

PART III

INNOVATIONS for ARUNACHAL PRADESH

This section contains details of national innovations, which are deemed suitable for introduction in Arunachal Pradesh





Karuna Kant Nath
Assam

Manual wood cutting

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

This equipment consumes lesser time and labour compared to available saws and has a mechanism and linkages similar to manually operated sewing machine. The work of three labourers can be done by one labour using this machine. The innovator has also developed a multi bobin *charkha* and a bamboo cross cutter. He has been supported under the *MVIF* scheme of NIF and has been doing modest business in the area.

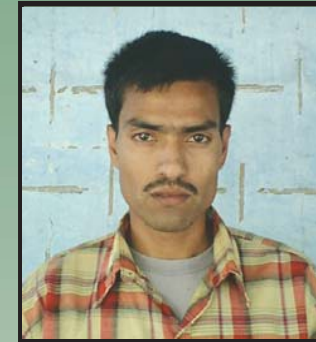
Karuna was awarded during the Third National Competition of NIF.



Egg incubator

Eggs need controlled heat and humidity to incubate properly. The innovator has developed an incubator, which is made up of plywood lined with thermocol. The unit is divided into two chambers. It can be heated by electric light as well as the kerosene lamp. The kerosene lamp is used in case of power failure. There is a regulator to control the intensity of the light.

NIF has facilitated the marketing of a few units in the surrounding area and to DRDA, Sibsagar along with one unit to a NGO in Manipur. The innovator has also been supported under the *MVIF* scheme.



Milonjyoti Das
Assam



Nasim Ahmed
Assam

Bamboo polishing machine

Nasim has developed a machine that polishes bamboo sticks used for making bamboo curtains and mats. The bamboo sticks are rubbed mechanically for smoothing. It can polish 100 kg of bamboo sticks at a time within 90 minutes. It reduces labour cost many folds. Only one labour is required for running the machine and adjusting the bamboo sticks.



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. Muruganantham
Tamil Nadu

Sanitary napkin making machine: An option for women entrepreneurship

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.

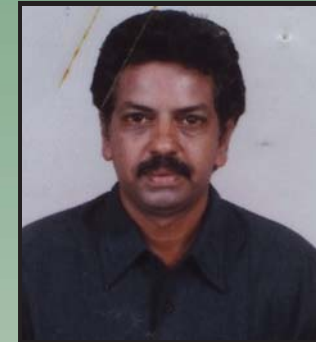
The innovator prefers to sell the napkin making machinery only to self-help groups of women. He has also designed a napkin vending machine such that one can put a coin and get a pad. With the support from the *Micro Venture Innovation Fund* scheme of NIF, the innovator has been able to install over fifty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



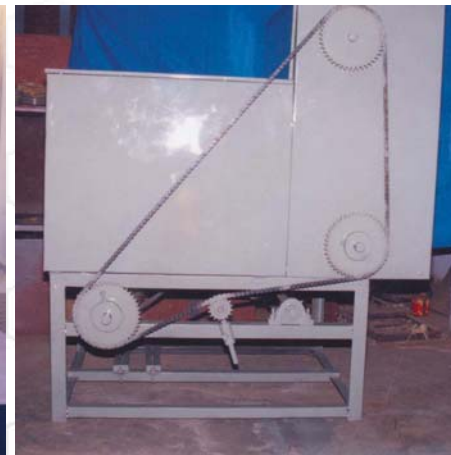
Garlic peeling and lemon cutting machine

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 MVIF and marketing effort of NIF.



M. Nagarajan
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. The product 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.



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.



N Sakthimainthan
Tamil Nadu





Dharamveer
Haryana

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 even in the fields, 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 . One unit has been sent to Kenya on a pilot basis for application feasibility study in the country. Once the feasibility is confirmed, a contract order from the country is expected for more number of units.



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.



Prem Singh Saini
Haryana





Sandeep Kumar
Bihar

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!



Power generation through sewage / slow moving water

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 achieves energy generation from slow moving sewage or any other source of water.

In this arrangement, electricity is generated when the slow moving sewage / water is passed through a cylindrical drum. The helical blades inside the cylindrical drum provide desired efficiency to the system in generating 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 this innovation.



K. Balakrishna
Karnataka





**Sheikh Jahangir Sheikh
Usman**
Maharashtra

Two-wheeler based spray painting device

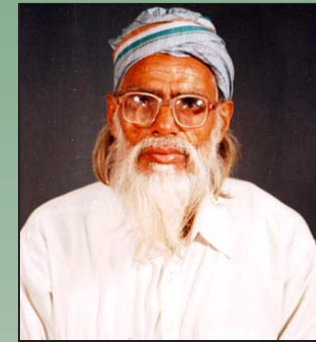
The innovation is a painting device that can be easily mounted on a two-wheeler scooter and carried to a customer's place. Deriving power from the two-wheeler's engine to run the compressor, this device lends flexibility of usage to the painter. This innovation won Sheikh Jahangir, a consolation prize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



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.



Mohammad Saidullah
Bihar





Imli Toshi Namu
Nagaland

Hydro generator using bamboo composite

Energy generation and pumping water for irrigation is a widespread rural need.

The innovator has used the bamboo powder, a by-product from the bamboo lathe machine invented by him, and mixed it with a resin to create a strong composite to fabricate the lightweight hydro turbine for generation of energy.



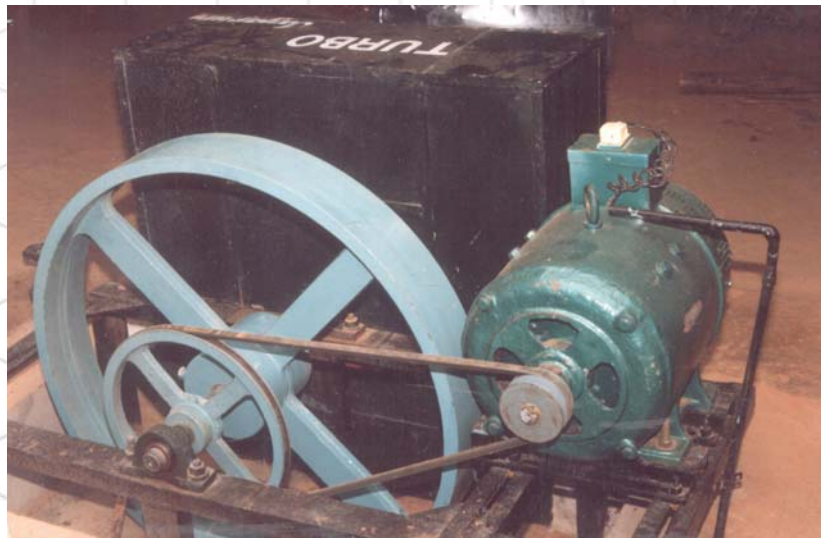
Modified hydro electricity turbine

Electricity supply in the hills is always a problem with either the difficulty of access or distribution or disruption.

Hydro electric turbine is specifically designed for the hills. It costs Rs.30,000 and meets the individual electric needs of a rural household. The innovator has installed a few of these turbines in the hilly villages of Karnataka.



G. K. Ratnakar
Karnataka





Dilip Bhagabati
Assam

Monkey trap

Sometimes monkeys destroy the crops, kitchen garden and even the grocery of kitchen. To get rid of this, the innovator has developed a trap. The naughty monkey can be trapped and released in the dense forest.



Biomass gasification system

There are lots of villages in the country which are still not electrified or are receiving power erratically. Crude oil is not a very likely solution as it is depleting and the price is also going higher day by day. Use of biomass as a fuel therefore appears to be a good solution!

People using the biomass gas (producer gas) as a fuel generally complains of choking in the engine after running for a certain period of time. The innovator has changed the conventional design of gasifiers especially the filters and cooling unit to get clean gas, ensuring smooth operation of engine at low operational cost. On an average the biomass requirement is one kg/kW-h and the costs of 10 kW, 25 kW, 30 kW and 35 kW biomass gasifier system are Rs. 1,25,000, Rs. 2,00,000, Rs. 3,00,000 and Rs. 3,25,000, respectively.

Scientists from TERI (The Energy Research Institute) has confirmed the uniqueness and over fifty users have confirmed its operational practicability. The innovator has sold over fifty units after getting *MVIF* Support from National Innovation Foundation through GIAN North.



Rai Singh Dahiya
Rajasthan





Arvindbhai Patel
Gujarat

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 existing air inside the compressor, so that, while kick starting, this air is utilized and transferred to the tube. A pinch of polymer granules is also inserted to seal the leakage in the tube.

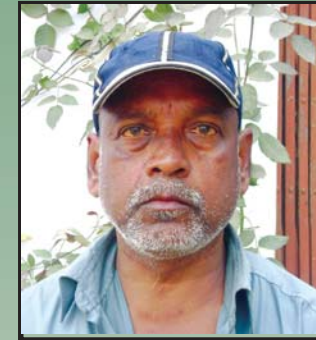
NIF had facilitated sales of a few hundred pieces to customers in Assam and Arunachal Pradesh through dealership technology licensing and local entrepreneurs.



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.



Ramashankar Sharma
Bihar





Ishwar Singh Kundu
Haryana

Herbal growth promoter

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

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

The innovator won a consolation award in NIF’s Fourth National Biennial Competition. 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.



Mango nipper

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.



Madhav Mahajan
Maharashtra





Dadaji Ramaji Khobragade
Maharashtra

HMT: An improved paddy variety

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

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



Mysore Mallige: A unique paddy variety

Shri Lingamadaiah, a graduate in law, is known for his variety '*Mysore Malligae*' in Karnataka, Tamil Nadu and parts of Andhra Pradesh. *Mysore Malligae*' developed through systematic recurrent selection by the innovator. It is an early bearing variety with a yield of about 36 quintals per acre (9000kg/ha). The innovator was facing pest and disease problem in paddy for many years and also getting low milling recovery. He started multiplying the new paddy variety by selection procedure to get pest and disease free variety with higher milling recovery. It yields more even without any extra input and is of short duration, resistant to lodging and milling recovery is about 80 percent. If grown organically, hardly any pest and disease attack is observed. He is growing this variety since 1994. It has covered 25-30% of paddy growing area in the region.

He won the first national award in the second national competition of National Innovation Foundation and was also honored with Beeja Mitra award from GREEN Foundation.



M. Lingamadaiah
Karnataka

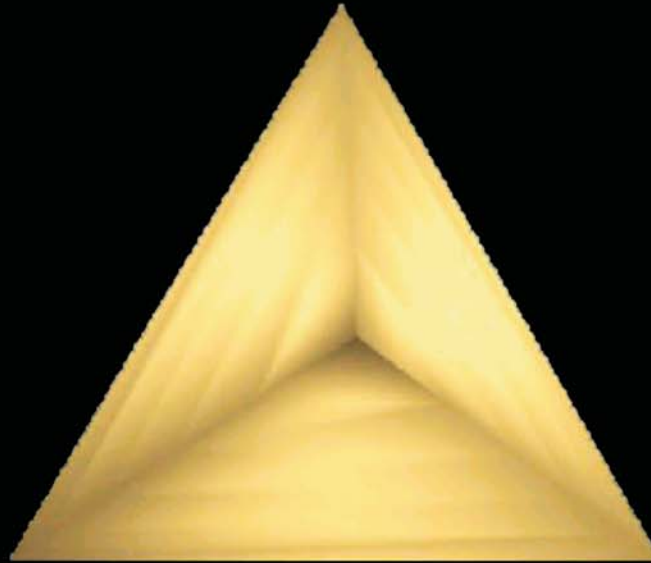


Endnotes & References

1. Parrota, J. A. 2001. *Healing plants of Peninsular India*, New York. CABI Publishing. pp. 1-917.
2. Prajapati, N.D., Purohit, S.S., Sharma, A.K. and Kumar, T. 2007. *A Handbook of Medicinal Plants*, Jodhpur, Agrobios (India), Section II.pp.1-554.
3. http://www.botanical.com/site/124_bhindi.html downloaded on 10.12.2008.
4. <http://www.pfaf.org/database/plants> downloaded on 10.12.2008.
5. Iwayama, Y., Fuku, S. and Nakashima, A. 1982. *Skin protecting agent*. Tanpei Seiyaku, Japan (Pat no. JP57099517 (A) dt. 21.06.1982; <http://v3.espacenet.com>, downloaded on 11.12.2008).
6. Tamsang, K.P. 2004. *Glossary of Lepcha medicinal plants*, Kalimpong, India, Mani Printing Press, pp.7-19.
7. Tiwari, K.C., Majumder, R. and Bhattacharjee, S. 1979. Folklore medicines from Assam and Arunachal Pradesh. *Int. J. Crude Drug Res.* 17 (2):61-67.
8. Holdsworth, D. and Wamoi, B. 1982. Medicinal plants of the Admiralty Islands, Papua New Guinea. Part I, *Int. J. Crude Drug Res.* 20 (4):169-181.
9. Deka, L., Majumdar, R. and Dutta, A.M. 1983. Some ayurvedic important plants from district Kamrup, Assam. *Ancient Sci. Life.* 3 (2):108-115.
10. Universal Medikit, <http://www.umkit.com/Herbal%20products.htm>, downloaded on 29.08.2008.
11. Pushpangadan, P., Rawat, A.K.S., Rao, Ch.V., Srivastava, S.K. and Khatoon, S. 2006. *A synergistic antipyretic formulation*. CSIR, New Delhi. (Pub no. WO /2006 /06 7537 dt. 29.06.2006 ; <http://www.freepatentsonline.com>, downloaded on 29.08.2008).
12. Duke, J.A. and Vasquez, R. 1994. *Amazonian Ethnobotanical Dictionary*, CRC Press, Boca Raton. p. 181.
13. Jain, S.K. 1991. *Dictionary of Indian Folk Medicine and Ethnobotany*, New Delhi, India. Deep Publications, pp. 1-311.
14. Coee, F.G. and Anderson, G.J. 1996. Ethnobotany of the Garifuna of Eastern Nicaragua. *Econ. Bot.* 50 (1):71-107.
15. Gupta, M.P., Arias, T.D., Correa, M. and Lamba, S.S. 1979. Ethnopharmacognosic observations on Panamanian medicinal plants. Part I. *Q. J. Crude Drug Res.* 17 (3/4):115-130.
16. Wild crafted herbal products, <http://www.wildcrafted.com.au/> downloaded on 22.08.2008.
17. Agarwal, R.K. and Agarwal, A. 2004. *Herbal composition having antiallergic properties and a process for the preparation thereof*. Bangalore, Natural Remedies Pvt. Ltd. (Pat no. 6730332 dt.04.05.2004; <http://patft.uspto.gov>, downloaded on 23.08.2008).
18. Morimoto, C. and Dang, N.H. 2006. *Compositions for cancer prevention, treatment, or amelioration comprising papaya extract*. (Pub no.WO/2006/004226 dt. 12.01.2006; <http://www.wipo.int/pctdb/en/wo.jsp>, downloaded on 23.08.2008).
19. Adesina, S.K. 1982. Studies on some plants used as anticonvulsants in Amerindian and African traditional medicine. *Fitoterapia* 53:147-162.
20. Panthong, A., Kanjanapothi, D. and Taylor, W.C. 1986. Ethnobotanical review of medicinal plants from Thai traditional books, Part 1: plants with antiinflammatory, anti-asthmatic and antihypertensive properties. *J. Ethnopharmacol.* 18 (3):213-228.
21. Aravind Herbal Labs (P) Limited, <http://www.tradeindia.com/> downloaded on 29.08.2008.
22. Himalaya healthcare, <http://www.himalayahealthcare.com> downloaded on 10.12.2008.
23. Enrico, D.V., Antonio, P., Chiara, C., Luisa, G., Gianfranco, M. and Emanuella, M. 2008. *A novel use of antidepressant compounds and related compositions*. Medestea Internazionale S.P.A.,Italy. (Pub no. WO/2008/078353 dt. 03.07.2008; <http://www.freepatentsonline.com>, downloaded on 29.08.2008).
24. Singh, K.K. and Maheshwari, J.K. 1994. Traditional phytotherapy of some medicinal plants used by the Tharus of the Nainital district, Uttar Pradesh, India. *Int. J. Pharmacog.* 32 (1):51-58.
25. John, D. 1984. One hundred useful raw drugs of the Kani tribes of Trivandrum forest division, Kerala, India. *Int. J. Crude Drug Res.* 22 (1): 17-39.
26. Singh, V.K., Ali, Z.A., Zaidi, S.T.H. and Siddiqui, M.K. 1996. Ethnomedicinal uses of plants of Gonda district forests of Uttar Pradesh, India. *Fitoterapia.* 67 (2):129-139.
27. Depsonpharma, <http://www.depsonspharma.com> downloaded on 05.11.2008.
28. Litna, <http://www.litna.com/company2.htm>. downloaded on 05.11.2008.
29. Bassa, B.V. 2003. *Antitumor agent*. Biozak, Inc., San Jose, Canada. (Pat no. 6660309 dt. 09.12.2003; <http://www.freepatentsonline.com> downloaded on 08.11.2008).
30. De Souza, A. 2005. A herbal composition having potent antimicrobial and wound healing properties. Mehta, D.S., Vaidya, R.A., Vaidya, A.B. and De Souza, A. Michel Apartment, Mumbai. (Pat no. WO/2005/115090 dt. 08.12.2005; <http://www.freepatentsonline.com> downloaded on 8.11.2008).
31. Sahu, T.R. 1984. Less known uses of weeds as medicinal plants. *Ancient. Sci. Life.* 3 (4):245-249.
32. Bhandary, M.J., Chandrashekar, K.R. and Kaveriappa, K.M. 1995. Medical ethnobotany of the Siddis of Uttara Kannada district, Karnataka, India. *J. Ethnopharmacol.* 47 (3):149-158.

33. Martinez, M.A. 1984. Medicinal plants used in a Totonac community of the Sierra Norte de Puebla: Tuzamapan de Galeana, Puebla, Mexico. *J. Ethnopharmacol.* 11 (2):203-221.
34. Natural skin Care, <http://www.drhauschka.co.uk>, downloaded on 08.11.2008.
35. Kamata Y., Toyokawa, T., Teruya, M. and Ichiba T. 2005. *Anti-obesity agent having lipase inhibiting activity and antioxidation activity*. Okinawa Prefecture. (Pat no. JP2005060334 (A) dt.10.03.2005; <http://v3.espacenet.com> downloaded on 08.11.2008)
36. Reddy, M.K., Viswanathan, S., Thirugnanasambantham, P. and Kamesawaran, T. 1993. Analgesic activity of *Leucas aspera*. *Fitoterapia.* 64 (2):151-154.
37. Singh, V.P., Sharma, S.K. and Khare, V.S. 1980. Medicinal plants from Ujjain district Madhya Pradesh - Part II. *Indian Drugs Pharm. Ind.* 5:7-12.
38. Girach, R.D., Aminuddin, Siddiqui, P.A. and Khan, S.A. 1994. Traditional plant remedies among the Kondh of district Dhenkanal, Orissa. *Int. J. Pharmacog.* 32 (3):274-283.
39. Herbal Products, http://www.hariniherbal.com/herbal_steam_bath.htm, downloaded on 21.08.2008.
40. Rathore, A., Juneja, R.K. and Tandon, J.S. 1989. An iridoid glucoside from *Nyctanthes arbortristis*. *Phytochemistry* 28 (7):1913-1917.
41. Dixit, R.S. and Pandey, D.C. 1984. Plants used as folk-medicine in Jhansi and Lalitpur sections of Bundelkhand, Uttar Pradesh. *Int. J. Crude Drug Res.* 22 (1):47-51.
42. Lupin Herbal, [http://www.lupinworld.com/herbal/ htm](http://www.lupinworld.com/herbal/htm), downloaded on 21.08.2008.
43. Chattopadhyay, S., Achari, B., Poddar, A. and Kumar, A. 2007. *Extracts from Nyctanthes arbortristis for the treatment of Leishmaniasis*. CSIR, New Delhi. (Pub no. WO/2007/042902 dt. 09.04.2007; <http://www.freepatentsonline.com>, downloaded on 22.08.2008).
44. Pushpangadan, P., Mehrotra, S., Rawat, A.K.S., Khatoon, S. and Govindarajan, R. 2006. *Safe, eco-friendly, health protective herbal colours and aroma useful for cosmaceutical applications*. CSIR, New Delhi. (Pat no. 20060115505 dt. 01.06.2006; <http://appft1.uspto.gov>, downloaded on 22.08.2008).
45. Tamsang, K.P. 2004. *Glossary of Lepcha medicinal plants*, Kalimpong, India, Mani Printing Press, pp.7-19.
46. Bhattarai, N.K. 1992. Folk herbal remedies of Sinhupalchok district, Central Nepal. *Fitoterapia* 63 (2):145-155.
47. Reddy, M.B., Reddy, K.R. and Reddy, M.N. 1989. A survey of plant crude drugs of Anantapur district, Andhra Pradesh, India. *Int. J. Crude Drug Res.* 27 (3):145-155.
48. Khanom, F., Kayahara, H. and Tadasa, K. 2000. Superoxide-scavenging and prolyl endopeptidase inhibitory activities of Bangladeshi indigenous medicinal plants. *Biosci. Biotech. Biochem.* 64 (4):837-840.
49. John, D. 1984. One hundred useful raw drugs of the Kani tribes of Trivandrum forest division, Kerala, India. *Int. J. Crude Drug Res.* 22 (1): 17-39.
50. Antony, M.B. 2008. *Preparation, process and a regenerative method and technique for prevention, treatment and glycemic control of diabetes mellitus*. Always, India, Arjuna Natural Extracts. (Pat no. 7378113 dt.27.05.2008; <http://patft.uspto.gov> downloaded on 23.10.2008)
51. Rohatgi, S. 1996. *Ayurvedic composition for the prophylaxis and treatment of AIDS, flu, TB and other immuno-deficiencies and the process for preparing the same*. Kanpur, India. (Pat no. 5529778 dt. 13.09.1994; <http://patft.uspto.gov>, downloaded on 23.10.2008).
52. Spring, M.A. 1989. Ethnopharmacologic analysis of medicinal plants used by Laotian Hmong refugees in Minnesota. *J. Ethnopharmacol.* 26 (1):65-91.
53. Zagari, A. 1992. *Medicinal plants*. Vol. 4. (5th ed.) Tehran, Iran.Tehran University Publications, p. 969.
54. Sebastian, M.K. and Bhandari, M.M. 1984. Medico-ethnobotany of Mount Abu, Rajasthan, India. *J. Ethnopharmacol.* 12 (2):223-230.
55. Hwang, Shie-Ming. 2001. *Process for preparing an anti-viral medicinal product from plant extracts*. Sage R&D, Columbus, USA. (Pat no. 6214350 dt. 10.04.2001; <http://patft.uspto.gov>, downloaded on 25.08.2008).
56. Tsai, Hsiu-Hsien, Hwang, Shie-Ming and Kung, Pai-Chu. 1998. *Use of plant extracts for treatment of HIV, HCV and HBV infections*. Sage R&D, Columbus, USA. (Pat no. 5837257 dt.17.11.1998; <http://patft.uspto.gov>, downloaded on 25.08.2008).
57. Singh, V.K. and Ali, Z.A. 1992. A contribution to the ethnopharmacological study of the Udaipur forests of Rajasthan, India. *Fitoterapia* 63 (2): 136-144.
58. Nagaraju, N. and Rao, K.N. 1990. A survey of plant crude drugs of Rayalaseema, Andhra Pradesh, India. *J. Ethnopharmacol.* 29 (2):137-158.
59. Gupta, S., Yadava, J.N.S. and Tandon, J.S. 1993. Antisecretory (antidiarrhoeal) activity of Indian medicinal plants against *Escherichia coli* enterotoxin-induced secretion in rabbit and guinea pig ileal loop models. *Int. J. Pharmacog.* 31 (3):198-204.
60. Solanki, R.S. 2003. *Herbal formulation*. Sahajanand Biotech Private Ltd, India. (Pub no. GB2378384 dt. 12.02.2003; <http://v3.espacenet.com>, downloaded on 23.10.2008).
61. Pushpangadan, P., Rao, Ch.V., Rawat, A.K.S., Ojha, S.K. and Reddy, G.D. 2008. *Anti-allergic herbal formulation*. CSIR, New Delhi. (Pat no. 7344739 dt.28.12.2004; <http://patft.uspto.gov> downloaded on 22.10.2008).
62. [http://pharmaceuticals.indiabizclub.com/catalog/123280~oils_\(atharva_nirgundi_siddha_tail\)~pune](http://pharmaceuticals.indiabizclub.com/catalog/123280~oils_(atharva_nirgundi_siddha_tail)~pune), downloaded on 04.08.2008.
63. Pushpangadan, P., Rao, Ch.V., Govindarajan, R., Ojha, S.K., Rawat, A.K.S., Reddy, G.D. and Mehrotra, S. 2008. *Anti-arthritic herbal composition and method thereof*. CSIR, New Delhi. (Pat no. 7338674 dt. 04.03.2008; <http://patft.uspto.gov>, downloaded on 25.08.2008).

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
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