



**HARYANA INNOVATES**

# HARYANA INNOVATES



**HONEY BEE NETWORK**

[www.honeybee.org](http://www.honeybee.org)

Regional Collaborator  
Kamaljeet

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# 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 Haryana. 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 Haryana 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 Haryana 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

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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.



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 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

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<sup>1</sup> 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.

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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.

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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

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

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



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- 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](mailto: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 Haryana. Tremendously rich knowledge of biodiversity and environment besides numerous grassroots innovations can be leveraged through the proposed collaboration.



Anil K Gupta  
Executive Vice Chairperson, NIF, Ahmedabad  
Professor, Indian Institute of Management,  
Ahmedabad  
[anilg@nifindia.org](mailto:anilg@nifindia.org)



**“Technology is the non-linear tool available to humanity, which can effect fundamental changes in the ground rules of economic competitiveness”.**

**- 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”.**

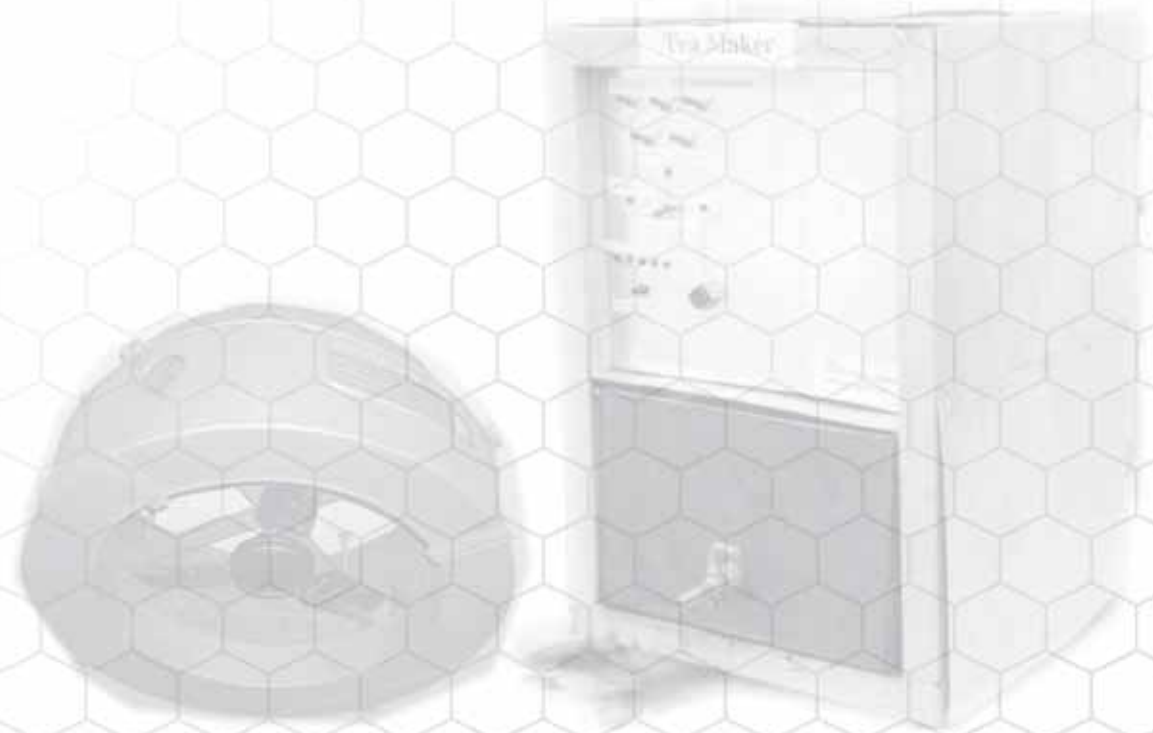
**- Dr R A Mashelkar**

# PART I

# INNOVATIONS

from HARYANA

This section contains path breaking innovations  
originating from ignited minds of Haryana





**Prem Singh Saini**  
Ambala, Haryana

## Telephone Operated Remote Switch

The innovator observed the difficulty of farmers in their homes at night, who need to go to faraway fields, as per availability of power supply, to switch the motor on or off for pumping water.

The innovation uses the power of a mobile phone on existing networks to enable the farmer to know of electricity status and remotely switch the pump on or off as required, while sitting in his home itself. This “mobile phone operated switch” is an instrument box with an attached mobile phone and modified circuit which can toggle a device between switch-off and switch-on conditions, besides letting the user know the status of the remote device.

Only authorized users having the specific mobile number can operate the system. Sitting at home, traveling thousands of miles away, the farmer can know if electricity is “on’ or ‘off’ at pump house. He can turn the pump on or off at will without spending any call charges. He would know of the status of electricity supply, and pump status and control functions just by the number of rings.

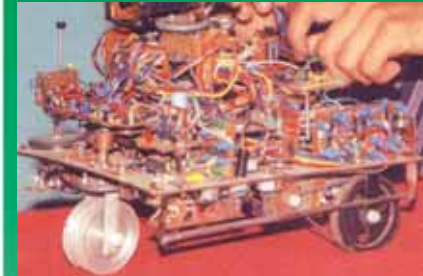


## Electronic Robot, Guest Welcome System & Talking Poster

The innovator has developed an electronic robot that can be used in hazardous areas for command and control. This unit can be controlled by a TV remote and can ‘see’ and maneuver around obstacles, take photographs as required, detect fire, smoke and monitor humidity levels. The functional versatility and degrees of freedom is achieved by its 10 wheels, powered by 5 motors using custom electronics embedded with more than 40 ICs, 200 transistors, 900 resistors, dedicated sensors and intelligent control systems.

The innovator has developed two other intelligent applications that respond to human presence and deliver the desired function on demand. The first innovation is a guest welcome system installed at entry points in any building which can detect motion and give out the welcome address thereby surprising and delighting the guest. It also greets the guest while going out. It is programmed to be uni or bi directional, has audio volume control and as a standalone unit, it can be powered by battery or conventional electricity.

Extending the envelope of automated communication, the second innovation is a “talking poster”, which suits the learning style of some users who are unable to read the content of a poster. The content is delivered via audio as a pre-recorded message when the person come in and stands in the line of sight of the poster. NIF helped the innovator in procuring orders from a Mumbai based company, which has deployed the posters among its MFI and Cooperative Bank clients for sharing information about loans schemes among potential clientele. The posters in various language versions have been installed in states like Andhra Pradesh, Maharashtra, Orissa etc.





**Gopal Kumar Saluja**  
Ambala, Haryana

## Ceiling Cooler

While costly airconditioners and aircoolers have been around for years, this innovator has developed a unique 'ceiling cooler' by upgrading the ubiquitous ceiling fan.

The ceiling cooler comprises the ceiling fan, a submersible water-pump with motor, a cylindrical water container having arrangement for continuous water drip, as used in desert coolers. Four spokes made from valves of old engine are welded to cross bars for adjusting and making the unit leveled.



## Cotton Cultivation for Water Conservation

In many regions, where irrigation adds to the cost as well as increases the incidence of the pests, farmers have evolved novel practices to achieve efficiency with lesser resources. One such example is to sow cotton on the ridges and provide irrigation in each channel separated by a distance of six feet.

Water is applied in the alternate channel in subsequent irrigation. This reduces water requirement and controls the weeds and also the pests. This practice is found to control wilt and other diseases, while the yield remains equal to those seen in normal irrigation and sowing pattern.



**Harbhajan Singh**  
Fatehabad, Haryana





**Ram Kumar**

Hissar, Haryana

## Indigenous Gas Kit for Moped

As an accomplished mechanic of two wheelers, this innovator got inspired by a Maruti van fitted with a LPG gas kit, and decided to build his own gas powered moped.

He has developed a gas powered moped unit using a small LPG cylinder at the rear and a custom gas kit with a specialized valve that prevents back flow of gas or damage due to sparks in the carburetor. The low running cost and manageable weight of the small cylinder at back are some of the highlights of this innovation.





## Mobile Operated Vehicle Security System

Vehicle security is an important concern as the phenomena of car theft has become a widespread problem. The innovator has used the power of mobile telephony to provide an effective vehicle security system to monitor and prevent car thefts.

If the vehicle is stolen, car owner can call back the pre-programmed mobile number in the vehicle to cut off the engine ignition system, thereby disabling it. Only the car owner can switch on the ignition by making another call to the same number. Since this system uses a mobile phone fitted inside the car, in case of theft, the car location can always be tracked using the national net of the cellular service providers.





**Rambilas Sharma**  
Rohtak, Haryana

## Gas Based Trolley and a Water Pump

Starting out as a vendor delivering LPG cylinders, this innovator first developed a LPG gas based motorcycle. Then he moved on to develop a water pump powered by TVS moped engine running on LPG.

Apart from achieving a high energy efficiency of Re 1.00 per hour of operation, the innovator addressed several technical issues by custom designing a gas inlet, building a new carburetor to facilitate combustion of gas in the engine, using a bicycle freewheel and chain for cranking the engine.



## Safe Chaff Cutter

Rural India is witness to many accidents due to use of unsafe equipments and some times careless work practices. When a chaff cutter is running, users sometimes use their hands to pull out the chaff stuck in the machine. The absence of safety features or design provisions to handle such functional needs cause heavy injuries.

The innovator has upgraded the existing motor driven chaff cutter with addition of gear combination to control the pressure rollers and cutting action at the time of entanglement of fodder to avoid any accident.

A safety attachment is developed for the chaff cutter by using an old gear box of thresher and propeller shafts used in cars and trucks. This attachment helps in controlling the forward and backward movement of rollers. This helps in smooth and regulated operation in machine when there is chaff entanglement in between the rollers (a clutch based locking system is developed by another innovator, Kamruddin Saifi in western Uttar Pradesh. It helps in detaching the motor from the chaff cutter through a clutch and applying instantaneous breaks through a foot pedal).



**Ram Prasad Beniwal**  
Hissar, Haryana





**Ashok Kumar Dhiman**  
Firozpur, Panchkula,  
Haryana

## Tea Making Machine

The innovator has developed a versatile, automated, low cost tea making machine that facilitates the Indian method of making fresh tea. Unlike conventional machines, which use premixed powder or tea-bags, this machine produces tea, with an option of mixing milk, sugar and tea leaves in user determined proportions.

By circulating hot water in the system, the entire unit can be cleaned effectively. Using a low wattage heater, the machine can also be run by an inverter during power black-outs. It produces 4 cups of tea in 5 minutes.



*In 1943 a prolific innovator, late Shri P L Mistry, had also innovated a machine for preparing tea in the Indian way.*

## 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.



**Dharamveer**

Firozpur, Panchkula,  
Haryana





**Attar Singh alias  
Pappu Ahalawat**  
Jhajhar, Haryana

## Solar Powered E-bike

The innovator had difficulty in transporting fodder from far away fields to his home for the cattle. Inspired by an electric bicycle that he saw on the road, he decided to build his own version of an e-bike powered by the sun to cut down on energy costs.

Using roof mounted solar panels to charge the batteries; the innovator developed his e-bike fitted with a three phase motor at the rear. The solar bike comprises a bike frame (Todi frame), set of batteries, 3-phase motor and power controller (48 V DC – 3 Phase AC) to drive the rear wheel.



## Improved Hadamba Thresher

The innovator, years ago, witnessed heavy commercial losses incurred by farmers due to ineffective threshing and breakage of seeds using existing Hadamba threshers. As a solution to this, he decided to redesign it for effectively threshing castor seeds.

Improvements in this specialized thresher include reallocation of conveyer belt in the feeding chute arrangement for better grain feeding access, controlling the exit hatch for seeds to one third of the original area, reducing speed of cutter rotor to eliminate seed breakage, and maintaining speed of the agitator to achieve proper and consistent filtration of seeds.

*The innovation was scouted by Dr Attar Singh of Krishi Vigyan Kendra, Haryana Agricultural University, Bhiwani.*



**Jagmal Singh**

Bhiwani, Haryana



**Ramesh K Nobhoria\***  
Chandigarh

## Sanjha Chulha

The innovator wanted to develop an effective, smokeless, and energy efficient stove that can handle solid biomass, adapt itself to versatile cooking needs and also achieve complete combustion.

Sturdily built in mild steel, with primary and secondary hot air flow for complete combustion, it has three sequential burning assemblies of different temperatures. It has minimal heat loss due to glass wool insulation and fire brick lining. With a heat exchanger, it has a 400W electric blower to feed hot air to the firing chamber for fast and complete combustion.

The unit has a chimney, to take away the flue gases, with an attached temperature gauge which helps indicate the need to fire more fuel in the firing box. This unit has a built in feature for placing chapatti/tandoor tawa inside the first chamber. With a separate ash pot in the fire box, the unit also works with different fuels such as biomass fuel briquettes, wool, coal etc.



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



## Potato Peeling Machine

In his native place, the gurudwaras have to peel large quantities of potatoes for the weekly “langar” (community lunch) for which the innovator decided to develop a motorized tool for reducing drudgery and increasing speed and precision.

Using locally available standard components, this ingenious device uses a standard drum into which the washed and soaked potatoes are loaded from the top. The rotation of the base of drum makes the potatoes come in contact with walls coated with textured sandpaper. The arrangement facilitates removal of the peels effectively. The peeled potatoes exit from the chute located at the side of the drum, which are then washed to remove any impurities.



**O P Garg**

Kurukshetra, Haryana





**Mahaveer Singh**  
Bhiwani, Haryana

## Kit for Hydraulic Lift System

The innovator noticed a common problem in the hydraulic pump system of most tractor based lifting systems. In existing hydraulic system for tractors, the pump runs continuously when the engine is running, even when it is not needed. This leads to loss of power and reduction in component and product life.

Without any modification to existing tractors, the innovator built a “on demand” kit, which is mounted using four screws between the hydraulic pump and driving gear. With this device, the user can disengage the hydraulic lift system when not needed and also engage it quickly and easily when required.



## 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*), “*bhang*” (*Cannabis sativa*), and “*kutki*” (*Picorrhiza kurroa*) etc.

The innovator has 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.



**Ishwar Singh Kundu**  
Kaithal, Haryana



**Yasmin Mirza\***  
**Prof. K. R. Aneja**  
**Dr. A.K. Punia**

*Kurukshetra, Haryana*

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

## A Cost Effective Laboratory-Scale Fermenter\*

The idea of developing a cost-effective laboratory scale fermenter came to their mind during the study of production of alkaline protease by a *Bacillus* species isolated from soil.

A laboratory scale fermenter is basically a vessel, which provides a controlled environment for the growth of microorganisms for obtaining a metabolic product of interest. Fermentation is mainly carried out in conical flasks, which are incubated in a shaker incubator. Unlike the laboratory scale fermenter, in this mini fermenter, glass bottles are used and any number of bottles can be used with a single motor. Also the need of shaker incubator is omitted in this set up since the air supply serves the purpose of aeration and agitation. Sparger (glass tube for air supply) is used which has a single big opening facing the bottom, the arrangement of which is considered to be the best as it doesn't get blocked by the growth of microorganisms. The drop in air pressure is also minimum. The mini-fermenter mimics large scale fermenters as it provides constant air supply.

Mini-fermenter set up requires only Rs. 500-600 and is reusable. It can be operated in batch and fed in batch mode. It can run for many days (10-15) without the risk of oxygen limitation or accumulation of waste gases. School and college laboratories can set up the mini-fermenter to study the principles of microbial fermentation.



## Improved Varieties of Chilli and Onion

An improved variety of chilli named Alakhpura selection has been developed, the seed quality of which is claimed to be very good with 95 per cent germination. The fruit size is 6-9 inches, and it is said to be somewhat hot and pungent with thick skin texture. The powdered dried chilli imparts bright red colour. This variety grows well in sandy loam soil and the innovator has sold it to farmers throughout Haryana.

The onion variety developed by the innovator is commonly known in the innovator's village and neighbouring area as "*Balwan Singh ka pyaj*". It can be stored for around one year and the germination capacity of its seeds is claimed to be 98 per cent.



**Balwan Singh**  
Bhiwani, Haryana

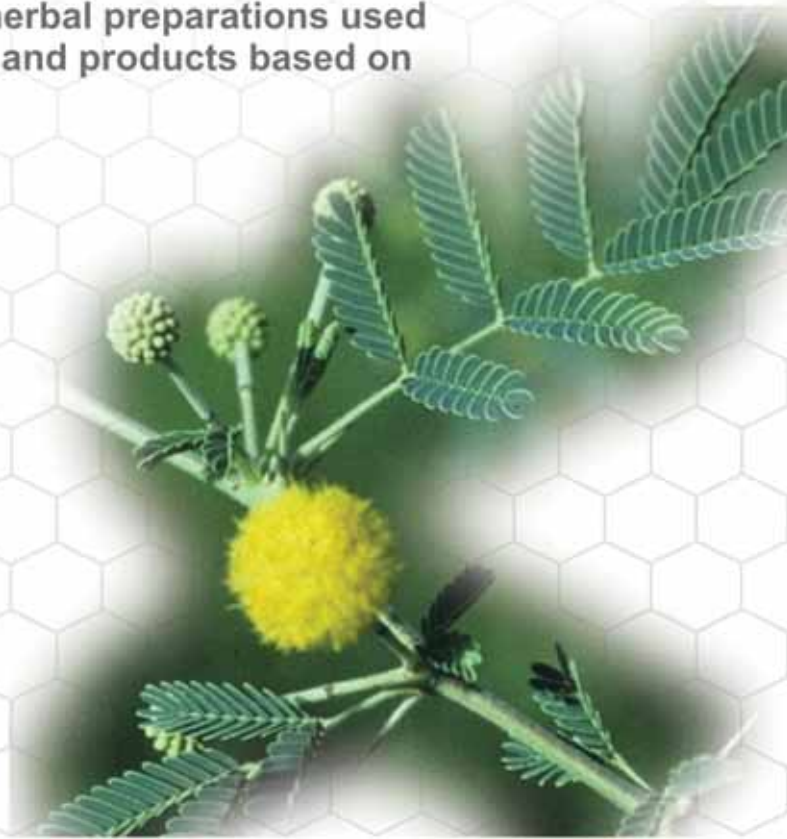




## PART II

# HERBAL PRACTICES & PRODUCTS

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



## *Acacia nilotica* (L.) Del. (Babul)

### NIF Database

#### Uses from Haryana

**Burn:** Bark of the plant (1 kg) and mustard oil (250g) are boiled in water (5 lt) till 1/5<sup>th</sup> of the decoction remains. It is then applied on the affected human parts.

- Jagdish, Hissar, Haryana

#### Uses from other states

**Mouth ulcer:** Bark of the plant is chewed for immediate relief

- Geeta Devi Kumavat, Jaipur, Rajasthan

**Dental care:** Bark is boiled in water and the decoction is used to gargle. This strengthens teeth and eliminates other dental problems

- Geeta Devi Kumavat, Jaipur, Rajasthan

**Pneumonia:** Bark (10 g) is boiled in water (50 ml) till the decoction becomes half of the original volume. It is given to the patient to drink after adding some sugar.

- Chen Singh Charan, Nagor, Rajasthan

**Diarrhoea:** Juice of the leaves is extracted and administered orally

- Omkarmal G Maur, Nagor, Rajasthan

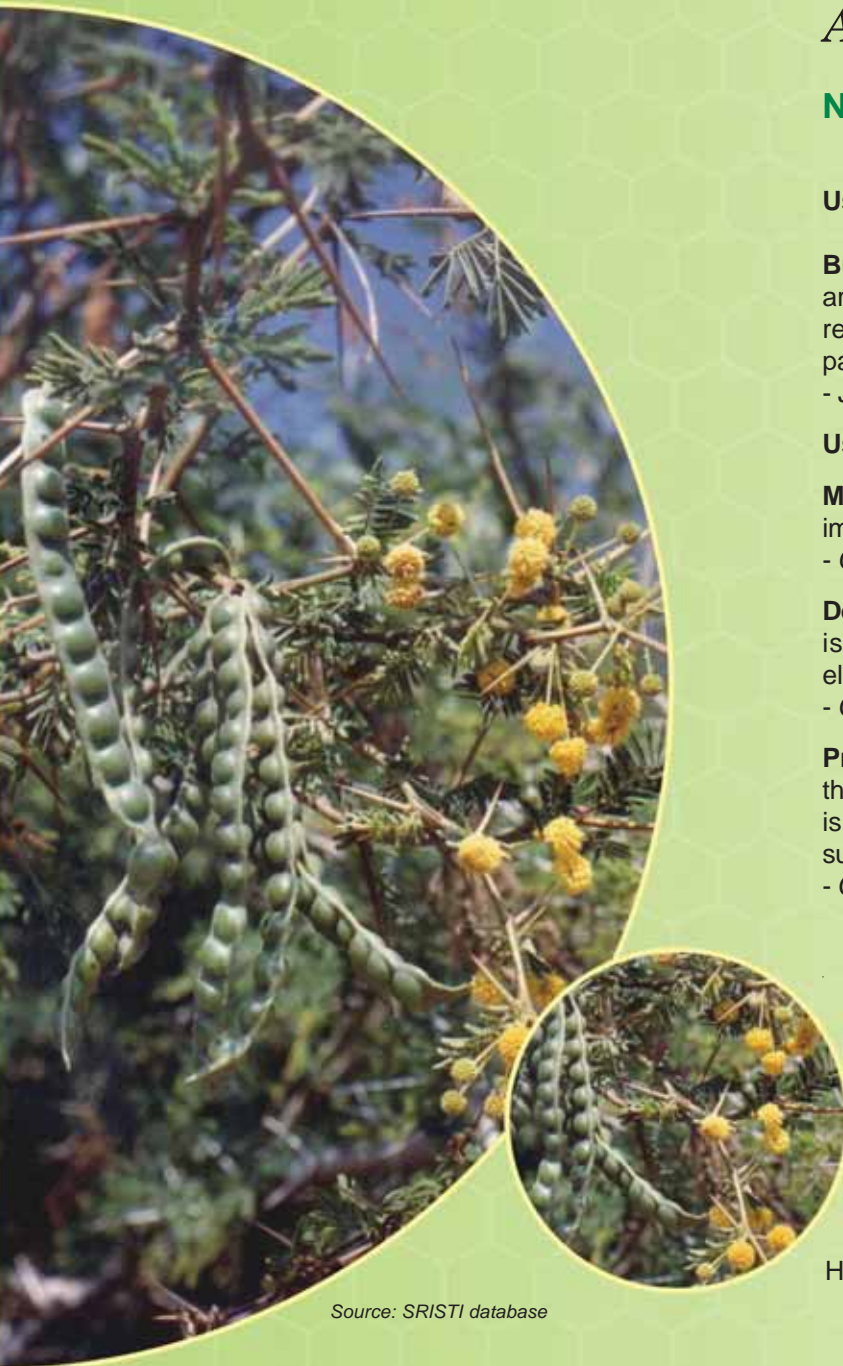
**Urine problem:** Equal amounts of bark and seeds are ground into a fine paste. One spoon of the paste is given with water

- Ganesh Das, Sirohi, Rajasthan

### Uses in Classical Codified Literature

Paste made from fresh leaves is applied on the forehead for headache<sup>1</sup>; decoction of the bark is gargled to give relief from sore throat<sup>2</sup>; decoction of the bark is consumed to cure bronchitis<sup>3</sup>; and dried bark powder is taken orally with water for diabetes<sup>4</sup>.

Toothpaste is prepared from *Acacia* under the brand name 'Dental cream'<sup>5</sup>. Thirty patents were found on its medicinal uses such as for dental plaque and gingivitis<sup>6</sup>.





## ***Boerhaavia diffusa* L. (Punarnava)**

### **NIF Database**

#### **Uses from Haryana**

**Stomach disorder:** Shade dried leaves along with twig of the plant are ground to make a fine powder. One spoon of the powder is taken with a pinch of rock salt and a spoon of butter  
- *Rajendra Singh, Jind, Haryana*

**Jaundice:** Juice extracted from the roots (20g) is given orally  
- *Sukhai Mali, Faridabad, Haryana*

#### **Uses from other states**

**Jaundice:** Juice extracted from the plant is given with honey and sugar candy  
- *Monika Kumari, Sitamarhi, Bihar*

**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*

**Kidney stone:** Milk boiled with roots is taken orally  
- *Monika Kumari, Sitamarhi, Bihar*

#### **Veterinary practice**

**Maggot wound:** Root is ground into a paste along with some limestone and applied topically  
- *Jeyapaul, Madurai, Tamil Nadu*

### **Uses in Classical Codified Literature**

Juice extracted from the leaves is given with milk to get relief from cataract<sup>7</sup>; decoction of the plant is given orally to purify blood<sup>8</sup>; the plant extract is used as diuretic<sup>9</sup>; and decoction of the leaves is applied externally in case of skin infections<sup>10</sup>.

'Liver-Kidney Care'<sup>11</sup> is made from this plant and works synergistically on the liver and kidney to heal and prevent infections in both the systems. Fourteen patents have been found on the medicinal uses of *Boerhaavia* for various diseases like liver disorders<sup>12</sup>, hypertension<sup>13</sup> etc.



Source: SRISTI database

## *Carica papaya* L. (Papita)

### NIF Database

#### Uses from Haryana

**Toothache:** Cotton dipped in the latex of the stem is kept on the aching tooth to get relief  
- *Mangeram Jani, Hissar, Haryana*

#### Uses from other states

**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*

**Kidney stone:** Roots (5g) are ground into a fine powder and taken with 50ml of water  
- *Mukesh Kumawat, Jaipur, Rajasthan*

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

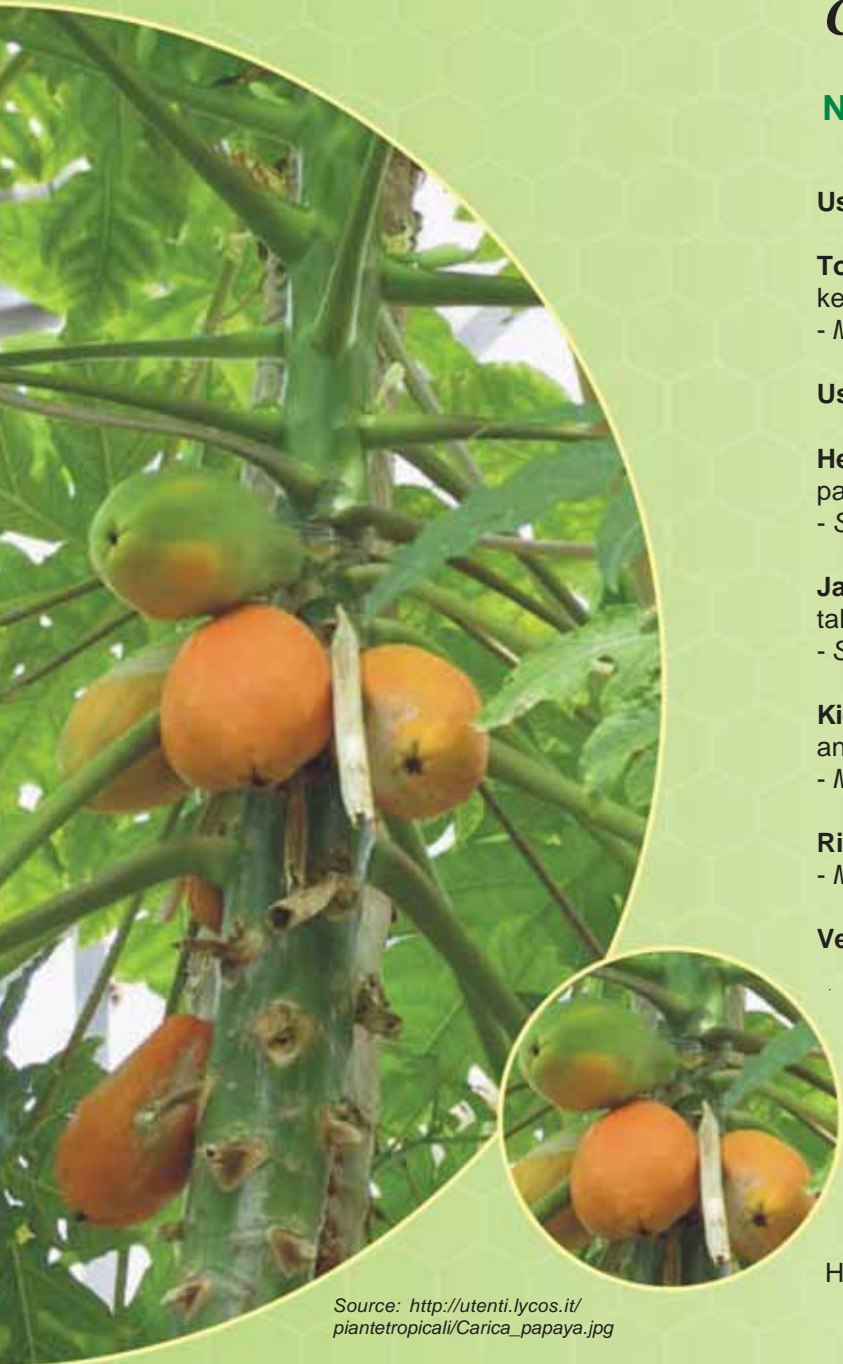
#### Veterinary practice

**Appetizer:** Fruit mixed with camphor is given to the animal for 15 days  
- *Ravi kumar, Chikmangalur, Karnataka*

### Uses in Classical Codified Literature

Decoction of the flower is used as cardi tonic<sup>14</sup>; bark powder is applied externally on wounds<sup>3</sup>; decoction of the bark is given orally to get rid of intestinal worms<sup>15</sup>; beverage of the fruit is taken orally to cure diarrhoea<sup>16</sup>.

Natural moisturisers and creams are prepared from *Carica* in combination with other plants<sup>17</sup>. Thirty patents have been found on its medicinal uses such as an antiallergic<sup>18</sup> and for the prevention of cancer<sup>19</sup>.



Source: [http://utenti.lycos.it/piantetropicali/Carica\\_papaya.jpg](http://utenti.lycos.it/piantetropicali/Carica_papaya.jpg)

## *Citrullus colocynthis* (L.) Schr. (Tumba)

### NIF Database

#### Uses from Haryana

**Stomach disorder:** Baked seeds are eaten to combat the disease

- Jagadish, Hissar, Haryana

**Joint pain:** Powder of baked seeds is taken with water

- Jagadish, Hissar, Haryana

#### Uses from other states

**Earache:** Equal amount of seeds of the plant and castor are fried in mustard oil till the mixture turns black. The concoction is then filtered and used as ear drops

- Chaturbhuj Kumhar, Jaipur, Rajasthan

**Cough:** Small pieces of the stem of the plant and the bulb of onion are fried in mustard oil, and taken orally along with some salt

- Ganga Devi, Chandava, Jharkhand

**Constipation:** Roots are chewed to get rid of constipation

- Chenaram Banjara, Nagor, Rajasthan

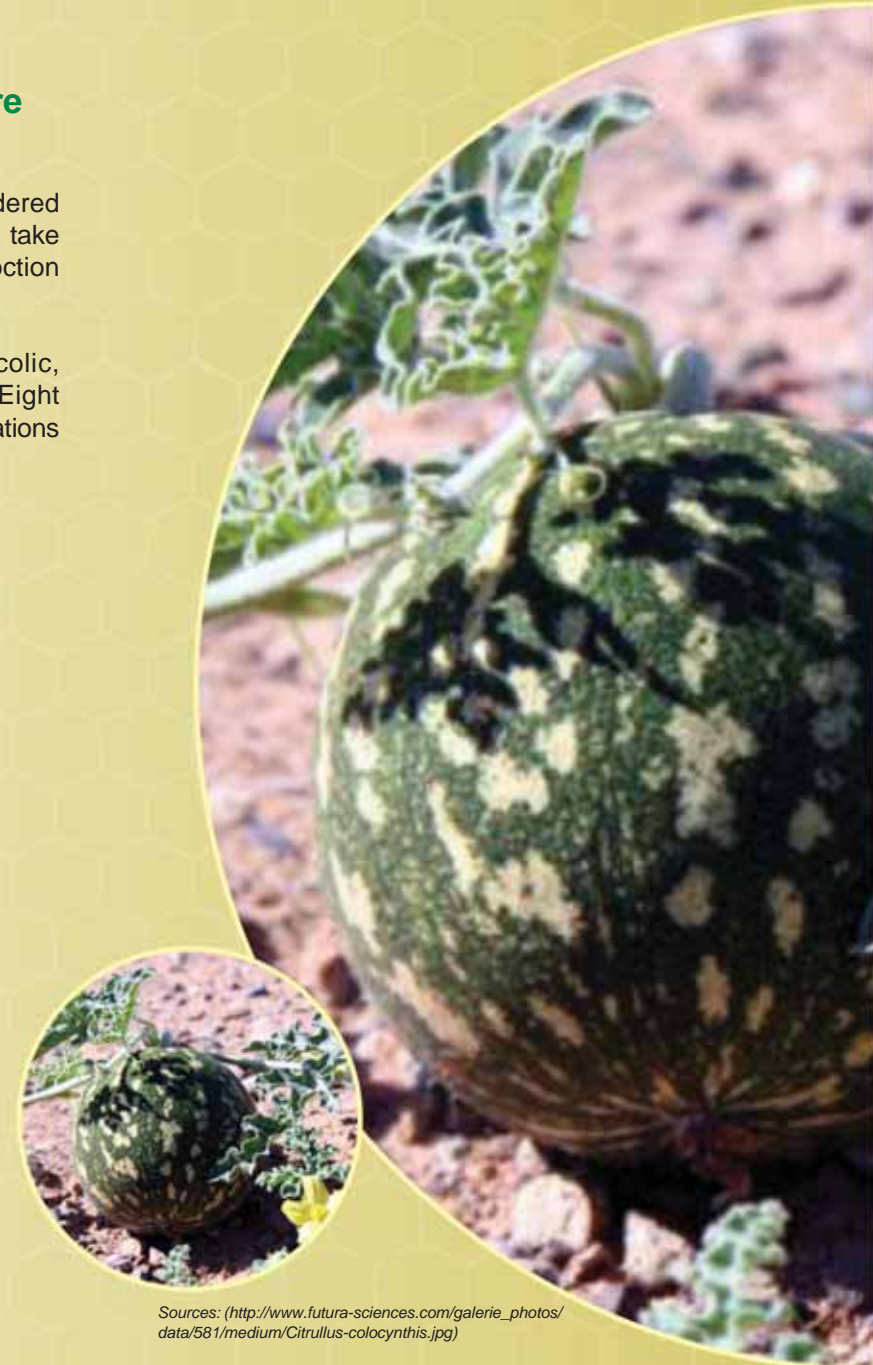
**Piles:** Fruit powder is mixed with fenugreek, thymol and salt and a spoon of this mixture is taken orally

- Durga Jethiwal, Nagor, Rajasthan

### Uses in Classical Codified Literature

Pounded fruits are used to cure boils<sup>20</sup>; powdered roots are given orally to cure jaundice<sup>2</sup>; diabetics take dried fruit powder orally with water<sup>21</sup>; and decoction of the fruit is used as diuretic<sup>22</sup>.

Plant tincture is used in homeopathy for colic, abdominal pain and other gastric upsets<sup>23</sup>. Eight patents have been found on its medicinal applications like for treating dental plaques and gingivitis<sup>6</sup>.



## *Jatropha curcas* L. (Ratanjyot)

### NIF Database

#### Uses from Haryana

**Eczema:** *Jatropha* oil (60g) and bee wax (30g) is heated at 60° celcius, then borax (1g) is added in water (10ml). All are mixed together and stirred slowly on simmer flame. The resultant ointment is applied on the infected area

- *Raghubir Agarwal, Hissar, Haryana*

#### Uses from other states

**Agnail:** Latex is applied on the infected part

- *Atilik Baruah, Sibsagar, Assam*

**Jaundice:** Juice extracted from leaves and bark is mixed with jaggery. One tea-spoonful of this mixture to be given

- *Dimbeswar Gogoi, Sibsagar, Assam*

**Thorn pain:** Latex of the plant is applied on the affected part

- *Madhav Shankar Rao Patil, Jalgaon, Maharashtra*

**Skin disease:** Paste made from leaves is applied topically

- *Madhav Shankar Rao Patil, Jalgaon, Maharashtra*

#### Veterinary practice

**Foot & mouth disease:** Seeds are ground with latex of *Calotropis gigantea* R.Br. and some edible oil. Paste obtained is then applied topically

- *Gandubhai, Dang, Gujarat*

### Uses in Classical Codified Literature

Bark powder is taken orally with water to get cured from pyorrhea<sup>24</sup>; the leaves are useful in ulcer<sup>2</sup>; young branches are warmed in fire and tied on the aching joint<sup>25</sup>; latex is applied on the burnt part<sup>26</sup>.

'*Jatropha* tincture'<sup>27</sup> is used as disinfectant, antiparasitic and anticoagulant. Thirteen patents have been found mainly on its medicinal uses such as for healing cuts, burns and wounds<sup>28</sup>



Source: NIF Database

## *Phyllanthus emblica* L. (Amla)

### NIF Database

#### Uses from Haryana

**Cough/cold:** Powder is prepared from fruits (4nos.) and *Glycyrrhiza glabra* L. (10g). 5g of this powder is taken with a glass of water

- Ved Prakash, Faridabad, Haryana

**General health:** Seeds are ground into a fine powder and cooked with ghee and sugar and small bolus (ladoos) prepared from it.

- Dharamveer, Yamunanagar, Haryana

#### Uses from other states

**Diabetes:** Dry fruits and seeds of *Syzygium cumini* (L.) Skeels are ground to make a fine paste. Pellets are prepared from the paste. This pellet is taken orally

- Prakash Kumar Mali, Sirohi, Rajasthan

**Jaundice:** Equal amounts of amla fruit, ginger, black pepper and turmeric are ground into a fine powder. One tea-spoonful of this powder is taken with honey

- Nagarmal Bagaria, Nagor, Rajasthan

**Wounds:** Pounded leaves are applied on wounds

- Sevaram Bhaskar, Dhamtari, Chhattisgarh

#### Veterinary practice

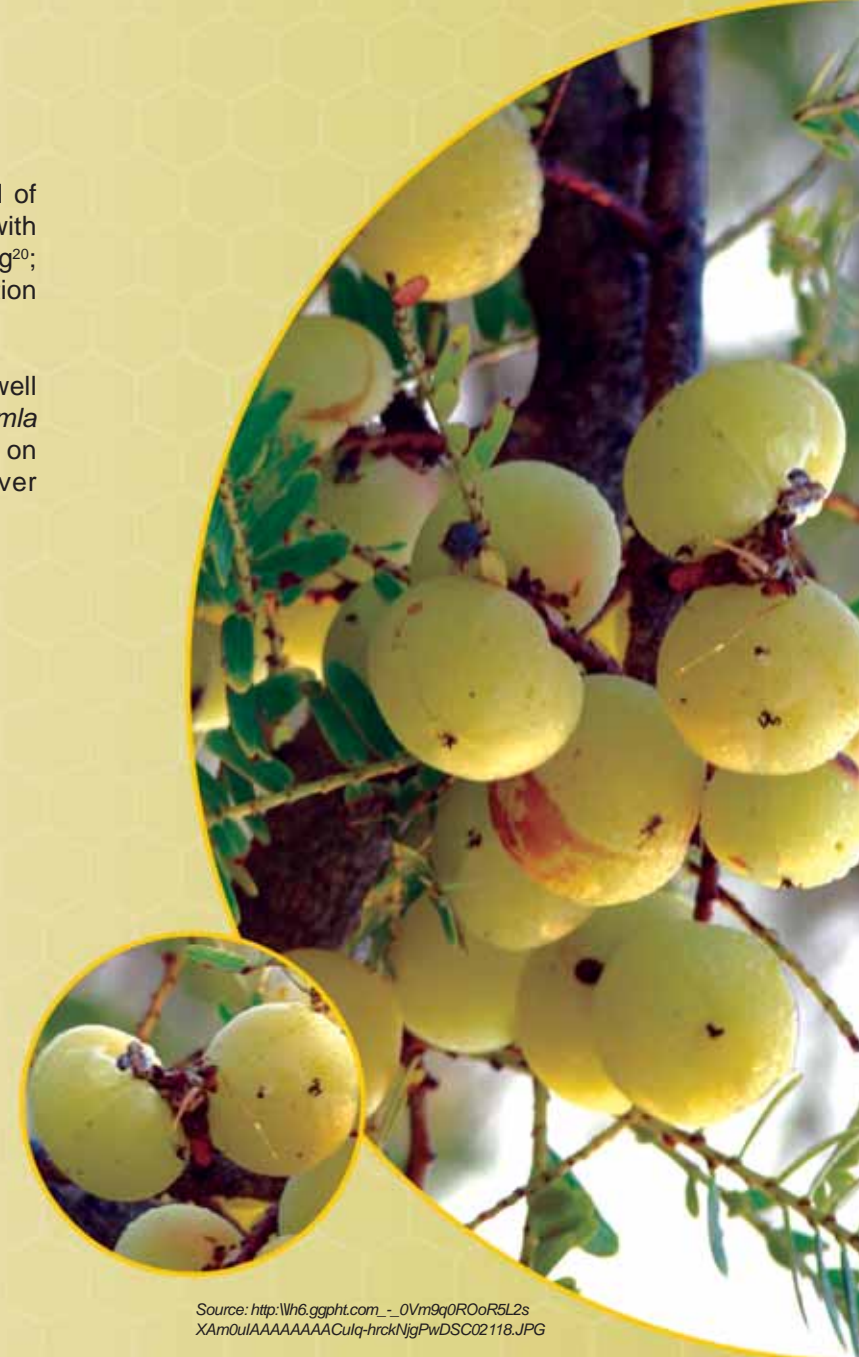
**Swelling of throat:** Ground equal amount of fruits of the plant and the bark of *Jasminum sambac* (L.) Ait. and take it orally with water

-Ramdas, Dang, Gujarat

### Uses in Classical Codified Literature

Pulp (2-3g) is eaten with warm milk to get rid of headache<sup>29</sup>; powder of cotyledons, after mixing with ghee, is applied on the head to stop nasal bleeding<sup>20</sup>; fruits are taken orally to reduce acidity<sup>30</sup>; decoction of the fruit is taken to increase blood count<sup>31</sup>.

*Phyllanthus* is one of the main ingredients of well known medicine 'Triphala, Chavanprash and *Amla* hair oil' <sup>5</sup>. Seventy six patents have been found on its medicinal uses such as for diabetes<sup>32</sup>, liver disorders and immune deficiencies<sup>33</sup>.



## *Solanum nigrum* L. (Makoi)

### NIF Database

#### Uses from Haryana

**Stomachache:** Leaves of *makoi* (200g) are fried in mustard oil (20ml), and taken with little salt  
- *Sukhai mali, Faridabad, Haryana*

#### Uses from other states

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

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

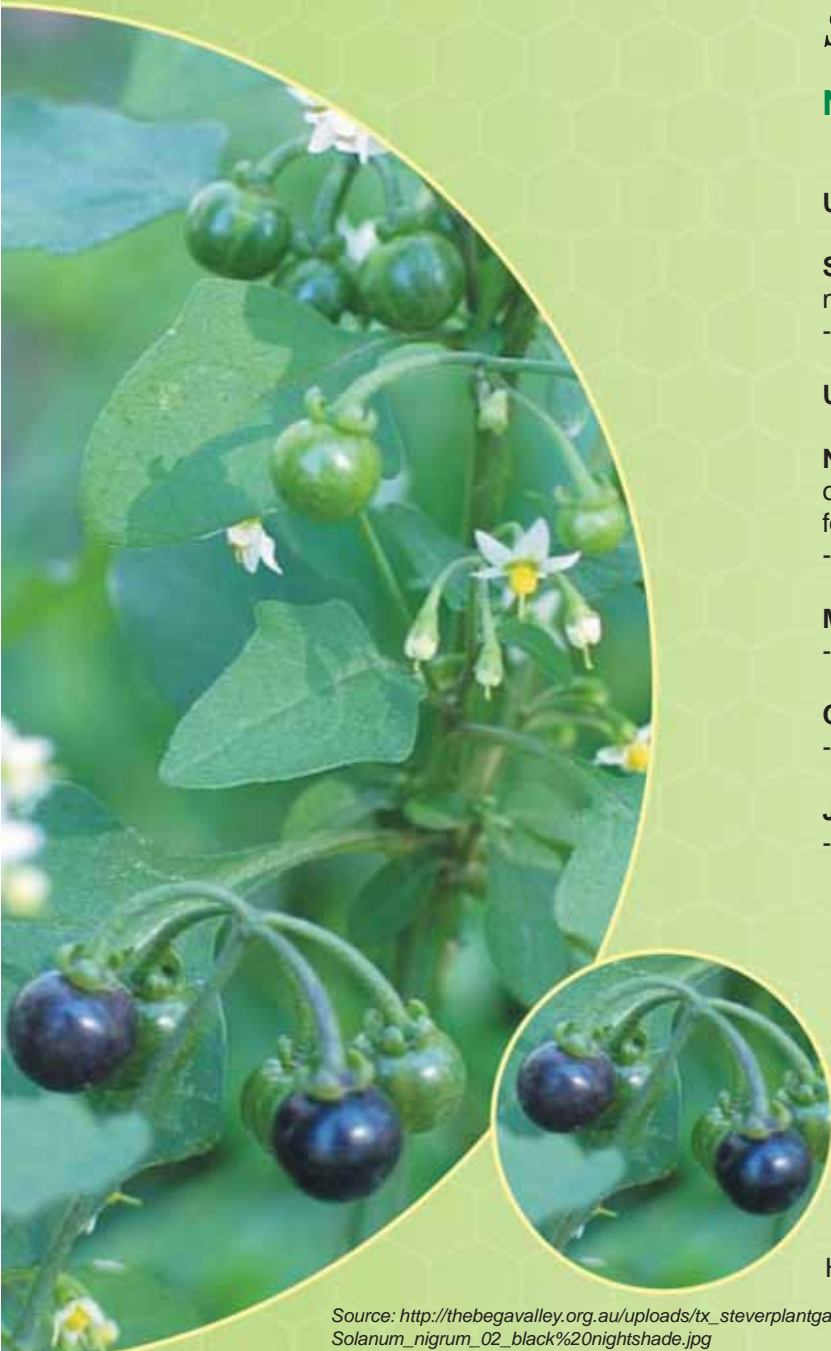
**Cough:** Juice extracted from roots is taken orally  
- *Priyanka Kumari, Gopalganj, Bihar*

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

### Uses in Classical Codified Literature

Powdered fruit is given orally to reduce fever<sup>25</sup>; juice extracted from the whole plant is applied externally on the burnt part<sup>34</sup>; poultice of the plant is used for knee pain<sup>35</sup>; and fruits are ground and taken orally to cure diarrhoea<sup>25</sup>.

'Herbolax'<sup>5</sup>, made from *Solanum* along with other plants, is used as a gentle laxative, in constipation and for electrolyte balance. Ninety patents have been found on its medicinal uses mainly on hepatitis<sup>36, 37</sup>.



## *Strychnos nux-vomica* L. (Kuchla)

### NIF Database

#### Uses from Haryana

**Diabetes:** Dried plant is powdered and one spoonful of the powder is taken orally with water  
- Patel Singh, Hissar, Haryana

#### Uses from other states

**Eczema:** Plant is boiled in oil extracted from *Calophyllum inophyllum* L. and applied on the infected part  
- P Gopalkrishnan Nair, Thiruvananthapuram, Kerala

**Rheumatism:** Juice is extracted from the root bark. Vine of *Aristolochia indica* L. (10g) and mustard seeds (5g) are ground and added to 210ml of this juice. This mixture is applied on the aching joints  
- Murugesan, Tirunelveli, Tamil Nadu

**Insect bites:** Stem bark of the plant is ground with the roots of *Pongamia pinnata* (L.) Pierre and ripened fruits of *Tamarindus indica* L. in equal amounts and made into a fine paste. Pellets are prepared from this paste and one pellet is taken daily  
- Pongavanam. K, Dindigul, Tamil Nadu

#### Veterinary practice

**Bloat:** Triturate the tender leaves and fruits of bitter cucumber to extract juice, mix with buttermilk and take orally  
-Jevayaben, Dang, Gujarat

### Uses in Classical Codified Literature

The roots are used to cure fever<sup>3</sup>; dried seeds of the plant are used for indigestion<sup>38</sup>; the root bark is ground with turmeric and applied externally on dropsy<sup>3</sup>; the stem bark is roasted on fire, powdered and made into a paste with ghee and applied externally on cuts and wounds<sup>39</sup>.

*Nux-vomica* is a common homeopathic remedy for indigestion, vomiting, diarrhea, cramps, constipation, colds, and headache<sup>40</sup>. Twenty one patents have been found on the medicinal uses of *Strychnos* such as for joint pains<sup>41</sup> and viral diseases<sup>42</sup>.



## *Tinospora cordifolia* (L.) Merr. (Giloy)

### NIF Database

#### Uses from Haryana

**Diabetes:** Powder of the leaves (¼ spoon) is taken regularly

- Patel Singh, Hissar, Haryana

#### 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 is applied on the forehead

- Stedimon Arackal Paul, Port Blair, Andaman & Nicobar Island

**Chronic fever:** Whole plant (50g) and leaves of *Ocimum sanctum* L. (11 nos.) are soaked overnight and pounded together the next morning and taken with honey or sugar candy

- Jagjit Bahadur, Sitapur, Uttar Pradesh

**Jaundice:** Juice of the plant and radish is extracted and taken orally

- Jagjit Bahadur, Sitapur, Uttar Pradesh

**Rheumatism:** Plant (25g), dry ginger (5g) and sesame oil (5g) are soaked in water overnight. The next morning the mixture is filtered and taken orally

- Jagjit Bahadur, Sitapur, Uttar Pradesh

#### Veterinary practice

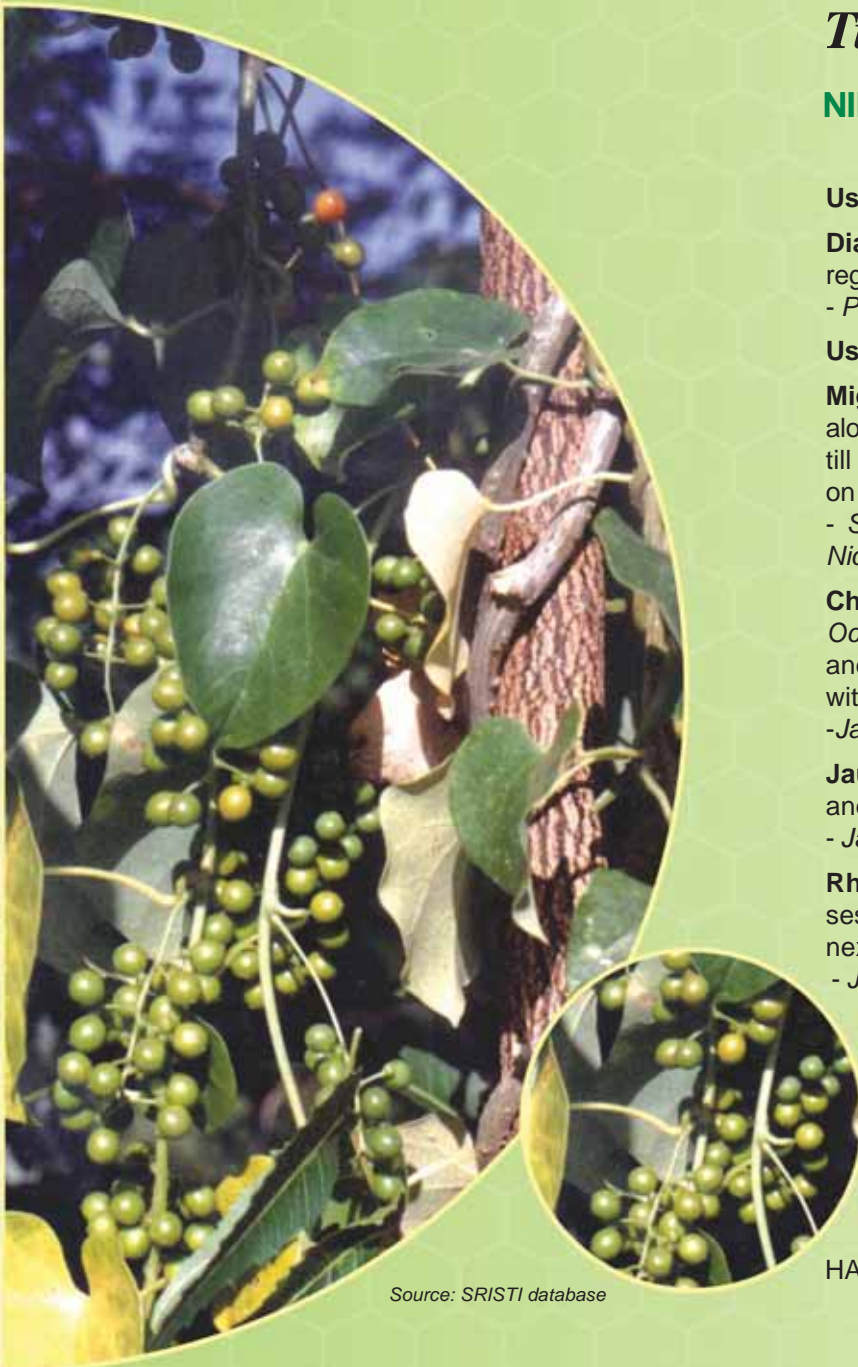
**Anestrous:** Plant, along with bark of *Cassia fistula* L. and leaves of *Artocarpus heterophyllus* Lam., is ground and taken orally

- Honnegowda, Bengaluru rural, Karnataka

### Uses in Classical Codified Literature

Powdered roots are taken for mouth ulcer<sup>43</sup>; powdered plant is administered orally with honey to get relief from stomach disorder<sup>44</sup>; the stem is bitter and used as an anthelmintic<sup>2</sup>; and the decoction of the plant is given orally to cure diarrhoea<sup>45</sup>.

*Tinospora* is a well known medicinal plant and used to cure a number of diseases in combination with other plants under the brand names 'Geriforte, Diabecon<sup>5</sup>' etc. More than hundred patents have been found on its medicinal application such as an antiallergic<sup>46</sup>, and for cancer<sup>47</sup> etc.



Source: SRISTI database



## *Vernonia cinerea* (L.) Less. (Sahdevi)

### NIF Database

#### Uses from Haryana

**Vomiting/loose motion:** The plant is soaked in water intermittently stirred. The mixture is then filtered and 2 tablespoons are taken orally at an interval of 15-20 minutes 5-6 times

- Chandiram, Bhiwani, Haryana

#### Uses from other states

**Nervous disorder:** Equal amounts of leaves of the plant and *Solanum torvum* Sw. are ground and one spoon of the paste is taken

- Latuma Nagounder, Trichi, Tamil Nadu

**Headache:** The plant (10g) is ground with an equal amount of garlic and boiled in coconut oil (100ml) till 1/4<sup>th</sup> of the solution remains. It is then filtered and camphor (10g) powder is added. This oil is then topically applied on the aching part

- Anvy Moly Tom, Wayanad, Kerala

**Diabetes:** Roots (10g) are ground into a fine paste and given to the patient with sugar candy (10g)

- Pavan Mehra, Sikar, Rajasthan

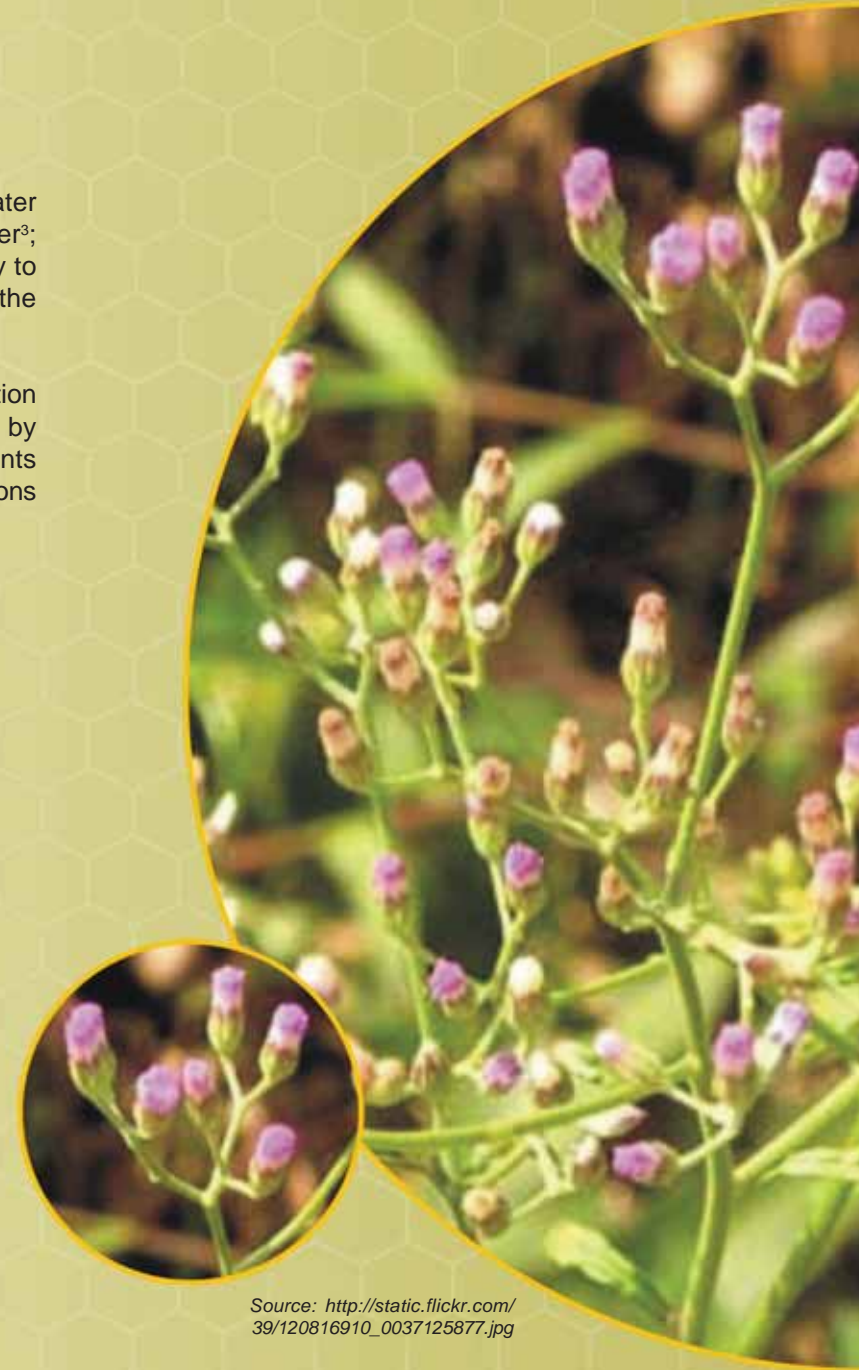
**Psoriasis:** Seeds (5g) are eaten with warm water

- K.L.Lakshmana Shetty, South Kanara, Karnataka

### Uses in Classical Codified Literature

Powder of dried flowers is consumed with hot water for conjunctivitis<sup>48</sup>; the whole plant is used for fever<sup>3</sup>; decoction of the dried aerial parts is given orally to keep blood pressure normal<sup>49</sup>; and decoction of the plant is administered orally to cure jaundice<sup>50</sup>.

'Cystone'<sup>5</sup> is prepared from *Vernonia* in combination of other plants, which inhibits calculogenesis by reducing stone-forming substances. Five patents have been found on its various medicinal applications such as for stimulating hair growth<sup>51</sup>.



## *Ziziphus mauritiana* Lamk. (Bor)

### NIF Database

#### Uses from Haryana

**Hair Care:** Fresh leaves (100-150g) are boiled in one litre of water. The mixture is cooled and used to wash hair. It is beneficial for hair loss, grey hair and helps to strengthen the hair

- *Baba Anantanand, Hissar, Haryana*

#### Veterinary practice

**Lactagogue:** Dry leaves are ground and the powder is given with cattle feed

- *Baba Anantanand, Hissar, Haryana*

#### Uses from other states

**Acne:** Paste is prepared from the leaves and applied topically

- *Ajay Kumar Jena, Balasore, Orissa*

**Indigestion:** The roots are ground into a fine paste and one spoonful taken orally

- *Madhusuda Munda, Keonjhar, Orissa*

**Jaundice:** Ground three terminal buds of the plant, *Psidium guajava* L. and *Punica granatum* L. each and three small tablets are prepared. One tablet is given to the patient thrice a day

- *Nirman Barman, Bongaigaon, Assam*

**Rheumatism:** The leaves and roots of the plant are ground along with the roots of *Cassia auriculata* L.; the paste is applied topically on the aching part

- *Jivanbhai Bhanjibhai Jagarana, Bhabnagar, Gujarat*

### Uses in Classical Codified Literature

Pounded leaves are applied on boils<sup>24</sup>; powdered leaves are taken to reduce blood sugar<sup>20</sup>; decoction of the plant administered orally acts as diuretic<sup>52</sup>; and powder of dried fruit is given orally with water to cure diarrhoea<sup>53</sup>.

'Dhanwantharam oil<sup>54</sup>', prepared from *Ziziphus* along with other plants, is used for rejuvenating body and skin care. More than ten patents have been found on its medicinal applications mainly for treating cancer and tumorous growth<sup>55</sup>.



## 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 as well as human being. 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 its 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 is spread in the field. Some times it is released in field with the flow of irrigation water. In some cases it is also drenched in the affected part of the plant as well as 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 contents 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 reduce the toxic contamination in our food and environment.

\* These formulations are based on traditional knowledge of farmers and developed by Sadbhav-SRISTI Sanshodhan Laboratory ([www.sristi.org](http://www.sristi.org)). This product is 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.



## Herbal Formulations for Livestocks and Poultry\*



### Coccicure\*

*Sudakarbhai K. Gaudi & Jeevalbhai M. Gaudi, 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.



### Poulmax\*

*Community knowledge, Valsad, Dang, Gujarat*

It is a unique herbal medication for promoting poultry immunity. It cures symptoms like greenish diarrhea, 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 & 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 & 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 3 days after adequate standardization.



*\*These formulations are based on traditional knowledge of farmers and developed by Sadbhav-SRISTI Sanshodhan Laboratory ([www.sristi.org](http://www.sristi.org)). This product is 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.*

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## PART II : HERBAL PRACTICES & PRODUCTS

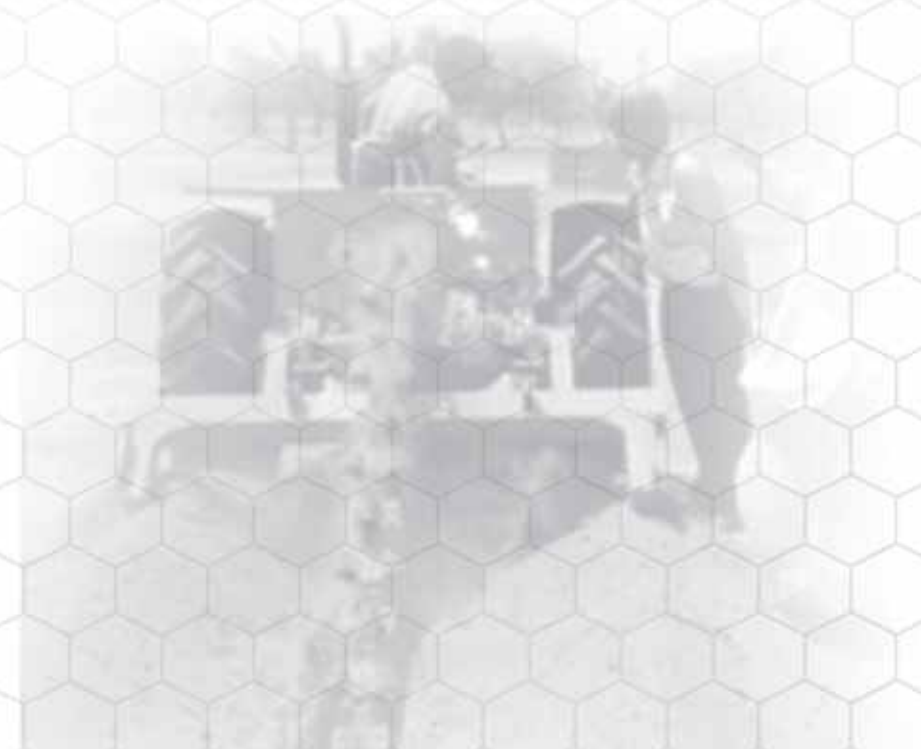
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## PART III

# INNOVATIONS

## for HARYANA

This section contains details of national innovations which are deemed suitable for introduction in Haryana





**Arvindbhai Patel**  
Gujarat

## Auto air kick pump & the natural water cooler

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.

**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!



## Fruit harvesting device

Farmers all over India need a simple device that can reach tall branches of trees to cut and harvest thousands of fruits per day. This innovative device with unique shape and cutting action can be used to harvest fruits quickly, saving time and increasing output.

The novelty lies in the design of replaceable cutting blades and hooking angle given to the oval shaped ring that assists in harvesting the fruits on upright branches. It is light weight, durable and suitable for harvesting fruits like mango, safota, guava, orange, etc.



02



**Madhav Mahajan**

Maharashtra

**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.

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



## Multi purpose wood-working machine

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.



**Ghonakanta Gogoi**  
Assam



**A. Muruganandam**

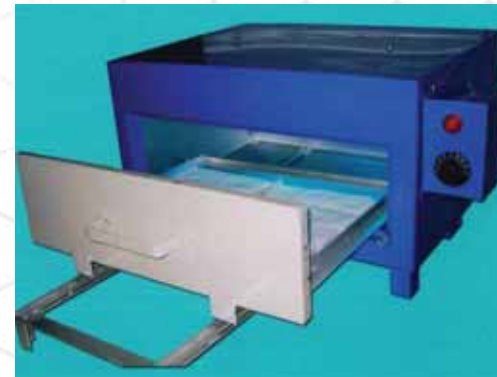
Tamil Nadu

## 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.



## Garlic peeling & lemon cutting machine

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, and has 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 size. It can be operated by one person and cuts lemon into eight equal pieces. The innovator has been able to run a good business with the financial support of Micro Venture Innovation Fund and marketing effort of NIF.



**M. Nagrajan**

Tamil Nadu





**Raghav Gowda**  
Karnataka

## 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.



## Power generation through sewage

There is a search going around the world for solutions that harness alternate energy sources to generate electricity. The innovator has developed a system that generates energy from slow moving sewage or any other source of flowing water.

In this arrangement, electricity is generated when the slow moving sewage/water is passed through a cylindrical drum. The helical blades inside the drum rotate it and generate power. The capacity of the existing pilot unit is 30 kVA. This technology can have a tremendous impact on the generation of power from low velocity, high volume discharge of effluents from industries and civil sewage processing plants. NIF has been actively following up with national and international entities for partnership in taking this innovation forward. NIF has also filed a patent for the technology in the innovator's name. Public agencies such as municipal authorities can particularly help in testing its utility.



**K. Balakrishna**

Karnataka





**Chinder Singh**

Uddhamsingh Nagar,  
Uttaranchal

## Multicrop combine unit

Harvesting of wheat and collection of chaff for feeding the animals is a time consuming process. The existing combines are fitted to tractors and need separate units to be fitted for harvesting of wheat and then for cutting of straw. Few farmers have the dual tractor-combine units and most small farmers have to wait for combine units to be available and pay necessary hire charges.

The innovator has developed a dedicated single unit which, can simultaneously do both harvesting of wheat and generating the straw and depositing them in two separate tanks on either side. The machine also cleans grains, pulses and oilseed crops without breakage.

Using an Ashok Leyland engine, with a compact footprint, it is a versatile option that can maneuver in tight zones with narrow plant interspacing. The machine can harvest wheat at the rate of one acre per hour.





## Ten-in-one agricultural implement

Lack of workers to help him in his fields led Gurcharan to think about a multi-functioning machine that would help him save energy and work more efficiently. First he made a standard structure of his envisioned machine and used it for basic tasks like chaff cutting and paddy threshing. After he got comfortable using his machine, he started increasing its functionality by modifying it to perform other tasks too.

The machine carries out ten different farming chores viz. water pumping, chaff cutting, electricity generation, sharpening/grinding tools, sawing/wood cutting, coconut peeling, winnowing, paddy threshing, groundnut threshing and soft chaff/grass cutting. The machine, which is no bigger than a standard bicycle, has a frame consisting of a hand crank, chain and sprocket drive and a pair of belt and pulley. It can be operated by hand or foot (Also see Honey Bee, 17(3): 5 & 19, 2006).



**Guru Charan Pradhan\***  
Sundargarh, Orissa

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



**Kishanlal Jangid**  
Sikar, Rajasthan

## Safe wood cutting machine

Carpenters work intensely on their job using powered equipment and sometimes get too close to the cutting blades while holding the log firmly and feeding them. This opens the chance for accidents as well as related occupational hazards due to inhalation of the fine dust, chips and woodflakes.

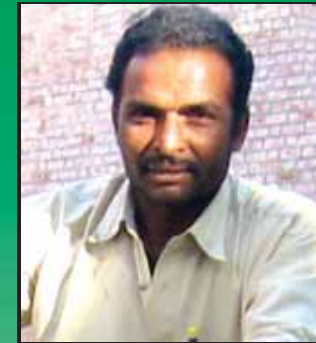
The innovator has developed an improved machine to address these concerns. The machine uses a 2HP motor, transmission system, rotating platform, and saw blade with a simple elegant construction. It consists of a moving platform to feed the job, while being able to fix and cut the job in any orientation. It also has facilities to mount multiple fixtures using an inbuilt scale for measurement and productivity enhancement.



## Bullet santi

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'.



**Mr. Mansukh Bhai Jagani**

Amreli, Gujarat





**Gopalbhai Suratia,**  
Vadodara, Gujarat

## Hand driven sprayer

This innovator, a farmer by profession, has designed and built a sprayer based on a novel idea. The innovativeness of the design lies in harnessing the power generated by the motion of bicycle wheels on the ground to drive the piston of the sprayer.

Some of the features of this model include a customized barrel for storing pesticides, ability to adjust the nozzle distance and the height of the spray boom as per the orientation of the crop, and ease of maintenance and repairs. The unit can spray an acre of land in 6 hours of operation



## Trench digging machine

While on a trip, the innovators noticed laborers manually digging the ground to make long trenches to lay telephone cables, taking months to complete the work. This inspired the innovators to build a mechanized equipment to dig trenches rapidly.

The trench digging unit developed by the innovators can be fitted to any tractor. The modified unit has a hydraulic lever to adjust digging depth and to maneuver the running unit, a planetary gear system and motion converter unit to achieve speed reduction and deliver power from the tractor. The compact machine can dig narrow and deep channels evenly, on hard and soft soil conditions. In one hour, it can dig 65 meters long, 5 feet deep and 14 inches wide pit, while consuming only 2.5 liters of diesel per hour. The equipment costs less than half that of imported models. It is even used by the local telephone department to lay cables.



**Radhey Shyam Tailor**  
**Nathulal Jangid**  
**Yusuf Khan**

Sikar, Rajasthan





**Yusuf Khan**

Sikar, Rajasthan

## Groundnut digging machine

Rajasthan has predominantly sandy soil. Groundnut cultivation is affected during harvest, as upto 20% of the pods are left underground. Complete digging out of all the groundnut pods from the soil is not possible as manual labor is scarce, costly and other means are not available.

The innovator has revolutionized groundnut digging with this sturdy rugged desert unit which is retrofitted on a standard 35HP tractor. As the tractor moves forward, the vanes at the bottom of this unit rotate, digging and scooping out the soil-groundnut mixture and dropping them into a vibrating storage bin. The bin has fine sieves at the bottom which lets out the soil while trapping the individual groundnut pods on the top. The hatch at the back of the unit is used to take out the groundnuts.

The unit consumes four litres of diesel per hour and completes digging out groundnuts from a hectare of field in one day. The unit can run on uneven terrain and can also be used to sift out small stones, solid residue and garbage from fields and country roads.



The innovator has been supported under the '*Micro Venture Innovation Fund*' of NIF for commercialising his innovation. In 2006, the technology was licensed to a Vizag based company called Ardee Hi-Tech Pvt. Ltd. This license was targeted for its application as a sea beach cleaner.

## Check dam and Dual purpose tractor

The innovator lives in an arid region, prone to water scarcity. This inspired him to build a dam that could be built on site using local materials, unskilled labour, and at minimal cost.

His path breaking innovation consists of a modular check dam built using the arch shaped bunds in sequence. The innovator was inspired by the strength and durability of arches used vertically in constructing bridges. He used locally available materials such as stones, river sand and deployed one mason and four labourers to build the dam. The low cost dam was built in 4 days and at a total cost of Rs 10,000. This dam has made the area a green haven.

His next major innovation, developed over 15 years was a compact yet powerful 10HP “convertible” tractor. The front axle is designed facilitating its deployment as a “three wheeler” at low speed for farming operations and a “four wheeler” at higher speeds for transporting goods to the market. The tractor is built with an adjustable wheel base for various inter-culturing operations, thereby enabling the farmer to repair the unit with minimal effort or skills.



**Bhanjibhai Mathukia**  
Junagadh, Gujarat





**Madanlal Kumawat**  
Danta, Rajasthan

## Improved multicrop thresher

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 thresher 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 provided working capital for his enterprise from the Micro Venture Innovation Fund of NIF. More than a hundred farmers have bought his thresher.





## '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.

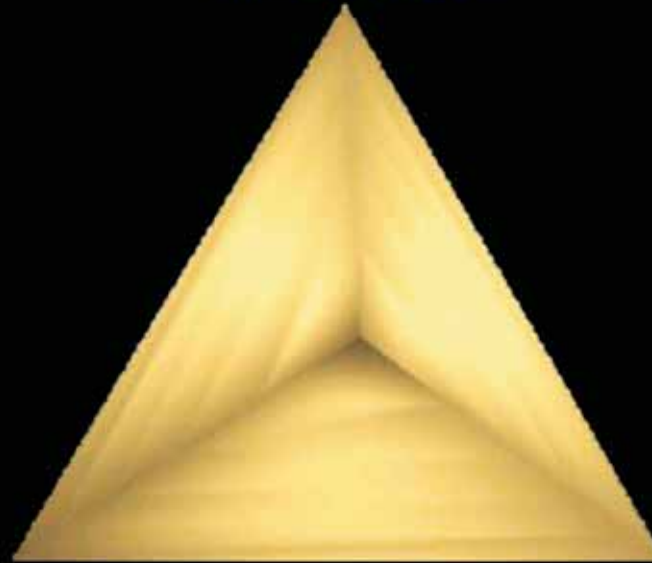
"Kudrat 9", an improved wheat variety, developed by him using simple method of selection is quite popular among the farmers in different parts of Uttar Pradesh, Madhya Pradesh, Chattisgarh, Maharashtra, Rajasthan, Gujarat and some parts of Bihar, Haryana and Punjab. This variety bears large number of 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.



**Prakash Singh  
Raghuvanshi**

Varanasi, Uttar Pradesh

Innovation



Investment

Enterprise



**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](mailto:honeybee@sristi.org)  
[www.sristi.org/honeybee.html](http://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](http://www.nifindia.org)