats experiments
M/s. FRLHT, Bangalore	Spray drying of herbal soup
M/s. JKK Nataraj College of Pharmacy, Komarapalayam	Hepato protective activity of wedelia
M/s. Arya Vaidya Nilayam, Madurai	Oral subacute toxicity of AVNRDC-1 syrup
M/s. Arya Vaidya Pharmacy, Coimbatore	Evaluation of XXX for antifatigue property
M/s. TTK Healthcare, Chennai	Animal toxicity/human clinical trials
M/s. Hindustan Lever Lt., Mumbai	Literature survey of certain Medicinal Plants
M/s. Vedic Life Sciences, Mumbai	In vitro anti-inflammatory activity of an essential oil
M/s. Arya Vaidya Sala, Kottakkal	28 day oral toxicity of AF-304 and AF-4-04
M/s. Vedic Life Sciences, Mumbai	Antidepressant activity evaluation of a substance
M/s. Vedic Life Sciences, Mumbai	Anxyolytic evaluation
M/s. Vedic Life Sciences, Mumbai	90 days toxicity studies of ADM01 tabs and ADKP tabs.
M/s. Vedic Life Sciences, Mumbai	90 days toxicity studies of ADM01 tabs and ADKP tabs.
M/s. Arya Vaidya Nilayam, Madurai	Mast Cell stability and antitussive studies
M/s. Vedic Life Sciences, Mumbai	Evaluation of an Hypnotic
M/s. Arya Vaidya Salai, Kottakkal	Antipyretic study
M/s. TTK Healthcare Ltd., Chennai	Skin irritation test on NOMOS mosquito repellent spray
M/s. Vedic Life Sciences, Mumbai	Evaluation of antidepressant activity and Anxydytic activity
M/s. Vedic Life Sciences, Mumbai	90 days subchronic repeated dose oral toxicity study of ADMO1
M/s. TTK Healthcare, Chennai	Acute toxicity studies in rats and clinical evaluation of WGW infants
M/s. Vedic Life Sciences, Mumbai	Chronic toxicity study of ADKP
M/s. Vedic Life Sciences, Mumbai	Micronucleus assay
M/s. Arya Vaidya Nilayam, Madurai	Antitussive and mast cell stabilization studies

M/s. TTK Healthcare, Chennai	Toxicity test conducted on WGW in pet containers
M/s. Vedic Life Sciences, Mumbai	ADKP chronic toxicity study and Micronucleus assay
M/s. Arya Vaidya Sala, Kottakkal	Acute toxicity studies of AF-1-04 and Antipyretic studies of AF-1-04 and AF-2-04
M/s. Vedic Life Sciences, Mumbai	Chronic toxicity study of ADMO1
M/s. Vedic Life Sciences, Mumbai	90 days subchronic repeated dose oral toxicity study of ADKP premix
M/s. Arya Vaidya Sala, Kottakkal	Subacute oral toxicity study of AF0-104, Subacute oral toxicity study of AF-2-04, Antiallergic activity of AF-1-04, Antiosteoarthritic activity of AF-4-04
M/s. Tablets (India) Ltd., Chennai	Pharmacological studies on their products
M/s. Hindustan Lever Ltd., Bangalore	Literature survey on Medicinal Plants
M/s. TTK Healthcare Ltd., Chennai	Oral acute toxicity studies on their products
M/s. Natural Herbal Powder & Fruit Products Production & Marketing Indl. Coop. Society Ltd., Nellikuppam	Oral acute toxicity studies of herbal tea
Mr. Supratin Mandal, Jeypore College of Pharmacy	Separation of the chemical constituents present in the 3 samples
M/s. TTK Healthcare Ltd., Chennai	Acute toxicity studies on 14 products
M/s. TTK-LIG Ltd., Chennai	In vitro spermicidal activity
Ms. A. Sivagamasundari, Nellikuppam	Acute oral toxicity study of herbal tea
Mrs. Renuka Devi	Studies on medicinal plants using HPTLC
The Forest College & Research Institute, TNAU	Carrying out analysis on certain plants
M/s. Arya Vaidya Sala, Kottakkal	Study of acute-osteoporotic activity of AF-4-04
M/s. Jasmine C.E. Pvt.Ltd., Coimbatore	Acute oral toxicity study
M/s. Arya Vaidya Sala, Kottakkal	Acute osteoporotic activity and Lactagogue study of AF-3-04
Mr. S.I. Davis Presly, Pachaiyappa's College, Chennai	Carrying out formulation studies
M/s. Lakshmi Seva Sangham, Gandhigram	Mercury, sulphur and metal analysis in products.
M/s. TTK Healthcare Ltd., Chennai	Acute toxicity studies conducted on valethamate Bromide

M/s. Arya Vaidya Sala, Kottakkal	Acute toxicity study of AF-2-04 and Evaluation of Lactogogue activity of AF-3-04 in wistar rats
Ms. A. Krishnaveni, Lecturer, Sri Padmavathi School of Pharmacy Tirupati	HPTLC analysis of samples
Mrs. S.N. Padma Devi, Ph.D. Scholar, PSGR Krishnammal College for Women, Coimbatore	HPTLC analysis of some medicinal plants
M/s. Biorigine Life Science Pvt. Ltd., Hyderabad	Anti-atherosclerotic activity of POMEGA
Mrs. Bharti Ahirwar, Research Scholar, Guru Ghasidas University, Bilaspur	HPTLC analysis
Mr. Gopalakrishna, Research Scholar, SCS College of Pharmacy, Harapanahalli.	HPTLC chemical finger printing, estimation of strychnine and Brucine with interpretation.
M/s. Arya Vaidya Sala, Kottakkal	Evaluation of anti-osteoporotic activity of AF-1-04
M/s. Biorigine Life Sciences Pvt.Ltd., Hysderabad.	Clinical study of POMEGA
Mrs. Bharti Ahirwar, Research Scholar, Guru Ghasidas University, Bilaspur	HPTLC analysis for Ph.D. work
M/s. Biorigine Life Sciences Pvt. Ltd., Hyderabad	Clinical study of POMEGA
Mr. S. Sathesh Kumar, Research Scholar, University College of Pharmaceutical Sciences, Kakatiya University, Warangal	Finger print analysis of 5 samples and one formulation of herbal drug using HPTLC
M/s. TTK Healthcare Ltd., Chennai	Conducting toxicity studies for Valethamate Bromide Inj.
M/s. Natural Remedies, Bangalore	Analysis of tea samples using HPLC
Mr. Suhas, V.L., IISc., Bangalore	Acute and 28 day toxicity studies in rats
Mr. Neeli Raj Kumar, Final M. Pharm. Student, JKK Nataraji College of Pharmacy, Komarapalayam	Utilisation of HPTLC services for project
M/s. FRLHT, Bangalore	Acute oral toxicity studies for a herbal product, namely "Gudapaka".

**Annexure VI: Conferences / Seminars attended by the staff**

<b>Title of the Seminar / Conference attended</b>	<b>Date</b>	<b>Attendee(s) from TIFAC CORE</b>
International Siddha Congress, 2002, at Gandeepam, Sivagangai (Dt.)	May 24-26, 2002	Dr. S. Manimaran
International convention of "Pharmacy Educators" at Bangalore.	March 16-17, 2002	Dr. S. Manimaran
National Seminar on "Siddha Medicine" at Tamil University, Tanjavur.	December 09-10, 2002	Dr. S. Manimaran
Indian Pharmaceutical Congress, Pune	December 03-15, 2002	Dr. S. Manimaran
ICMR sponsored National Seminar on "Medicinal Plants & Health Care" held at PSGRK College for Women, Coimbatore.	August 27-28, 2003	Dr. S. Manimaran
Third National Conference on "Siddha Medicine for all ages" held at Coutralam, TN.	December 06-7, 2003	Dr. S. Manimaran
55 <sup>th</sup> Indian Pharmaceutical Congress held at Chennai on "Research Perspectives in Herbal Sciences"	December 19-21, 2003	Dr. S. Manimaran
National Symposium on "Herbal Sciences (HERBOTECH 2005), Kamaraj College of Engineering & Technology, Madurai	January 21-22, 2004	Dr. M.J. Nanjan
"Career Prospects in Pharmacy Profession", JSS College of Pharmacy, Ooty, conducted by IPA Education Division	August 22, 2004	Dr. S. Manimaran
National Seminar on "Herbal Drugs", PSG College of Pharmacy, Coimbatore.	October 29, 2004	Dr. M.J. Nanjan
"The need for Standardization of Herbal Drugs", National Seminar on Herbal Medicines, SASTRA, Thanjavur	November 28, 2004	Dr. M.J. Nanjan
National Conference on "Herbal Pharmaceutical Entrepreneur Development", PSG College of Pharmacy, Coimbatore, the Role of TIFAC in promoting Research in Educational Institutions	December 03-05, 2004	Dr. S. Manimaran
TIFAC CORE HD, a case study, in Indian Pharmaceutical Congress, Kolkatta.	December 03-05, 2004	Dr. M.J. Nanjan
56 <sup>th</sup> Indian Pharmaceutical Congress, Kolkatta	December 03-05, 2004	Dr. S. Manimaran
Brain Storming Session (BSS) on "Herbo-Mineral Pharmaceutical Products in Indian Systems of Medicine: Problems & Prospects", Jamia Hamdard, Delhi	December 07-08, 2004	Dr. M.J. Nanjan

9 <sup>th</sup> national Conference on “Bioactive Heterocycles and Drug Discovery Paradigm”, Rajkot, Gujarat.	January 08-10, 2005	Dr. M.J. Nanjan
National Seminar on “Globalising Ayurvedic and Herbal Products: Challenges and Strategies, Mumbai.	February 04-05, 2005	Dr. M.J. Nanjan
International Conference on “Health Sciences”, Mysuru	February 25-26, 2005	Dr. M.J. Nanjan, Dr. S. Manimaran
International Conference on “Drug Development from Medicinal Plants - Issues and Problems”. - Received Best Paper Award at C.L. Baid Metha College of Pharmacy, Chennai.	October 20-22, 2005	D. S. Manimaran
“Heavy Metals in Ayurvedic Formulations”, All India Seminar organized by Ayurvedic Medicines manufacturers of India, Trichur.	October 29, 2005	Dr. M.J. Nanjan
“Traditional Medicine/Herbal Drugs: Challenges and Opportunities”, Indian Pharmaceutical Congress, Hyderabad, A.P.	December 02-04, 2005	Dr. M.J. Nanjan
International Conference on “Ethnopharmacology and Alternative Medicine” Amala Cancer Research Centre, Thrissur, Kerala.	January 20-22, 2006	Dr. S. Manimaran, Mr. Saleemulla Khan
National Convention of Pharmacy Educators, Ramakrishna College of Pharmacy, Coimbatore.	March 04-05, 2006	Dr. S. Manimaran
45 <sup>th</sup> Annual meeting of Society of Toxicology, SanDiego, USA	March 04-09, 2006	Dr. M.J. Nanjan Dr. Praveen Bommu
International conference on Globalization of Traditional, Complementary and Alternative Systems of Medicine, Tamil Nadu Agriculture University, Coimbatore.	March 16-18, 2006	Dr. S. Manimaran
International Conference on “Biotechnology - Promises and Realities” held at P.S.G.R. Krishnammal College for Women, Coimbatore	July 14-15, 2006	Dr. S. Manimaran
58 <sup>th</sup> Indian Pharmaceutical Congress, Mumbai	December 01-03, 2006	Dr. S. Manimaran
National Symposium on “Phytopharmaceuticals in Indian Scenario”, Periyar College of Pharmaceutical Sciences, Trichy	January 05-06, 2007	Dr. S. Manimaran
“Management and Conservation of Nature - Nilgiris Biosphere Reserve (NBR)”, Emerald Heights College for Women, Ooty	February 06-07, 2007	Dr. S.P. Dhanabal Dr. S. Manimaran
Second International Conference and Indo-Canadian Satellite Symposium on “Pharmaceutical Sciences, Technology, Practice and Natural Products”, JSS College of Pharmacy, Ooty.	February 24-26, 2007	Dr. S.P. Dhanabal Dr. S. Manimaran

National Seminar on "Pharmaceutical Sciences, Practice and Education", JSS College of Pharmacy, Ooty.	March 01-03, 2008	Dr. S.P. Dhanabal Dr. S. Manimaran
3rd International Congress on "Complementary Medicine Research", Sydney, Australia	March 29-31, 2008	Dr. S.P. Dhanabal
1st International Euro-India Conference on "Holistic Medicine (ICHM-2008)" (organized by Ayurveda-und Venen-Klinik Dr. Mathew, Austria), Kottayam, Kerala.	August 21-23, 2008	Dr. S.P. Dhanabal Dr. T.K. Praveen
International Herbal Conference on "Herbal Medicine-Evaluation of Quality, Efficacy and Safety", held at The Lalit Ashok, Bangalore.	February 26-28, 2009	Dr. S.P. Dhanabal

## Annexure VII LIST OF PUBLICATIONS

(Dr. M.J. Nanjan)

1. A critical review on potent Pim kinase inhibitors under current clinical trials. Gomathi priya Jeyapal, MJN Chandrasekar, Rajendiran Krishansamy, Jubie Selvaraj, Manal Mohammed, MJ Nanjan. *Bioorganic Chemistry* (In press)
2. Thiazolidinediones as antidiabetic agents: A critical review, **Moola Joghee Nanjan**, Manal Mohammed, Prashantha Kumar B R, Chandrasekar M J N, *Bioorganic Chemistry* (In press).
3. Resveratrol, a potential radioprotective agent: A mini review. Dithu Thekkekkara, B Duraiswamy, **M J Nanjan**. *International Journal of Pharmaceutical Science and Research* (2017); Vol. 8(9):1000-09.
4. Poly(malic acid) bearing Doxorubicin and N-Acetyl Galactosamine as a site-specific prodrug for targeting Hepatocellular carcinoma. Nivishna Venkatraj, **M.J.Nanjan**, Pascal Loyer, M.J.N.Chandrasekar and Sandrine Cammel-Marion. *Journal of Biomaterials Science: Polymer Edition*, 2017, [://dx.doi.org/10.1080/09205063.2017.1311294](http://dx.doi.org/10.1080/09205063.2017.1311294).
5. Estrogen Receptor Agonists/Antagonists in Breast Cancer Therapy: A critical review, A Jameera Begam, S Jubie and **M.J.Nanjan**, *Bioorganic Chemistry* 71(2017)257-274.
6. A pharmacological overview of lamotrigine for the treatment of epilepsy. Venkata Ramesh Yasman, Satya Lavanya Jakki, V.Senthil, M.Eswaramoorthy, S.Shanmuganathan, K.Arjunan and **M.J.Nanjan**. *Expert Review of Clinical Pharmacology*. ISSN:1751-2433(Print)1751-2441(Online) Journal homepage: <http://www.tandfonline.com/loi/ierj20>
7. Inhibitors of histone deacetylase as antitumor agents: A critical review Manal Mohammed, M. J. N. Chandrasekar, Gomathi Priya Jeyapal, **M.J. Nanjan**. 2016, 18-42.
8. Nutritional assessment of the plant, *spargula arvensis*. Linn. Mahalakshmi Sundarapandian, Dithu Thekkekkara and **Moola Joghee Nanjan**. *Indian Journal of Natural Product Research*, Vol.7(2), June 2016, pp.150-154.



9. Classical taxonomy studies of medically important *Ipomoea leari*. Porwal O, Gupta S, **Nanjan M.J**, Singh A *Ancient Sci of life*, 2015; 35: 34-41.
10. An Insight into the synthesis and biological evaluation of Pyrazoloquinolines. R. Chandrasekhar, **M. J. Nanjan**. *International Journal of Pharm Research & Development* 2015, 7(5), 44-69.
11. A thermally responsive short elastin like polypeptide drug conjugate: synthesis, characterization and biological evaluation for targeted delivery of anticancer Drugs. Rubha Saxena, **Moola Joghee Nanjan**. *Int J of Pharm Sci*. 2014, Vol 6 ,Issue10, 326-333.
12. **Anticancer potential of Solanum jasminoides**. O. Porwal, **M. J. Nanjan**, M. J. N. Chandrasekar, R. Srinivasan and S. Gupta *International Journal of Pharmaceutical Sciences and Research*, 2014; Vol.5 (9): 3768-3774.
13. Resveratrol for the Management of Diabetes and its Downstream Pathologies. **Moola Joghee Nanjan** and James Betz.; *European Endocrinology*, 2014;10 (1):31-5
14. Chitosan based *in situ* gel forming azithromycin nanocomposite for treating *S.typhi* infections. D.Manikandan, V. Nivishna and **M.J.Nanjan** *Nanomedicine and Nanobiology*, 2013 (In Press)
15. Docetaxel loaded *in situ* gel forming nanocomposite and its anticancer activity. D. Manikandan, R. Thangam, **M.J. Nanjan** *Journal of Nanopharmaceutics and Drug Delivery*, 1, 279-288 (2013).
16. An *in vitro-in vivo* correlation study of modified release formulations of Venlafaxine.HCl. Aravindaraj, J.R., Manikandan, D., **Nanjan, Moola Joghee**. *Journal of Basic and Applied Pharmaceutical Sciences*,2014;35(4)565-576.
17. Novel Glitazones with Diverse Peroxisome Proliferator Activated Receptor Modulatory Potential. Thaggikuppe Krishnamurthy Praveen, Moola Joghee Nanjan Chandrasekar, **Moola Joghee Nanjan** *Current Bioactive Compounds*, Volume:9, Issue:3,Pages 221-234,2013.
18. Elastin like Polypeptides and their Applications in Anticancer Drug Delivery Systems: A Review. Rubha Saxena, **Moola Joghee Nanjan** *Drug Delivery*, DOI: 10.3109/10717544.2013.853210
19. Resveratrol supplementation in patients with Type II Diabetes Mellitus: A prospective, open label, randomized controlled trail. Bhatt Jayesh Kumar, **Nanjan Moola Joghee** *International Research Journal of Pharmacy*, 2013, 4 (8), 245-249.
20. Newer approaches to the discovery of glitazones. T.K. Praveen, M.J.N. Chandrasekar, **M.J. Nanjan** *Mini-Reviews in Organic Chemistry*, 2013, 10, 66-72.
21. Novel glitazones : glucose uptake, cytotoxic activitiy and structure-activity relationships, B.R. Prashatha Kumar, S. Santhosh Kumar, Patel Viral, Ashish Wadhvani, R.Vadivelan, M.N. Sathish Kumar, K. Elango, **M.J. Nanjan**. *Med Chem Res* (2012) 21: 2689-2701.
22. Antioxidant activity of *Ipomoea Leari*, Porwal Omji, Saxena Rubha, **Nanjan Moola Joghee**, *Journal of Drug Delivery & Therapeutics*; 2012, 2(5), 79-85.
23. Discovery of novel glitazones incorporated with phenylalanine and tyrosine: Synthesis, antidiabetic activity and structure-activity relationships. B.R.

- Prashantha Kumar, Nasir R. Baig, Sai Sudhir, Koyal Kar, M. Kiranmai, M. Pankaj, **Nanjan M. Joghee**. *Bioorganic Chemistry*, 45 (2012) 12–28.
24. A simple and efficient synthesis of 3-(2-Pyridinyl)dithio propanoic acid hydrazide : a heterobifunctional crosslinker. Rubha Saxena, **M.J. Nanjan** *Int J Pharm Pharm Sci*, Vol 4, Suppl 4, 557-559, 2012
  25. Resveratrol supplementation improves glycemic control in type 2 diabetes mellitus. Jayesh kumar Bhatt, Sabin Thomas, **M.J. Nanjan**. *Nutr. Res*, 32 (2012) 537–541.
  26. *In vitro* antioxidant activity of *Solanum jasminoides* Paxt extracts. M.J.N. Chandrasekar, R.Srinivasan, O.Porwal, **M.J. Nanjan** *Journal of Natural Remedies*. Vol. 12/2 (2012)114-117.
  27. Sydnones, A Brief Review, Roshini Chandrasekhar, **M.J. Nanjan** *Mini Reviews in Medicinal Chemistry*, 2012, 12, 1359-1365.
  28. Synthetic strategies for the construction of delta carbolines: A chemical ladder in search of novel drugs. Ankur Gupta, Bhagyashree Kamble, **Nanjan Moola Joghee** and Chandrasekar Moola Joghee *Nanjan Current Organic Synthesis*, 2012, 9, 377-396.
  29. Development of sustained release antipsychotic tablets using novel polysaccharide isolated from *Delonix regia* seeds and its pharmacokinetic studies. K. Krishnaraj, M.J.N. Chandrasekar, **M.J. Nanjan** S. Muralidharan, D. Manikandan *Saudi Pharmaceutical Journal*, (2012) 20, 239-248.
  30. Health Outcome Measures for Diabetes Mellitus: A Review. Jayesh K Bhatt, Sabin Thomas, **Nanjan M.J.** *Applied Research in Quality of Life*.(2012) 7:413–443.
  31. Effect of Oral Supplementation of Vitamin C on Glycemic Control and Lipid Profile in Patients with Type 2 Diabetes Mellitus. Jayesh K Bhatt, Sabin Thomas, **Nanjan M.J.** *International Journal of Pharmacy and Pharmaceutical Sciences*, 2012,4, 2, 3541.
  32. Synthesis and biological evaluation of some substituted 4-Piperidones, Manikandan D, Krishnaraj K, **Nanjan M.J.** *International Journal of ChemTech Research*, 2012, 4, 2, 532-538.
  33. Efficient conversion of N-terminal of L-tyrosine DL-phenylalanine and glycine to substituted 2-thioxo-thiazolidine 4-ones: A stereospecific synthesis, B.R. Prashantha Kumar, Prabudha Basu, L. Adhikary, **M.J. Nanjan** *Synthetic Communication: An international journal for rapid communication of synthetic organic chemistry*. DOI 10. 1080/00397911.2011.576322.
  34. Synthesis and characterization of 3-Hydroxy-4, 5-dihydro[1,2,3] Oxadiazolo [3,4-A] Quinolin-10-ium and its Fluoro derivative. Roshini Chandrasekhar, B. Gopalan, **M.J. Nanjan** *Internal Journal of Chem Tech Research* Vol. 3, No.3, pp 1125-1128, July-Sept 2011
  35. Rigid and flexible docking studies on PPAR- $\alpha$  agonists: key interactions for a better antihyperglycemic activity and in silico pharmacodynamic activity versus experimental in vivo activity. B. R. Prashantha Kumar, S. Sopna, Jenson Verghese, Bijoy Desai, **M. J. Nanjan**. *Med Chem Res*. (2012) 21:624-633.
  36. Phytochemical Investigations of *Caesalpinia Digyna* Root. R.Srinivasan, M.J.N.Chandrasekar, **M.J.Nanjan** *E-Journal of Chemistry*, 2011, 8(4), 1843-1847

37. Investigation of selected medicinal plants (*Strobilanthes kunthianus*, *Strobilanthes cuspidatus*) and marketed formulation (Shallaki) for their anti-inflammatory and anti-osteoarthritic activity. B.S. Desu, K. Elango, M. N. Satish Kumar, B. Suresh, S. Manimaran, **M. J. Nanjan**. *Pharmanest* 2011, 2, 492-494.
38. Isolation and evaluation of a polysaccharide from *Prunus amygdalus* as a carrier for transbuccosal delivery of Losartan potassium. MJN. Chandrasekar, S. Mahesh Kumar, D. Manikandan, **M.J.Nanjan**. *International Journal of Biological Macromolecules*, doi:10.1016/j.ijbiomac.2011.02.023.
39. Analysis of wedelolactone in *Eclipta alba* and its formulation by HPTLC. Somesh Thapliyal, N.Mahadevan, M.J.Nanjan. *Journal of Global Trends in Pharmaceutical Sciences* 2011, 2(4), 450-457.
40. *In vitro* dissolution profile comparison of an anti-migraine combinational drug in dosage form. Hiremath Vijay Basayya, Kaliaperumal Krishna, Bhojraj Suresh, **Nanjan Moola Joghee** *Chinese Journal of Chromatography*, 2010, 28(1), 93-99
41. Modern approaches to herbal drug standardization from a global perspective. **M.J. Nanjan** *Ayurveda in Transition, Essays in memory of Aryavaidyan S. Varier*, Dec 2010, 82-92, Kottakkal Arya Vaidya Sala.
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