“FRUIT processing industries contribute more than 0.5 billion tonnes of waste worldwide,” says Amit Arora of IITB-Monash Research Academy, Mumbai. “It can be a viable single starting material for the recovery and production of multiple co-products.”

Scanning available literature on value addition to fruit-derived waste, the authors, Amit Arora and others, argue in a recent paper published in the journal *Food Chemistry* that bioactive compounds such as pectins, lipids, flavonoids, and dietary fibres abound in the peels, pomace and seed fractions of the fruit processing waste. Using novel bio-refinery approaches these can be viably extracted. Further, the waste that remains after such recovery could also be a source for production of biofuels.

Worldwide comparison of food production and consumption indicates wastage of 30-40%. However, as the authors say “compared to general food or other biomass derived waste, fruit processing wastes are found to be selective and concentrated in nature” making it viable for extraction of useful and commercial products from them.

Depending on the location and method of harvest, studies show the fruit processing industry discards as much as 30-50% fraction in case of mango, 40-50% pomegranate, 30-50% citrus and 20% banana fruit. The authors point out that a wide range of bioactive compounds, mainly primary and secondary metabolites of plants, such as phenolics, alkaloids, glycosides, volatile oils, mucilage, gums, oleoresins, bioactive lipids and polyphenols, and dietary fibres could be extracted gainfully from the fruit processing waste.

Mango kernels, banana peels, etc. are rich in resistant starch, a class of dietary fibre promoted as nutritional supplements for hypertension, obesity and anti-diabetic formulations. Vicilin-like protein from watermelon seed, sleptin from jackfruit seed, and proteolytic enzyme actinidin from kiwi fruit seeds can be extracted. Discarded seeds are rich in protein content having anti-hypertensive to anti-inflammatory pharmacological properties. Many seeds also contain amino acids like histidine and aromatic amino acids like phenylalanine that act as antioxidants.

Today most fruit discards are dumped into landfills. The authors estimate that the cost of dumping fruit processing waste into landfills in India alone would be in the order of $300 million per year. Another estimate indicates that the fruit processing waste alone contributes more than 20 million tonnes of carbon dioxide equivalent of global greenhouse gas emissions, mainly in the form of methane and nitrous oxide due to decomposition inside landfills.

The authors suggest that instead of dumping the fruit discards and polluting the environment, biochar could be produced just by heating the biomass in the absence of oxygen. Specially designed pyrolysis equipment could produce biochar that ‘improve the quality of acidic soil by increasing the pH of the soil, habitat for microorganisms and act as exchange sites for plant nutrient support’. As biochar acts as carbon sequestration ‘contrary to composting, it provides a significant reduction of greenhouse gas emissions’.

Arora says that the novel idea of extracting bioactives “opens new avenues for food, chemical and pharmaceutical industries, which have a tremendous potential, especially where availability of fruit processing waste is abundant.”


*Contributed by T.V. Venkateswaran, Vigyan Prasar*

**Scientists Develop Software to Predict Ailing Heart**

**SCIENTISTS** have developed a computer programme that can monitor irregular heartbeats of a patient and can predict if the patient is suffering from heart disease.

The programme is designed to analyse data from an electrocardiogram which is used to monitor a patient’s heartbeats over a period of time. The result is seen as many
The most significant application of our program is to generate an alert signal for irregular electrocardiogram behaviour in a person. Such an automated system will be useful in remote areas where a cardiologist may not be easily available," the researchers write in their paper published in Current Science.

The study was done at the Shri Shankaracharya College of Engineering and Technology and Chhattisgarh Swami Vivekananda Technical University, Bhilai in Chhattisgarh. The program has been tested for efficiency at the Massachusetts Institute of Technology–Beth Israel Hospital database of normal individuals and arrhythmia patients.

Speaking on the occasion, Dr. K.S. Sachdeva, Deputy Director General, NACO, said, “Advocacy for HIV is in the evolutionary stage. This is one disease where the social context is more relevant than the treatment context. Standing at an inflexion point one can say that much has been achieved. We are close to almost eliminating HIV/AIDS.”

However, emphasising on the need for a vaccine, Dr. Sachdeva added, “Despite the programme advancement, vaccine will remain important. You never know when the disease can resurface. Vaccine itself is the most effective prevention tool.”

In 2015, HIV prevalence in India was an estimated 0.26% of the total population. India has almost 2.1 million people living with HIV. The good news is that India’s HIV incidence is slowing down, with a 32% decline in new HIV infections (86,000 in 2015), and a 54% decline in AIDS-related deaths between 2007 and 2015. Also, with the medicinal interventions, the patients can now have near to usual efficiency.

Sharing her experience on how we can accelerate HIV treatment prevention, Ms Nicole Seguy, Team Leader for Communicable Diseases at the World Health Organization, India country office, said, “We are moving towards elimination but we will have some bottlenecks along the way. Vaccine will be welcomed as that will be an additional tool. Together, we can find solutions to the resources issues.”

“I am the happiest trans-woman living with HIV,” emphasised Ms Simran Shaikh, India HIV/AIDS Alliance. She also added, “Today, the government has made a commitment towards this. Funding is drying at every stage, but it is not only in India, it’s a global issue.”

(O-L) Dr. Nicole Seguy, Simran Shaikh, Dr. KS Sachdeva, Gautam Yadav and Dr. Nikhil Singla engaging with the participants at HIV Under the Microscope: Quest for a Vaccine event organised by IAVI
Lost Species of Jumping Spider Found in India

ONLY a single male specimen of a rare jumping spider, *Brettus cingulatus*, has been described and recorded from Myanmar (earlier Burma) since 1895.

More than a century later, a team of naturalists led by Arachnologist Javed Ahmed has sighted and reported a single male specimen of this species from the Alibaug district in Maharashtra, which is a new record from India. In fact, the specimen was sighted hidden under a teak leaf from the garden of Rajashree Khalap, a co-researcher.

The team then researched on this widely and found its presence in other regions as well. Co-researchers Sumukha J.N. and Dr. Krishna Mohan photographed the spider from the forests in Karnataka. This research spurred a new record for Bangladesh and Malaysia as well, as the species was recognised in these countries too.

This find was just the beginning as the team soon realized another astonishing fact: as per records available on jumping spiders, hitherto seven species of small to medium-sized spiders are identified under the genus *Brettus*. “However, during the course of our research we found that one species of *Brettus*, recorded as a separated species – *albolimbatus* – was actually the female of the *Brettus cingulatus* species!” clarifies the lead author Javed Ahmed. “The *Brettus* genus is a widely photographed species.

So, then, this is a discovery that spans three countries, two regions – South & Southeast Asia – and united two disparate species as one, nearly a century after they were described,” says the author.

Although a proper description of the male specimen of the species *B. albolimbatus* was not described earlier, many photographic records and sightings were reported by other researchers of the female *B. albolimbatus* in association with the male of *B. cingulatus*.

Despite photographing them together, it had not occurred to them that they could be one and the same species. When queried on how this confusion arose, Ahmed clarified: “The spider exhibits sexual dimorphism; that is, the male and female spiders display some dissimilarity in appearance; a trait found in many animals including humans. This could possibly be the reason for misjudging and recording them under different species earlier.”

However, this time, the naturalists studied both the specimen in detail and after careful observation of the body structures, pedipalp and epigynum (genitals of spiders, by which they are classified), came to the conclusion that they belonged to the same species. Collaborating with Edward Hill, the internationally acclaimed expert on jumping spiders, the discovery was published on 22 May 2017, in the journal *Peckhamia*.

The team, well known for discovering fascinating spiders from India, is led by Javed Ahmed comprises Rajashree Khalap, Sumukha J.N., engineer and wildlife photographer, and Krishna Mohan, surgeon and a wildlife photographer from Karnataka.

All specimen collected and photographed have been deposited at the repository of the Forest Training Institute, Chikhaldara, Amravati.

Lying Flat Not Helpful in Brain Stroke

*Contributed by Susheela Srinivas, #189, 1 F cross, 3rd Stage, 4th Block, Basaveshwaranagar, Bengaluru-560079; Email: sushsri@gmail.com*
Indian Scientists Create Gel for Wound Healing

INDIAN scientists have come up with a new combination of polymers that can be used as a hydrogel to make the process of wound healing faster.

The main advantage of the new hydrogel is that mixing of the two polymers causes rapid gelation at the body temperature of 37 degree Celsius itself and at the same time does not generate much heat. Generation of heat during the gelling process can lead to tissue death in the area surrounding the injection site. This will be avoided.

Speaking to India Science Wire, Suresh Kumar Jewrajka of CSIR-Central Salt and Marine Chemicals Research Institute (CSMCRI) at Bhavnagar, Gujarat, who is one of the researchers involved in the development said, “The new hydrogel also leaves no by-product. Hence, it is biocompatible. Further, it is biodegradable making it well suited for wound healing and tissue regeneration.”

The combination developed by the scientists consists of a modified version of polyethylene glycol and a reactive block copolymer of poly [(2-dimethylamino) ethyl methacrylate] and poly (N-isopropyl acrylamide). The two compounds react and form a hydrogel in less than four minutes.

The results were published in the internationally renowned science journal Materials Chemistry B. The journal is brought out by UK’s Royal Society.

Hydrogels have a special property of absorbing water and becoming a semisolid gel at body temperature. This helps to maintain it in a liquid state in the vial and solidifying into a gel when applied on a wound or injected near the site of an injury.

In a few minutes, the liquid becomes a gel that aggregates platelets and prevents loss of blood. This aids wound closure. It also has the ability to incorporate antibiotics and provides sustained release of the drug at the injury site.

Other scientists who contributed to the study were Arvind Singh Chandel and Nutan Bhingradia from CSIR-CSMCRI, and Shailja Singh and Deepika Kannan from Shiv Nadar University, Uttar Pradesh.

They are now taking the research forward by testing it on mice. “We need to do extensive experiments to test its utility in clinical applications. Our future work will also deal with making elastic and crystalline hydrogels for tissue regeneration,” the scientists told India Science Wire.

Bhavya Khullar, India Science Wire, Vigyan Prasar

IT is generally believed that lying flat on the bed with the head facing upwards improves recovery after a brain stroke by increasing blood flow to the brain. A recent study has demolished this belief.

A clinical trial conducted between March 2015 and November 2016 with 11,093 patients in 114 hospitals from UK, Australia, China, Taiwan, India, Sri Lanka, Chile, Brazil, and Colombia has brought out new findings in this direction.

From India, 499 patients were enrolled from six stroke centres – Christian Medical College in Ludhiana, PGIMER in Chandigarh, Dr. Ramesh Superspeciality Hospitals in Guntur, SCTIMST, Thiruvananthapuram, and Baby Memorial Hospital in Calicut.

The majority of patients who took part in the study had mild to moderate severity strokes and were between 53 and 81 years of age. Patients with brain stroke were either asked to lie flat with their face upwards or with their head raised to at least 30 degrees during the first 24 hours after they were admitted to the hospital. They were assessed for the degree of disability 90 days later or death during this period.

The results revealed that lying flat or sitting up at an angle of 30 degrees after a stroke made no difference to the recovery. The findings were published in the New England Journal of Medicine.

Brain stroke is a leading cause of death and disability. The present recovery protocol involves laying the patient flat on the bed but this method also increases the risk of pneumonia. The research led by The George Institute for Global Health, Australia, discovered that the position of a patient’s head with the most common form of stroke, acute ischemia, does not affect outcomes.

Lead investigator Professor Craig Anderson of The George Institute for Global Health, Sydney said, “Many stroke specialists believe that the way the body is positioned after stroke makes a difference to their patient’s recovery. But, there was really no conclusive evidence to back this up. We know the first 24 hours of care post-stroke are crucial to recovery, so it was vital to find out if sitting up or lying down flat could make any difference.”

These results will help frame guidelines for lower to middle-income countries, like India, where lying flat after a brain stroke is more commonly practiced due to the lack of motorised beds.

Bhavya Khullar, India Science Wire, Vigyan Prasar