

**No. DSIR/MS/2020/04**  
**Government of India**  
**Ministry of Science & Technology**  
**Department of Scientific & Industrial Research**  
**MONTHLY SUMMARY FOR THE CABINET**  
**(April 2020)**  
**(Part-I Unclassified)**

**Major achievements during the month of APRIL 2020:**

**1. Council of Scientific & Industrial Research (CSIR)**

**Key Contributions and Activities of CSIR**

Even as the entire country was in a nation-wide lockdown, CSIR and its laboratories were operated overtime with many scientists, staff and students who worked round the clock to develop technologies and tools to mitigate the rapid spread of the virus in the country and also find a cure for the disease. With expertise in various disciplines spanning from biological sciences, to chemical sciences and engineering, CSIR was engaged in developing and deploying several S&T based solutions, products and technologies towards addressing the epidemic in the country. Despite the extraordinary challenge posed by lockdown, CSIR scientists, students and staff, exhibiting great dedication, have worked tirelessly on multiple fronts ranging from setting up testing of patient samples, to development of novel diagnostics, drugs, vaccines and hospital devices and PPEs and other initiatives. A dedicated site on the CSIR website has been created for capturing COVID 19 related activities.

During April 2020, CSIR and its laboratories carried out its activities aligned to its five verticals that CSIR devised in March 2020 as soon as the pandemic hit the country. The five verticals are:

- Digital and Molecular Surveillance;
- Rapid and Economical Diagnostics;
- Repurposed/New Drugs and Vaccines;
- Hospital Assistive Devices and PPEs,
- Supply Chain and Logistics.

All CSIR labs are contributing to these verticals and CSIR is actively engaged in identifying suitable Industry and PSU partnerships for each and every vertical such that the products and technologies developed are readily scaled up and deployed in the country. CSIR is also working in close synergy with other ministries and departments and state governments in the mitigation of the Covid19 outbreak. CSIR has let firms defer fees on use of its technology and also allow it to use its IP to manufacture items

for containing COVID-19 and to defer payments for up to six months. This will be applicable to include diagnostic kits, PPEs, drugs & health equipment.

### **Digital and Molecular Surveillance**

The goal of this vertical is to be able to trace patients digitally and establish virus transmission chains and mitigate transmission. Further, identification of the strain of the virus and its sequence are critical towards understanding molecular epidemiology, which will assist in accurate diagnosis, development of suitable vaccines and drugs for the Indian population.

- **Molecular Surveillance:** From the time of identification of the Coronavirus strain (SARS-CoV-2) causing Covid-19, nearly 11,000 sequences have been reported globally which are mainly from China, US, and other countries. The data obtained from sequencing helps trace the spread of the viral strains and how they are evolving and if the vaccines and drugs under development would be effective on the strains. Given the vast influx of people from all over the globe, the vastness of the country and the genetic diversity, it is especially critical for India to understand the origins and the spread in various regions in the country and if they are mutating and whether there are any India specific mutations if we are to tackle the outbreak effectively immediately. The information obtained from the sequencing will enable India to develop/deploy suitable vaccines, diagnostics and drugs in the country. To date, only a few sequences from India have been analyzed. To overcome this significant gap in understanding, CSIR has taken up the sequencing mission on priority.
  - CSIR-CCMB, CSIR-IGIB, and CSIR-IMTech are doing sequencing of coronavirus to know if any genetic changes are occurring in the virus while it is spreading in the country. The information will help gauge the severity of disease in various geographical regions, developing an ELISA detection test, and ultimately vaccine against coronavirus. About 100 virus samples have been sequenced so far.
- **Digital Surveillance Platform:** The objective is to integrate digital data on the virus such as the viral genome, with deep patient data and disease course data including outcomes. These require the integration of data from multiple platforms and must be linked together before the identification. CSIR is building end to end capacity in this vertical.
  - A platform for surveillance is being developed in partnership with Intel India. CSIR is working with TATA Group for initiating district level screening in Kolar and large scale screening centered on TATA group employees.

### **Rapid and Economical Diagnostics**

The key to isolation of infected patients is the detection of the virus at the earliest and hence the need to expand the diagnostic scale in the country manifold. CSIR labs are well equipped with the technology and know-how of Coronavirus diagnostic tests and also possess expertise in developing newer and rapid diagnostics

- **Diagnostic Testing of Coronavirus Samples:** CSIR is deeply involved in the testing of human samples for the presence of coronavirus infection using the **RT-PCR test**. Several of its laboratories are engaged in the work:

- ✓ Laboratories already testing: CSIR-CCMB, CSIR-IIIM, CSIR-IMTech, CSIR-IHBT and CSIR-NEERI
- ✓ Laboratories ready for the testing: CSIR-IGIB, CSIR-IIP, CSIR-IICB, CSIR-NEIST, CSIR-CDRI, CSIR-IITR, CSIR-NBRI, CSIR-CIMAP, and CSIR-CFTRI;
- ✓ Laboratories Supporting State Governments with RT-PCR machines: CSIR-CLRI, CSIR-NIIST and CSIR-NIO.

The total number of tests done by CSIR labs in April are ~4000 samples in all. However, they have also supported state governments in the testing of the patient samples.

- **Training of Human Resource for Testing:** CSIR-CCMB and CSIR-IGIB are engaged in training of human resources for conducting coronavirus testing and of the 115 trained, 51 were from non-CSIR labs including university and hospitals.
- **Diagnostics Validation Centre:** Several Indian companies are coming up with new diagnostic kits that need to be validated by the government before accepting them and putting them to use. CSIR-CCMB is the only non-ICMR designated Validation Center and CSIR-IGIB is ready to be a Validation Centre.
- **Novel Diagnostic Test FELUDA:** Rapid, easy to use and accurate disease diagnosis with the help of a low-cost diagnostic tool is the need of the hour in a pandemic such as COVID-19. The CSIR-IGIB developed a low cost COVID-19 diagnostic kit. Called Feluda, this is a paper-strip based diagnostic tool that uses CRISPR/CAS gene-editing technology. The methodology has been developed in CSIR-IGIB for detecting single nucleotide variants in RNA or DNA or more broadly detecting any DNA or RNA fragment, without the need for sequencing. The principle of discrimination is derived from the natural property of the enzyme being used for the invention, *Francisella novicida* Cas9 (FnCas9) which shows a very low binding affinity to mismatched substrates. Currently, the technology is being regularly validated both at CSIR-IGIB and NCDC on a large number of patient samples to increase the robustness of detection, and tie-ups with industrial partners have been initiated for scaling up for deployment.

**Pooled Sample Testing:** To further increase the pace and scope of testing, CSIR has developed a methodology for pooled sample testing. Diagnostic assays using quantitative Polymerase Chain Reaction most commonly process patient samples one by one. While this is usually an effective and reliable method, the current efforts against the COVID-19 pandemic demand more efficient measures. Diagnostic assays can be scaled up by the method of High-Throughput qPCR via sample pooling.

Pooling, the action of combining multiple samples into one tube, is most effective when the chance of positive detection of the target, SARS-CoV-2 RNA, is low. In such cases, large groups of samples can be conclusively classified as negative with a single test, with no need to individually test every sample. However, different frequencies of the target-product presence in the samples, require different pool/batch sizes for optimal results.

- At present, CSIR-CCMB is pooling 5 samples into one tube for diagnosis. CSIR-IMTech has also started the pooling of samples. This has led to 3 to 5-fold enhancement in the efficiency of testing
- **Serology based Diagnostic Tests:** Antibody tests are faster, cheaper and can be tested at the point of care and can be carried out on a large scale and indicate exposure of virus in the population. These techniques hold much value for ramping up the country's capacity in COVID-19 testing
  - CSIR-CCMB and CSIR-IICB are working towards developing these tests.
- **Scale-Up of Resources for Diagnostic Tests:** Reverse transcriptase needed for RT-PCR based assay is being produced in large quantities. It is feared that country will face a shortage of this crucial enzyme for pursuing the testing of coronavirus. CSIR-IICT has optimized a large-scale production of Reverse Transcriptase – a key enzyme in running the RT-PCR diagnostic tests which would be sufficient for lakhs of tests.

## Development of Repurposed Drugs/New Drugs and Vaccine

Given the recent emergence of the COVID19, worldwide there are no drugs available for the treatment and that developing new drugs against coronavirus will take several years, efforts are on globally to fast track and test the drugs approved or tested for non-coronavirus diseases such as HIV or Ebola (called as repurposing). India is also participating in some of these global trials and will also carry out its clinical trials. The main focus of this vertical is on enabling quick access to drugs against coronavirus for Indian patients as soon as they are developed in India or globally. CSIR is exploring all possible options ranging from repurposed drugs to new drugs to phytopharmaceuticals and AYUSH products and biological therapeutics including vaccines.

Towards that CSIR is working on the synthesis of the top 'potential' repurposed drugs in case India goes for compulsory licensing such that the country can quickly launch the drugs in the country for patients. For this CSIR has tied up with top pharmaceutical Industries such as Cipla and CSIR has well-established credentials in the synthesis of drugs, having worked closely with industry and being the fountainhead of processes for generic drugs for which India is globally renowned.

- **Clinical trials of Mw:** CSIR and **Cadila Pharmaceuticals** have received regulatory approval for clinical trials to evaluate the efficacy of an existing gram-negative sepsis drug, called Sepsivac for COVID19 patients. The drug contains heat-killed Mycobacterium (Mw) and is found to be extremely safe in patients and no systemic side effects are associated with its use. Sepsivac has been clinically developed and approved for gram-negative sepsis, a severe infection. The drug has been shown to reduce the mortality of critically ill patients by more than half. It also leads to faster recovery of organ dysfunction seen in this condition. It is now approved for marketing in India and will be available commercially as Sepsivac® from Cadila Pharmaceuticals Ltd. The drug is being tested in three different trials to combat Covid-19.
  1. **On critically ill Covid19 patients:** "A clinical trial to evaluate the safety and efficacy of Mw in critically ill patients suffering from COVID 19 infection" was approved by DCGI. This will be a randomized, blinded, two arms, active comparator-controlled clinical trial and will evaluate the efficacy of the drug for

reducing mortality (deaths) in critically ill COVID-19 patients. The trial will be conducted in AIIMS-New Delhi, AIIMS-Bhopal and PGI, Chandigarh and is expected to be completed in the next few months.

2. **Hospitalized** (but not critically ill) **Covid19 patients**: Permission for conducting a Phase III clinical trial titled "A Randomized, Double-blind, two-arm, controlled clinical trial to compare the Efficacy and Safety of Mycobacterium w (Mw) administered along with Standard of care versus Placebo administered along with Standard of care, in adult, COVID 19 positive patients hospitalized but not critically ill." was provided by DCGI. This trial will assess the quicker recovery of hospitalized COVID-19 patients, who are not critically ill. This will also look at the prevention of the progression of disease wherein patients will need ICU management.
3. **High-Risk Contacts of Covid19**: "A Randomized, Double-blind, two arm, Placebo-Controlled Clinical Trial to Evaluate the Efficacy and Safety of Mycobacterium w in preventing COVID-19 in subjects at risk of getting infected with COVID-19" was also approved. This trial aims to see if Mw can protect the close contacts of COVID-19 patients and health care staff by boosting their innate response and thereby preventing them from acquiring the disease.

In Gram-negative sepsis as well as in critically ill COVID-19 patients, there is an altered immune response leading to a massive change in their cytokine profile. The drug modulates the immune system of the body and thereby inhibits the cytokine storm leading to reduced mortality and faster recovery. It can be used concurrently with any other therapies required in the management of such critically ill patients without any restriction. Its unique properties include boosting protective immunity (Th1, TLR2 agonist) and suppressing non-protective response (Th2).

- **Small Molecules; Active Pharmaceutical Ingredients (APIs), Phytopharmaceuticals and AYUSH:**

CSIR's focus is on:

- Repurposing of existing drugs in the advanced clinical trials world over
- Synthesis of key intermediates of these drugs as well as Hydroxychloroquine to reduce India's dependence on imports,
- Initiate trial on indigenous repurposed drug
- Clinical trials of Phytopharmaceuticals
- Clinical trials of AYUSH drugs.

Based on the global therapeutic pipeline, CSIR has identified the top 25 drugs/drug candidates that have the potential to be beneficial in the treatment of Covid-19. This is a dynamic list given that the global therapeutic landscape is changing with several ongoing clinical trials whose results are likely to impact the outcomes. Of the top 25 drugs/drug candidates shortlisted, CSIR has prioritized drugs for establishing an optimal synthetic process for those drugs for which there is a higher potential of them getting approved and which are not commercially available in India.

Developing the synthetic process of these top drugs/drug candidates will enhance the chances of the drugs getting introduced in India by an Industry, once favorable outcomes are obtained in clinical trials.

Many CSIR labs across India such as CSIR-IICT, CSIR-CDRI, CSIR-NCL, CSIR-IICB, CSIR-IIIM, CSIR-NIIST, CSIR-NEIST, and others are involved in this strategy. Other than Favipiravir, CSIR-IICT has taken initiatives to reduce import dependency for APIs and

drug intermediates. The institute has collaborated with LAXAI Life Sciences to develop and manufacture Active pharmaceutical ingredients (APIs) and drug intermediates.

#### Key Drugs/Drug Candidates Under Development at CSIR

Name	Indication for which it is approved/ under trial	Is under trial for COVID -19	IP Status/ Company	Industrial partner in India	Present Status
Favipiravir	Influenza/ Russia/, China, Japan	Yes	Expired in 2019/ Fujifilm	Yes	Scaling up for regulatory purpose, currently with Indian regulatory authorities
Remdesivir	Ebola (Phase II/III)	Yes	Patent valid till 2035/ Gilead	Yes	Gram scale synthesis achieved, awaiting FDA approval and Gilead stance
Umifenovir (Arbidol)	Influenza (in market in Russia and China)	Yes	Patent expired	Yes	CSIR made process development and industrial partners scaling up studies
Chloroquine/ Hydroxychloroquine (intermediate)	Malaria/ Rheumatoid arthritis	Yes	Generic	Yes	Gram scale synthesis completed with starting materials available in India
Camostat Mesylate	Chronic pancreatitis/ Japan	Yes	Ono Pharma	No	Gram scale synthesis completed

## In-silico screening of FDA approved drugs against validated targets

In addition to the top 25 drugs mentioned above, CSIR labs are also exploring other FDA approved drugs for repurposing against Covid-19. Towards this CSIR is working with major software companies and well-characterized and validated drug targets are being explored. From these docking studies several potential drug molecules for repurposing have been identified which include some new candidates along with some well-known molecules. CSIR will test these new drug candidates in suitable in vitro and in-vivo models and promising ones could be considered for clinical trials against Covid-19.

- **New Drug Discovery and Development:** In addition to repurposed drugs, new drugs specific to coronavirus must be discovered and taken up for development. CSIR labs, CSIR-CDRI, CSIR-NCL, CSIR-IICT, CSIR-CLRI, CSIR-IIIM and others are working on this aspect and are utilizing molecular modeling-based approach followed by screening and testing.
- **Phytopharmaceutical Formulation:** CSIR and Sun Pharma are developing ACQH, a formulation developed for dengue being repositioned for coronavirus. The application for the clinical trial has been submitted to DCGI and approval is expected soon.
- **Supplements:** CSIR has filed an application for Trademark for developing Zinc Gluconate and Vitamin C as a nutraceutical, which has been found beneficial in patients with coronavirus infection.
- **Traditional Medicine:** CSIR is working with the Department of AYUSH and the joint efforts of CSIR-Ministry of AYUSH have been planned in as prophylactic, symptom management, and add-on interventions to the modern medicine treatments. Following AYUSH botanicals/formulations have been taken up by CSIR and Min. of AYUSH for clinical trials:
  - *Glycyrrhiza glabra*
  - *Tinospora cordifolia*
  - *Withania somnifera*
  - AYUSH-64
- **Immunity boosters:** CSIR-CIMAP readied technology transfers of its two herbal products to entrepreneurs & start-ups. The products made of twelve herbs including Ashwagandha, Mulethi, Harad, Baheda and Sataver is effective in boosting immunity.
- CSIR-NIIST transferred technology for making Trikatu syrup to Trivandrum-district Palm products development Cooperative Federation Ltd., Parassala, Trivandrum. Trikatu is used in Ayurveda for treating respiratory tract infections and gastric and abdominal disorders.
- **Herbal decongestant spray:** CSIR-NBRI developed a herbal decongestant spray that will clear the windpipe, remove congestion caused by mucus and ease breathing.



## Biological Therapeutics and Vaccines

- **Inactivated Corona Vaccine:** CSIR-CCMB and Bharat Biotech are working together for inactivated coronavirus vaccine development under the aegis of CSIR-NMITLI Program.
- **Convalescent Plasma Therapy:** The U.S. Food and Drug Administration has approved the use of convalescent plasma therapy as an experimental treatment in clinical trials, and for critically ill COVID-19 patients without other treatment options. The therapy, which takes antibodies from the blood of a person who has recovered from a virus and transfuses those antibodies into a person sick with that virus, has long been used as a way to help kick start a person's immune system. The CSIR-IICB proposal on convalescent plasma therapy has been approved by the West Bengal State Govt. on April 9, 2020. The trial has been planned involving CSIR-IICB, Medical College Hospital, and ID & BG Hospital. Applications were made to the Human Ethics Committees and the approval has been received from all three institutes. The trial has been submitted for registration at the Clinical Trial Registry of India and would be submitted for regulatory approval. A dedicated 'Epidemic Immune Monitoring Lab' has been prepared for this program.
- **Corona Viral Cultures and Cell lines for Screening Assays and Testing:** To take forward new drug discovery, a critical step is the establishment of viral cultures and assays for testing. CSIR-CCMB has made considerable progress towards that and all the identified small molecules, natural products and phyto-pharmaceuticals will be tested once the platform is ready.

## Hospital assistive Devices and PPEs

A major challenge during the corona pandemic globally has been the severe shortage of ventilators and oxygen enrichment devices given that COVID19 patients develop severe respiratory problems. Another critical requirement in this pandemic has been the need for personal protective equipment (PPEs) to the caregivers such as Doctors, Nurses and paramedical staff given the infectious nature of the virus.

CSIR has many high-quality engineering labs such as CSIR-CSIO who has the expertise of developing medical devices. CSIR-NAL, CSIR-CMERI, CSIR-CECRI and CSIR-CSIO and other labs are working actively in the development of ventilators and PPEs.

For the scale-up of these CSIR has tied up with PSUs such as BHEL and BEL. Under this vertical, CSIR is developing:

- Ventilators,
- Oxygen Enrichment Unit,
- Pedal-operated Water Dispensing Taps,
- Electrostatic Disinfectant,
- Face Shield
- Personal Protective Equipment, etc.

**Ventilators:** Following types of ventilators are under development which will be productionized with BHEL:

- ✓ Bi-Level Positive Airway Pressure (BiPAP) system is being developed by CSIR-NAL



- ✓ Respiration assistance intervention device: A Portable Ventilator is being developed by CSIR-CSIO

**Disinfection Machine:** CSIR-CSIO, Chandigarh has developed an innovative technology of electrostatic disinfection and sanitization which is very efficient and effective to stop the spread of virus and pathogens. In recent developments, CSIR and BHEL has agreed to produce the such machine in large scale so that this can be available in the market. The BHEL, Haridwar unit has started the production and very soon the device will go to various testing and validation. Once, all the certification processes get completed, the device will be available for the end-use.

**IR Thermometers:** Handheld digital IR thermometer which is an important component of measures to mitigate Coronavirus outbreak are required on a large scale. A digital thermometer has been developed by CSIR-NCL along with a start-up, BMEK, and is being upscaled by BEL which will manufacture it. About 100 prototype units will be made for pilot distribution and testing at TUV Rheinland India Pvt Ltd Bangalore. CSIR-NML is also developing IR Thermometers.

**Oxygen Enrichment Unit (OEU):** OEU is one of the critical needs of COVID-19 patients is the need to meet the oxygen requirements due to their lungs being compromised. Oxygen enrichment unit (OEU) to increase the oxygen concentration from the ambient air of 21-22% to 38-40% have been developed by CSIR-NCL and Genrich Membranes, a start-up innovation venture. It produces enriched oxygen for patients in the home and hospital settings. The prototype units are ready at Pune and will be validated at TUV Rheinland India Pvt Ltd Bangalore after the trials, scale-up will be done.

**Hands-Free Washing Stations:** To decrease the risk of infection at public places, hand free washing stations have been developed by CSIR-CSIO and CSIR-IIMT. These can be deployed at places like slums, hospitals, railway stations etc to promote hygiene and safe practices. CSIR-NEERI has also developed similar hands-free washing stations.

**Road Sanitizer Unit:** The CSIR-CMERI Road Sanitizer Unit is a tractor-mounted Road Sanitizing System and can be effectively deployed in long stretches of highways, vicinity of toll plazas etc, where there is a massive volume of traffic and a good chance of the infection spreading. It can also be deployed in Housing Complexes, Office Complexes, Sports Arenas, Apartment buildings etc. Asansol Municipal Corporation after Inspection of the Unit has placed an order for four such systems, of which one has already been delivered. Durgapur Municipal Corporation has also expressed interest for the Unit and procedural negotiations are under progress. Some MSMEs and Small Business Clusters have also expressed interest for the Unit and interactions are underway for the same.

**PPEs:** Several devices such as Face shield, face mask, gowns and suites and gloves have been developed. Some of these have been submitted to the South India Textile Research Association (SITRA), Coimbatore for certification. Once certified, it will be given to local manufacturers for producing it on a large scale.

- Coveralls: Protective coveralls are essential for personnel working in COVID-19 high- risk environments. CSIR-NAL designed a personal protective coverall suit for the healthcare personnel.

- Face Shields: Venture Centre at CSIR-NCL developed OHP & MDF sheets face shields. CSIR-CECRI also prepared 3-D printed face shields.
- Face Masks: With the COVID-19 being highly infectious, face masks have become an essential to safeguard for just about every citizen. To meet the sudden spurt in demand, a large number of CSIR laboratories including CSIR-AMPRI, CSIR-NEERI, CSIR-CLRI, CSIR-IIP, CSIR-CSMCRI, CSIR-CMERI, CSIR-CECRI, CSIR-NEIST, CSIR-CIMFR and many others, stepped forward to develop face masks and distributed it to the needy. The masks were distributed to employees, villagers, healthcare professionals and the common people.
- CSIR-CECRI, CSIR-CMERI and CSIR-NEIST also imparted training on making masks under their entrepreneurship programme for rural areas.

**Makeshift Hospital:** CSIR is preparing itself to address the unmet need of a large number of hospitals. Its constituent laboratories, namely CSIR-Central Building Research Institute (CSIR-CBRI), Roorkee and CSIR-Structural Engineering Research Centre (CSIR-SERC), Chennai have the desired expertise and can undertake the work of transforming existing schools into makeshift hospitals, and also set up on-site modular 2- to 4- bed transit hospital facilities as immediate measures. The laboratories also have expertise in setting up pre-engineered buildings by way of short-term measures.

- CSIR-CBRI, Roorkee has made prototype make-shift hospital building. This design of the make-shift hospital is being implemented near Haridwar in Uttarakhand along with the State Government. A demonstration unit for COVID-19 related facility is also being set up by CSIR-CBRI for NDRF at their 8<sup>th</sup> Bn Station in Ghaziabad.

## Vertical 5: Supply Chain & Logistics Support Systems

CSIR Supply Chain initiative is to ensure, to the extent possible, that no user organization (hospital, testing lab, ambulance network, health center, mohalla clinic, police, municipality etc) ever runs short of what is needed to address the COVID-19 pandemic. Effectively, the platform is to assure security to any individual user who is infected with or at risk of infection from the SARS-CoV2 (doctors, nurses, hospital attendants, sanitation workers, police etc). This is expected to become the national benchmark for all future epidemics and a model for pre-emptive disaster relief.

There are four thrust areas within this effort:

- Develop and coordinate an IT platform: for visibility of demand and supply of required goods and services to tackle the COVID-19 crisis. Development of platform is in progress and collaboration discussions are on with partners TCS and CII, the first rollout expected soon.
- Establish Regional Inventory Centers: Select CSIR laboratories can be set up as regional (physical or virtual) inventory management centers for inbound critical supplies (CSIR-NEERI Nagpur, CSIR-IMMT Bhubaneswar, CSIR-SERC Chennai)
- Pre-emptive identification of supply chain issues in new launches of CSIR products (Devices, PPE, kits, drugs, vaccines etc) and services (testing, training) for COVID-19 management

- Establish best practices and synergies from other efforts (Rural Employment Generation, Food Security for marginalized sections, Epidemiological forecasting and Regulatory Standards Development)

Presently, CSIR Supply Chain Vertical Team is working with PAN CSIR lab/unit scientists, TCS, CII, and other third parties to set up information management and forecasting databases at a national level to capture demand and supply scenarios for key items that are required to address the COVID-19 emergency. The primary aim is to build a public platform that will not only help users source primary items (those that can be used for surveillance/testing/vaccines/treatment/devices / personal protective equipment e.g. human temperature checking devices, kits, remdesivir, ventilators, masks, sanitizer) but also their first-level components, so that:

- Anticipated shortages can be addressed;
- Black marketing, hoarding, and over-forecasting is dis-incentivized; and
- Over-production can be avoided.

The key task is to prepare a bill of materials for each key item category and to provide a document or link to the specifications. There may be more than one specification for a product category (e.g. home, mobile, and hospital ventilators). After that, an Item master- a standard form capturing all details of the primary use item - has to be prepared in line with TCS, CII requirements, which will be spelled out on national level healthcare information and demand forecasting platform.

#### Patents:

Patents Filed		Patents Granted		Patent Prosecutions	
India	Abroad*	India	Abroad*	India	Abroad
6	24	3	6	75	121

\* Data reported to IPU during the said period and may increase later during national phase entries

#### Outreach Activities

**Sanitizers and disinfectants:** As the demands for sanitizers and disinfectants spiraled, CSIR laboratories from across India manufactured sanitizers & disinfectants for distribution to lakhs of people.

- CSIR-CLRI handed over the 2nd batch of 120 liters of hand sanitizers to City Medical Officer, Greater Chennai Corporation, Chennai.
- CSIR-NGRI handed over sanitizers to Uppal (Hyderabad) Police and the Task Force, L. B. Nagar (Hyderabad).
- CSIR-IIIM distributed hand sanitizer to DGP office of J&K UT and 15 JAT Regiment of Army, GMC Jammu, SMGS hospital, Dental hospital, CRPF hospital, and Air Force Hospital.
- CSIR-IITR provided 200 L of WHO-formulated Hand-rub sanitizer to frontline health workers including Doctors of King George's Medical University. It also provided

1800 liters of sanitizer to UP Governor for distribution to the front line care workers and others.

- CSIR-IMMT handed over sanitizers to IG Police (Provisions) Cuttack, AIIMS Bhubaneswar, Special Task Force of Crime Branch Police, Odisha.
- CSIR-NEIST produced along with Marjing Industries Pvt Ltd, Imphal launched an alcohol-based herbal hand sanitizer.
- CSIR-CECRI prepared 600 litres of sanitizers for distribution.
- CSIR-CBRI handed over sanitizers to ACMO
- CSIR-CIMAP handed over 500 bottles of herbal sanitizers to police personnel in Lucknow.
- CSIR-CFTRI distributed sanitizers to SBI Branch Staff in the Campus and to Holdsworth Memorial Hospital, Mysore.
- CSIR-IHBT provided 1000 units of hand sanitizers along with 100 units of 500 ml refill cans of sanitizers to the district administration.
- Trial using the **anti-leprosy vaccine** Mw for COVID 19 gets underway at AIIMS (New Delhi), AIIMS (Bhopal) and PGIMER (Lucknow).

**Food:** During the month-long lock-down, the underprivileged, especially the poor, homeless and migrant labourers faced difficulties in feeding themselves. Also, it was essential to provide fortified foods and nutritional food supplements such as zinc and vitamin-enriched mango bar to increase immunity. CSIR-CFTRI, the food technology laboratory of CSIR led the initiative in providing food and food-supplements to the needy. CSIR-CFTRI provided nutritional biscuits to AIIMS, Delhi for its recuperating patients.

- CSIR-IHBT distributed several thousands of ready-to-eat canned food to not only nearby areas but also sent food to other CSIR laboratories such as CSIR-IMMT who distributed it to the needy.
- CSIR-IIP along with the "Ek Choti Se Rasoi" team, a group of social workers, distributed lunches to more than 300 poor people every day for the entire month.
- CSIR-CIMFR has been serving food in villages and to migrant labourers since 9 April 2020.

#### **Programs for Students:**

- "JIGYASA" is one of the national level initiatives of CSIR under which scientists connect with school students. It is a unique platform for bringing scientists and teachers together for nurturing young minds. This program envisages opening up the national scientific facilities to school children, enabling CSIR scientific knowledge-base and facility to be utilized by schoolchildren. This model of engaging school children also has been extended to other schools in addition to KVS. To date, about 3,00,000 students have taken part in JIGYASA program. Even during the lockdown, a series of webinars were organized. During April 2020, a webinar on cancer, its symptoms, and treatments was organized.
- CSIR-NISCAIR announced an online painting, cartoon and video-making competition for school children during the lockdown period.

## **DEPARTMENTAL ACTIVITIES**

DSIR's mandate is to promote Industrial Research and Development besides technology promotion, development and utilization. In order to promote and nurture Research and Development in the country, Industrial R&D Promotion Programme of the department gives recognition and registration to in-house R&D units of industries, not for profit Scientific and Industrial Research Organizations (SIROs) Public Funded Research Institutions (PFRIs) and periodically renews these recognition / registration under the respective Government Notifications (as amended from time to time), by virtue of which these organizations are able to obtain Customs duty exemptions, Goods & Service Tax (GST) concessions and Weighted tax deductions on R&D by Industry (us 35(2AB) of IT Act). This scheme helps in encouraging industrial R&D in the country.

### **Industrial R&D Promotion Programme Recognition/ Registration and renewal of In-house R&D in Industry**

- 62 in-house R&D units of industries were granted renewal of recognition as well as renewal of registration certificates.

### **Public Funded Research Institution (PFRIs) Registration and Renewal of PFRIs**

- 01 PFRI was granted registration certificate.

### **Fiscal Incentives for R&D by Industry**

- 74 reports in form 3CL submitted to CCIT under Section 35(2AB) of IT Act for weighted tax deduction on industrial R&D involving a total amount of Rs. 171893.1 lakhs.

## **PUBLIC SECTOR ENTERPRISES**

### **Central Electronics Limited (CEL)**

CEL is an enterprise under DSIR having an objective to commercially exploit the indigenous technologies developed by National Labs and R&D institutions in the country. CEL has developed a number of products for the first time in the country through its own R&D efforts and it continues to emphasize its leading role in the area of solar photovoltaic systems, electronic gadgets for Railway and other strategic electronic equipment/components among others.

- The company manufactured electronic components/systems/SPV products worth Rs.1.23 Lakhs during April, 2020.
- Sale of items worth Rs.1.23 Lakhs was realized during April, 2020.

## **National Research Development Corporation (NRDC)**

NRDC continues to lay emphasis on broadening and strengthening the technology resource base by nurturing long term relationships with R&D institutions as well as universities, technical organizations, industries and also individual inventors.

- NRDC has been assigned 06 technologies such as Low-Cost Ultra-Portable Thermal Scanner by CSIR-CEERI, Electrostatic Disinfection Machine by CSIR-CSIO, HCARD by CSIR-CMERI, Herbal Hand Sanitizer & Spray by CSIR-NBRI, Ventilators and Related Equipments by CSIR-CMERI and Products to Boost Immune System by CSIR-CIMAP during April, 2020.

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