BIHAR INNOVATES
PREFACE

National Innovation Foundation (NIF) 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. Till date NIF has been able to scout innovations and traditional knowledge practices from over 520 districts across India.

Thanks to the support of volunteers from 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, innovation and traditional knowledge from Bihar. I am conscious of its limitation in terms of coverage and outreach. But if we could uncover at least a few 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 Bihar 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 Bihar 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 the 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 every 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.
To make the 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 just his/her 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, National Innovation Foundation (NIF) 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 in different sectors. The network acknowledges the innovators, traditional knowledge producers and communicators so that they do not remain anonymous.

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.

Building a Bridge with Grassroots Innovators in Informal Sector
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 a 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 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 (not all unique, not all distinctive) from over 520 districts of the country.

NIF has filed 198 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 area 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 for the school and college education.

d. Demonstrations and trials can be organized at various regional research stations and 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 in 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 State of Bihar. Tremendously rich knowledge of biodiversity and environment besides numerous grassroots innovations can be leveraged through the proposed collaboration.

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“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 BIHAR

This section contains grassroots innovations emerging from rural/urban areas of Bihar
Cooker for coffee

Conventionally, the pressure cookers have been used for making food only. However, the innovator has modified the normal cooker and made it into an espresso coffee making machine.

The modified cooker is used to boil water and generate steam. It is then passed through a modified delivery system, attached to the lid, to a jar containing milk, coffee and sugar. In five minutes frothy, tasty coffee gets ready!

The modified cooker has been in great demand and even tea stall vendors from nearby districts have bought it for their shops.
Reducing the pollution

For operating a welding machine, the generator used by the innovator emitted a lot of flue gases and also produced unwanted noise. To solve this problem, the innovator retrofitted a cylindrical container to the exhaust pipe of the engine. The specific arrangement of different types of fins in the cylinder filters out the particulates and allows the clean air to pass, resulting in very low emissions and thus controlling pollution and reducing noise.

BIT Mesra, Ranchi has confirmed considerable reduction in the proportion of carbon monoxide and carbon dioxide in the flue gases after adding the device instead of conventional muffler. The temperature of the flue gas was also reported to be significantly reduced. The testing was facilitated by NIF.
Handpump with a change

The plunger design of a hand pump has been modified by the innovator, which has resulted in substantial increase in the efficiency. The change of material has also helped in reducing the cost and weight as well.

BIT Mesra, Ranchi tested the same at NIF’s instance and found that the hand pump with the modified plunger gave 69 percent more discharge than the hand pump with the conventional plunger for the same number of strokes and head.
Novel gear mechanism & Cap for the wooden pencil

Novel gear mechanism
The innovator has come up with this device to reduce the hard work involved while riding a bicycle/rickshaw uphill. The new gear mechanism enables a person to pedal backwards and yet move the cycle forward, thereby reducing effort and fatigue. It also prevents the reverse motion of the vehicle on slopes.

Cap for wooden pencils
The innovator has interestingly devised a cap for the normal wooden pencil, which prevents the tip from being broken easily. The cap also has an eraser and a sharpener to address the other needs of the user.
Amphibious bicycle & others

Saidullah’s penchant for innovations has made him lead such a rich life that it can inspire generations to come. He made the amphibious bicycle in mid 1970s to cross over from one place to another during a flood in the region. Thereafter he has been churning one innovation after the other over the years with his latest being an amphibious rickshaw. Among his many innovations a few that can be mentioned are a mini tractor, key operated table fan, fodder cutter operated centrifugal pump, spring loaded bicycle, mini turbine etc.

The serial innovator, Shri Saidullah was given the Life Time Achievement Award at the hands of the then President of India, in NIF’s Third National Competition for Grassroots Innovations and Traditional Knowledge Practices in 2005.
Bicycle that can be carried in a bag

A gritty and hard working graduate, Sandeep made this folding bicycle, which can be assembled and dismantled easily in a very little time. When dismantled and folded, the bicycle becomes portable such that it can be put in a bag and carried along!
Solar cycle along with FM, radio and charging facility &
Multifunctional emergency light

Solar cycle along with FM, radio and charging facility

Move over petrol and electricity operated two-wheelers for here comes the solar cycle, working on solar batteries. Using a 12 V motor, the cycle gives a speed up to 30 km per hour, good enough for a joyful city ride. It also has a tape recorder and FM radio for listening pleasure apart from a plug point, which enables the stored energy to be used for charging/operating various small devices.

Multifunctional emergency light

Who says an emergency light can only be used for lighting purposes? Definitely not the innovator, for he has come up with a solar powered light having tubes that can glow up to twelve hours, along with a FM radio, a mobile charger, a WLL Telephone battery charger and a 12 V DC fan that can be operated for four hours. Apart from solar energy, this emergency light can also be conventionally charged by electric power.
Tobacco leaf cutting machine

It is a manually operated machine for cutting tobacco leaves. The leaves are passed between the cylindrical rasps, flattened and then cut. Depending upon the cutting requirements, adjustments can be made in the assembly also.
New brake mechanism in bicycle

This bicycle is unlike normal bicycles where a lever attached to the cable is pressed to apply the brakes. In this bicycle an accelerator like action is used, where by rotating the hand grip, the brakes are applied.

The innovator has also modified a foot operated water pump to make it more efficient.
Communication board for the deaf and the dumb

This thoughtful effort from a student enables deaf and dumb people to communicate with others as well as among themselves easily. This is a board that has alphabets, numbers and commonly used words written on it. The user has a torch, which is used to illuminate the specific word, alphabet or number such that the person viewing the board can understand the meaning.
Pen multimeter

The innovator has modified a ball pen to act as an electric current tester and a sort of multimeter to check diode, resistance and capacitor’s ratings. Moreover, it also has a small LED which can be used at night as a source of light.
Understanding that steam at an equal temperature is hotter than water, Pradeep has come up with an egg boiler that uses steam instead of water to boil the eggs. In the lower compartment water boils and the steam rises through a perforated opening to the upper chamber where the eggs are kept. This way the eggs boil quickly saving fuel.

The innovator was awarded in the student’s category in NIF’s First National Competition for Grassroots Innovations and Traditional Knowledge Practices in 2001.
This section contains details of herbal preparations used traditionally for various ailments and products based on such traditional knowledge.
PART II : HERBAL PRACTICES & PRODUCTS

Uses of Achyranthes aspera L. (Apamarg)

NIF Database

Uses from Bihar

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

Itching
Powdered roots (5g) are 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, Shivhar, Bihar

Hemorrhoids
Dried roots are ground into a fine powder; one spoon of this taken on an empty stomach till the ailment cures
- Vishwanath Mahato, East Champaran, Bihar

Veterinary practice

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

Uses from other states

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

Asthma
The whole plant (50-100g) is ground into a fine powder. 5g of this powder is taken with water till cured
- Ahmed Hussain, Lohardaga, Jharkhand

Poisonous bites
Root paste is applied on the spot of bite and also administered orally
- Jagjit Bahadur, Sitapur, Uttar Pradesh

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

Uses in Classical Codified Literature

Dried aerial parts are taken orally in case of diabetes\(^1\); powder made from the dried plant given orally to treat whooping cough\(^2\); decoction of the plant used as laxative\(^3\); decoction of the plant applied externally on boils and pimples\(^5\).

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 like for curing laryngopharyngitis\(^6\), bronchial asthma\(^6\) etc.

Source: http://www.impgc.com/images/plantPictures/Achyranthes%20aspera.jpg
Uses of Aegle marmelos (L.) Corr. (Bel)

NIF Database

Uses from Bihar

Ulcer
Leaves of bel (100g), petals of rose (100g) and turmeric (50g) are pounded and mixed with honey (50g). Tablets are prepared from this mixture and given thrice a day for 7-10 days.
- Rameshwari Singh, Nawada, Bihar

Fever
Leaves of bel and chirayata (Andrographis paniculata (Burm.f.) Wall.ex Nees) 250g each are boiled in a litre of water to obtain a decoction of 250g. 100g decoction is given to the patient twice a day for seven days.
- Sindhoo Kumari, Gopalganj, Bihar

Jaundice
Freshly plucked green leaves are soaked in a glass of water. This water is taken on an empty stomach 2-3 times a day till the ailment cures.
- Akhilesh Kumar Yadav, East Champaran, Bihar

Diabetes
Equal quantity of leaves of bel and fruits of Indian gooseberry are taken and the juice is extracted. A teaspoon of the juice is given to combat the disease.
- Vinita Kumari, Sitamarhi, Bihar

Veterinary practice

Abdominal pain
Leaves of Aegle and Euphorbia nerifolia L., flower of Tagetes erecta L., are mixed with fodder and fed to the animal.
- Dipendra Kumar, East Champaran, Bihar

Uses 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

Sunstroke
Juice is extracted from the fresh leaves and taken orally.
- Vijaya Bharati, Hazaribag, Jharkhand

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

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

Uses in Classical Codified Literature

Burnt fruit pulp is applied on rheumatic arthritis; 10g fruit pulp is given before sleep to overcome morning sickness; fruit rind is applied externally on head to kill headlice.

‘Bael’, prepared from Aegle is used in diarrhoea, dysentery and GI disorders. It has digestive and carminative properties. ‘Lukol’s’ tonic is made from this plant along with other plants, which improves uterine circulation, and its antimicrobial and astringent actions on the mucous membrane of the genital system control leucorrhoea. ‘Bilwa’, 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 like for treating diabetes, gastric ulcer etc.
Uses from Bihar

Jaundice
Juice extracted from the plant is given orally for three days consecutively
- Jagnarayan Singh, Gopalganj, Bihar

Kidney stone
Milk boiled with the roots is taken
- Monika Kumari, Sitamarhi, Bihar

Stomach disorder
Juice is extracted from the plant and mixed with equal amount of cow’s urine. Two spoonful of the mixture is taken
- Monika Kumari, Sitamarhi, Bihar

Uses from other states

Headache
Leaves are ground into a fine paste and applied on the forehead
- Sukumar Nath, North Tripura, Tripura

Conjunctivitis
Decoction of the root (50g) is given once a day
- Ramnarayan Gameti, Udaipur, Rajasthan

Cough
Leaves of punarnava (5g), one small onion, a small piece of ginger and a spoonful of cardamom are cooked well and taken orally
- Hasina Khan, Margav, Goa

NIF Database

Uses of Boerhaavia diffusa L. (Punarnava)

Uses from Bihar

Jaundice
Juice extracted from the plant is given orally for three days consecutively
- Jagnarayan Singh, Gopalganj, Bihar

Kidney stone
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Stomach disorder
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- Hasina Khan, Margav, Goa

Uses in Classical Codified Literature

Juice extracted from the leaves is given with milk to get relief from cataract; decoction of the plant is given orally to purify blood; the plant extract is used as diuretic; decoction of the leaves is applied externally in case of any skin infections.

Liver-kidney care is made from this plant, which works synergistically on the liver and kidney to heal and prevents infections in both systems. Fourteen patents have been found on the various medicinal applications of Boerhaavia for different ailments like liver disorders, hypertension etc.
Uses of *Bombax ceiba* L. (Semal)

**NIF Database**

**Uses from Bihar**

**Pimples**
Paste made using thorn and milk is applied on the pimples for seven days
- *Pravin Kumar Sharma, East Champaran, Bihar*

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

**Diarrhoea**
Juice from the leaves is extracted and a spoonful given to the patient along with sugarcandy for four days
- *Neha Kumari, East Champaran, Bihar*

**Veterinary practice**

**Bloat**
Fruits (100g) are mixed with an equal amount of buffalo ghee and fed to the animal twice a day
- *Ramnath Thakur, East Champaran, Bihar*

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

**Uses from other states**

**Gynaecological disorder**
Powdered gum (5g) is mixed with water and given to the patient to drink for five days
- *Jugeshwar Ram, Hazaribag, Jharkhand*

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

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

**Uses in Classical Codified Literature**

Decoction of the bark is given orally to combat fever\(^{19}\), diabetics should take decoction of the heartwood\(^{20}\); and to reduce stomachache administer bark juice \(^{21}\).

Product ‘Acne-n-Pimple Cream’ \(^{22}\) 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\(^{23}\), AIDS\(^{24}\) etc.
Uses of Carica papaya L. (Papita)

NIF Database

Uses from Bihar

Kidney stone
Pounded roots (6g) are mixed with water (50g) and taken orally
- Sandhya Suman, Sitamarhi, Bihar

Intestinal worms
Fresh latex from a branch is taken and administered orally along with a spoonful of honey
- Prabhat Kumar Pandey, East Champaran, Bihar

Ringworm
Milky latex is applied topically
- Mukesh Kumar, East Champaran, Bihar

Veterinary practice

Lactogouge
Fruits are fed daily to enhance milk production
- Manoj Kumar, Madhubani, Bihar

Uses from other states

Toothache
Cotton dipped in the latex of the stem is kept on the aching tooth
- Mangeram Jani, Hissar, Haryana

Headache
Seeds and garlic are ground into a fine paste and applied on the forehead
- Saiba Barman, Borpeta, Assam

Jaundice
Curry made from the raw/unripe fruit is taken orally
- Sharda Devi Gangwal, Jaipur, Rajasthan

Uses in Classical Codified Literature

Decoction of the flower is used as cardiotonic25; bark powder is applied externally on wounds26; decoction of the bark is given orally to get rid of intestinal worms27; beverage of the fruit is taken orally to cure diarrhoea28.

Natural moisturisers and creams29 are prepared from Carica in combination with other plants. Thirty patents were found on its medicinal uses such as an antiallergic30 and for prevention of cancer31.
Uses of *Datura metel L.* (Dhatura)

**NIF Database**

**Uses from Bihar**

**Cough**
Juice from the roasted leaves is extracted; two spoonful of the juice is mixed with a spoon of ghee and taken orally.
- *Mohani Kumari, Lakhisaray, Bihar*

**Bodyache**
Equal quantity of leaves of dhatura, bark of neem, leaves of chirayata (*Andrographis paniculata* (Burm.f.) Wall.ex Nees), leaves of tobacco are taken and boiled in 1 litre of water till the total solution is reduced to 1/4th. Sesame oil is then mixed in it and the mixture applied on the affected part.
- *Lalbabu Sahni, Madhubani, Bihar*

**Arthritis**
Leaves of dhatura, *Anthocephalus chinensis* (Lamk.) A.Rich.ex.Walp. (ten each) and ginger (100g) are ground together with sugar (50g), and the paste is applied on the aching body part.
- *Ramanand Shah, East Champaran, Bihar*

**Eczema**
A fruit is roasted and ground to make a fine powder, sesame oil (250g) and milk are then added to make a paste. The paste is applied on the infected part.
- *Vikas Kumar, Nawada, Bihar*

**Veterinary practice**

**Diarrhoea**
Roasted fruits are given with fodder.
- *Jawaharlal Prasad, East Champaran, Bihar*

**Uses from other states**

**Alopecia**
Juice is extracted from the leaves, smeared on the head, and left for 30 minutes.
- *Bansi Ghosal, West Midnapur, West Bengal*

**Headache**
Seeds are chewed and spat for instant relief.
- *Ganesh Das, Sirohi, Rajasthan*

**Asthma**
A seed soaked in water is taken orally initially, gradually a seed is increased every week for five weeks.
- *Rani Farhat, Hazaribag, Jharkhand*

**Diarrhoea**
Seeds are ground with little water. The mixture is filtered and administered orally.
- *Ajit Singh Rathod, Nagor, Rajasthan*

**Uses in Classical Codified Literature**

One fruit, filled with 10g *Piper longum* L. is burnt and 5g of the ash is taken with honey, morning and evening for 5 days to cure malaria; the thumb is kept inserted within the fruit to treat finger felon; root paste is applied externally on poisonous bites. *Muscles & joint rub* is a highly effective medicine for backache, muscular sprain and joint pain made from the plant.
Uses of *Eclipta alba* (L.) Hassk. (Bhangra)

**NIF Database**

**Uses from Bihar**

- **Greying of hair**
  Handful of leaves are ground and mixed in mustard oil (50g). The mixture is then applied on the head
  - *Supriya Kumari, Lakhisaray, Bihar*

- **Earache**
  1-2 drops of the juice is extracted from fresh leaves and used as ear drop
  - *Dipak Kumar Tiwari, Gopalganj, Bihar*

- **Jaundice**
  Juice is extracted from the plant and three spoonful are given orally along with sugar candy (50g) twice a day till the ailment cures
  - *Raghuvansh Prasad Singh, Munger, Bihar*

**Uses from other states**

- **Mouth sores**
  Fresh leaves are chewed for immediate relief
  - *Sanjay Singh Uplana, Nagda, Madhya Pradesh*

- **Cough**
  Juice is extracted from the pounded leaves and honey is added. 1-2 drops of this is given thrice a day
  - *Sanjay Singh Uplana, Nagda, Madhya Pradesh*

- **Bodyache**
  Juice is extracted from the leaves and applied
  - *Vijay Gupta, Muzzafarpur, Uttar Pradesh*

- **Cuts**
  Shoot paste is applied on cuts
  - *Rani B. Bhagat, Pune, Maharashtra*

**Uses in Classical Codified Literature**

Powder of dried aerial parts is used for asthma35; buds are ground in sesame oil and applied on the forehead to get rid of headache36; plant is applied on ringworm lesions37.

‘Bhringraja’38 is used as a liver tonic and for various chronic skin diseases. ‘Eclipta tincture’39, is a highly effective medicine of liver ailments such as cirrhosis and infective hepatitis and other conditions involving hepatic enlargement. Thirteen patents have been found on its medicinal applications mainly for liver disorders40 and for hair care41.
Uses of \textit{Holarrhena antidysenterica} Wall. (Indrajo)

\section*{NIF Database}

\subsection*{Uses from Bihar}

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

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

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

\subsection*{Uses from other states}

\textbf{Kidney stone}
Juicy paste of the bark is mixed with soured ghee and taken
- Robert L. Hnamte, Aizawl, Mizoram

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

\section*{Uses in Classical Codified Literature}

\textbf{Anemia}
Paste of bark is mixed with salt and taken orally
- Robert L. Hnamte, Aizawl, Mizoram

\textbf{Skin disease}
The dried bark is powdered, mixed with ghee and honey and is taken orally
- Robert L. Hnamte, Aizawl, Mizoram

\textbf{Dried bark powder} is given orally to cure stomachache; 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.

\textbf{`Diarex vet'} is used for diarrhoea in cattle. `Kutajarista and Kutajavaleha' 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.
**Uses of *Leucas aspera* Spr. (Guma)**

### NIF Database

#### Uses from Bihar

**Fever**
Equal amounts of flower of guma; leaves of *Azadirachta indica* A. Juss., *Ocimum sanctum* L., roots of *Cyperus rotundus* L., *Solanum xanthocarpum* Schrad. & Wendl. and black pepper seeds are pounded and the juice extracted, two spoonful are taken orally.
- Nushrat Jahan, Gopalganj, Bihar

**Stomachache**
Curry made from the plant is taken.
- Usha Rani, Darbhanga, Bihar

**Eczema**
Plant is burnt and some coconut oil is mixed with the ash. The paste is applied on the infected body part.
- Gokul Singh, East Champaran, Bihar

**Piles**
Equal amounts of roots of guma and black pepper are ground, a spoonful of the mixture is given twice a day till the ailment cures.
- Umesh Mishra, East Champaran, Bihar

**Veterinary practice**

**Anorexia**
Juice is extracted from the leaves and flowers, 3-5 spoonful is given orally.
- Chandrashekhar Prasad Kushwaha, East Champaran, Bihar

### Uses from other states

**Migraine**
Juice is extracted from the freshly plucked leaves and 2 drops of the same is put in the nose.
- Ramji Chink Badaik, Gumla, Jharkhand

**Sinusitis**
Juice of leaves is put in the nose.
- Nayan Kalita, Kamrup, Assam

**Jaundice**
Juice from the pounded leaves is extracted and little quantity of goat urine is mixed; this is given twice a day for 4 days.
- Shalini Shrivastava, Balia, Uttar Pradesh

### Uses in Classical Codified Literature

Dried plant powder is applied on scabies; the plant is used as an anthelmintic; a handful of flowers (5g) are roasted in ghee and taken once a day to cure cough.

‘Herbal Steam Bath’ is useful to get rid of various primary health and hygiene problems like cleaning and removing bad odour of the body, for treating burning sensation in eyes, watery eyes, headache, nausea, migraine etc.
Uses of *Nyctanthes arbor-tristis* L. (Harshingar)

**NIF Database**

**Uses from Bihar**

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

**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

**Piles**
Seed paste is taken orally with water.
- Lavli Kumari, Gopalganj, Bihar

**Uses from other states**

**Intermittent fever**
Two leaves of harshingar, 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 taken orally.
- Arjun Singh, Bharatpur, Rajasthan

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

**Uses in Classical Codified Literature**

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

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

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

**Source:** [http://prathom.swu.ac.th/panmai/pic/7-10110-002-110.JPG](http://prathom.swu.ac.th/panmai/pic/7-10110-002-110.JPG)
Uses of *Solanum nigrum* L. (Makoi)

NIF Database

**Uses from Bihar**

**Cough**
Juice extracted from the roots is taken orally
- Priyanka Kumari, Gopalganj, Bihar

**Jaundice**
Juice extracted from the roots is taken orally
- Suman Kumari, Gopalganj, Bihar

**Uses from other states**

**Stomachache**
Leaves of makoi (200g) are fried in mustard oil (20ml), salt is added and then taken orally
- Sukhai Mali, Faridabad, Haryana

**Nasal bleeding**
Dry fruit (25g) is boiled in mustard oil (100g), oil is filtered and applied on the forehead
- Sahim Ansari, Lohardaga, Jharkhand

**Mouth ulcer**
Leaves are chewed
- Shripal Singh, Bulandshahar, Uttar Pradesh

Uses in Classical Codified Literature

Powdered fruit is given orally to reduce fever\(^{54}\); juice is extracted from the whole plant and applied externally on the burnt part\(^{16}\); poultice of the plant is placed on the aching joint\(^{16}\); fruits are ground and taken orally to cure diarrhoea\(^{54}\).

‘Herbolax’\(^4\), made from *Solanum* along with other plants, is used as gentle laxative, for constipation and electrolyte balance. Ninety patents were found for its medicinal uses mainly on hepatitis\(^{57, 58}\).
Uses of *Vitex negundo* L. (Nirgundi)

**NIF Database**

**Uses from Bihar**

**Stomachache**
Powdered leaves of *Vitex, Cocculus hirsutus* (L.) Diels. and *Bombax ceiba* L. are mixed in equal ratio and taken.
- Yusuf Khan, East Champaran, Bihar

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

**Veterinary practice**

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

**Uses from other states**

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

**Ulcer**
Half cup juice is extracted from the leaves and taken orally.
- P D Walikar, Bagalkot, Karnataka

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

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

**Uses in Classical Codified Literature**

‘Muscle & joint rub’ is a highly effective medicine for backache, muscular sprain and joint pain. ‘Dental Cream’ 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’ is useful in arthritis, joint pain, relieves oedema. Thirty five patents have been found on the medicinal applications like for treating rheumatic arthritis.
Herbal Formulations for Healthy Crops

**SRISTI SHAASTRA**
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.
PART II : HERBAL PRACTICES & PRODUCTS

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.

Mastherb
Ukhardiyabhai S. Raot, Dang, Gujarat

Mastherb 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 intramammary 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.
This section contains details of national innovations, which are deemed suitable for introduction in Bihar.
Auto air kick pump

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 entrepreneurs in different states.
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!

Unicool- the natural water cooler
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.

The Innovation has been taken up for value addition at CMERI Durgapur (WB) through the NIF-CSIR JIC Fellowship Scheme.
Earthen kitchen products

Tawa/pan

Non stick tawas have become an essential part of our kitchens to prepare low oil food but are costly. Their non stick coating also doesn’t last long. Blending traditional and modern technology, Mansukhbhai has developed a clay tawa with a black non-stick food grade coating. Being non-metallic, the rotis, dosas and other items cooked on it give a different taste and feel altogether.

Mitticool

A fridge for the common man that does not require electricity and keeps food fresh too. With this basic premise in mind Mansukhbhai came up with Mitticool, a fridge made of clay. It works on the principle of evaporation. Water from the upper chambers drips down the side, taking heat from the inside gets evaporated, leaving the chambers cool. Cool and affordable, this is the option to keep food, vegetables and even milk fresh naturally for days.
Sanitary napkin making machine

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 industry standard raw materials 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 of NIF, the innovator has been able to install over fifty units in seven states.
An improved dual pod variety of chick pea—“Sushil Laxmi”

The most distinctive feature of the variety is that it bears two pods per axil as compared to single pod per axil, which is a common feature of all the varieties that are available in the market. Plant is tall (50-60cm), spreading and has bushy type growth habit. Foliage is dark green and seeds are attractive, bold (25-30 gram/100 seeds) and brown in colour. The variety has been reported to be tolerant to wilting and insect pest attack in farmer’s field, yielding on an average 14 - 16 quintals per acre under irrigated conditions and 12 - 13 quintal per acre in unirrigated conditions.
Manual milking machine

Safe milking of cows/buffaloes is a requirement across rural India and this product is an efficient step in that direction. It is a low cost, manually operated device that helps farmers to milk the animal hygienically and also reduces drudgery in the process.

The machine has simple controls and can be easily operated by women as well. The creation of suction and low vacuum makes it suitable for other applications also. NIF has been giving marketing support to the innovator. As a result, this machine has also been sold to customers in Phillipines, Uganda and Ethiopia apart from India.
Aloe vera gel extractor

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.
In a traditional bullock cart, with two wheels, part of the load is borne by the draft animals on their shoulders and neck. Moreover, the harnessing system makes it difficult to negotiate sharp bends or turns in the road. This causes galls on the neck of the bullocks, which affects not only the efficiency of the animals but also their stamina. This cart is thus designed to overcome the shortcomings of the traditional carts by having an extra wheel to balance the load. In addition, the cart has a tilting mechanism that is based on the rope and pulley system, which can be controlled by a lever located alongside the cart driver.

Aaruni-the tilting bullock cart

Amrutbhai Agrawat
Gujarat
Like other drought prone regions, Amreli region, from where the innovator belongs, has severe labor shortage, few farm animals or mechanized implements to conduct farming operations. To address this need, the innovator designed a unique unit: the ‘Bullet Santi’.

Using the chassis, drive and power of an Enfield Bullet motorcycle, the innovator has retrofitted an attachment with two wheels at the rear with a tool bar to fit various farm implements. This helps in ploughing, weeding and sowing seeds. Being a unique local solution, the machine has proved to be cost effective and fuel efficient. Bullet Santi can plough an acre of land in half an hour consuming only two litres of fuel. Innovator got a patent in India and USA. Given the fact, many other users and innovators copied this technology, he has appreciated the concept of ‘Technology Commons’ implying no restrictions for other innovators to copy and adapt. But commercial firms will need license from members of the ‘Technology Commons’.
Production of soft *muga* silk

The innovator has mechanised the process of *muga* silk weaving by way of making modifications in the conventional mechanised loom. *Muga* silk weaved with the device becomes soft as well as blocks UV radiations up to 80% as per laboratory tests at Tezpur University.

The innovator has made various products like shirts, belts, caps etc. with the *muga* weaved from this loom. He has also made an umbrella out of this material which is durable, stain free, and water proof. It has a pleasing golden shine which illuminates colour, better than that offered by conventional umbrellas.

NIF had facilitated the technology transfer of this *muga* umbrella to Assam Silk Development Centre.
Mobile operated switch and multi-media poster

Imagine a village where the farmer has the luxury of being able to stay at home and switch his irrigation pump in the faraway field on or off as required during the day or at night. This is made possible by this innovation, which uses the power of mobile telephony to trigger electrical control switches.

The farmer can remotely know the status of the pump in his cell phone and turn the motor on or off by calling the particular configured number. It activates the switching by certain number of rings and hence incurs no call charges. Prem Singh has developed several other innovations, one of which is the viewer triggered multi-media poster. If any agency wants to communicate some graphic message with different language audios or videos, this multi-media poster can be very useful. NIF facilitated a Mumbai based company to purchase two hundred units of the talking poster worth around eight lakh rupees for diffusion in various states. These were made available in five local languages.
‘Kudrat-9’- an improved variety of wheat

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.
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 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 for use in the gardens in the Rashtrapati Bhavan with encouraging results.
An improved variety of pigeon pea- “Virat (JP-6)”

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.
An improved variety of pigeon pea- “Richa 2000”

This variety has coloured big flowers, long leaves and bunchy type pod bearing at the top. Topping is done periodically, which results in bushy growth. This variety has synchronous maturity with higher yield (24 quintals/acre), more branches/plant (12-14) and more pods/plant (700 – 800) than other local popular varieties of the region.
End notes & References


BIHAR INNOVATES | 58