

# Schedule T- Good manufacturing Practices of Indian Systems of Medicine

## Points to be covered in this topic

- Introduction
- Basic principles of GMP
- Components of GMP
- List of machinery, equipment and minimum manufacturing premises required for the manufacture of various categories of ayurvedic, siddha system medicines
- List of machinery, equipment and minimum manufacturing premises required for the manufacture of various categories of Unani System of Medicines



# Schedule T- Good manufacturing Practices of Indian Systems of Medicine

## ❑ INTRODUCTION

- Good Manufacturing Practice (GMP) is a **production and testing practice** that helps to **ensure a quality product**.
- These are a **series of general principles** that must be observed during **manufacturing**
- When a **company is setting up** its quality program and manufacturing process, there may be many ways it can **fulfill GMP requirements**
- It is the company's responsibility to determine the **most effective and efficient quality process**
- The **Good Manufacturing Practices for ASU Drugs as described in Rule 157 of Drugs & Cosmetics Rules 1945** with conditions as **specified in Schedule T / GMP** are to ensure that :
  - I. Raw materials used in the manufacture of **drugs are authentic**, of **prescribed quality** and are **free from contamination**
  - II. The **manufacturing process is as has been prescribed** to maintain the standards
  - III. **Adequate quality control** measures are adopted
  - IV. The **manufactured drug** which is released for **sale is of acceptable quality**

## ❑ BASIC PRINCIPLES OF GMP

Many countries have legislated that **pharmaceutical and medical device companies must follow GMP procedures**, and have created their own GMP guidelines that correspond with their legislation

**Although there are a number of them, all guidelines follow a few basic principles :**

- Manufacturing processes are **clearly defined and controlled**. All critical processes are **validated to ensure consistency**



- Manufacturing processes are **controlled, and any changes to the process are evaluated**
- Changes that have an impact on the **quality of the drug are validated as necessary**
- **Instructions and procedures are written in clear** and unambiguous language
- **Operators are trained to carry out and document procedures**

## ☐ COMPONENTS OF GMP AND ITS OBJECTIVES

- **GMP schedule** for ISM manufacturing units is quite elaborate and broadly covers each and every component of manufacturing process
- Different components of GMP are given below in order of appearance in **Schedule-T**

### ❖ Part-I

#### ➤ **Factory Premises**

**The manufacturing plant should have adequate space for :**

- I. **Receiving and storing raw material**
- II. **Manufacturing process areas**
- III. **Quality control section**
- IV. **Finished goods store**
- V. **Office**
- VI. **Rejected goods/drugs store**



#### ➤ **General Requirements**

- A. **Location and surroundings**
- B. **Buildings**

The building used for factory shall be such as to permit production of **drugs under hygienic conditions** and **should be free from cobwebs and insects/rodents.**

The **premises used for manufacturing, processing, packaging and labelling will be in conformity with the provisions of the Factory Act**

1. Compatible with other **manufacturing operations**
2. Adequately provided with **working space to allow orderly and logical placement of equipment and** avoid the **risk of mix up** between different drugs or components
3. Designed, constructed and maintained to **prevent entry of insects and rodents**
4. Interior surface (walls, floors and ceilings) shall be smooth and free from cracks and permit easy cleaning and disinfection

### C. Water Supply

### D. Disposal of Waste

### E. Container's cleaning

### F. Stores

#### ✓ Raw Materials :

- All raw materials for manufacturing shall be **stored in the raw materials store**
- While designing such containers, cabins or areas in the raw materials store, care may be taken to handle the

#### Following different categories of raw materials :




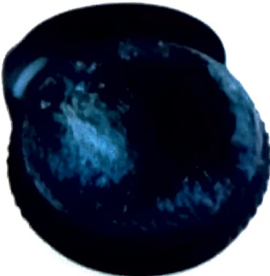
1. Raw material of metallic origin
2. Raw material of mineral origin
3. Raw material from animal source
4. Fresh Herbs
5. Dry Herbs or plant parts
6. Excipients etc
7. Volatile oils/perfumes and flavours
8. Plant concentrates and exudates/resins





## 2. PART-II

A. List of machinery, equipment and minimum manufacturing premises required for the manufacture of various categories of ayurvedic, siddha system medicines

**1200 Square feet** covered area with **separate cabins** partitions for each activity. If **Unani medicine are manufactured in same premises** an additional Area of **400 sq. feet will be required**


S.no.	Category of Medicine	Minimum manufacturing space required	Machinery/equipment recommended
1	 <p><b>Churna / Nasya / Manjan/ Lepa Kwath Chum</b></p>	<b>200 Sq. feet</b>	Grinder/Disintegrator/Pulveriser/Powder mixer/Sieves/shifter
2	<p><b>Pills/Vatti/Gutika Matirail</b></p> 	<b>100 Sq. feet</b>	<p><b>Ball Mill, Mass mixer/power mixer, pill/vatti cutting machine, stainless steel trays/Containers for Storage</b></p> <p>Driers/ Mechanised chatee (for mixing guggul) where required</p>
3	<p><b>Tablets</b></p> 	<b>100 Sq. feet</b>	<p><b>Ball Mill, Mass Mixer/Powder mixer, Granulator, drier, Tablet compressing Machine and sugarcoating machine</b></p>
4	<p><b>Kajal</b></p> 	<b>100 Sq. feet</b>	<p><b>Earthen lamps for Collection of Kajal, Tripplle Roller Mill, End Runner, Sieves, S.S Patila, Filling/packing manufacturing room should be provided with exhaust fan and ultra violet lamps</b></p>




5	<b>Capsules</b> 	100 feet	Sq.	Air-Conditioner, <b>De humidifier, hygrometer, Thermometer, Capsule filling Machine</b> and chemical balance
6	<b>Ointment/Marham Pasai</b> 	100 feet	Sq.	Tube filling machine, Crimping Medicine/Ointment Mixer, End Runner/Mill (Where required), <b>S.S Patila</b>
	<b>Asava /Aristha</b>	100 feet	Sq.	Fermentation tank, container and distillation plant

Each manufacturing unit will have a separate area for Bhatti, furnaces, boilers, puta, etc. This will have proper ventilation, removal of smoke, prevention of flies, insects, dust etc. the furnace section could have tin roof

### B. List of machinery, equipment and minimum manufacturing premises required for the manufacture of various categories of Unani System of Medicines

**1200 Square feet** covered area with **separate cabins** partitions for each activity. If Ayurveda/Siddha medicines are manufactured in same premises an additional Area of **400 sq. feet will be required**

Sr. No .	Category of Medicine	Minimum manufacturing space required	Machinery/equipment recommended
1	<b>Habb (Pills) and Tablets</b> 	100 sq. ft	<b>Ball Mill, Mass Mixer Powder mixer, Granulator drier, tablet compressing machine, pill/vatti cutting machine, stainless steel trays/container for storage and sugar coating, polishing pan in case of sugar coated tablets, mechanised chato, (for mixing of guggul) where required</b>

2	<b>Sufoof (Powder)</b>	200 sq. ft.		Grinder/Pulveriser, Seiver, Trays, Scoups, Powder mixer, (where required)
3	<b>Raughan (Oils) (Crushing and Boiling)</b>	100 sq. ft.		Oil Expeller, S.S. Patilas Oil filter bottle filling machine, bottle drier, Bhatti
4	<b>Marham, Zimad (Ointment)</b>	100 sq. ft.		Kharal, Bhatti, End runner, Grinder, Pulversiser, Tripple Roller Mill
5	<b>Qurs (Tab)</b>	100 sq. ft.		<b>Grinder/Pulveriser, Sieves, power mixer (where needed), Granulator, Drier, Tablet compressing machine, Die punches Trays, O.T. Apparatus, Balance with weights, Scoops, Sugar coating pan, Polishing pan, Heater</b>
6	<b>Capsule</b>	100 sq. ft.		Pulveriser, <b>Powder mixer</b> (where needed), <b>capsule filling machine</b> , Air conditioner, <b>De-humidifier balance with weights</b> , storage containers, glass
7	<b>Qutoor-e-Chashm and Marham (Eye drops, eye ointment)</b>	100 sq. ft.		<b>Hot air oven electrically</b> heated with Thermostatic control, kettle

# GENERAL INTRODUCTION TO HERBAL INDUSTRY

## Points to be covered in this topic

- **Introduction**
- **Present status of herbal medicine**
- **Future prospects of herbal medicine**
- **Plant based industries in India**
- **Central governmental establishments**





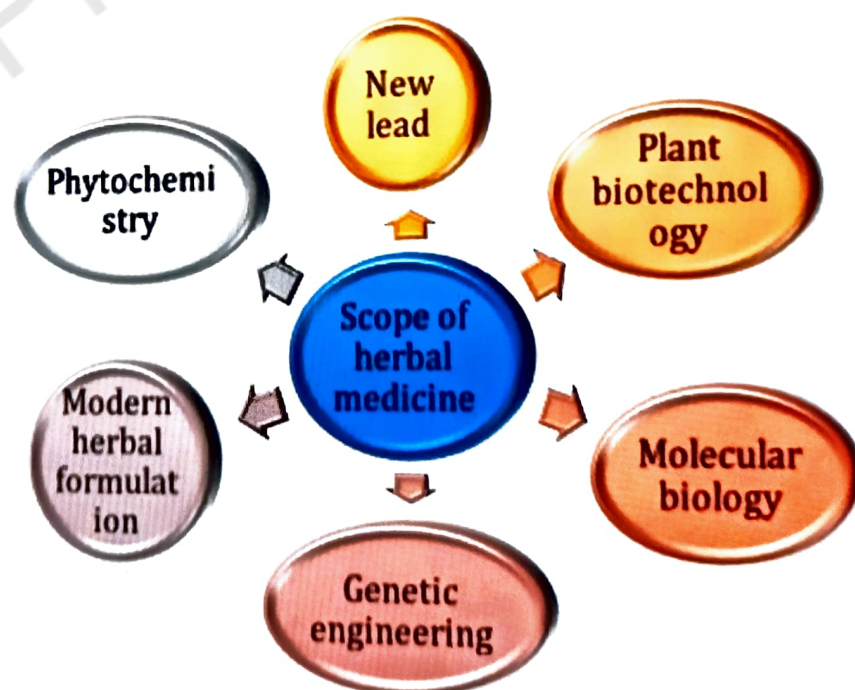
## ❑ INTRODUCTION

- Global resurgence of interest in medicinal plants has resulted in explosive growth of the herbal drug industry
- A recent survey revealed that **61% of the 877 drugs introduced worldwide** can be traced to or were inspired by natural products
- The **World Health Organization (WHO)** estimates that **80% of the population** of developing countries **relies on traditional medicines**
- Even the **modern pharmacopoeia** contains at least **25% drugs derived from plants** and many others, which are **semi-synthetic**
- In the global herbal market **European Union (EU)** has the biggest share of **45%** while **North America** accounts for **11%**, **Japan 16%**, **Asian countries 19%** and **rest of EU 4.1%**
- The global market for medicinal plant-based raw drugs alone is estimated to be worth more than US \$5 billion per annum. **India's export share in this is about 8%** with **China (24%)** and the **United States (11%)** being the leaders

## ❑ PRESENT STATUS OF HERBAL MEDICINE

- Herbal medicine based traditional medical system of treatment is the **rapidly growing health care system** of economic importance and is now widely used in many countries of the world
- In Africa up to **80% of the population** use this traditional medicine system
- It is very difficult to point out an exact time when the use of plants was started as medicine, the carbon dating from **ancient Babylon (Iraq)** records that plants were cultivated as medicines **60,000 years ago**.
- Ancient Ayurveda was meant essentially to promote health, however, rather than fight disease
- **Charak Samhita (1000 BC)** and **Sushrut Samhita (100 AD)** are the main **text available**
- Ayurveda materia medica gives detailed descriptions of over **1500 herbs and 10,000 formulations**

- Nature has provided many of the effective agent such as dactinomycin, bleomycin, and doxorubicin, vinblastine, etoposide, and paclitaxel (anticancer), chloroquine, artemisinin (anti-malarial), metformin and eventually the other biguanide (anti-diabetic), cucrcumin, phenoxidiol (anti-HIV drugs) etc. **India has around 25,000 effective plant based formulations** used traditionally with over 1.5 million practitioners of traditional medicinal system and **7800 medicinal drug manufacturing units in India**, which consume about **2000 tones** of herbs annual
- Traditional medicine in most regions of the world takes place after **WHO Traditional Medicine Strategy 2002-2005**, state member also developed their **own documentation and safety concern**
- available data suggests that the **Traditional medicine have significant market** in member states.
- Indian herbal market is nearly 50 billion rupees with 14% annual growth. One billion rupees worth of herbal product are being exported.
- The demand for medicinal plants is increasing everyday and WHO has projected that global herbal market will grow up to **\$ 5 trillion in 2050 from the current level of \$ 62 billion**. India and China produce more than 70% of the global diversity. The significant global herbal export market include **EU, USA, Canada, Australia, Singapore, and Japan** while **Brazil, Argentina, Mexico, China and Indonesia** are new emerging market



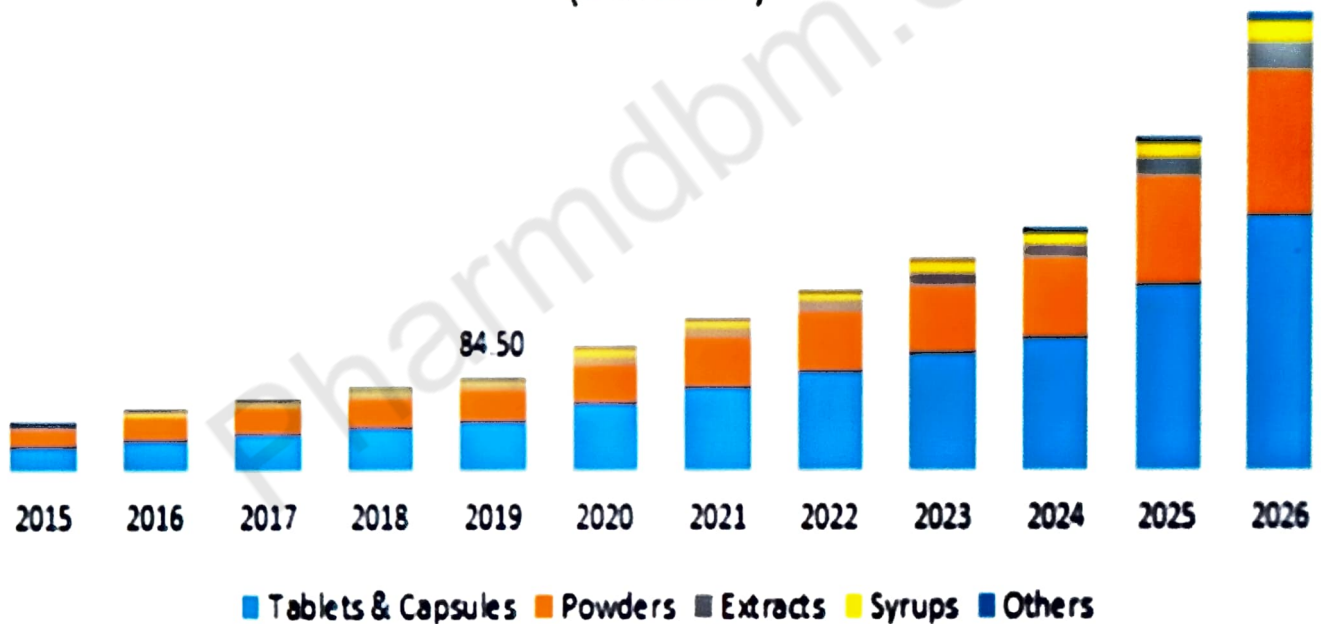
## World market

- The global herbal market has grown steadily in the last few years
- The market size is projected to reach **USD 86.74 Billion by 2022**, at a **CAGR of around 6.8% from 2016 to 2022**
- The **growing awareness for preventive healthcare** methods is the major driving factor of this market

### Significance factors :

- ✓ Preference of consumers for natural therapy
- ✓ Concern regarding undesirable side effects of modern disease
- ✓ Effective to many diseases
- ✓ Economic

Global Herbal Medicine Market Estimates, By Form, 2015 - 2026  
(USD Billion)



- The global Herbal Medicine Market size was valued at **USD 84.5 billion in 2019** and is anticipated to grow at a CAGR of 20.5% during the forecast period

## ❑ FUTURE PROSPECTS OF HERBAL MEDICINE

- It is estimated that there are **about 350,000 species** of existing plants **(including seed plants, bryophytes, and ferns)**, among which 287,655 species have been identified as of 2004. Relatively small percentages (1 to 10%) of these are **used as foods by both humans and other animal species**. It is possible that even more are used for medicinal purposes. WHO has shown great interest in documenting the use of **medicinal plants used by tribes** from different parts of the world. Many developing countries have intensified their efforts in documenting the **ethno-medicinal data on medicinal plants**. Once these **local ethno-medicinal preparations** are **scientifically evaluated** and **disseminated properly**, people will be better informed regarding **efficacious drug treatment and improved health status**. The **traditional knowledge system needs to be studied, documented, preserved** and **used for the benefit of humankind**, before it is lost forever. This will require **a holistic approach**, involvement and participation of local inhabitants.
- The **Associated Chambers of Commerce and Industry of India (ASSOCHAM)** has **projected that the market size of herbal industry which is currently estimated at Rs. 7,500 crores (Rs.75 billion) will double to levels at Rs.15,000 crores by 2015**.
- A quick estimate of the potential reveals that **India can generate raw stock of around Rs. 300 billion and easily achieve around Rs.150 billion value added products**



## ❑ PLANT BASED INDUSTRIES IN INDIA

- In India about **880 species** of **medicinal plants in active trade** estimated at **1,28,000 tonnes** of medicinal plant-based raw material is consumed by **around 8,300 licensed** units manufacturing herbal medicines and products across the country
- Of these **80% is sourced from the wild Plant** based crude drugs exported are estimated worth **Rs.463 crores**
- The major export destinations being the United States, Germany, Japan, UK, France, Taiwan, Italy, Pakistan and Hong Kong
- Today there are **30 companies doing more than Rs.5 crore business per year**
- The products of these companies are included within the broad category of **'Fast Moving Consumer Goods'(FMCG)** which include herbal medicines for internal consumption, health foods, toiletries etc.



## BEST FMCG COMPANIES

2020



**Dabur, Baidyanath and Zandu** together have about **85% of India's domestic market**. Some of the major units engaged in herbal drug manufacture are listed below :

COMMERCIAL HERBAL DRUG INDUSTRY	DESCRIPTION
<p><b>Dabur India Ltd</b></p> 	<ul style="list-style-type: none"> <li>• India's <b>largest herbal medicine supplier</b></li> <li>• The <b>fourth largest producer of FMCG</b></li> <li>• It was established in <b>1884</b> and has grown to Rs.65 crores annual turnover in 2003 With 15% sales volume being <b>herbal drugs and the rest mostly food and cosmetics</b></li> <li>• <b>Dabur Chyawanaprash</b> having a <b>market share of 70%</b> and <b>Chewable Hajmola digestive tablets 88%</b>. Other major products are Dabur Amla Hair Oil, Vatika (shampoo) and Lal Dant Manjan (tooth powder).</li> <li>• Dabur's Ayurvedic Specialities Division has over <b>260 medicines</b> for treating a range of conditions from <b>common cold to chronic paralysis</b></li> </ul>
<p><b>Sri Baidyanath Ayurvedic Bhawan Ltd</b></p>	<ul style="list-style-type: none"> <li>• Was founded in <b>1917</b> in <b>Kolkata</b> and specializes in Ayurvedic medicines</li> <li>• It has expanded into <b>FMCG with cosmetic and hair-care products</b>. With a total sales volume of <b>Rs.35 crores</b>, it has over <b>700 Ayurvedic products</b> made at <b>10 manufacturing centres</b> with <b>1,600 employees</b></li> </ul>

**Baidyanath**

**100** years of caring



## Zhandu Pharmaceutical

- Zhandu Pharmaceutical Works incorporated in Bombay in 1919 was named after an 18th century Ayurvedic physician
- Its primary business being herbal drugs, today it also has chemicals and cosmetics divisions. With total sales volume at Rs.4.5 crores
- one of its current projects is to develop a plant-derived dopamine drug for Parkinsonism for which an NDA has been filed with the USFDA

## Himalaya Drug Company

- Was established in 1934 in Bangalore
- With Rs.50 crores annual turnover
- it has a US Distribution Division (Himalaya USA)
- It is well known in the United States for Liv-52 a liver protective for the treatment of viral hepatitis

## Charak Pharmaceuticals

- Founded in 1947 has three distribution centres across India 'Evanove' its product for menopause contains herbal estrogen receptor modulators in addition to soya and asparagus

## Vicco Laboratories

- Established in 1958 mainly produces topical therapies based on Ayurveda
- It is best known internationally for its tooth paste Vajradanti



TOP 10



AYURVEDIC PRODUCT



MANUFACTURERS IN INDIA पतंजलि®



ZANDU

Himalaya®



VICCO  
LABORATORIES

<p><b>The Emami Group</b></p>	<ul style="list-style-type: none"> <li>• Founded in <b>1974</b> . with an <b>annual turnover of Rs. 11 crores</b></li> </ul>
<p><b>Aimil Pharmaceuticals Ltd.</b></p>	<ul style="list-style-type: none"> <li>• <b>Incorporated in 1984</b> and engaged in manufacture and sales of both generic and proprietary Ayurvedic medicines has an annual business turnover of Rs.2 crores</li> </ul>
<p><b>Universal Medicaments Pvt. Ltd</b></p>	<ul style="list-style-type: none"> <li>• <b>Unit of Universal Pharmaceuticals Group</b></li> <li>• Best recognized for its formulations <b>Karnim (anti-diabetic supplement)</b>, <b>Herbokam (anti-Stress formula)</b>, <b>Chetak (stimulant)</b> and <b>Tonabolin (iron supplement)</b></li> </ul>
<p><b>Surya Herbal</b></p>	<ul style="list-style-type: none"> <li>• New Delhi is involved in <b>manufacture and export of wide range of Ayurvedic generic</b>, branded specialties and other OTC herbal health care products</li> <li>• Established in the <b>year 1999</b>, it was promoted by <b>Surya Roshini Group</b></li> </ul>



**emami\* limited**



**UNIVERSAL  
AUTOFOUNDRY  
LIMITED**



**AIMIL**

**PHARMACEUTICALS (INDIA) LIMITED**





## Sami Labs



- Research and Development group of **Sabinsa Corporation**, a US company with affiliates in India
- It produces **herbal extracts and special powders**

## Maharishi Ayurveda Products International Inc.



- **Established in 1985**
- It was first set up as a **100% export-oriented unit**. With an annual sales turnover of nearly Rs. **5 crores**
- **ISO 9001 certified Maharishi Ayurveda produces over 900 medicinal formulations** and presently it exports to over four countries with the **United States alone consuming 50% of its turnover**

## Kottakkal Aryavaidya Sala



- Is a **century-old charitable institution** engaged in the practice and propagation of Ayurveda
- Established at **Kottakkal in Kerala in 1902** by the visionary physician and philanthropist the Late **Vaidyarathnam P.S.Varier**

## Cholayil



- Is amongst **kerala's most famous and respected ayurvedic families** practicing Ayurveda for generations and also presently manufacturers of the world's largest selling Ayurvedic soap '**Medimix**'
- A **Chennai-based Rs.100-crore FMCG**,
- Cholayil Pharmaceuticals is the **flagship company** of the Cholayil group and produces products focussed on the **toiletries, personal care and health care segments**.
- It has **15% market share in talc and 17% in bath soap in Kerala**.
- Its products include both **traditional formulations and herbal contemporary dosage forms**

## ☐ Medicinal and Aromatic Plant based industries and institutions in India

- In India, it is estimated that there are about **25,000 licensed pharmacy of Indian system of medicine. P**
- **Recently about 1000 single drugs and 3000 compound formulations are registered**
- Herbal Industry in **India uses about 8000 medicinal plants.**
- In India, herbal Research institute and manufacturer of herbal formulations. However none the pharma has standardized herbal medicine using active compounds as markers linked with confirmation of bioactivity of medicinal plants.
- There are about **8000 drug manufactures in India**, there are however **not more than 25 manufactures that can be classified as large scale manufactures**
- A large number of **academic, industrial and government institutes are conducting research on the medicinal plants of India**

Following Table provides a short list of some of the eminent institutes which are active in research on medicinal plants and in Ayurveda :

Name	City	Postal code	e-mail
CCRAS (Central Council for Research in Ayurveda and Siddha)	New Delhi	110001	ccras_dir1@nic.in
RRL (Regional Research Laboratory) (CSIR)	Jammu-Tawi	180001	qazi_gn@yahoo.com
NBRI (National Botanical Research Institute) (CSIR)	Lucknow	226001	r.tuli@nbri.res.in
Gujarat Ayurveda University	Jamnagar	361008	info@ayurveduniversity.com
Bhavan's SPARC	Mumbai	400049	bhaspa@bom5.vsnl.net.in
National Institute of Ayurveda	Jaipur	302002	nia@raj.nic.in
ACARTS	Mumbai	400008	clinpharm@hathway.com
Arya Vaidya Shala	Kottakal	676503	mail@aryavaidyasala.com
Interdisciplinary School of Health Sciences	Pune	411007	shs@unipune.ernet.in
Banaras Hindu University	Varanasi	221005	directorims@satyam.net.in
CIMAP (Central Institute for Medicinal and Aromatic Plants)	Lucknow	226015	director@cimap.res.in
ICMR (Indian Council for Medical Research)	New Delhi	110029	icmrhqds@sansad.nic.in
National Medicinal Plants Board	New Delhi	110001	ccras_dir1@nic.in
Indian Drug Manufacturers	Mumbai	400018	publications@idm.in
Regional Medical Research Centre (ICMR)	Belgaum	590010	oicmrbelm@yahoo.co.in
PERD Centre (Pharmaceutical Education and Research Development)	Ahmedabad	380054	perdar@perdcentre.com
CCRUM (Central Council for Research in Unani Medicine)	New Delhi	110001	ccrum@del3.vsnl.net.in
NISCOM (National Institute of Science Communication)	New Delhi	110012	niscom@sirnetd.ernet.in
IMPCCOPS (Indian Medical Practitioners Co-operative Pharmacy & Stores Ltd.)	Chennai	600041	admin@webhealthcenter.com
IHMHR (Indian Institute of History of Medicine and Medical Research)	New Delhi	110062	root@chamduni.res.nic.in
Zandu Foundation	Mumbai	400025	zanduhq@glasbn01.vsnl.net.in
Pharmexil	Hyderabad	500038	info@pharmexil.com
Chemexil	Mumbai	400039	chemexil@vsnl.com
CDRI (Central Drug Research Institute) (CSIR)	Lucknow	226001	icmrredl@res.nic.in
IMPLANT Centre (Inter-university Medicinal Plant Laboratory for Analysis, Nurture and Therapeutics)	Rajkot	360005	rrkalartya@sauuni.ernet.in
NIMHANS (National Institute for Mental Health and Neurosciences)	Bangalore	560029	siddha@nimhans.kar.nic.in
Punjab University	Chandigarh	600014	webman@pu.chd.ac.in
LM College of Pharmacy	Ahmedabad	380009	mukeshgobal@hotmail.com
NBPGR (National Bureau of Plant Genetic Resources)	New Delhi	110012	root@nbpgr.delhi.nic.in
NPRC (Nicholas Piramal Research Centre)	Mumbai	400013	recruitment@nicholaspiramal.co.in
NCL (National Chemical Laboratory)	Pune	411008	rs.malga@ncl.res.in
TBGRU (Tropical Botanical Garden & Research Institute)	Thiruvananthapuram	695562	director_tbgru@rediffmail.com
BHU (Banaras Hindu University)	Varanasi	221005	ve_bhu@sify.com
Podar Hospital	Mumbai	400018	rapame@rediffmail.com
Botanical Survey of India	Kolkata	700001	envis@cal2.vsnl.net.in
FRHET (Foundation for Revitalisation of Local Health Traditions)	Bangalore	560024	Darshan.shankar@frhet.org.in
IATAM (International Association for the Study of Traditional Asian Medicine)	Mumbai	400012	iastamindia@vsnl.net
ADMA (Ayurvedic Drug Manufacturing Association)	Mumbai	400012	amam2003@sify.com

## ❑ CENTRAL GOVERNMENTAL ESTABLISHMENTS

### 1. Ayush

Agenda of AYUSH Developing and propagating these officially recognized traditional medical systems by :

1. Encouraging scientific **research and regulating education standards**
2. **Promoting cultivation and regeneration** of medicinal plants
3. Laying down pharmacopoeial standards to ensure **quality drugs by following good manufacturing practices (GMP)** and evolving good laboratory practices
4. Supplementing state governments' efforts in setting up specialist clinics of **AYUSH in allopathic hospitals and AYUSH wing in district allopathic hospitals**
5. **Creating and spreading awareness** by effective communication strategies to reach all sections of people

#### *Research councils*

- **CCRAS** is an autonomous body under the department of **AYUSH, Ministry of Health and Family Welfare, Government of India**. Its activities are carried out through its **38 institutes/units located all over India and through a number of units located in universities/institutes/hospitals of Ayurveda and Siddha**
- **CCRUM**, also an **autonomous organization**, was **established in 1979** to initiate, develop and coordinate scientific research in Unani system of medicine
- **CCRH**, fully funded by the government, functions through a network of 40 institutes/units
- **National Medicinal Plant Board (NMPB)**

**Medicinal plants are a living resource**, exhaustible if overused and sustainable if used with care and wisdom



## National institutes

The following are the **11 national institutes** under **AYUSH** established to promote **excellence in ISM and Homeopathy education**:

1. **National Institute of Ayurveda, Jaipur**
2. **National Institute of Siddha, Chennai**
3. **National Institute of Unani Medicine, Bengaluru**
4. **Morarji Desai National Institute of Yoga, New Delhi**
5. **National Institute of Naturopathy, Pune**
6. **National Institute of Homeopathy, Kolkata**
7. **The Rashtriya Ayurveda Vidyapeeth, Delhi**
8. **The All India Institute of Ayurveda, New Delhi**
9. **North Eastern Institute of Folk Medicine, Pasighat**
10. **Institute of Post Graduate Teaching and Research in Ayurveda, Jamnagar**
11. **North Eastern Institute of Ayurveda and Homeopathy, Shillong**

## 2. Council of Scientific and Industrial Research

The Council of **Scientific & Industrial Research (CSIR)**, a **premier industrial R & D organization** in India was constituted in **1942** by a **resolution** of the Central Legislative Assembly

**CSIR laboratories** at the forefront of herbal drug-related research are listed below :

- **Central Institute of Medicinal and Aromatic Plants, Lucknow (CIMAP)**
- **Indian Institute of Integrative Medicine, Jammu**
- **National Botanical Research Institute, Lucknow**

## 3. Department of Science and Technology



- The **Department of Science and Technology (DST)**
- Is a **department within the Ministry of Science and Technology in India established in 1971**
- objective is to **promoting new areas of science and technology** and to **play the role of a nodal department for organizing, coordinating and promoting scientific and technological activities in the country**

#### 4. Department of biotechnology

- The **setting up of a separate Department of Biotechnology ( DBT)** under the **Ministry of Science and Technology in 1986**

#### 5. Indian council of medical research

- The **Indian Council of Medical Research ( ICMR), New Delhi**
- The apex body in India for the **formulation, coordination and promotion of biomedical research**
- One of the **oldest research bodies in the world**

#### 6. Defense research and development organization

- The **Defense Research and Development Organization ( DRDO)** is an **agency of the Republic of India, responsible for the development of technology** for use by the military
- It was formed in **1958**

#### 7. Indian council of agricultural research

- The **Indian Council of Agricultural Research ( ICAR)** is an **autonomous organization** under the **Department of Agricultural Research and Education (DARE)**, Ministry of Agriculture, Government of India.
- Formerly known as Imperial Council of Agricultural Research, it was **established in 1929**



सत्यमेव जयते

Department of Science and Technology (DST)

**DST**



**icmr**  
INDIAN COUNCIL OF  
MEDICAL RESEARCH  
Serving the nation since 1911