WEST BENGAL INNOVATES

Honey Bee Network

National Innovation Foundation

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National Innovation Foundation

Bungalow 1, Satellite Complex
Premchand Nagar Road
Vastrapur, Ahmedabad 380 015
Gujarat, India
Telephone: +91-79-2673 2456/2095
www.nifindia.org Email: info@nifindia.org

HONEY BEE NETWORK

www.honeybee.org, www.sristi.org

Regional Collaborators
Jaydeep Mandal, Murshidabad
DRCSC, Kolkata
CIS, Kolkata

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WEST BENGAL INNOVATES

PREFACE

National Innovation Foundation has been pursuing the mission of making India innovative and a creative society since 2000 with the active support of Department of Science and Technology, Government of India. We have not been equally successful in scouting and documenting innovations and traditional knowledge practices in every state.

Thanks to the support of volunteers of Honey Bee network, we have been able to discover many unsung heroes and heroines of our society who have solved local problems without any outside help.

Despite various constraints, NIF has put together a small book celebrating creativity, innovations and traditional knowledge from West Bengal. I am conscious of its limitation in terms of coverage and outreach. But if we could uncover so many examples of the ability of local communities and individuals to solve problems on their own without outside help, how much more can be done if state and private sector agencies join hands with NIF actively.

I invite the state government and its various organs to actively support our quest to uncover many more creative communities and individuals in rural and urban areas. NIF will then help in building value chain around them.

The book is divided in three parts. The mechanical innovations developed by innovators from West Bengal are covered in part one. Selected examples of herbal traditional knowledge are given in part two. The innovations from other parts of the country suitable for the development of West Bengal are given in part three.

By no stretch of imagination, could we claim that we have achieved a great deal. We have merely made a simple point. There are a large number of knowledge rich people who

may not have been educated much, may in fact be economically poor also, but still have the ability to solve a few problems so well.

The challenge really is to work out a synergy so that no creative voice remains unheard, and no solution remains localized and unrecognized. By adapting public policy in support of grassroots innovators and traditional knowledge holders, we can make economic development process more inclusive and sustainable.

This book on innovations has been compiled at the request of Dr. Vijay Kelkar, Chairman, Finance Commission and Member, Governing Council of the National Innovation Foundation as a tribute to the creativity and innovation at grassroots. This presentation is part of a series of innovation compendium prepared for each State of India. We hope this will be followed up in the form of concrete policy and institutional initiatives in each State to empower creative people to improve the quality of life of common people and thus promote inclusive growth.

It is my belief that such examples will act as spur for other State government departments to look for creative efforts of their staff and users at ground level. I hope that NIF will have the opportunity to work closely with the State government in future and expand knowledge base, add value to selected technologies and help them diffuse through commercial and non-commercial social channels for improving the livelihood of the majority of the people.

R. A. Mashelkar, FRS
Chairperson, Governing Council
National Innovation Foundation, Ahmedabad
mashelkar@nifindia.org

Building a Bridge with Grassroots Innovators in Informal Sector

To make Indian development process more inclusive, there is no escape from building upon creative and innovative experiments pursued by common people at village or semi-urban level. Many of these experiments lead to development of innovations, which can improve productivity and generate employment. However, the purpose of a particular innovator may often be to solve his problem. There is no mechanism available for him to share the knowledge, innovation or practice with other people in different regions. Sometimes, ideas and innovations get diffused through word of mouth. But many times, these ideas remain localized. In the process, potential growth and social development gets constrained. To overcome this constraint, Honey Bee Network with a handful of volunteers triggered a movement, twenty years ago to scout, spawn and sustain the unaided innovations and outstanding traditional knowledge from the informal sector of our country.

Drawing upon this experience, NIF (National Innovation Foundation) was set up in 2000 with the help of Department of Science and Technology, Government of India to scale up the idea of learning from grassroots innovators.

Under the inspiring leadership of Dr. R. A. Mashelkar, Chairperson NIF and former Director General, Council of Scientific and Industrial Research (CSIR), NIF has taken major initiatives to serve the knowledge-rich, economically poor people of the country. It is committed to make India innovative by documenting, adding value, protecting the intellectual property rights of the contemporary unaided technological innovators, as well as of outstanding traditional knowledge holders. It aims at promoting lateral learning among local communities to generate low cost affordable solutions of the persistent and emerging problems, and enhance the diffusion of innovations on a commercial as well as non-commercial basis.

How does NIF work?

Primarily, NIF has five functions: (a) Scouting and documentation, (b) Value addition and research and

[1] The Honeybee collects pollen from the flowers but they are not impoverished, in the process links one flower to another enabling cross-pollination. Similarly, the Honey Bee Network strengthens people-to-people contacts, learning and networking by pooling the solutions developed by individuals across the world in different sectors. The network acknowledges the innovators, traditional knowledge producers and communicators so that they do not remain anonymous.

development, (c) Business development and Micro Venture, (d) Intellectual Property Rights protection and (e) Dissemination, database development and IT applications.

NIF has been entrusted with the responsibility of building a National Register of Grassroots Innovations and Traditional Knowledge. It is not enough to document or disseminate the innovations or outstanding traditional knowledge. Value addition is very important for harnessing the full potential of the idea. NIF has entered into MOU with CSIR and Indian Council of Medical Research (ICMR) besides other organizations. CSIR has allocated funds to support research on grassroots innovations in CSIR labs. Similarly, ICMR supports research on such herbal healing knowledge, which has not been documented in the classical texts and formal institutional literature. NIF also helps in generating a very large pool of open source / public domain technologies. A small number of innovations are also protected by patents and other IPRs.

For most innovators, attracting risk capital for converting innovations into enterprise is very difficult. They neither can offer much collateral nor are they able to develop business plan or deal with formal R&D system.

A Micro Venture Innovation Fund (MVIF) has been set up with the help of SIDBI to provide risk capital for technologies at different stages of incubation. Under single signature, innovators are trusted and investments are made to help them commercialise their innovations. Most innovators do not make good entrepreneurs. For entrepreneurship, one has to make consistent batch by batch production of products. Innovators are often incorrigible improvisers. They seldom make two things alike. NIF has helped such innovators to license their technologies to third party entrepreneurs. Most of the licenses have been given to small entrepreneurs and in a few cases, to medium enterprises.

A very elaborate benefit sharing system has been developed, governed by the Prior Informed Consent (PIC) of the knowledge

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The Honey Bee Network strongly believes in sharing knowledge among the providers of innovations in their own language, which is achieved by publishing local language versions of Honey Bee newsletter. It also ensures that a fair share of benefits arising from commercial exploitation of local knowledge and innovations reaches the innovators and knowledge providers.

providers. Attempt is made to share benefits not only with the innovators but also with their communities and for nature conservation. In addition, a small part is kept for contingency support to needy innovators, for R&D stakeholders, promoting women's innovations and meeting overhead costs.

It is remarkable that grassroots innovations are generating global demand, as evident from inquiries from around fifty-five countries for various technologies, NIF has succeeded in commercializing products across countries in six continents apart from being successful in materialising thirty cases of technology licensing with the help of partner agencies.

What has it done?

With major contribution from the Honey Bee Network, NIF has been able to build up a database of more than 1,00,000 ideas, innovations and traditional knowledge practices from over 500 districts of the country.

NIF has filed 182 patents in India and seven in US and one PCT application. Out of these, 33 patents have been granted to grassroots innovations in India and four in US. NIF has funded 113 projects under MVIF to the extent of Rs.1.3 crores. Hundreds of technologies have diffused through farmer to farmer social network.

NIF has proved that Indian innovators can match anyone in the world when it comes to solving problems creatively. Where they perform better than rest is in generating more affordable sustainable solutions by using local resources frugally.

Those who see poor only as the consumer of cheap goods, miss the knowledge richness at the grassroots level. The Poor can be the Providers also.

The Grassroots to Global (G2G) model that NIF is propagating is all set to change the way the world looks at the creativity and innovations at grassroots.

How can state government join hands with NIF?

a. NIF has no field extension unit nor does it want to have one. However, state government has several field functionaries in the field of agriculture, education, industry, rural development, women and child care, forestry, etc. There can be a very fruitful partnership between NIF as a source of innovative ideas and technologies and state

government as partner in dissemination, value addition and even commercialization through incentives, promotion, subsidies, etc.

b. State government can join the national campaign for scouting innovations and traditional knowledge and motivate its grassroots functionaries to join hands with NIF in uncovering the talent at the community level.

c. Students in schools and colleges can be motivated to scout creative and innovative people in their neighbourhoods and send the entries to NIF (Post Box No.15051, Ambavadi, Ahmedabad 380 015, campaign@nifindia.org). Examples of innovations can also be included in the curriculum of the school children.

d. Demonstrations and trials can be organized at various regional research stations, KVKs (Krishi Vigyan Kendras) so as to create awareness about the creative potential of common people.

e. The research institutions can be mandated to add value to the knowledge of innovative people and help in protecting their knowledge rights.

f. On the state's website, link to NIF can be given and the innovations from the region can be displayed to put forward the creative face of the state before the people.

g. Some of the innovative people identified by NIF and/or state government could be awarded at district and state level besides giving them support for further work.

h. A nodal officer could be appointed to keep a dynamic touch with NIF to ensure that all the areas of possible cooperation are explored.

I hope that NIF would be able to develop a functional, fruitful and fulfilling relationship with the government of West Bengal state. Tremendously rich knowledge of biodiversity, minerals and environment can be leveraged through the proposed association.

Anil K Gupta
Executive Vice Chairperson, NIF, Ahmedabad
Professor, Indian Institute of Management, Ahmedabad
anilg@nifindia.org

“Innovation opens up new vistas of knowledge and new dimensions to our imagination to make everyday life more meaningful and richer in depth and content”.

- Dr. A.P.J. Abdul Kalam

“The purpose of innovation is to create a new value for an individual, team, organization or for society at large”.

- Dr. R.A. Mashelkar

PART I

INNOVATIONS
from WEST BENGAL

This section contains grassroots innovations emerging from the rural/urban areas of West Bengal

01

Nitai Das Gupta
Murshidabad

A Life Dedicated to Innovations

Waland- Amphibious Cycle Rickshaw

This boat shaped rickshaw, which can accommodate four persons, was developed by the innovator in 1954. The direction of this rickshaw is controlled by a handle attached to the front wheel. The speed in water and on land is estimated to be 8 km/hr and 30 km/hr respectively.

5-Gear Bicycle

This innovative bicycle having five gears was developed by the innovator in 1958. Two persons can ride this bicycle. Of the five gears, two gears were specially incorporated to enable a comfortable ride on hilly terrains.

Motor Cycle Driven Ambulance

Transport of the sick and injured persons to health facilities in rural areas is a major concern due to the lack of motorised ambulances. Methods currently used such as carrying on a crude stretcher or in wheel barrows or carts, are slow and uncomfortable, leading to unnecessary delays and discomfort of the patients.

To address these problems, the innovator came up with a motorcycle driven ambulance way back in the seventies. The ambulance, which has all facilities of a conventional one, can be easily detached from the motorcycle.

Four Wheeler Vehicle Driven By Four Persons

The innovator developed this vehicle in 1997 when he was requested to come up with a special manual vehicle that can carry four persons, for a road show in south India. The vehicle consists of four wheels and two frames and has eight non-changeable gears. The steering and a brake, which applies to all four wheels simultaneously, are provided in front to the driver on the left.

02

Mrinal Kanti Bandopadhyay*
Kolkata

Energy Saving Battery Driven Motorcycle

Understanding the need to have battery powered vehicles to check the high pollution levels in cities, the innovator came up with such a motor bike almost a decade ago.

The motor bike uses two 12 volt, 75 ampere/hour lead acid batteries. It achieves a maximum speed of 40 km per hour under normal riding conditions. The innovative feature of the vehicle is that an aerodynamic fiber sheet is fitted to the handle bar of the motor cycle, which decreases the battery consumption when speed increases beyond 25 km/h. Other modifications, including redesigning the front portion, altering the size of chain-sprocket and the front wheel, have also been done done by the innovator. He has also attached a display to indicate the status of battery consumption. This enables the rider to decide when to recharge the batteries or how far to go.

* Though awarded in NIF's Second National Competition in 2002, the innovator is a professional as per the present rules of NIF, which were redefined 2003 onwards to specifically focus on innovations from the people of unorganised sector.

03

Pressure Type Kerosene Stove

Usha Shankar Bhattacharya*
Kolkata

After sustained efforts of many years, in the year 1993, the innovator was able to develop a superior stove, which had oil savings of 40-60 percent over the regular stove. The improved stove offered better combustion, enhanced safety and reduced operating noise.

According to the innovator, the stove has the potential to save hundreds of tones of valuable fuel a year, which is surely impressive in a country that carries the reputation of being the world's least efficient energy user.

* Though awarded in NIF's First National Competition in 2001, the innovator is a professional as per the present rules of NIF, which were redefined 2003 onwards to specifically focus on innovations from the people of unorganised sector.

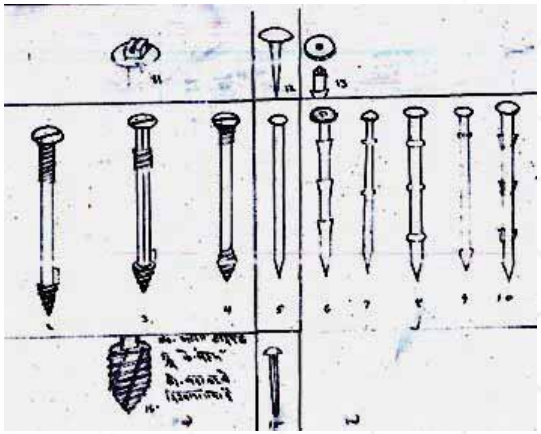
Mahabir Choubey
Purulia

Novel Screw Design

The innovation is a screw, which has combined the features of the conventional wooden screw (threaded conical front) and metal stud (constant pitch intermediate thread). The novel screw thus comprises a head portion provided integrally with the body portion. The screw is tapered at the tip and the remaining portion possesses constant diametrical threaded pitch like the conventional metal screw/stud.

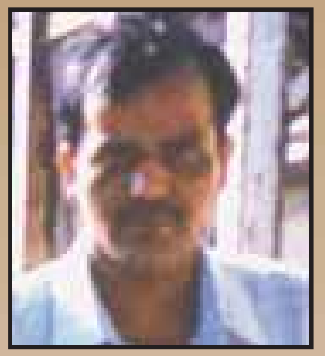
This screw has an advantage of cutting its own threads when it is being screwed in for fastening purpose. Due to the use of Seller's /ACME type of threads, stress concentration becomes less and thus reduces subsequent failure (cracks) that occurs in the wood.

The screw does not become loose after some time, as it is broader at its tip and the cross sectional wedges around the screw (3-4) give it a better locking mechanism or grip. NIF, through its Micro Venture Innovation Fund, supported this innovation for commercialisation.



05

Cycle Operated Pump



Nasiruddin Gayen
South 24 Parganas

This invention relates to a pedal water pump, which is particularly useful for pumping water from the canal for irrigation purposes and to draw water from wells, tube wells and reservoirs.

This novel pump is portable and can be taken and installed on site at will. The novel twin cylinder system with connecting rod/gear/flywheel arrangement ensures constant delivery of water without any dead stroke. There is constant steady output with lesser biomechanical load while using for longer time. This innovation makes it easier to pedal than pumping by hand especially for people with heart ailments, elderly, women and children.

Dharnidhara Mahato
Purulia

Pedal Operated Paddy Thrasher

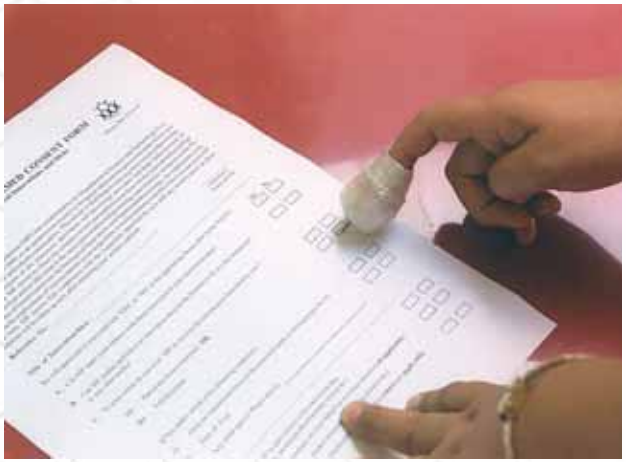
The innovator has come up with a pedal operated paddy thrasher that is available at less than one-fifth of the cost of conventional paddy thrashers, while delivering twice the output. Using this thrasher, a person can thrash 1000-1200 kg of paddy in a day, which makes it quite efficient for village use.

07

Single Finger Pen

Arindam Chattopadhyay
Bankura

This innovation is a very simple one. A small refill-based pen is attached to a ring worn on a single finger. This innovation could be useful for physically challenged people who do not have a thumb. It could also be useful for the normal people for ticking a sheet or just writing. NIF has supported the innovator from its Micro Venture Innovation Fund for test marketing.



08

Ranjit Ghorai
Bankura

Par-Boiled Paddy Distributor

Conventionally the spreading of par-boiled rice is done manually using a tray. The par-boiled paddy is very hot and labourers get burn and blisters many a time.

The innovator has developed a simple but very effective par-boiled paddy spreading machine. This machine can spread about 800 kg par-boiled paddy in five minutes. The machine is a trolley having a sluice gate kind of opening at the bottom where the size of the opening can be adjusted. While carrying the par-boiled rice to a different site for drying, the opening is kept closed.

It can also be used for spreading cow dung compost in the farm field, and there is no need of hiring any labour for this purpose.

09

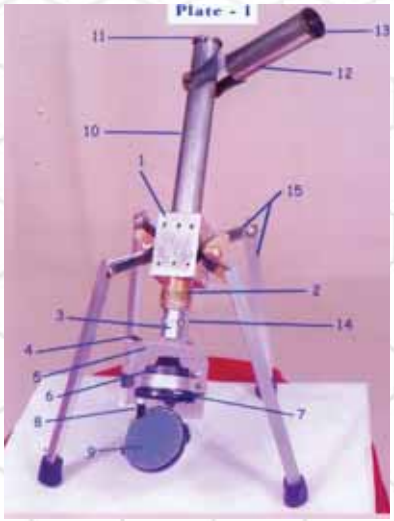
Mini Microscope

Chand Narayana Bairagya*
Burdwan

Many times students need to carry microscopes for field work. The conventional microscopes are bulky and tedious to carry.

To solve this problem, the innovator has come up with a handy lightweight microscope that looks just like a conventional microscope. It weighs only 250-500 gm (depending on material of frame) and has a magnifying capacity of 450 to 675X. It is very useful for fieldworkers who otherwise need to carry ordinary microscopes with them.

Apart from the microscope, the innovator has also developed a three-in-one fish reproductive chamber and multiple arc projector.



* Professional registered in NIF's Professional database. As per its mandate, NIF does not consider professionals for awards or financial support, but only helps in providing visibility or linkages.

10

Biswajeet Sutradhar
Purulia

Wooden Bicycle

This innovation is a bicycle made entirely from wood. Great to look at and ride, this bicycle has a shining teak finish. The innovator has modified the chain and sprocket system slightly to suit his 'wooden' needs. He was scouted during the 20th Shodh Yatra in West Bengal.

11

Pumpkin-Bottlegourd Vine Fusion (a kind of air layering)

Bijay Pramanik
Purulia

The innovator utilised the different timings of maturation of bottlegourd and pumpkin to increase his yield. He observed that pumpkin flowered a month earlier than the gourd. So when pumpkin needed more nutrients, it took from the gourd vine and vice versa.

He planted a bottle gourd and a pumpkin sapling closely and then fused them at one place. Due to this both plants started yielding more fruits.

12

Arun Kumar Ram*
Howrah

Human Mask to Prevent Tiger Attacks

Tiger attacks on human is very common in the Sunderbans. Being a keen student of nature, Arun observed that the tiger seldom attacks from the front. He looked at several other prey–predator relationships and got further confirmation.

Having this understanding, he designed a human mask and tied it on the back side of the head. The thought was that the tiger would get the illusion that the back was actually the front side of the person and hence would not attack. The Forest Department liked the innovation and replicated it on a large scale without attributing any acknowledgement to Arun, the person from whom the idea originated. The result of the experiment was very positive and the number of cases of attack by the tiger came down drastically.

Arun, being quite humble, is happy and content that his innovation has saved so many lives.

* Professional working in a NGO. As per its mandate, NIF does not consider professionals for awards or financial support, but only helps in providing visibility or linkages.

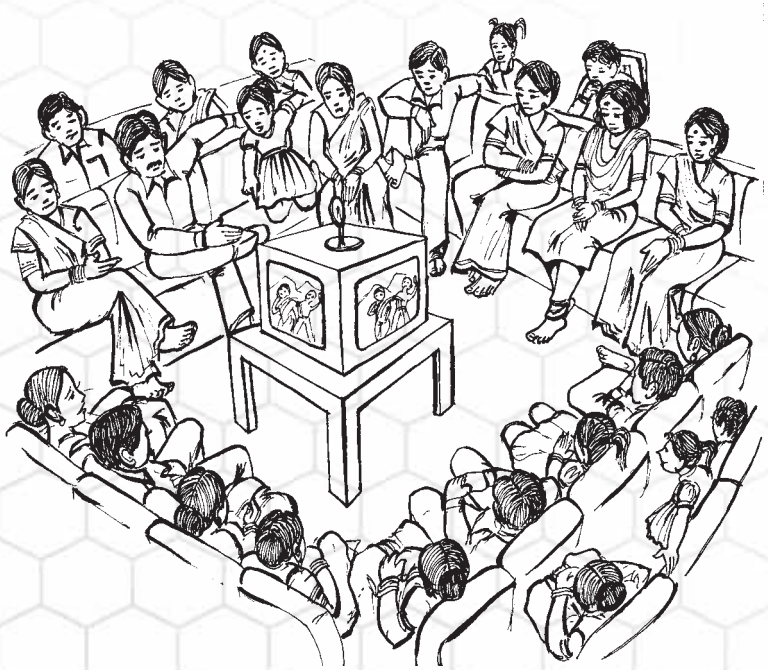
13

Idea of a Four-sided Television

Bappi Roy
Bankura

In most of the meetings in rural areas, people prefer to sit in a circle so that they can look at each other and at the same time, enjoy a bonfire in the winter or a folk theatre performance. At present, all modes of visual communication require people to sit behind each other and face other persons' backs.

The suggestion from Bappi was of a four-sided television, which would make it possible for people to sit in a circle and watch programme, while having frontal view of each other.

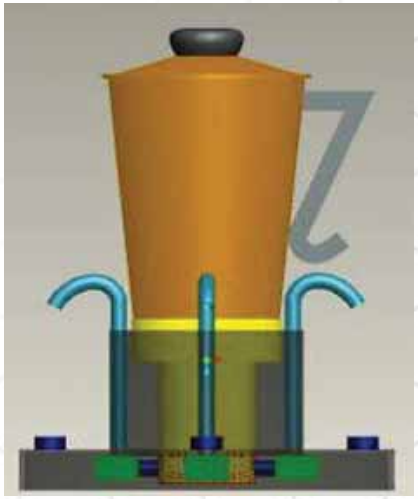


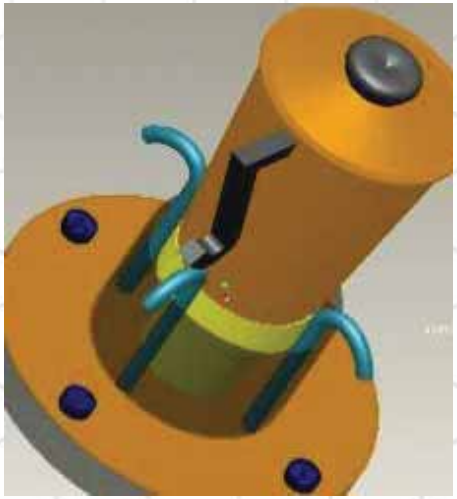
14

Sukomal Basak
Cooch Behar

Self Dispensing Apparatus for Liquids

This innovation is a container and a dispenser that pours liquid as soon as a glass is kept below the dispenser. The main container with four dispensers (on four sides) is kept on a stainless steel base. Below each dispenser, on the platform, are four switches. These switches are connected to a valve, which gets open when the switch gets pressed due to the weight of the glass placed on it. As a result, the liquid from the main container flows out through the dispenser into the glass. The innovator was supported by NIF for product development.





15

Automatic Urinal Cleaning System

Pulak Pal
Murshidabad

In order to promote better sanitation in public lavatories, the innovator has designed a purely mechanical device for urinal cleaning. This system does not require electricity for running and is economical both in construction and operation. It utilizes a simple self-designed pump for operation resembling an injection system. Incorporation of a such a system will make the public services friendlier and hygenic for the people.

Narayan Das Jethwani
Darjeeling

Temperature Regulated Fan Speed Control System

Many times at night the temperature lowers and one has to physically get up and reduce the fan speed, which is quite irritating. The innovator has come up up with an electronic system that will automatically adjust the rotational speed of the room fan according to the room temperature enabling a person to sleep peacefully and comfortably.

Ajooba Tube Light Frame

This system is a tube-light frame with out any choke and starter. The product is capable of using even 80 per cent fused tubes, which are considered as waste and thrown away. The power consumption is low and as there are no chokes or starters used, the overall cost is also quite less. Another interesting part of the system is that the luminosity of the tube can also be controlled.

Through its Micro Venture Innovation Fund, NIF has provided the innovator with working capital for commercialisation of his innovations.

17

Apparatus to Lift Surface Water from River

Jaydeep Mandal*
Murshidabad

The apparatus comprises six aluminum hollow tubes attached to a rotatable wheel, which is mounted on a metallic stand. At the end of each tube a plastic funnel is attached. Due to the flow of the river water, the wheel along with the funnels starts rotating. Water, entering the funnel, passes through the tube to an outlet pipe. This water can be stored, purified and used for drinking purposes or can directly be used for irrigation.

This system offers a low cost, environment friendly solution for supplying potable water to riverside villages or for using water for irrigation or even industries.

* Professional registered in NIF's Professional database. As per its mandate, NIF does not consider professionals for awards or financial support, but only helps in providing visibility or linkages.

20th Shodh Yatra
December 26, 2007- January 2, 2008
Patamda, East Singhbhum & Purulia to Bankura, West Bengal

Shodh Yatra is a journey on foot in the search of knowledge, creativity and innovations at grassroots.

It is an attempt on the part of SRISTI, a Honey Bee Network partner based at Ahmedabad and NIF along with other network partners to reach out to the remotest part of the country with a firm belief that hardships and challenges of natural surroundings are one of the prime motivators of creativity and innovations.

Shodh Yatra aims at unearthing such traditional knowledge and grassroots innovations that have not only simplified the lives of men, women and farm labourers but have also significantly contributed towards the conservation of bio-diversity.

The yatris, during the 20th Shodh Yatra, over the period of eight days, travelled through the rural areas honouring innovators, traditional knowledge holders, experimental farmers and centenarians on the way. Many biodiversity and recipe contests were also organised at various places. The Shodh Yatra saw the participation of people from all walks of lives, scientists, students, innovators, farmers, journalists and traditional knowledge holders from India and abroad.

NATIONAL INNOVATION FOUNDATION, INDIA

The Sixth National Biennial Competition for Green Grassroots Unaided Technological Innovations and Traditional Knowledge

Co-sponsors

Honey Bee Network

CSIR

SRISTI

IIM-A

The competition

The NIF, set up by Department of Science and Technology, GOI, seeks entries of unaided technological innovations and traditional knowledge developed by an individual or group comprising farmers, artisans, fishermen and women, slum dwellers, workshop mechanics, students, local communities etc., in managing natural and/or other resources. The innovations can be in machines, gadgets, implements, or processes for farm operations, household utility, transportation, energy conservation or generation, reduction in drudgery, creative use of biodiversity, development of plant varieties, generation of herbal remedies for human or animal health or developing new or any other low cost sustainable green technology related to various aspects of survival in urban and rural areas. Creative ideas for innovative technologies which have not yet been reduced to practice are also welcome. Communities developing People's Biodiversity Register (PBR) or People's Knowledge Register (PKR) are encouraged to register/link their knowledge base with the National Register at the NIF.

The awards

The best three innovations and traditional knowledge practices will be awarded Rs 1,00,000, Rs 50,000 and Rs 25,000 each in different categories. In addition, individuals and/or organizations that make extraordinary contributions in scouting grassroots innovations and traditional knowledge may also get awards worth Rs 50,000, 25,000 and 15,000 respectively besides recognition to many others. There will be several consolation prizes of Rs 10,000 each in different categories depending upon the number of entries and incremental inventiveness and potential social and environmental impact. Three most outstanding innovative ideas may be given prizes of Rs 50,000, 25,000 and 15,000 in addition to consolation prizes of Rs 5,000 each. There are special prizes for innovations by or dealing with, physically challenged people. The innovations /ideas of professionally trained persons are not considered for award or financial support. There are special awards for journalists writing about grassroots innovations and/ or traditional knowledge and creating greater awareness about NIF's missions. *The award money may be revised in due course.*

Students

Young inventors and innovators are invited to send their ideas or innovations for a special category of awards for them. These should be unsupervised, an outcome of their own creativity, without any support from their teachers or outsiders. There will be prizes worth Rs 15,000, 10,000 and Rs 7,500 for the best three entries and several consolation prizes of Rs 5,000 each in this category.

How to participate

Individuals or groups may send as many entries as they wish on plain paper providing a) genesis of the innovation and traditional knowledge b) its background and c) educational qualification and occupation, accompanied by photographs and/or videos if possible and any other information that may help in replicating the innovations/traditional knowledge. Herbal entries may be accompanied by dried plant samples to enable proper identification procedure. The **Sixth National Competition started on February 1, 2007 and entries would be accepted till January 31, 2009.** Every entry should include the **full postal address** to facilitate further communications.

Where to send entries?

National Coordinator (Scouting & Documentation), National Innovation Foundation, Bungalow No. 1 Satellite Complex, Premchand Nagar Road, Ahmedabad 380015 Gujarat
Toll Free No 1800 233 5555 Fax: (079) - 2673 1903
email: campaign@nifindia.org; www.nifindia.org

PART II

HERBAL PRACTICES & PRODUCTS

This section contains details of herbal preparations used traditionally for various ailments and products based on such traditional knowledge.

Uses of *Achyranthes aspera* L. (Apang)

Source: http://www.impgc.com/images/plantPictures/Achyranthes%20aspera.jpg

NIF Database

Uses from West Bengal

Toothache
Paste prepared from roots along with three black pepper seeds is applied on the aching tooth
- *Susanta Kumar Manjhi, Birbhum, West Bengal*

Constipation
Chewing of roots is useful
- *Ambika Singh Sardar, Purulia, West Bengal*

Piles
Whole plant paste is applied topically
- *Satyen Chatterjee, Murshidabad, West Bengal*

Uses from other states

Toothache
Teeth are brushed with freshly plucked roots
- *Bhagvat Prasad Yadav, Nawada, Bihar*

Asthma
Dried branches are burnt into ash, which is taken orally
- *Chandrasingh Chaudhary, Nandurbar, Maharashtra*

Itching
Powdered root (5g) is taken orally with water twice a day for seven days
- *Indira Kumari, East Champaran, Bihar*

Fever
Roots (5g) are ground with half black pepper into a fine powder, which is administered orally
- *Rajkishor Prasad, Sheohar, Bihar*

Headache
Tablets (of about 5g) are prepared from the pounded roots; one tablet is taken in the morning with water for three days
- *Jagjit Bahadur, Sitapur, Uttar Pradesh*

Abscess
Root paste is applied on the abscess
-*Ravi Uraav, Hazaribag, Jharkhand*

Veterinary practice

Topical inflammation
Plant paste is applied externally on topical inflammation
- *Sheikh Hifazat Hussain*, *East Champaran, Bihar*

Uses in Classical Codified Literature

Dried aerial parts are taken orally in case of diabetes[1]; powder made from the dried plant is given orally to treat whooping cough[2]; decoction of the plant is used as laxative[3]; and decoction of the plant is applied externally on boils and pimples[3].

Product 'Cystone'[4] is made from this plant, which inhibits calculogenesis by reducing stone-forming substances like oxalic acid, calcium hydroxyproline and prevents urinary tract infections. Thirty-five patents have been found on the medicinal applications of *Achyranthes* for curing laryngopharyngitis[5], bronchial asthma[6] etc.

Uses of *Adhatoda vasica* (L.) Nees (Basok)

NIF Database

Uses from West Bengal

Tonsilitis
Decoction of the leaves of adhatoda, tulsi and rhizome of ginger is made. This is then used to gurgle.
- *Shikha Samanta, Hooghly, West Bengal*

Asthma
Dried leaves are burnt and the smoke is inhaled
- *Susanta Kumar Manjhi, Birbhum, West Bengal*

Cough/cold
Decoction of leaves is administered orally till the ailment cures
- *Priyanka Pramanik, Purulia, West Bengal*

Acidity
Dried bark (8g) is boiled in 250ml of water till the solution becomes half. This solution is filtered and given orally 2-3 times a day
- *Susanta Kumar Manjhi, Birbhum, West Bengal*

Uses from other states

Tuberculosis
Juice extracted from the leaves is taken orally along with honey
- *Mahesh Bijarania, Nagor, Rajasthan*

Malaria
Few leaves are boiled in water (250g), filtered and jaggery is added; this is then administered orally
- *Mahesh Kumar Khangar Purohit, Sirohi, Rajasthan*

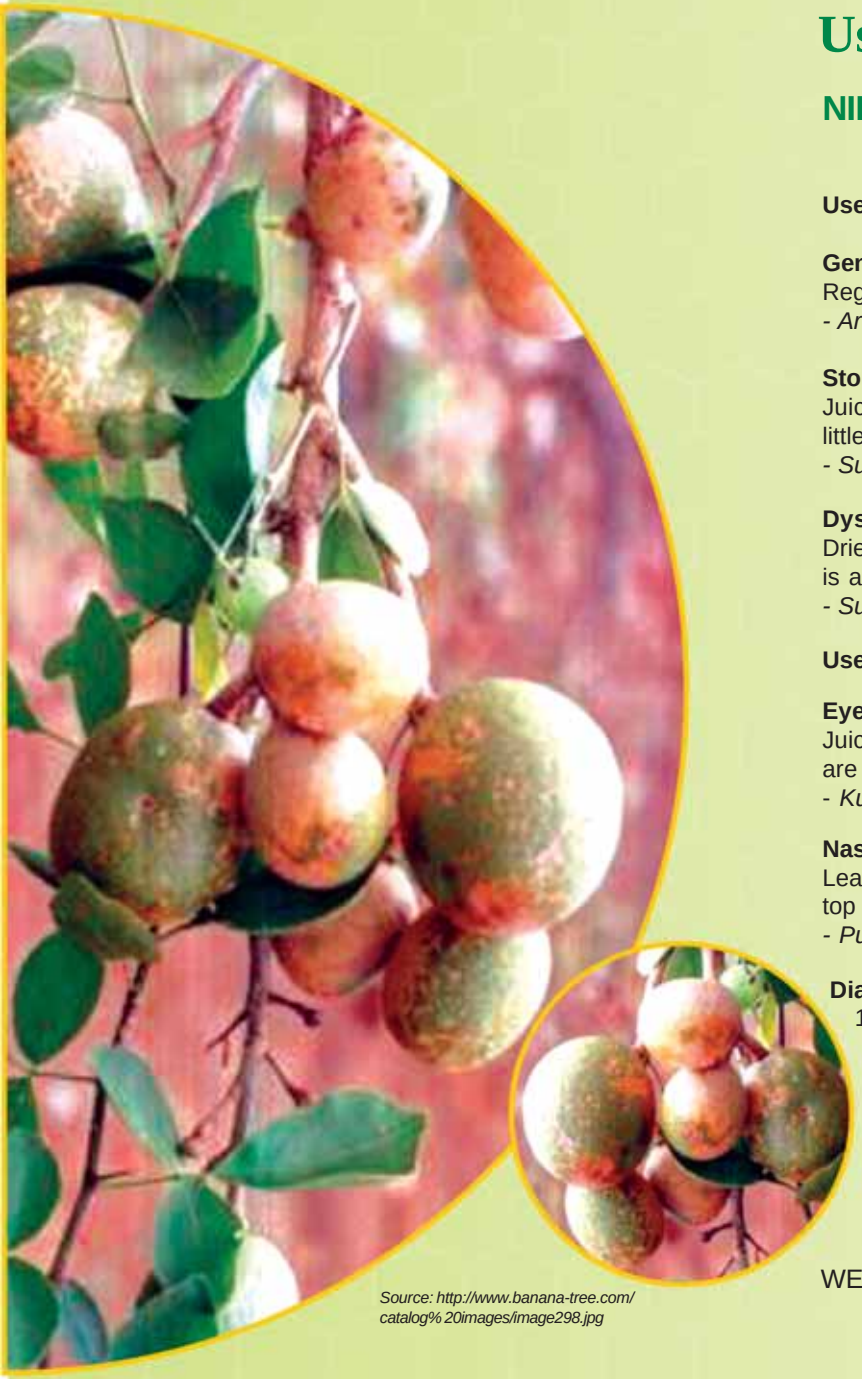
Constipation
Decoction of leaves with honey is given orally to get relief
- *Pradip Kumar, Bulandshahar, Uttar Pradesh*

Uses in Classical Codified Literature

Decoction of the plant is taken orally to cure asthma[7]; leaves (500 g) decocted in 5 litres of water until a dark brown mass is obtained and two spoonful are taken with honey thrice a day for 2-4 days to get rid of fever[8]; rheumatic patients should warm the leaves and rub on the body[9].

Product 'Menstri Care'[10] prepared from the plant is an effective medicine for women's health concerns. 'Diakof'[4], a herbal medicine uses *Adhatoda* along with other plants for treating cough. Ten patents have been found on its medicinal applications mainly for cough[11] and asthma[12].

Source: NIF database



Source: http://www.banana-tree.com/catalog% 20images/image298.jpg

Uses of *Aegle marmelos* (L.) Corr. (Bel)

NIF Database

Uses from West Bengal

General debility
Regular intake of a fruit along with the gum is helpful
- Arun Ghosh, Bankura, West Bengal

Stomach disorder
Juice extracted from leaves is given orally along with little salt
- Surjit Singh Sardar, Purulia, West Bengal

Dysentery
Dried leaves are ground into a fine powder and a spoonful is administered orally adding salt
- Surjit Singh Sardar, Purulia, West Bengal

Use from other states

Eye diseases
Juice is extracted from the green leaves and two drops are put in the eye
- Kumari Nigar Pravin, Hazaribag, Jharkhand

Nasal bleeding
Leaves are ground into a paste, which is applied on the top of the nose
- Puran Chand, Kangra, Himachal Pradesh

Diabetes
150ml of the juice extracted from the pounded roots is administered orally
- Maibum Lolito Meitei, Bishempur, Manipur

Jaundice
Juice extracted from leaves or fruits is given orally
- Ngairangbam Santosh Singh, Imphal East, Manipur

Menorrhagia
Leaf paste is administered orally to control the disorder
- Rani B. Bhagat, Pune, Maharashtra

Intestinal worms
Juice extracted from the green leaves is taken orally
- Jagjeet Bahadur, Sitapur, Uttar Pradesh

Diarrhoea
Pulp of the ripen fruit is taken
- Jagjeet Bahadur, Sitapur, Uttar Pradesh

Uses in Classical Codified Literature

Burnt fruit pulp is applied for rheumatic arthritis[2]; 10g fruit pulp is given before sleep to overcome morning sickness[13]; and fruit rind is applied externally on hair to kill headlice[14].

'Bael'[4], prepared from *Aegle* is used in diarrhoea, dysentery and GI disorders. It has digestive and carminative properties. Lukol's[4] tonic is made from this plant along with other plants. It improves uterine circulation, and its antimicrobial and astringent actions on the mucous membrane of the genital system also help control leucorrhoea. 'Bilwa'[15], a product of *Aegle* is used as a medicine to cure a number of diseases. Fifty-three patents have been found on the medicinal applications of *Aegle* for curing diabetes[16], gastric ulcer[17] etc.

Uses of *Bombax ceiba* L. (Shimul)

NIF Database

Uses from West Bengal

Pimples
Pounded bark is applied on pimples
- *Priyanka Paramanik, Purulia, West Bengal*

Blood dysentery
Dried gum is ground into a fine powder and half a spoon of the powder is given along with milk to drink twice a day till the ailment cures
- *Susanta Kumar Manjhi, Birbhum, West Bengal*

Uses from other states

Pimples
Paste of thorns and milk is applied on the pimples for 7 days
- *Pravin Kumar Sharma, East Champaran, Bihar*

Wound
Fresh bark is ground, mixed with little water and applied on the infected part
- *Pravin Kumar Sharma, East Champaran, Bihar*

Diarrhoea
A spoonful of the juice extracted from the leaves is given along with sugar candy for 4 days
- *Neha Kumari, East Champaran, Bihar*

Constipation
Bark powder (3g), coriander powder and jaggery are taken with water
- *Devaram, Sirohi, Rajasthan*

Piles
Paste (10g) of the ground roots is taken with water for seven days
- *Antaryami Pradhan, Angul, Orissa*

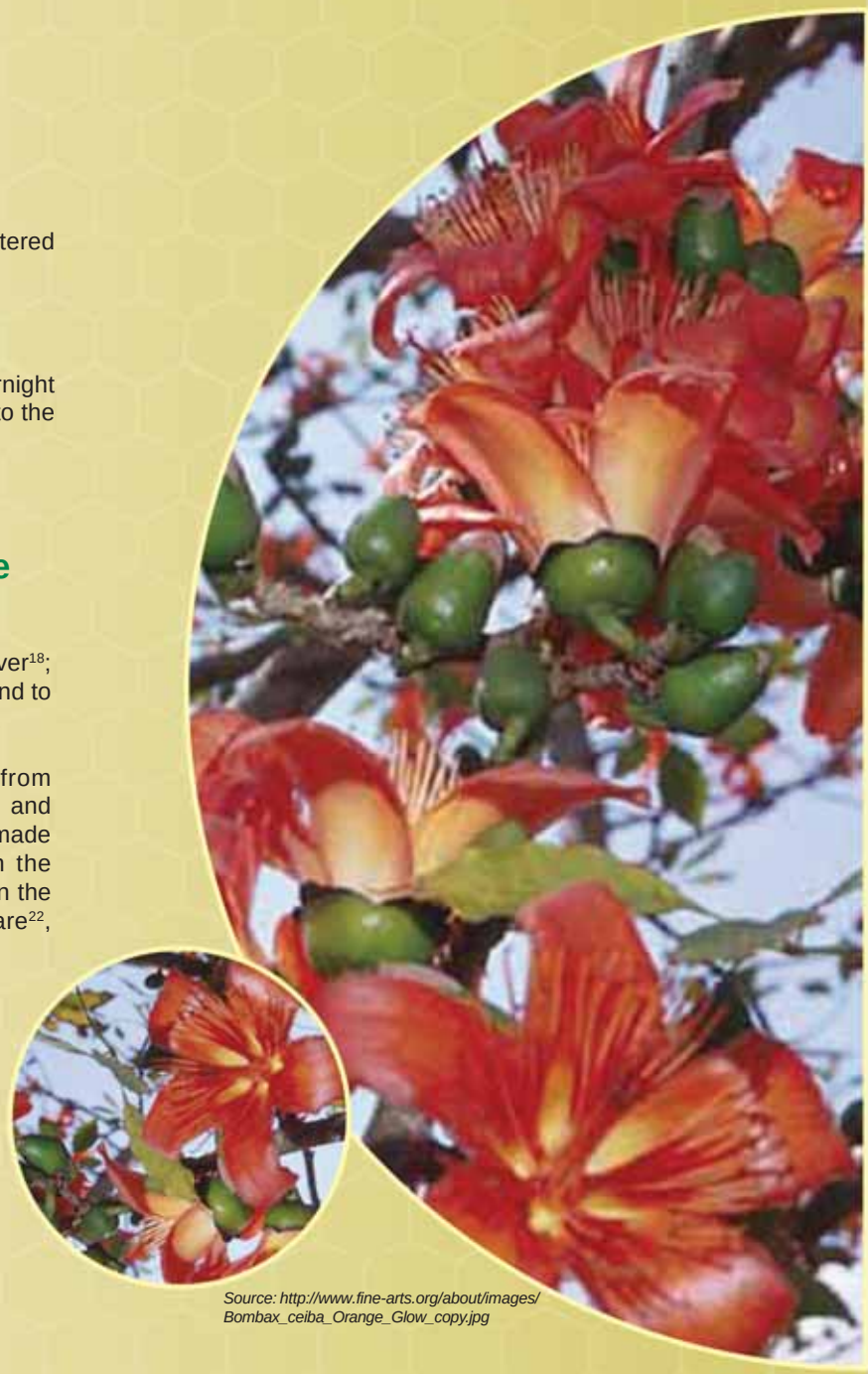
Gynecological disorder
Gum (5g) is ground, mixed with water and administered for 5 days
- *Jugeshwar Ram, Hazaribag, Jharkhand*

General health
Few flowers are soaked in a glass of water overnight and taken next morning for giving a cooling effect to the body
- *Mukta Kumavat, Sikar, Rajasthan*

Uses in Classical Codified Literature

Decoction of the bark is given orally to combat fever[18]; diabetics are given decoction of the heartwood[19]; and to reduce stomachache bark juice is administered [20].

Product 'Acne-n-Pimple Cream'[21] is prepared from *Bombax* along with other plants to treat pimples and skin eruptions. 'Evecare'[4], a multi herb product made from this plant, has a regularizing influence on the menstrual cycle. Eight patents have been found on the medicinal applications of *Bombax* like for skincare[22], AIDS[23] etc.



Source: http://www.fine-arts.org/about/images/Bombax_ceiba_Orange_Glow_copy.jpg

Uses of *Butea monosperma* (Lamk.) Taub. (Palash)

Source: http://www.plantcreations.com/images/Butea_monosperma_amazing.jpg

NIF Database

Uses from West Bengal

Poisonous bites
Seed powder is mixed with latex of *Calotropis procera* (Ait.) R.Br. and is applied on the affected part
- Priyanka Pramanik, Purulia, West Bengal

Intestinal worms
Dried leaves are ground into a fine powder and one spoonful of the same is administered orally along with water
- Susanta Kumar Manjhi, Birbhum, West Bengal

Dysentery
Gum of palash (5g) and black pepper seeds (7) are ground together and one spoonful of the powder is administered orally for 7 days
- Susanta Kumar Manjhi, Birbhum, West Bengal

Gynecological disorder
Seed powder (5g) is taken orally along with milk
- Ambika Singh Sardar, Purulia, West Bengal

Uses from other states

Toothache
Resin powder is filled in damaged gums
- Bhomabhai Damor, Banaskantha, Gujarat

Cuts & wounds
Juice extracted from bark is applied
- Dinesh Bediya, Ranchi, Jharkhand

Acidity
Resin (2g) is taken with cold water
- Pritam Chand, Kangra, Himachal Pradesh

Intestinal worms
Seeds (3-4) are ground in water and given orally
- Sitaram Bediya, Hazaribag, Jharkhand

Dysentery
Resin (25g) is administered orally
- Thavriben Kateria, Banaskantha, Gujarat

Joint pain
Powdered resin is taken with milk
- Devaram, Sirohi, Rajasthan

Skin diseases
Young pods levigated with cow urine are topically applied
-Madhav Rao Shankar Rao Patil, Jalgaon, Maharashtra

Uses in Classical Codified Literature

Bark is used as poultice for pimples[24]; bark juice is given orally to get rid of intestinal worms[25]; and dried flower powder is administered orally as diuretic[26].

'Lukol[4]' has a stimulatory action on the endometrium and improves uterine circulation. 'Hair Loss Cream[4]' improves tensile strength of hair and increases hair density. Ten patents were found for its medicinal uses for bone disorders[27], skin care[28] etc.

Uses of *Ficus benghalensis* L. (Bot)

NIF Database

Uses from West Bengal

Wound
Leaves are burnt into ash and coconut oil is added to form a paste. This paste is topically applied
- Priyanka Paramanik, Purulia, West Bengal

Sprain
Bark is ground and mixed with water to make a paste. Lukewarm paste is smeared on the site of the sprain
- Arun Ghosh, Bankura, West Bengal

Heel crack
Latex is topically applied
- Priyanka Pramanik, Purulia, West Bengal

Uses from other states

Fever
Decoction of bark along with little salt is administered orally
- Sohanlal Chhipa, Jhalor, Rajasthan

Whooping cough
Bark is ground into a fine paste and one spoonful is taken orally
- Priyanka Kumari, West Champaran, Bihar

Stomachache
Warmed leaves are tied on the stomach to get relief from pain
- Gajanand Maharaj, Jaipur, Rajasthan

Backache
Latex mixed with mustard oil is massaged on the aching part
- Chen Singh Charan, Nagor, Rajasthan

Itching
Crushed leaves (30-40) are soaked in water (4litres) overnight and boiled till the decoction remains 1 litre. Half a litre of mustard oil is added, the solution is mixed and filtered. This solution is applied topically
- Randhir Kumar, Hazaribag, Jharkhand

Uses in Classical Codified Literature

Diabetics should take aerial roots' paste mixed with salt after filtering once a day in the morning for 8 days[29]; decoction of plant is applied externally on wounds and ulcers[30]; latex is given orally to cure bronchitis[31].

'Anti-Dandruff shampoo'[4] a product prepared from this plant in combination with other plants is used to keep hair healthy and dandruff free. Product 'KLD Lotion'[32], a multiherbal ayurvedic preparation using *Ficus*, is effective in many skin ailments such as acne marks, pimples, burns - sunburns, nappy rash etc. 'Litina'[33], a herbal toothpaste made from this plant along with other plants, is good for the gums and the teeth. Four patents have been found on medicinal applications of *Ficus* for antitumor[34] medication, wound healing[35] etc.

Source: NIF database

Uses of *Holarrhena antidysenterica* Wall. (Kurchi)

Source: http://www.motherherbs.com/pcat-gifs/products-small/kudsappalai.jpeg

NIF Database

Uses from West Bengal

Liver disorder
Decoction of the bark is administered orally
- Priyanka Pramanik, Purulia, West Bengal

Diarrhoea/dysentery
Juice extracted from bark is administered orally
- Ambika Singh Sardar, Purulia, West Bengal

Intestinal worms
Juice from the pounded leaves is taken orally to kill worms
- Ambika Singh Sardar, Purulia, West Bengal

Uses from other states

Fever
Leaves (5g) along with those of *Picrorhiza kurroa* Royale ex. Benth. (5g) are boiled in 100ml of water till the decoction remains 10ml. This is then taken orally till the ailment cures
- Hariom Kumar, East Champaran, Bihar

Bodyache
Bark is ground in water; some quantity is taken orally and the rest is applied on the body
- Devaram, Sirohi, Rajasthan

Malaria
Equal amount of leaves of kurchi and *Cyperus rotundus* L. are ground into a fine powder. One spoonful is taken orally to combat the disease
- Chandan Kumar, East Champaran, Bihar

Dysentery
Paste is prepared from the bark. 10g of the paste is given along with a spoonful of honey
- Kundan Kumar, East Champaran, Bihar

Kidney stone
Juicy paste of the bark is mixed with sour ghee and is taken orally
- Robert L. Hnamte, Aizawl, Mizoram

Skin disease
Dried bark is powdered, mixed with ghee and honey, and is taken orally
- Robert L. Hnamte, Aizawl, Mizoram

Uses in Classical Codified Literature

Dried bark powder is given orally to cure stomachache[36]; seeds are ground into a powder, a dose of 5-10g of the powder is given with water as an antidote and a paste of the seeds is also applied locally to relieve pain and swelling on poisonous bites[37].

'Diarex vet'[4] is used for diarrhoea in cattle. 'Kutajarista and Kutajavaleha'[38] are the most popular preparations used in diarrhoea, dysentery, colitis and bleeding problems. Thirteen patents have been found on its medicinal applications mainly for gastrointestinal disorders[39].

Uses of *Kalanchoe pinnata* (Lam.) Pers. (Patharkuchi)

NIF Database

Uses from West Bengal

Eye pain
Two drops of the juice extracted from the leaves are put in the eyes
- *Susanta Kumar Manjhi, Birbhum, West Bengal*

Stomach disorder
Two spoonful of the juice extracted from the leaves are given orally
- *Susanta Kumar Manjhi, Birbhum, West Bengal*

Cuts & wounds
Topical application of leaf paste helps in stopping bleeding
- *Arun Ghosh, Bankura, West Bengal*

Pain
Leaf paste is applied on the aching part
- *Priyanka Pramanik, Purulia, West Bengal*

Uses from other states

Jaundice
Juice of leaves along with black pepper powder is given till the ailment cures
- *Arunkumar Pandey, Fatehpur, Uttar Pradesh*

Fever
Juice of leaves along with black pepper powder is given orally
- *Arunkumar Pandey, Fatehpur, Uttar Pradesh*

Diarrhoea
Leaves (5-6) are ground along with some sugar candy and sap obtained is administered orally
- *Bikesh Kumar, Sitamarhi, Bihar*

Uses in Classical Codified Literature

Plant paste is applied on forehead to alleviate headache[40]; leaf paste is applied externally to cure cuts and wounds[41]; fresh sap of plant is used for eye diseases[42].

Product 'Regenerating Day Cream'[43] a multiherbal medicine enhances skin's tone and elasticity, helping to smooth wrinkles and fine lines. Five patents have been found on medicinal applications of *Kalanchoe* as an anti-obesity[44] medication.

Source: NIF database

Uses of *Nyctanthes arbor-tristis* L. (Shiuli)

Source: http://prathom.swu.ac.th/panmai/pic/7-10110-002-110.JPG

NIF Database

Uses from West Bengal

Cough/cold
Two spoonful of the juice of leaves is administered orally along with honey or ginger juice
- *Susanta Kumar Manjhi, Birbhum, West Bengal*

Fever
Juice of leaves is administered orally to cure fever
- *Susanta Kumar Manjhi, Birbhum, West Bengal*

Uses from other states

Hair fall
Seeds are crushed in water and the paste is applied on hair scalp
- *Rani B. Bhagat, Pune, Maharashtra*

Cough/cold
Paste is prepared using three leaves and black pepper and is taken orally with water
- *Ashok Kumar Yadav, East Champaran, Bihar*

Fever
Leaves (6-7), along with ginger, are crushed to extract juice, which is given to drink thrice a day
- *Rani B. Bhagat, Pune, Maharashtra*

Two leaves of shiuli, neem, three black pepper and four leaves of tulsi are ground in half litre of water and boiled till half a cup of residue remains. This is cooled and given orally
- *Arjun Singh, Bharatpur, Rajasthan*

Intestinal worms
Oral intake of leaf juice kills the worms
- *Rani B. Bhagat, Pune, Maharashtra*

Diabetes
Decoction of the leaves is taken orally for 40 days
- *Shama Pravin, Gopalganj, Bihar*

Wound
Topical application of leaf paste gives relief
- *Ranjeet Kumar, Sheohar, Bihar*

Pain
Fresh leaf paste is applied on the fractured part to alleviate pain
- *Ramsharan Dhruv, Dhamtari, Chhattisgarh*

Uses in Classical Codified Literature

Dried fruits are used orally to get relief of cough[45]; decoction of dried flowers is given with jaggery as an anti-fertility agent in females[46]; and leaf juice is applied externally on ringworm and other skin diseases[46].

'Lupin'[47], is a medicine used for pain and inflammation associated with musculoskeletal and joint disorders. Six patents have been found on its medicinal uses such as for treating Leishmaniasis[48] and also for its natural property as a dye[49].

Uses of *Phyllanthus emblica* L. (Amlaki)

NIF Database

Uses from West Bengal

Hair fall
Fruit is ground and mixed with coconut oil. This is applied on the scalp
- Surjit Singh Sardar, Purulia, West Bengal

Abscess
Fruit is ground into a fine paste and is applied on abscess
- Ambika Singh Sardar, Purulia, West Bengal

Diabetes
Regular intake of fruit combats diabetes
- Shiuli Mahato, Purulia, West Bengal

Urinary disorder
Juice extracted from unripe fruit is taken orally along with some sugar candy
- Surjit Singh Sardar, Purulia, West Bengal

Uses from other states

Diabetes
Equal amounts of amla, *Terminalia chebula* Retz., *Terminalia bellirica* Roxb. are ground into a fine powder. Two spoonful of this powder are given orally
- Pritam Chand, Kangra, Himachal Pradesh

Diarrhoea
Juice of amla, with an equal quantity of lemon juice, is administered orally
- Bina Chaudhry, Kamrup, Assam

Jaundice
Equal amounts of amla fruit, ginger, black pepper and turmeric are ground into a fine powder. One tea-spoonful of this powder is given with honey
- Nagarmal Bagaria, Nagor, Rajasthan

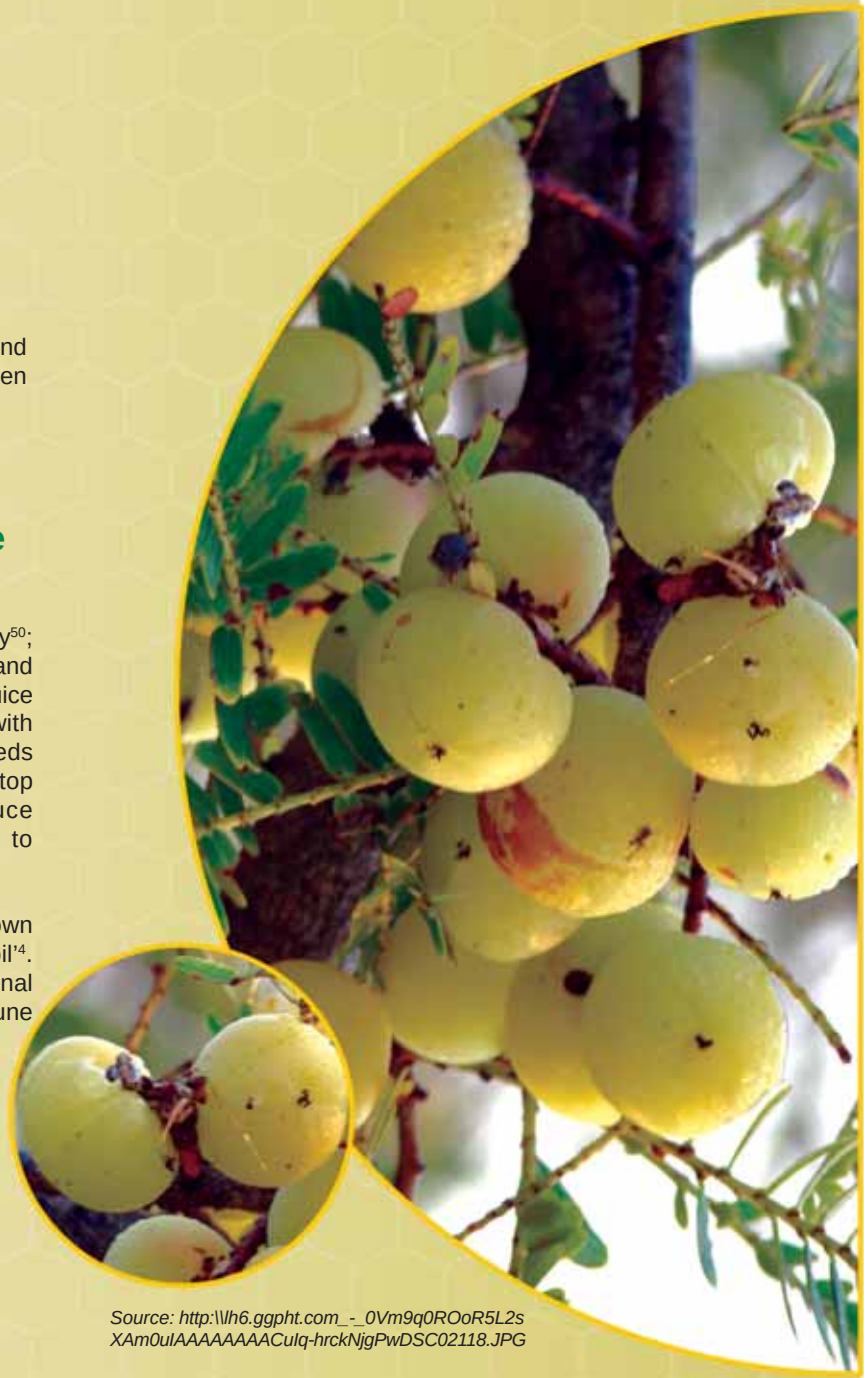
Wounds
Pounded leaves are applied on wounds
- Sevaram Bhaskar, Dhamtari, Chhattisgarh

Gynecological disorder
Equal amounts of amla, tapioca and cumin are ground into a fine powder. One spoon of the powder is given orally to cure the disorder
- Guna Ram Kanikar, Golaghat, Assam

Uses in Classical Codified Literature

Bark and fruits are used in diarrhoea and dysentery[50]; fresh juice of the fruit, mixed with pure cow's butter and honey, is administered to cure obstinate hiccough[50]; juice relieves pain in urine trouble[50]; pulp (2-3g) is eaten with warm milk to get rid of headache[51]; powder of seeds after mixing with ghee is applied on the head to stop nasal bleeding[2]; fruits are taken orally to reduce acidity[52]; and the decoction of the fruit is taken to increase blood count[53].

Phyllanthus is one of the main ingredients of well known medicines 'Triphala, Chavanprash and Amla hair oil'[4]. Seventy-six patents have been found on its medicinal uses such as for diabetes[54], liver disorders and immune deficiencies[55].



Source: http:\\lh6.ggpht.com_-_0Vm9q0ROoR5L2s XAm0uIAAAAAAAACuIq-hrckNjgPwDSC02118.JPG

Source: SRISTI database

Uses of *Tinospora cordifolia* (Willd.) Miers ex Hk. f. & Th. (Gulancho)

NIF Database

Uses from West Bengal

Fever
Juice extracted from stem (10g) is mixed with little water. Warmed juice is taken orally twice a day for 8-10 days
- Susanta Kumar Manjhi, Birbhum, West Bengal

Jaundice
Stem (8 inch long) is soaked in a cup of water and left overnight. The next morning the same water is given orally
- Susanta Kumar Manjhi, Birbhum, West Bengal

Diabetes
Juice extracted from stem is administered orally in the morning on an empty stomach
- Subhjyoti Chatterjee, Burdwan, West Bengal

Intestinal worms
Oral intake of leaves juice kills worms
- Susanta Kumar Manjhi, Birbhum, West Bengal

Uses from other states

Migraine
Stem of the plant (250g) is boiled in water along with green gram (250g) and sesame oil (250ml) till half of the decoction remains and then applied on the forehead
- Stedimon Arackal Paul, Port Blair, Andaman & Nicobar Island

Asthma
Juice is extracted from the leaves and two spoonful are administered orally with honey for 40-42 days
- Ramabandhu Mahajan, Jalgaon, Maharashtra

Diabetes
Fresh leaves (1-2) are taken on an empty stomach
- D. K. Phukan, Guwahati, Assam

Piles
Whole plant (50g) is boiled, dried and ground into a fine paste. Tablets are then prepared and one tablet is administered orally to the patient thrice a day for 3-5 days
- Pukhram Angouba Singh, Bishnupur, Manipur

Uses in Classical Codified Literature

Powdered roots are taken to treat mouth ulcer[56]; powdered plant is administered orally with honey to get relief from stomach disorder[57]; the stem is bitter and is used as an anthelmintic[26]; and the decoction of the plant is given orally to cure diarrhoea[58].

Tinospora is a well known medicinal plant and used to cure a number of diseases in combination with other plants with brand names 'Geriforte, Diabecon[4]' etc. More than hundred patents have been found on its medicinal applications such as an antiallergic[59], for cancer[60] etc.

Uses of *Vitex negundo* L. (Nishinda)

NIF Database

Uses from West Bengal

Oozing from ear
Few drops (3-4) of warmed juice of leaves is put in the ear
- *Susanta Kumar Manjhi, Birbhum, West Bengal*

Obesity
A spoonful of the juice extracted from the leaves is taken orally everyday
- *Arun Ghosh, Bankura, West Bengal*

Diabetes
Equal amounts of leaves of vitex, neem and *Catharanthus roseus* (L.) Don. are ground and tablets (5g) prepared from the powder. Two tablets are administered orally in the morning on an empty stomach
- *Susanta Kumar Manjhi, Birbhum, West Bengal*

Uses from other states

Rheumatism
Lukewarm leaves are put on aching joints
- *Naganath Durga Chogule, Sholapur, Maharashtra*

Lumbago
Juice extracted from fresh leaves is massaged on the affected area
- *Shreenand B. Dandekar & Meera Dandekar, Ratnagiri, Maharashtra*

Ear pain
Leaves are boiled in mustard oil, oil is then filtered and used as an ear drop
- *Bhagat Ram, Kangra, Himachal Pradesh*

Muscular pain
Leaves are smeared with mustard oil, lukewarmed and applied on the affected part
- *Savita Kumari, Gopalganj, Bihar*

Skin disease
Small pieces of plant, mixed with cow's urine, are applied on the affected skin
- *K. Lakshmana Shetty, South Karana, Karnataka*

Veterinary practice

Wound
Leaf paste is applied topically on wound
- *Nageshwari Devi, Hazaribag, Jharkhand*

Uses in Classical Codified Literature

Leaves are smouldered and the smoke is inhaled to get rid of cough[2]; in case of diarrhoea flowers are used[26]; and the extract of the plant is taken as a diuretic[2].

'Muscle & joint rub'[4], is a highly effective medicine for backache, muscular sprain and joint pain. 'Dental Cream'[4] is a specially formulated toothpaste that tightens and reduces swelling of gums, stops gum bleeding, prevents toothache, decay and controls bad breath. 'Atharva Nirgundi Siddha Tail'[61] is useful in arthritis, joint pain, relieves oedema. Thirty-five patents were found on the medicinal applications like for rheumatic arthritis[62].

Source:SRISTI Database

Herbal Formulations for Healthy Crops~

SRISTI SHASTRA

Arkhiben Vankar, Ranabhai Kamaliya, Banidan Gadhvi, Gemal Rana, Rajnikant Patel, Ahmadbhai Kadivala, Gujarat.

It flourishes the growth of the plant by increasing flowering as well as fruiting. Besides overall vegetative growth, it is not harmful to nature and human beings. It also controls sucking pests like white fly, heliothis, aphid etc.

SRISTI KRUSHAK

Popatbhai Rupabhai Jambucha, Gujarat

It is an excellent remedy for leaf curl disease. Besides controlling the disease it increases the vigor of the plants by increasing overall growth.

SRISTI SURAKSHA

Community Knowledge, Gujarat

It is a very efficient treatment for termite and acts as a vitaliser to the affected crops. To control termites the herbal formulation is mixed with sand and spread in the field. Some times it is released in the field along with the flow of irrigation water. In some cases, it is also drenched in the affected part of the plant and sprayed on the vegetation to repel termites.

SRISTI PRAYAS

Community Knowledge, Gujarat

It is a highly effective formulation to act as a herbal growth promoter, which stops shedding of flowers as well as increases the overall growth of the plant. This formulation strengthens the plants internally and enables them to withstand extreme weather conditions. Constant use of this formulation increases the yield and reduces the toxic content in our daily diet.

SRISTI SHAKTI

Community Knowledge, Gujarat

A herbal growth promoter, which helps in production of excellent quality organic food grain. Constant use of this formulation not only increases the yield but also reduces the toxic contamination in our food and environment.

Herbal Formulations for Livestock and Poultry~

Coccicure

Sudakarbhai K. Gauli & Jeevalbhai M. Gauli, Dang, Gujarat

It is a unique herbal medication for prevention and curing of Coccidiosis (*Eimeria* sp infections) in Poultry. The primary function of the medication is to reduce the oocytes maturation and affects the life cycle of various *Eimeria* species.

Poultmax

Community knowledge, Valsad, Dang, Gujarat

It is a unique herbal medication for promoting poultry immunity. It cures symptoms like greenish diarrhoea, conjunctivitis, nasal sputum, drop in egg production and respiratory distress in poultry. About 30g/100 birds for 0-4 weeks & 60g/100 birds for 4-8 weeks may be administered for seven days in stress or for three days before and three days after expected stress.

Mastiherb

Ukhardiyabhai S. Raot, Dang, Gujarat

Mastiherb is a unique intramammary herbal medication for curing mastitis in animals. Clinical trials indicated efficacy of the medication over subclinical mastitis; clinical mastitis and chronic mastitis. It was also validated in case of mastitis due to *Staphylococcus aureus*. The dose rate was found to be single intra mammary infusion for minimum three days after adequate standardization.

~These formulations are based on traditional knowledge of farmers and developed by Sadbhav-SRISTI Sanshodhan Laboratory (www.sristi.org). These products are licensed to Matrix Biosciences Pvt. Ltd, Hyderabad, Andhra Pradesh. The benefits are shared with the knowledge providers, communities, nature, those who add value and other stakeholders in the knowledge and value chain.

PART III

INNOVATIONS
for WEST BENGAL

This section contains details of national innovations, which are deemed suitable for introduction in West Bengal

Dadaji Ramaji Khobragade
Maharashtra

HMT- An Improved Paddy Variety

Khobragade selected and bred the HMT rice variety from the conventional 'Patel 3', a popular variety developed by Dr. J. P. Patel, JNKV Agriculture University, Jabalpur. He succeeded after five years of continuous study and research on a small farm owned by him without any support from the scientific community. This varierty has an average yield of 40 – 45 quintals per hectare with short grains, high rice recovery (80 %), better aroma and cooking quality in comparison with the parent ones. Most remarkable feature of the variety is the thinness of grain. It has been included as a standard reference for thinness by Protection of Plant Variety and Farmers' Right Authority (PPVFRA).

He won a National Award in NIF's Third National Competition for Grassroots Innovations and Traditional Knowledge in 2005. NIF has filed an application under PPVFRA 2001 to register his variety. Apart from HMT he has also developed six other paddy varieties namely DRK, Vijay Anand, Nanded Chinur, Nanded 92, Deepak Ratna and Nanded Hira. He regrets that local agricultural university took the credit merely for purifying the seeds and did not give him the due honour. HMT has diffused in more than one lakh acres in five states.

02

Kudrat 9- An Improved Variety of Wheat

Prakash Singh Raghuvanshi
Uttar Pradesh

The innovator believes that every farmer should get good quality seeds to deliver high yielding varieties of crops. He has developed a number of improved wheat, paddy, mustard and pigeon pea varieties, which are high yielding, robust stem, having bold seeds with good taste and resistance to major pests & diseases.

"Kudrat 9", an improved wheat variety, developed by him using simple method of selection is quite popular among the farmers in different parts of Uttar Pradesh, Madhya Pradesh, Chattisgarh, Maharashtra, Rajasthan, Gujarat and some parts of Bihar, Haryana and Punjab. This variety bears large number of ear bearing tillers with lengthy spikes and has a hardy stem. The grain contains high protein and has better taste. The average yield of this variety is 55-60 quintals / hectares.

Jai Prakash Singh
Uttar Pradesh

Virat (JP-6)- An Improved Variety of Pigeon pea

This new variety has coloured flowers, long leaves and bunchy type pods bearing at the top. The seed weight (19 – 20 gram/ 100 seeds), number of pods / plant (500 - 600), big size pods (3 – 5 inch), number of seeds/pod (5 – 6) and perennial yield (1st year 12 -14 quintal/ acre and 2nd year 14 – 15 quintal/ acre) is higher as compared to the local popular variety. This variety requires less quantity of seed (4 – 5 kg/acre) and maintenance as compared to other varieties grown in the region.

04

Aloe vera Gel Extractor

Dharamveer
Haryana

The innovator has developed an effective multipurpose unit capable of pulverizing, steaming, and extraction of gel for herbal applications.

With this device, the innovator uses the specially designed pressure cooking chamber to extract the essence from *Aloe vera*. Being a compact portable unit, it can be quickly and easily transported and used anywhere, to process herbs and deliver on demand. The present machine has a capacity to process 100 kg of *Aloe vera* per hour. The innovator was supported for production and commercialisation through GIAN North from the Micro Venture Innovation Fund at NIF. One unit has been sent to Kenya on a pilot basis for application feasibility study in the country.

05

Ishwar Singh Kundu
Haryana

Herbal Growth Promoter

A herbal plant growth promoter, which is effective in protecting the plants from a broad spectrum of pests apart from providing necessary nutrition has been developed. It is named as "*Kamaal*" meaning wonderful, due to its performance. It is effective in field crops as well as in vegetable crops.

The main ingredients of the product are "*aak"* (*Calotropis gigantea*), "*reetha*" (*Sapindus trifoliatus*), "*dhatura*" (*Datura metel*), "*neem"* (*Azadirachta indica*), Tobacco (*Nicotiana tabacum*), and "*bhang*" (*Cannabis sativa*), etc.

The innovator won a consolation award in NIF's Fourth National Competition for Grassroots Innovations and Traditional Knowledge Practices in 2007. He has also been supported under the Micro Venture Innovation Fund of NIF for commercialising "*Kamaal*". The product is a good hit in the local market and is fetching steady income for the innovator. This product has also been supplied to the garden in Rashtrapati Bhavan.

06

Multi Purpose Wood-working Machine

Ghonakanta Gogoi
Assam

Small carpentry workshops have difficulty in purchasing and using multiple machines due to high initial costs, space constraints and maintenance considerations.

This multipurpose machine with minimal footprint, is built to address all major workshop needs, allowing completing the sequence of wood-working operations in one place, and allowing better control on finished product.

N Sakthimainthan
Tamil Nadu

Hand Operated Water Lifting Device

An efficient way of pumping water to meet requirements in a cost effective way is always a challenge in rural India.

Developed from locally available materials, this hand operated water lifting device is simple in design, delivers high discharge and is low cost compared to conventional hand pump, bucket pump, and bicycle operated pumps. It costs approximately two thousand rupees. This innovation was awarded in NIF's Fourth National Biennial Competition for Grassroots Innovations and Traditional Knowledge Practices in 2007.

This innovation was also selected for value addition by CMERI, Durgapur under Mechanical Joint Implementation Committee (JIC) of CSIR-NIF.

08

Garlic Peeling & Lemon Cutting Machine

M. Nagarajan
Tamil Nadu

Faster peeling of garlic in an effective way is a major requirement in the pickle industry. This product is a food-grade, fully automated machinery designed for bulk quantity peeling of garlic. The machine ensures minimal damage and has wide application in making pickles and herbal medicines. The machine is energy efficient, saves labour, needs low capital and operating cost. It frees the industry from capacity constraints caused by shortage of labour in peak seasons.

The second product is also used in pickle industry, but for cutting lemons. It is a cost effective machine, having innovative design, with continuous feeding system. It performs precise and standard cutting of large quantity of lemons in uniform shape and sizes. It can be operated by one person and cuts lemon into maximum eight pieces. The innovator has been supported under MVIF scheme and has achieved a turn over of around sixty lakhs since 2003.

Sheikh Jahangir Sheikh Usman
Maharashtra

Two-wheeler Based Spray Painting Device

The innovation is a painting device that can be easily mounted on a two-wheeler scooter and carried to a customer's place. Deriving power from the two-wheeler's engine to run the compressor, this device lends flexibility of usage to the painter. This innovation won Sheikh Jahangir a consolation prize in NIF's Fourth National Competition for Grassroots Innovations and Traditional Knowledge Practices in 2007. NIF has also filed a patent application for the same and has supported him through the Micro Venture Innovation Fund. He has also made a scooter mounted washing machine and a scooter mounted flour mill.

10

Improved Multicrop Thresher

Madanlal Kumawat
Rajasthan

Farmers across India require a reliable machine that achieves threshing with minimal grain breakage, clean output for a variety of crops. The innovator has developed a versatile thresher that can meet these needs.

The modified farm implement reduces setup time to less than 15 minutes to switch over from one crop to another, and achieves minimal breakage. Its latest variant can also handle groundnut apart from threshing other cereals and pulses.

The innovator has been supported with working capital needs of his enterprise under the Micro Venture Innovation Fund of NIF. More than a hundred farmers have bought his thresher.

Karuna K. Nath
Assam

Manual Wood Cutting & Bamboo Cross Cutter

Cutting of wood effectively and efficiently is achieved by this machine. The equipment is cost efficient, and can be manually operated with both hand and foot pedal options. Most importantly it is portable, and can be taken to any worksite and has more productivity compared to manual sawing.

This equipment consumes lesser time and labour compared to available saws and has a mechanism and linkages similar to manually operated sewing machine. The work of three labourers can be done by one labour using this machine. The innovator has been supported under the Micro Venture Innovation Fund scheme of NIF and has been doing modest business in the area.

12

Auto Air Kick Pump & The Natural Water Cooler

Arvindbhai Patel
Gujarat

This innovation is a low cost, portable, compact aid to inflate tyre tubes/punctures of any vehicle having kick start or auto start mechanism so as to fix the problem on the spot and enable the rider to reach the nearby gas station or repair shop. This device uses the engine as the compressor for pumping air into the tube. A pinch of polymer granules is also inserted in the tube to seal the leakage in the tube.

Arvindbhai won a National Award in NIF's Second National Competition for Grassroots Innovations and Traditional Knowledge in 2002. NIF, apart from filing a patent in his name, facilitated sales of a few hundred pieces to customers in Assam and Arunachal Pradesh through dealership technology licensing and local entrepreneurs. The technology is available for licensing to enterpreneurs in different states.

Water Cooler: We already have refrigerators that operate on the principle of heat transfer and earthen pots that work on the principle of evaporation to cool water today. Arvindbhai has combined both features. In his natural water cooler, water is passed through cotton string covered copper coils, which are continuously being moistened by a dripper. Evaporation of water from lining on the coil cools the water inside. Cool water without electricity, isn't it a nice idea!

Khimjibhai Kanadia
Gujarat

Panihari - A Head Load Reducing Device

Rural women walk tens of miles with heavy load on their head, which causes stress, discomfort and eventually head and neck injuries.

The product is an ergonomically designed device fixed on top of the head, with two extended supporting rods from the sides of the device. The device transfers the weight carried on the head to the shoulders, which is better positioned to carry weight.

14

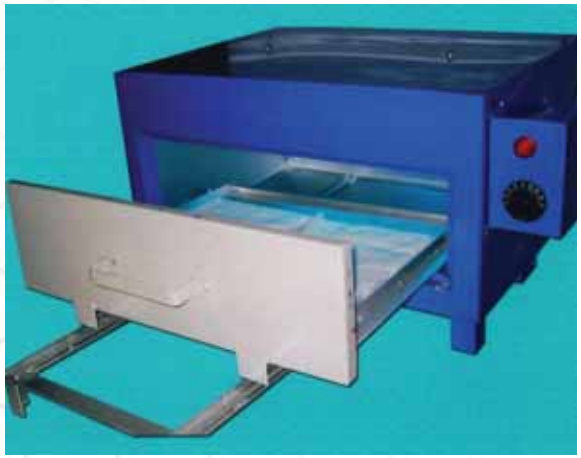
Sanitary Napkin Making Machine

A. Muruganandam
Tamil Nadu

Sanitary napkins, a universally needed product, have a very low penetration in India due to high price and the traditional trend of using cheaper but unhygienic old cloth pieces. The innovator has developed a machine that produces quality sanitary napkins at a low cost.

One can prepare sanitary napkins with standard material while cutting down the cost in production. It requires three to four persons to produce two pads per minute. Costing less than half of conventional options, this machine produces sanitary pads @ Rs.1 to Rs. 1.50 per pad approximately.

The innovator prefers to sell the napkin making machinery only to self-help groups of women. He has also designed a napkin vending machine such that one can put a coin and get a pad. With the support from the Micro Venture Innovation Fund scheme, the innovator has been able to install fifty units in seven states.



End Notes & References

1) Akhtar, M.S. 1992. Hypoglycaemic activities of some indigenous medicinal plants traditionally used as antidiabetic drugs. *J. Pak. Med. Ass.* 42 (11): 271-277.
2) Reddy, M.B., Reddy, K.R. and Reddy, M.N. 1989. A survey of plant crude drugs of Anantapur district, Andhra Pradesh, India. *Int. J. Crude Drug Res.* 27 (3): 145-155.
3) Zagari, A. 1992. *Medicinal plants*. Vol. 4. (5th ed.) Tehran, Iran. Tehran University Publications, p. 969.
4) Himalaya healthcare products, http://www.himalayahealthcare.com/products.htm, dt. 20.08.2008.
5) Guangkui, Z. 2008. *Chinese traditional medicine preparation for curing laryngopharyngitis*. Hunan Times Sunlight Pharmaceu (CN). (Pat no. CN101116680 dt. 06.02.2008; http://v3.espacenet.com, dt. 20.08.2008).
6) Muthuswamy, M.P. 2003. *Polyherbal composition for the treatment of Bronchial Asthma and the process.* Dalmia C.T. for Res and Dev (IN) and Murali Panchapagesa Muthuswamy (IN). (Pat no. WO03055558 dt. 10.07.2003; http://v3.espacenet.com, dt. 20.08.2008).
7) Siddiqui, M.B. and Husain, W. 1994. Medicinal plants of wide use in India with special reference to Sitapur district, Uttar Pradesh. *Fitoterapia.* 65 (1): 3-6.
8) Bhattarai, N.K. 1989. Traditional phytotherapy among the Sherpas of Helambu, Central Nepal. *J. Ethnopharmacol.* 27 (1/2): 45-54.
9) Rao, R.R and Jamir, N.S. 1982. Ethnobotanical studies in Nagaland. I. Medicinal Plants. *Econ. Bot.* 36: 176-181.
10) http://www.ayurvedicherbsdirect.com/menstricare-himalaya-p-32.html. dt. 08.11.2008.
11) Singh, R., Padiyar, A., Kanaujia, A. and Sharma, N. K. 2005. *Herbal formulation comprising extracts of Adhatoda, Hedychium and Curcuma as cough syrup.* Ranbaxy Lab Ltd. (Pub no. WO2005077393 (A1) dt. 25.08.2005; http://v3.espacenet.com dt. 08.11.2008).
12) Shanghvi, D.S., Mungre, A.P. and Zala Y.R. 2003. *New anti-asthmatic drug asmakure from indigenous herbs to cure the disease asthma*. Sun pharmaceutical Ind Ltd (Pat no. WO03030920 (A1) dt.17.04.2003; http://v3.espacenet.com dt. 08.11.2008).
13) Bhattarai, N.K. 1994. Folk herbal remedies for gynaecological complaints in Central Nepal. *Int. J. Pharmacog.* 32 (1): 13-26.
14) Shrivastava, R.K. 1985. *Aegle marmelos*: An Ipso Facto plant of India. *J. Res. Edu. Ind. Med.* 4 (3/4): 21-25.
15) Bazar of India herbal products, http://www.bazaarofindia.com/productsnew.asp?pid= 100K38&catid=BC&subcatid=CL, dt. 04.08.2008.
16) Pushpangadan, P. and Dhan, P. 2006. *Herbal nutraceutical formulation for diabetics and process for preparing the same*. CSIR, New Delhi. (Pat no. 7014872 dt. 21.03.2006; http://patft.uspto.gov, dt. 20.08.2008).
17) Rao, J.M., Sampathkumar, U., Sastry, B.S., Yadav, J.S., Raghavan, K.V., Palit, G., Rai, D., Varier, P.M., Muraleedharan, T.S. and Muraleedharan, K. 2003. *Composition for treating gastric ulcer and a process for preparing the same*. (Pat no. 20030180398 dt. 25.09.2003; http://www.freepatentsonline.com, dt. 20.08.2008).
18) Manandhar, N.P. 1995. An inventory of some herbal drugs of Myagdi district, Nepal. *Econ. Bot.* 49 (4): 371-379.
19) Khan, M.A. and Singh, V.K. 1996. A folklore survey of some plants of Bhopal district forests, Madhya Pradesh, India, described as antidiabetics. *Fitoterapia.* 67 (5): 416-421.
20) Manandhar, N.P. 1994. An ethnobotanical survey of herbal drugs of Kaski district, Nepal. *Fitoterapia.* 65 (1): 7-13.
21) http://www.aggarwaloverseas.com/HerbalDetail.aspx?ProductID=283, dt. 04.08.2008.
22) Inomata, S., Umishio, K., Kobayashi, K., Satake, M., Sekida, S. and Takano, A. 2003. *Matrix Metalloprotease Activity Inhibitor and Skin Care Preparation*. Shiseido Co. Ltd. (Pat no. JP2003201212 dt. 18.07.2003; http://v3.espacenet.com, dt. 20.08.2008).
23) Lai, Z. and Huang, X. 2008. *Pharmaceutical composition comprising a combination of Chinese traditional medicines.* Beijing Qijieyuan Pharmaceutical Technology Development Co. Ltd. (Pat no. 7381430 dt. 03.05.2008; http://patft.uspto.gov, dt. 20.08.2008).
24) Khan, M.A., Khan, T. and Ahmad, Z. 1994. Barks used as source of medicine in Madhya Pradesh, India. *Fitoterapia.* 65 (5): 444-446.
25) Bhattarai, N.K. 1993. Medical ethnobotany in the Rapti zone, Nepal. *Fitoterapia.* 64 (6): 483-493.
26) Prajapati, N.D., Purohit, S.S., Sharma, A.K. and Kumar, T. 2007. *A Handbook of Medicinal Plants*. Jodhpur, India. Agrobios, Section-II, pp. 59-60.
27) Maurya, R., Singh, G., Murthy, P.S.N., Mehrotra, S., Singh, D., Bhargava, B. and Singh, M.M. 2007. *Pharmaceutical composition containing Butea isoflavones for the prevention/treatment of bone disorders and a process for the preparation thereof*. CSIR, New Delhi. (Pub no. WO/2007/099432 dt. 07.09.2007; http://www.freepatentsonline.com, dt. 29.08.2008).
28) Hirano, A. 2003. *Skin care preparation*. TS AASU KK, Japan. (Pub no. JP2003113031 dt. 18.04.2003; http://www.freepatentsonline.com, dt. 29.08.2008).
29) Singh, K.K. and Maheshwari, J.K. 1994. Traditional phytotherapy of some medicinal plants used by the Tharus of the Nainital district, Uttar Pradesh, India. *Int. J. Pharmacog.* 32 (1): 51-58.
30) John, D. 1984. One hundred useful raw drugs of the Kani tribes of Trivandrum forest division, Kerala, India. *Int. J. Crude Drug Res.* 22 (1): 17-39.

31) Singh, V.K., Ali, Z.A., Zaidi, S.T.H. and Siddiqui, M.K. 1996. Ethnomedicinal uses of plants of Gonda district forests of Uttar Pradesh, India. *Fitoterapia.* 67 (2): 129-139.

32) Depsonpharma, http://www.depsonspharma.com/ayurvedic_herbal_products_kldlotion.htm. dt. 05.11.08.

33) Litna, http://www.litna.com/company2.htm. dt. 05.11.08.

34) Bassa, B.V. 2003. Antitumor agent. Biozak, Inc., San Jose, Canada. (Pat no. 6660309 dt. 09.12.2003; http://www.freepatentsonline.com dt. 08.11.2008).

35) De Souza, A. 2005. *A herbal composition having potent antimicrobial and wound healing properties.* Mehta, D.S., Vaidya, R.A., Vaidya, A.B. and De Souza, A. Michel Apartment, Mumbai. (Pat no. WO/2005/115090 dt. 08.12.2005; http://www.freepatentsonline.com dt. 8.11.2008).

36) Wasuwat, S. 1967. *A list of Thai medicinal plants*. Research Report no.1, project 17 ASRCT, Bangkok. p. 22.

37) Siddiqui, M.B. and Husain, W. 1990. Traditional antidotes of snake poison. *Fitoterapia.* 61 (1): 41-44.

38) http://www.herbalcureindia.com/herbs/holarrhena-antidysenterica.htm, dt. 04.08.2008.

39) Fitzgerald and Jamesina, A. 1999. *Methods for the prevention and treatment of gastrointestinal disorders*. The Procter & Gamble Company. (Pat no. 5932564 dt. 03.08.1999; http://patft.uspto.gov, dt. 20.08.2008).

40) Sahu, T.R. 1995. Less known uses of weeds as medicinal plants. *Ancient Sci. Life.* 3 (4): 245-249.

41) Bhandary, M.J., Chandrashekar, K.R. and Kaveriappa, K.M. 1995. Medical ethnobotany of the Siddis of Uttara Kannada district, Karnataka, India. *J. Ethnopharmacol.* 47 (3): 149-158.

42) Martinez, M.A. 1984. Medicinal plants used in a Totonac community of the Sierra Norte de Puebla: Tuzamapan de Galeana, Puebla, Mexico. *J. Ethnopharmacol.* 11 (2): 203-221.

43) http://www.drhauschka.co.uk/productinfo.php?product=226 dt. 08.11.08.

44) Kamata Y., Toyokawa, T., Teruya, M. and Ichiba T. 2005. *Anti-obesity agent having lipase inhibiting activity and antioxidation activity.* Okinawa Prefecture. (Pat no. JP2005060334 (A) dt. 10.03.2005; http://v3.espacenet.com dt. 08.11.2008).

45) Rathore, A., Juneja, R.K. and Tandon, J.S. 1989. An iridoid glucoside from *Nyctanthes arbortristis*. *Phytochemistry* 28 (7): 1913-1917.

46) Dixit, R.S. and Pandey, D.C. 1984. Plants used as folk-medicine in Jhansi and Lalitpur sections of Bundelkhand, Uttar Pradesh. *Int. J. Crude Drug Res.* 22 (1): 47-51.

47) Lupin Herbal, http://www.lupinworld.com/herbal/deepactos.htm, dt. 21.08.2008.

48) Chattopadhyay, S., Achari, B., Poddar, A. and Kumar, A. 2007. *Extracts from Nyctanthes arbortristis for the treatment of Leishmaniasis.* CSIR, New Delhi. (Pub no. WO/2007/042902 dt. 09.04.2007; http://www.freepatentsonline.com, dt. 22.08.2008).

49) Pushpangadan, P., Mehrotra, S., Rawat, A.K.S., Khatoon, S. and Govindarajan, R. 2006. *Safe, eco-friendly, health protective herbal colours and aroma useful for cosmaceutical applications*. CSIR, New Delhi. (Pat no. 20060115505 dt. 01.06.2006; http://appft1.uspto.gov, dt. 22.08.2008).

50) Tamsang, K.P. 2004. *Glossary of Lepcha medicinal plants*, Kalimpong, India, Mani Printing Press, pp. 7-19.

51) Bhattarai, N.K. 1992. Folk herbal remedies of Sinhupalchok district, Central Nepal. *Fitoterapia* 63 (2): 145-155.

52) Khanom, F., Kayahara, H. and Tadasa, K. 2000. Superoxide-scavenging and prolyl endopeptidase inhibitory activities of Bangladeshi indigenous medicinal plants. *Biosci. Biotech. Biochem.* 64 (4): 837-840.

53) John, D. 1984. One hundred useful raw drugs of the Kani tribes of Trivandrum forest division, Kerala, India. *Int. J. Crude Drug Res.* 22 (1): 17-39.

54) Antony, M.B. 2008. *Preparation, process and a regenerative method and technique for prevention, treatment and glycemic control of diabetes mellitus*. Alwaye, India, Arjuna Natural Extracts. (Pat no. 7378113 dt.27.05.2008; http://patft.uspto.gov dt. 23.10.2008).

55) Rohatgi, S. 1996. *Ayurvedic composition for the prophylaxis and treatment of AIDS, flu, TB and other immuno-deficiencies and the process for preparing the same*. Kanpur, India. (Pat no.5529778 dt. 13.09.1994; http://patft.uspto.gov, dt. 23.10.2008).

56) Singh, V.K. and Ali, Z.A. 1992. A contribution to the ethnopharmacological study of the Udaipur forests of Rajasthan, India. *Fitoterapia* 63 (2): 136-144.

57) Nagaraju, N. and Rao, K.N. 1990. A survey of plant crude drugs of Rayalaseema, Andhra Pradesh, India. *J. Ethnopharmacol.* 29 (2): 137-158.

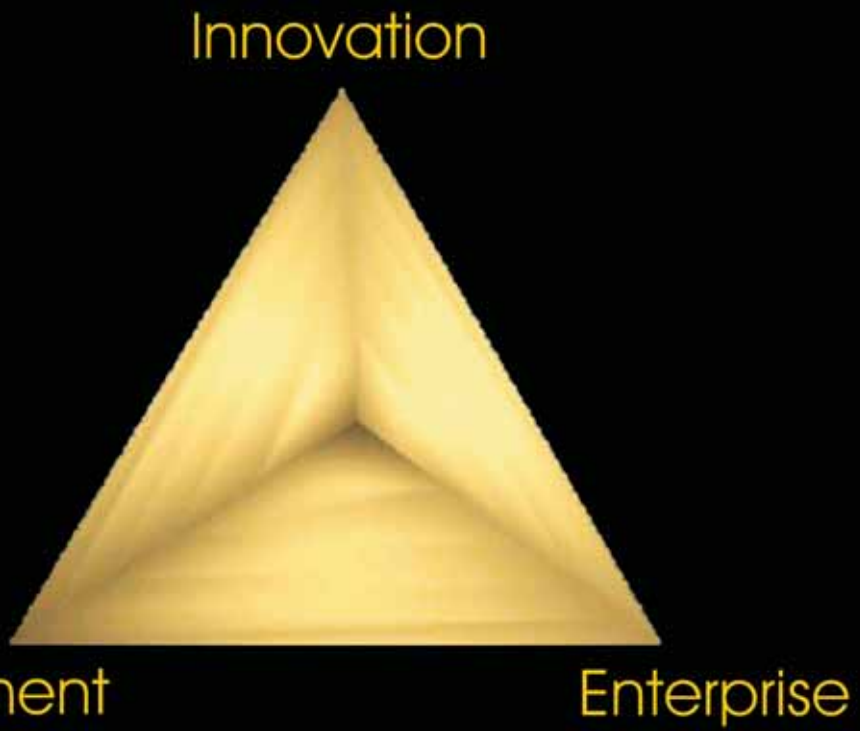
58) Gupta, S., Yadava, J.N.S. and Tandon, J.S. 1993. Antisecretory (antidiarrhoeal) activity of Indian medicinal plants against *Escherichia coli* enterotoxin-induced secretion in rabbit and guinea pig ileal loop models. *Int. J. Pharmacog.* 31 (3): 198-204.

59) Solanki, R.S. 2003. *Herbal formulation*. Sahajanand Biotech Private Ltd, India. (Pub no. GB2378384 dt. 12.02.2003; http://v3.espacenet.com, dt. 23.10.2008).

60) Pushpangadan, P., Rao, Ch.V., Rawat, A.K.S., Ojha, S.K. and Reddy, G.D. 2008. *Anti-allergic herbal formulation*. CSIR, New Delhi. (Pat no. 7344739 dt.28.12.2004; http://patft.uspto.gov dt. 22.10.2008**)**.

61) http://pharmaceuticals.indiabizclub.com/catalog/123280~oils_(atharva_nirgundi_siddha_tail)~pune, dt. 04.08.2008.

62) Pushpangadan, P., Rao, Ch.V., Govindarajan, R., Ojha, S.K., Rawat, A.K.S., Reddy, G.D. and Mehrotra, S. 2008. *Anti-arthritic herbal composition and method thereof*. CSIR, New Delhi. (Pat no. 7338674 dt. 04.03.2008; http://patft.uspto.gov, dt. 25.08.2008).



Honey Bee Network
SRISTI
P.O. Box : 15050, Ambawadi P.O.
Ahmedabad - 380 015, Gujarat, India
Phone: +91-79-27912792, 27913293
e-mail: honeybee@sristi.org
www.sristi.org/honeybee.html

National Innovation Foundation
Bungalow 1, Satellite Complex
Premchand Nagar Road
Vastrapur
Ahmedabad 380 015, Gujarat
Telephone: +91-79-2673 2456/2095
www.nifindia.org