
Photo courtesy: Rachna Chandra

**Editors note…..**

**Dear All,**

This issue of *guide.net* features articles of diverse nature. Similar to earlier issues, it portrays some emerging and existing issues *vis-vis* COVID-19 pandemic issues, ecosystem restoration and in-house activities of GUIDE. These articles are yet another indication that anthropogenic pressures are leading to environmental degradation at much faster pace and there are many spheres that are yet to be unveiled.

We are delighted to mention that each constructive criticism from our readers has helped in improving our e-newsletter. With a goal to introduce knowledge base, the *guide.net* covers topics from various aspects related to the environment. Crossing this line, it is now used as a vehicle to launch new ideas and finding new avenues for research which will address many of the existing questions. With every issue our endeavour is to provide a stronger and wider platform to ecologists to explore and present new avenues.

True to our original goal, *guide.net* will continue to present a mix of science articles, in-house news, information about upcoming conferences/ seminars/ webinars and symposia on environmental issues. As always, we earnestly solicit readers' views and constructive criticisms to improve *guide.net*.

This is an open platform and we earnestly request you all to participate and bring up new ideas to facelift the e-newsletter to more readers. Looking forward to your contributions for the forthcoming issue.

**Editors: Prabha Devi L. and Rachna Chandra**

## GUIDE Campus Biodiversity

### The Jerusalem Thorn Bloom in the GUIDE Campus

At the outset of this summer a beautiful yellow bloom caught the sight of the campus tenants' created by the Small shrub *Parkinsonia aculeata*. The Common names include palo verde, Mexican palo verde, *Parkinsonia*, Jerusalem thorn, and jelly bean tree, Vilayati kikar (Hindi) and the genus belongs to family Fabaceae. The genus name *Parkinsonia* honors the English botanist John Parkinson (1567–1650), while the species Latin name *aculeata* refers to the thorny stem of this plant.

It is a spiny shrub or a small tree that grows upto 10 m in height. It has single or multiple stems and many branches with pendulous leaves. It has peculiar strap like, twice compound leaves that look like long, feathery streamers. The leaves appear shortly after rain, they fold up at night, and usually within a few days the tiny leaflets drop off, leaving the persistent rachises (midribs) to flutter like streamers in the wind. The leaves and stems are hairless. The leaves are alternate and pennate (15 to 20 cm long). The flattened petiole is edged by two rows of 25 - 30 tiny oval leaflets; the leaflets are soon deciduous in dry weather leaving the green petioles and branches to photosynthesize.

The branches bear double or triple sharp spines 7–12 mm (0.28–0.47 in) long at the axils of the leaves. The flowers are yellow- orange and fragrant, 20 mm (0.79 in) in diameter, growing from a long slender stalk in groups of eight to ten. They have five sepals and five petals, four of them clearer and rhomboid ovate, the fifth elongated, with a warmer yellow and purple spots at the base. The flowering period in Bhuj is during February and March. The flowers are pollinated by

bees. The fruit is a seedpod, leathery in appearance, light brown when mature.

*Parkinsonia* is a native of tropical America and is now considered as a major invasive species in Australia, parts of tropical Africa, Hawaii, and other Islands in the Pacific Ocean. It forms dense thickets, preventing access for humans, native animals and livestock to waterways. *P. aculeata* is native to the Sonoran and Chihuahan Deserts of southwestern United States (western Texas, southern New Mexico southern Arizona), and northern Mexico (Sonora and Chihuahua) as well as the Galápagos Islands. It has a high tolerance to drought, prefers a full sun exposure, but can grow on a wide range of dry soils (sand dunes, clay, alkaline and chalky soils, etc.), at an altitude of 0–1,500 m asl.

The bright yellow beautiful flowers are attractive and fragrant, one to two cm wide and are borne in loose bundles on long flower stalks hanging near the ends of the branches. The long seed pods are with marked constrictions between each seed. The pods are 5 to 10 cm long and straw coloured when ripe. Each pod contains several hard brown seeds. Many of the seeds are hard and will germinate years later, in some cases after long immersion in water. The pods float and are spread by floods. This plant reproduces mainly by seed, but it can also produce suckers (particularly after it has been damaged).The seeds are mostly spread after being eaten by birds and other animals (e.g. cattle). The phytochemistry of the leaves, flowers and stems of *P. aculeata* has revealed the presence of glycosides, glycerides, flavonoids, reducing sugars, sterols and traces of minerals. Studies indicate that it possesses various pharmacological activities.

Prabha Devi L. <drlpraba@gmail.com>, GUIDE

## Ecological Restoration

### Eco-Restoration through Plastic Waste Management

Earth's biosphere is a unique system which supports a variety of ecosystems harboring the wonders of life. Even though it has been deteriorated to a larger extent by the anthropogenic invasion, when left undisturbed, it could bloom back to its functional state. Nevertheless, the recovery rate is lesser than the rate of degradation. A little aid can be provided in order to accelerate the restoration of ecosystem.

By definition, ecosystem restoration means the re-establishment of a deteriorated ecosystem along with the conservation of the existing ones. The concept aims at the creation of a healthier and productive environment which could satisfy the ecological, economic and social requirements. Any ecosystem, whether natural (e.g. forest, grasslands, oceans, wetlands) or artificial (e.g. farmlands) can be restored (UNEP, 2021). Conventional practices of restoration are planting native flora, removal of invasive species, watershed management and pollution control; which ultimately focus on reducing environmental stress so that nature can restore by its own. It is neither possible nor desirable that the system will be restored to its pristine form. However, it could rejuvenate living conditions, reduce the risk of diseases and natural calamities and improve the livelihood of the people depending on them.

Environmental pollution is the most significant issue which retards the restoration process. It is extremely difficult to get rid of the non-degradable waste materials that have accumulated in the natural system over years, particularly the plastics. Plastics are getting dumped into the environment ever since its discovery

and large scale production in the mid 20th century and about 60% of plastics produced in the world has ended up in natural environment or landfills. As per UNEP report, it is estimated that about 300 million tons of plastic waste is generated every year. The presence of plastics is thus ubiquitous across the world, polluting soil and water, retarding their quality and alternating their properties. Due to the lack of natural analogues, plastic is not biologically easily degradable and may undergo mere physical disintegration caused by mechanical abrasions. Plastics will become more complex, damaging and difficult to isolate from environmental substrata, after getting into smaller pieces.

World oceans play a significant role in sustaining life on Earth and thus important to consider for eco-restoration and make them pollution-free. Ocean supports economy, regulates climate, and acts as the greatest sequester of carbon. Oceans are also the ultimate sink of waste materials and about 80% of marine litter is said to be plastics. Both land- and ocean- based activities contribute to plastic debris in the oceans. Physical, chemical and biological conditions in the marine environment result in the gradual degradation of marine litter. Over time, the size of particles is considerably reduced forming micro-plastics and nano-plastics. They also release toxic chemical additives like phthalates, ethylene dichloride, lead, cadmium, etc. into the environment upon fragmentation. While larger debris cause physical damages like suffocation and entanglement of marine animals, micro and nano particles can enter the living system through ingestion by lower trophic level organisms. Due to their larger surface area for adsorption and hydrophobic nature, they act as vectors of persistent organic pollutants. The collection of these particles in lower levels of food web could also result in their bioaccumulation in higher level organisms, including humans. Thus, plastic waste management can be considered as the foremost step in all ecosystem restoration programs.

Every waste management regime begins with the basic principles of reduce, reuse and recycle. According to Plastic Europe, about 50% of solid wastes getting in landfills or reaching the oceans is single use plastics. Processing of virgin plastic granules for single use products requires higher energy and resource utilization which outcomes the usage and benefits, thus marks a higher carbon footprint. Single use plastic products like cigarette butts, bottles, cups, straws, carry bags and many more can be replaced by the products made of other natural and durable raw materials and even biodegradable plastics. By reducing the consumption, manufacturing can also be reduced which would further reduce the waste input into the environment. While production is reduced, the requirements can be satisfied through the 'reuse' strategy. Every time we reuse a product, the energy and raw material required to produce a product of the same grade can be conserved. High- and low-density polyethylene (HDPE and LDPE) and polypropylene (PP) composing many single use products are considered safe to be reused.

Recycling deals with the process of utilizing plastic wastes as secondary raw materials. The most common method of recycling comprises of mechanical recycling. Majority of thermoplastic wastes can be recycled efficiently through mechanical recycling without much energy consumption and quality impairments. Recycled plastics need to satisfy certain environmental standards and economic perspective; thus, all plastics cannot be sustainably recycled. In such cases, strategies of waste utilization like feedstock recycling and energy recovery are implemented. Both feedstock recycling and energy recovery deal with laminated, composite, mixed or contaminated plastics as combustion fuel, thereby reduce the overall carbon foot print by minimizing use of virgin fossil fuels.

Many microorganisms capable of degrading synthetic polymers naturally have been identified which can be used in reclamation of highly polluted waste lands, dump yards and landfills. The same is applicable in case of the marine environment for the removal of micro- and nano- plastics from ocean garbage patches.

The strategies for making the environment free of plastics may bring about remarkable economic and social benefits. Reduced use of plastics and energy recovery from wastes largely reduces the consumption of fossil fuel which further regulates carbon emission. A plastic free environment will be more functional and would promote efficient nutrient cycling. Thus, plastic waste management paves the way for a healthy natural condition and promoting ecosystem restoration activities. Altogether ecosystem restoration hopes to bring about significant changes in global atmospheric conditions resulting in a decline in the rising global temperature scenario. After all, a healthy ecosystem always supports a healthier population.

S. Anbazhagi <sanbazhagi@cukerala.ac.in>, Central Univ. Kerala
Aiswriya V. P., Central Univ. Kerala
Muthukumar Muthuchamy, Central Univ. Kerala

## Covid-19 Pandemic and The Environment

### Blue Economy Crunch during Covid-19 Pandemic Lockdown In India

The human activity was considerably reduced in many regions of the world for several months since 2020 due to the Covid 19 pandemic lockdown and the effects were experienced on land and at sea. Biodiversity loss and ecosystem degradation, both terrestrial and marine, are identified among the top five risks to the global economy, according to the World Economic Forum (WEF) and the IPBES Global Assessment report. There is also increasing evidence that the reductions in human activities have had impacts on the environment and there is need for a comprehensive understanding and quantification of these effects. Satellite images showed dramatic improvements in air quality and greenhouse gas reductions in big cities, higher water quality in watersheds, canals, lakes, bays and harbours. Due to the absence of human activities the highly visible and iconic large marine mammals including baleen whales, dugongs and manatees, and toothed whales such as orcas and dolphins appeared in unexpected areas. However, the abrupt, intense and unplanned cessation of human activities in efforts to curb the COVID-19 pandemic caused a deep economic crisis with devastating impacts on the complex and globalised value chains, such as seafood trade, jobs, social interactions and general human well-being.

Fish and fish products are among the most heavily traded food products in the world. The blue economy and especially the small-scale fisheries sector in India have severely shrunk due to disruptions in the fish catch, market, and supply chain. The satellite image analysis revealed that the 'area under fishing boats' near the docks and those parked on the land area increased by 483%, 189%, and 826% at Mangrol, Veraval, and Vanakbara harbor, respectively. According to the National Fisheries Development Board (NFDB) of India, the marine fisheries sector employs (directly and indirectly) more than 16 million fishing workers and their families in 3477 marine fishing villages across the seventy coastal districts of the country. The results from spatio-temporal analysis indicate that regular fishing activities came to a stand-still for almost ten weeks (between March and May 2020). The overall fish and prawn production declined by a quarter during the financial year 2020 - 2021 due to lack of labor, transportation, or ice to preserve catch, curfews and harbor closures.

The sustained availability and accessibility of aquatic food were accompanied by differentiated reduction in the incomes of both fish farmers and fishers, similar to the observations elsewhere. Many of the impacts on aquaculture and capture fisheries were widely observed in Asian countries where the local food supply systems play crucial role.


Photo courtesy: Rachna Chandra

The small scale fishing, (artisanal) sector is prominent for India's coastal development programmes as it is a major contributor of employment, food security and export earnings. Besides this, sector is important and essential in ensuring sustainability in fishing, marine wildlife habitats and ensuring cultural and traditional knowledge is protected. During lockdown, fishing was halted due to the closure of storage facilities, markets, and processing plants. India's Ministry of Home Affairs allowed fishing and aquaculture businesses to pursue their activities under conditions of adequate social distancing. However, the productivity levels at some shrimp processing plants were already hampered because of lack of work force who were mainly the migrants returned to their home states. Frozen shrimp, which makes up 70% of India's seafood export earnings have seen a sharp slump in demand from the United States and Europe following their own lockdowns. India shipped 12,89,651 MT of seafood worth Rs 46,662.85 crore (USD 6.68 billion) during 2019-2020 despite the sluggish demand in its major export markets caused by the Covid-19 pandemic (MPEDA,2020) report states that in Raigad district of Maharashtra state, one hundred thousand tonnes of wild-caught seafood was thrown back at sea at the end of March. When fishers managed to sell their catch, it was said they had to sometimes settle for as little as half or one-fourth of the usual market price. The shutdown of restaurants and hotels affected the demand for live and fresh high-value fish. The COVID-19 crisis came at a particularly pivotal time for small-scale fishers as diverse spring catches were said to usually be sufficient to guarantee enough income to endure the following monsoon and annual fishing ban

period. Women, who account for about half of all small scale fish workers in India, are believed to be amongst the most vulnerable in this crisis. Fish vendors, the majority being women, are unable to continue with their usual door to door selling activities. Financial losses due to COVID-19 may be further compounded due to the monsoon fishing ban for 60 days even though inspite of the support such as free ration and later facilitated the continuation of fish sales through new sanitary measures, changing consumer demands, market access, or logistical problems related to transportation and border restrictions. According to the Asian Development Bank (ADB), the growth in developing Asia slowed down and led to widespread unemployment, food insecurity and social inequities. The activities needed to deliver fishery and fish products from production to the final consumer are complex. The technologies used differ across the world from artisanal to highly industrial. The value chains include global, regional, and local markets. The key activities in the supply chain of aquaculture or fisheries include aquaculture production, fishing, transport, processing, and retail and wholesale marketing.

Each activity in the supply chain was disrupted owing to the impacts of COVID-19. Unavailability of supplies such as gear, ice, and bait due to the shutdown or not able to provide inputs on credit is also restricting the fishing activity. Misleading perceptions in some countries about fish and the spread of COVID-19 have led to decreased consumption of fish products. Fish and fish commodities were not included in the list of essential commodities initially, with several state governments imposing complete lockdowns on markets. The drop in demand, which in some cases has resulted in reduced prices have stopped or reduced activity for many fishing fleets, as their work has become unprofitable. Gender inequalities persist in fisheries and aquaculture, where women represent half of the workforce when both the primary and secondary seafood sectors are considered but are often assigned the most unstable and poorly or unpaid positions.

Outbreak of coronavirus has not only disrupted aquaculture activities but had impact on the farmers' economy. Small fish farmers incurred loss because they had to either sell the products at lower prices or couldn't sell the harvest. Due to lockdown, fish farmers were not able to harvest and also could not start a new production cycle resulting in reduced fish supply in the next few months and also loss of downstream and upstream sources of employment. Central Institute of Brackish water Aquaculture (CIBA) estimated that the sector will face a $1.5 billion loss for 2020-2021 due to Covid-19 restrictions. Shrimp hatcheries, farms, processors, retailers and exporters lost an estimated 30% to 40% of their business in the wake of India's lockdown.

One important strategy with shrimp culture would be to develop fry production at the region and country levels to reduce the dependency on imported fry. The production and use of locally available feeds can be further strengthened by supporting local feed producers to mobilize and collectively formulate an action plan for similarly disruptive scenarios. Shrimp production cycles are inflexible and time-dependent. During the lockdown tenure the cycle of shrimp hatchery operations also have been disrupted as the supply of *Vannamei* shrimp brood stock from the United States has been halted, delaying the breeding cycle, with a potential 20-30% fall in shrimp production as a consequence. Besides, it was estimated millions of shrimp seeds and tens of thousands of brood stock may have been lost due to farmers' unwillingness to stock farms due to low profitability, and a shortage of workers.

India is the world's third largest shrimp producer and the industry brings in an estimated $5 billion of foreign exchange earnings every year and employs 1.2 million people across the value chain – from farming, processing, retailing and exporting. Inter-state and intra-state movements are key to India's shrimp sector. An additional constraint for shrimp hatcheries is their dependence on specific pathogen-free (SPF) brood stock. Like most international cargo, imports of SPF brood stock were temporarily suspended during lockdown and the existing brood stock supply couldn't meet their needs.

Shrimp farming is practiced in about 0.15 million ha spreading across nine coastal states with an average productivity of 6 t/ ha mostly by small and medium scale farms. However, major critical inputs such as seed, feed, pond supplements and shrimp health care products are produced mostly in two southern states: Andhra Pradesh and Tamil Nadu and transported to all the other states. Farming, processing, feed production and research activities are concentrated in different regions and the prevailing industry's structure meant that lockdown restrictions left it vulnerable to labour shortages and market shocks. Fish farmers are not able to sell their harvest due to the market disruptions and therefore they are

keeping huge quantities of live fish which is needed to be supplied for an indeterminate period increasing costs, expenditure and risks.

India's lockdown affected 27% of shrimp farmers who had prepared shrimp ponds for stocking felt difficulty in obtaining production inputs like feed and seed and diagnostic labs during lockdown. Some producers reported "panic harvesting" small shrimp to sell at a discount to avoid bigger losses in the future. These impacts have created further challenges for the sale of fresh fish products, even where demand still exists domestically and internationally. The reduction in demand for fresh fish products has been accompanied by an increase in demand for canned, frozen and processed fish. The demand for these kinds of shelf stable fish products has predominantly been driven by an increase in retail sales from supermarkets, and consumer stockpiling (notably in the early stages of the pandemic). Aquaculture producers seem to have been able to maintain production and sales better where they were already selling to supermarkets and were thus already accustomed to meeting the requirements of processed and pre-packed products. Overall nationwide lockdown imposed delivered a blow on the morale of the aqua farmers and also affecting the Indian economy.

According to studies, Covid-19 caused a 7.4% drop in quantity and 0.74% in US dollar value during 2019-2020. To mitigate the impact, the Government of India declared fisheries and aquaculture as an essential activity, facilitated the movement of inputs and services. Further, a major Fisheries Development Scheme (PMMSY) with a financial outlay of 267 million USD has been announced by strengthening the value chain, doubling the fisher/farmer income, employment generation, economic and social security for fishers/fish farmers adhering to the sustainability principles. Short and medium-term technical and policy measures are suggested to tide over the impact of COVID-19 related lockdown and related restrictions. Fish and aquatic food value chain is currently witnessing a medley of challenges ranging from shutdown of operations, changing consumer demands, market access and logistical problems, and transportation and border restrictions.

Prabha Devi L. <drlpraba@gmail.com>, GUIDE

## Impacts of Covid -19 Pandemic Lockdown On The Environment

In December, 2019, a case of unidentified pneumonia was reported in Wuhan, Hubei Province, People's Republic of China (PRC). The identified clinical features were similar to that of viral pneumonia and World Health Organization (WHO) officially named the coronavirus disease as 'COVID-19'. While the International Committee on Taxonomy of Viruses named the virus 'severe acute respiratory syndrome coronavirus 2' (SARS-CoV-2). SARS-CoV-2 is a member of the family Coronaviridae and order Nidovirales. Within a short span of time, it led to more than 36.0 million confirmed cases in 216 countries.

The spread of the virus has led to the lockdown of all activities and movements of humans for a long period over three months worldwide excepting a few countries where the infection was not severe. Before the introduction of vaccination for the corona virus the best strategy against this pandemic prevention was through regular hand and face washes, use of masks, gloves and personal protective equipment and social distancing. The ongoing and future strategies against coronavirus ensue that huge quantity of masks, plastic products such as personal protective equipment (PPE) kits, face shields, chemicals such as chloroxylenol, chlorine, $H_2O_2$, etc. would be generated as waste. The amount of water consumption per person shall also increase. These effects can have unforeseen impacts on the environment. However, overall the pandemic would have positive and negative impacts on the environment

Air pollution levels have dropped significantly ever since lockdowns were put in place to contain COVID-19. Around the world, levels of harmful pollutants like $NO_2$ (nitrogen dioxide), CO (carbon monoxide), $SO_2$ (sulfur dioxide) and $PM_{2.5}$ (small particulate matter) have decreased. Levels of $NO_2$, influenced by weather and atmospheric processes had reduced by 20-60% in major cities across the world. $PM_{2.5}$, another ambient pollutant strongly linked to human activity with detrimental health impacts, also experienced a clear drop. US cities like New York and Los Angeles and cities such as Delhi, Bangkok, São Paulo and Bogotá are also reportedly enjoyed clearer skies with a drop in atmospheric levels of $CO_2$. However, the rate of ecosystem degradation and the effects of climate change did not diminish the ability of our ecosystems to act as carbon sinks considerably. This means that unless we continue to cap $CO_2$ emissions to shutdown

levels for an extended time, atmospheric $CO_2$ levels won't drop. Scientists have estimated that even with a 10% drop in emissions it would sustain round the year.

During the lockdown period without any major relaxations between March 25 and May 18 of the year 2020 pollution levels in Delhi reduced drastically and the Air Quality Index (AQI) remained 'satisfactory' category and during December 2020 remained 'moderate'. Pollution levels in Delhi-NCR came down by around 79% during the initial phase of the lockdown, mainly owing to no industrial activity, reduced traffic and a pause on construction activities. After May 18, as lockdown rules were eased, the pollution graph started climbing. Consequent to several strict measures taken during the lockdown, the concentrations of different pollutants ($PM_{10}$, $PM_{2.5}$, $NO_x$, NO, $NO_2$, $SO_2$, $NH_3$, CO, $C_6H_6$) reduced significantly. This clearly demonstrates that with proper implementation of regulations, norms and standards, there is enough scope to maintain the ambient air quality. Interestingly, it has been observed that in initial days of lockdown $O_3$ levels reduced due to almost constant meteorology, but later it increased with increase in solar radiations and ambient temperature which enhance the photochemical activity between volatile organic compounds and nitrogen oxides resulting in ozone formation. For the first time in almost 30 years Indians in the city of Jalandhar could clearly see the Himalayas due to India's lockdown clearing air pollution. The pandemic and its management have brought home the interconnectedness between nature and human existence with renewed understanding of the complex linkages between the economy and the environment.

With the extension of the lockdown restrictions the water quality of the rivers and lakes improved considerably. According to Central Pollution Control Board (CPCB) India's major rivers did not improve significantly during the lockdown imposed to curtail the spread of COVID-19. An improvement in water quality was observed in rivers Brahmani, Bramhaputra, Cauvery, Godavari, Krishna, Tapi and Yamuna due to closure of industries and reduction in human activities. Besides, unseasonal rains in the cities, however, may have played a bigger role than the lockdown in improving water quality in the rivers.

Along the entire stretch of Ganges, only the Haridwar site showed improvement to an extent of being potable as per the threshold set by the CPCB. A 55% decline in turbidity at that site during the lockdown was attributed to the abrupt halt in pilgrimage activities. Absorption by chromophoric dissolved organic matter which is an indicator of organic pollution declined all along the Ganges stretch with a maximum decline at the downstream location of Diamond Harbour. Restricted discharge of industrial effluent, urban pollution, sewage from hotels, lodges, and spiritual dwellings along the Ganges are some of the reasons behind such declines. The impact could be seen in terms of increased dissolved oxygen (DO) and reduced biological oxygen demand (BOD), Faecal coliform, Total coliform and nitrate ($NO^{3-}$) concentration. A declining trend in nitrate concentration was observed in most of the locations due to limited industrial activities and reduction in agricultural run-off due to harvesting season. In eastern India significant changes have been reflected throughout the stretch of river Damodar with the drop in nutrient supplies.

The improvement in surface water quality was seen in terms of suspended particulate matter (SPM) in the Vembanad Lake in Kerala, the longest freshwater lake in India. The SPM concentration during the lockdown decreased by 15.9%. The atmospheric pollution data for the study area obtained from the central and state pollution control board showed that the air quality had drastically improved since the first day of the lockdown. Although associating atmospheric particulate matter with suspended particulate matter in the lake is premature at this point, the improvement in environmental quality was observed in both atmosphere and hydrosphere.

The impact is positive at large with the closure of the industries and the reduction of other anthropogenic activities that influence water quality and other marine organisms. Nevertheless, unsystematic disposal of masks, gloves and an array of plastic disposables from the hospitals and households reached the oceans and were transported at different depths adding deleterious consequences to the life in the hydrosphere.

There have been countless posts on social media over the past few months reporting unusual wildlife encounters even in urban areas. Increase in species richness in temporarily less-disturbed habitats, a higher breeding success of an aerial insectivorous bird, and reduction of road-killing of both amphibians and reptiles were reported. Reduced human disturbance allowed wildlife to exploit new habitats and increase daily activity. With humans self-isolating in their

homes, animals that usually stay away from urban areas now have space to roam. In northern India, a herd of deer entered the streets of Haridwar during the nationwide COVID-19 lockdown. In India, there's been a massive spike in the number of baby Olive Ridley sea turtles, as beaches lie empty of humans.

Negative effects occurred on conservation actions and alien species eradications. The lower human disturbance linked to lockdown was in fact beneficial for invasive alien species that took advantage from the lockdown. Anecdotal observations, especially from metropolitan areas, suggest that nature has responded to lockdown. For example, some urban-dwelling animals, like gulls, rats or monkeys, may struggle to make ends meet without access to human food. In more remote areas, reduced human presence may potentially put endangered species, such as rhinos or raptors, at increased risk of poaching or persecution. From Africa to Colombia, there have been reports of a rise in poaching of endangered species as tourists stay away and many park rangers are left out of work.

Prabha Devi L. <drlpraba@gmail.com>, GUIDE

## Activities in GUIDE

In continuation to the Mushroom cultivation activities by GUIDE since 2017, Dr. G. Jayanthi (Scientist) and her team is conducting regular training on Oyster Mushroom cultivation for participants. During the months of January and February 2021, the team has conducted training on mushroom cultivation and a total of 12 participants were trained on different cultivation methods of Oyster mushroom. In addition to that, the cultivation of a highly medicinal mushroom, *Cordyceps militaris* was successfully done by GUIDE team. In this connection, considering the broad interest for this mushroom owing to its therapeutic and medicinal use, around 135 participants have registered with GUIDE for taking up the training on *Cordyceps* cultivation in the forthcoming months. Further, in line with this, GUIDE has signed MoU with Institute of Pharmacology, Nirma University, Ahmedabad to study the potential of active compounds of *C. militaris* on various ailments. Under this MoU, Dr. G. Jayanthi and Dr. K. Karthikeyan from GUIDE and Prof. Jigna Shah from Nirma University initiated in-vivo experiments using the extracts of the *C. militaris* mushroom against breast cancer cells in animal models.

Those interested in mushroom training may register at:

https://docs.google.com/forms/d/e/1FAIpQLSeYt7Tu6HJ7CJMxcB8z162X5L390nipKvJTw3UJBUavFUQKgQ/viewform?usp=sf_link

Guj scientists grow one of costliest mushrooms

Packed With Medicinal Properties, Cordyceps Militaris Costs Around ₹1.5L/KG

Nimesh.Khokharlya
@timesgroup.com

Rajkot: For long they have tickled your taste buds while adding nutritional value to Chinese, Japanese, Italian and Thai cuisines. But now a mushroom species, touted to be one of the costliest in the world, has also turned out to be of medicinal value.

Scientists at Kutch-based Gujarat Institute of Desert Botany (GUIDE) have successfully cultivated – 'cordyceps militaris' – a mushroom species that traditionally found its use in Chinese and Tibetan herbal medicines. The scientists grew the mushrooms in 35 jars in a controlled environment in a laboratory within 90 days giving 500 grams yield. The mushroom is valued at Rs 1.50 lakh a kg.

The institute which has found it useful in treating even breast cancer has decided to provide training to entrepreneurs at a very nominal fee as a livelihood option to cultivate mushrooms at laboratory scale.

"C. militaris is known as Himalayan gold. It has a multitude of health benefits and can potentially prevent a wide range of lifestyle illness. The fungus is club-shaped and the surface appears roughly punctured. The inner fungal tissue is whitish to pale orange. It is now possible to cultivate it in labs under controlled conditions," said GUIDE's director V Vijay Kumar.

The institute has studied the antitumor element of this mushroom variety in detail. "We explored the in-vivo anticancer activity of the extracts against breast cancer in animal models. This was done in coordination with Nirma University, Ahmedabad. The preliminary investigation reveals extracts of this mushroom can provide significant results in terms of reduction in breast cancer tumour," said K Karthikeyan, senior scientist and head of environment laboratory division at GUIDE. The institute has sought regulatory permission to carry out clinical trials on humans. "We are also studying its effect on prostate cancer but it has been delayed due to Covid-19 induced pandemic," he said.

Plans are to test anti-viral and anti-cancer properties of this species in Indian conditions. "With proper awareness, we can make this wonderful nutritional and medicinal supplement available to a broader population," said V Vijay Kumar, adding that GUIDE scientist G Jayanti and professor Jigna Shah from Nirma University were also part of this study.

Training of mushroom cultivation at laboratory scale costs as high as Rs one lakh a week. But GUIDE will provide this training at a normal charge.

NUTRITIONAL PUNCH

- C Militaries has anti-microbial, anti-oxidant, anti-viral, anti-diabetic, anti-inflammatory, anti-cancer, anti-tumor, anti-fibrotic, anti-HIV, anti-malaria and anti-fatigue properties
- Neuroprotective, reno protective, lung protective
- Useful in treatment of chronic bronchitis, kidney disorder, viral hepatitis
- Can boost body's immunity with its anti-ageing properties and improve liver function
- Used as energy tonic as it enhances stamina and promote antibody production

WHY IS CORDYCEPS MUSHROOM IN DEMAND?

Cordyceps is high in cordycepin, which has proven anti-tumor properties and helps reduce tumor size in the body. It also aids in boosting cellular energy, helps strengthening cardiac muscles and helps improve cardiac function. It helps in the adjustment of the respiratory system function by curing asthma and helps in the expansion of the bronchus, and even prevents pulmonary emphysema. It has been known to enhance the bone marrow in order to generate platelets.

GUIDE has signed MoU with GSFC University, Vadodara to conduct research on various prospects including Exploration of microbial diversity from extremophilic region; Biomolecules from less explored plants and athalassohaline microorganisms; Biosynthesis of industrially important eco-friendly compounds; Bioremediation of polluted environment using microorganisms; Developing Plant Growth Promoting Rhizobacteria (PGPR) for hypersaline soils of Kachchh, etc. In this regards, Dr. K. Karthikeyan, Senior Scientist at GUIDE and Dr. Saroj Shekhawat from GSFC University are the Coordinators.

## Symposium/ Workshops/ Conferences

➢ Dr. L. PrabhaDevi delivered honorary lecture on Research Methods and Report Writing in Science in a Webinar organised by the Department of PG Zoology, Nesamony Memorial Christian College, KanniyaKumari, Tamil Nadu, 29th January 2021.

- Dr. K. Karthikeyan delivered a talk in the webinar organized by Bishop Heber College, Tamil Nadu and Christ University, Bangalore as part of 'World Wetland Day' on 2nd February 2021.
- Dr. V. Vijay Kumar attended the Consultation meeting under the chairmanship by the Additional Secretary, EF & CC regarding 'Partnership with Research Institutes for Achieving India's Voluntary Targets of Land Restoration', through virtual platform held on 12th February 2021.
- Dr. V. Vijay Kumar participated as a Resource Person for the 1st virtual "Advanced Training Program on Water Resource Management, Glacier Monitoring & Climate Change Studies" held at DST's Centre of Excellence, Department of Geology, Sikkim University from 15th February to 7th March 2021.
- Ms. Monika Sharma, Ph.D scholar attended 'One day Online Workshop on MOOCs', jointly organized by Online Teaching Learning & Communication Centre, UGC-HRDC and Internal Quality Assurance Cell, Gujarat University, Ahmedabad, 25th February 2021.
- Training program on 'Sustainable harvesting of Oleo-Gum Resin from (Guggal) *Commiphora wightii*' was organized by Forest department of Kachchh, Gujarat and Gujarat Medicinal Plant Board, Gandhinagar wherein the GUIDE scientists were invited as resource person during 9th to 11th March 2021. Dr. V. Vijay Kumar, Director and Dr. Arun Kumar Roy Mahato, Sr. Scientist, and Dr. Jayesh B. Bhatt, Scientist participated in this. The Secretary, Ministry of Ayush, Vadya Shri Rajeshbhai Kotecha, Dr. J. N. Shashtri, CEO-NMPB, Dr. Chidambaram Mokat, Regional Director, Western Region, NMPB, Pune, Shri Jagdish Prasad, Director GMPB were also present during the program. Dr. V. Vijay Kumar gave a brief introduction on "*Commiphora wightii* and its uses". Dr. Jayesh Bhatt made an audio-visual presentation on "Distribution and Status of Commiphora wightii in Kachchh, Gujarat and importance of Guggal gum as an Ayurvedic medicine".


- Dr. Rachna Chandra participated and delivered a talk on Kachchh Biosphere Reserve: The Rann in Five-day National webinar on Biosphere Reserves of India – Identification, Conservation and Management during 15th - 19th March 2021.
- Dr. K. Karthikeyan delivered a talk on aspects related to environmental microbiology and sustainability in the webinar organized by Christ University, Bangalore on 20th March 2021.

## Upcoming Webinars/ Conferences

- 7th GoGreen Summit. Conference Theme: Unfolding the Concepts of Green Technology to achieve Zero Emission, 14th - 15th October 2021.
- Webinar: International Conference on Ecology and Environmental Diversity, 21st - 22nd October 2021. https://ecology.environmentalconferences.org/.
- 9th International Conference on Environment Pollution and Prevention (ICEPP 2021), 19th - 21st November 2021, Sydney, Australia.

**Gujarat Institute of Desert Ecology**
**P.O. Box No. 83, Mundra Road, Bhuj,**
**Kachchh-370001, Gujarat, India**
**Tel: 02832-235025 Fax: 02832-235027**
**Website: http://www.gujaratdesertecology.com**