National Innovation Foundation - India

8th National Biennial Grassroots Innovation Awards 2015

25 years

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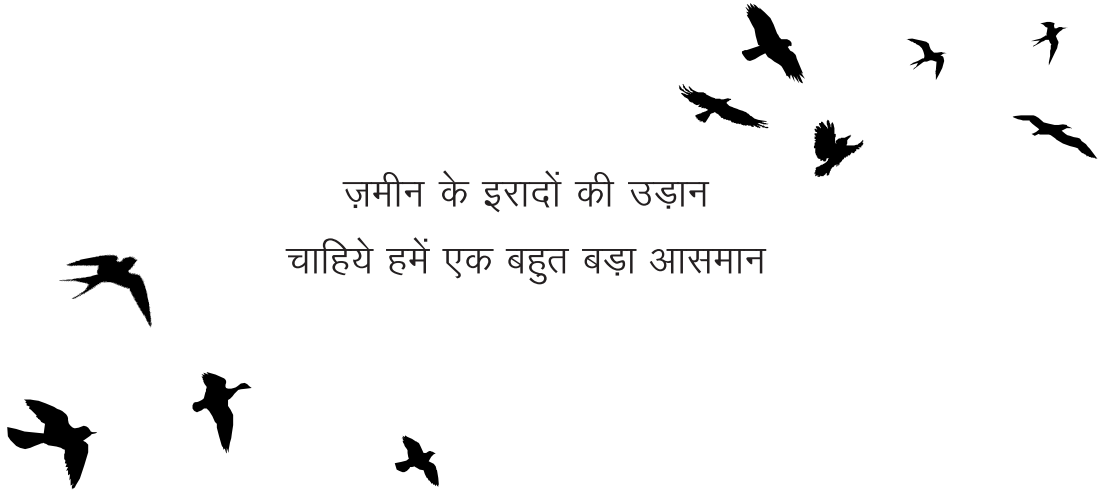
March 2015

National Innovation Foundation - India
Autnomous Body of Department of Science and Technology, Govt. of India
Satellite Complex, Prem Chand Nagar Road
Near Mansi Crossroads
Ahmedabad 380015



ज़मीन के इरादों की उड़ान
चाहिये हमें एक बहुत बड़ा आसमान

R. A. Mashelkar, F.R.S.
Chairperson,
National Innovation Foundation - India
President, Global Research Alliance

Another occasion to recognize the best creative minds of the country! I feel really happy that a number of innovators, traditional knowledge holders and creative children are being honoured at the Eighth National Biennial Grassroots Innovation award function. I must appreciate Dr Vipin Kumar and his team, who have worked very hard to ensure that each innovation or traditional knowledge practice selected for the purpose has gone through a very critical scrutiny and validation.

I am happy to note that the Indian Council of Medical Research (ICMR) has decided as a part of its MoU with NIF to support validation and value addition of 800 traditional knowledge practices. Given the fact that NIF has more than 100,000 such practices in database, this is still a drop in the ocean. We need to really think of a next generation solution if justice has to be done to the huge backlog of knowledge and innovation that the people have shared with us without any reciprocity.

NIF has now filed six hundred and ninety six patents for grassroots innovators and children in India, eight in US, 27 PCT applications and 27 Plant variety protections, besides design and trademark registrations. It could not have been possible without the active *pro bono* support of IP lawyer community. Likewise, almost all the scientist and designers in public and private sector have helped NIF in validating and value-adding in people's knowledge without charging at all or much for their time. This is in addition to thousands of volunteers of Honey Bee Network who walk from village to village and search for creative people. This is just a small reflection of the social and ethical capital created by the Network which NIF harnesses in the service of the nation.

I hope that team NIF will rededicate themselves to the service of the inventors and innovators of the country to justify the faith people have put in NIF by sharing their knowledge voluntarily. I also congratulate all the winners of this round.

RA Mashelkar

Anil K Gupta
Executive Vice Chairperson,
National Innovation Foundation - India
& Professor, Indian Institute of Management
Ahmedabad

Asymmetry of knowledge, power, institutional access and reciprocity between formal and informal sector in society has been at the root of alienation, anger and apathy at the grassroots level. But some individuals and communities don't fit this pattern. They protest. They do so through their creative pursuits and express it in the form of innovative solutions of the problems that formal sector has ignored for so long. They also accumulate stories and memories of small experiments done over a long time in the form of functional (and sometimes dysfunctional) traditional knowledge. Not all innovations or traditional knowledge practices have been sustainable. But many have been. Given their limited access to resources, institutions and formal scientific and technological systems, new materials, and tools, their solutions often are very frugal, knowledge intensive (as against material intensive) and affordable. In most cases they are based on the multiple life cycles of each component or ingredient. These are deeply embedded in local socio-ecological context and often are ecologically safe. Frugal, friendly and flexible innovations can teach a lot to the formal sector.

But the dominant perception has been to view knowledge rich-economically poor people as a Bottom of the Pyramid. Obviously, 25 years of effort of the Honey Bee Network has not been effective enough as yet to persuade people to realize that a) poor people are not poor in all resources, they may be rich in knowledge, ethics and institutional values, b) they are not thus resource poor because knowledge is indeed a resource, c) they are not at the bottom of knowledge and creativity pyramid, they may be at the base of only economic pyramid and d) they are not *sink* of aid, assistance and advice but also *source* of possible frugal innovations and precious traditional knowledge.

Language is believed to shape the habit of thought and we have not yet brought about change in the dominant discourse on the subject. But progress is being made.

The Eighth Biennial Presidential Grassroots Innovations Award function at the President's House (Rashtrapati Bhavan) being organized as a part of Festival of Innovation hosted by the office of the President of India, (March 7-13, 2015) is a testimony to that progress. Honourable President will host ten grassroots innovators, school and college students as Innovation scholar-in-residence. They will stay at the Rashtrapati Bhavan for two weeks and be mentored by the office of the President and National Innovation Foundation and Honey Bee Network volunteers. This shows the value the head of the largest democracy in the world places on the knowledge richness of the common people and youth. There are few such examples worldwide.

The office of the President used to host an exhibition of innovation since 2010 President Pranab Mukherjee has decided that a Festival of Innovation be organized every year starting this year during March 7-13, 2015. This is a new milestone in the journey of grassroots innovators towards getting new voice, visibility and velocity in the society.

A jury of outstanding scientists and grassroots innovators screened the shortlisted innovations and chose the awardees. It does not mean that out of more than 35,000 entries received during the Eighth round, only these many were worth recognizing, It only means that given out limited resources, NIF could validate only a few claims out of which the awardees have been selected. We are aware that a crisis of expectation is looming large on the horizon. When out of tens of thousands ideas, innovations and traditional practices received from all over the country, only a few are supported, there is bound to be disappointment to those unserved. I hope that policy makers will realise the predicament we all face in the matter.

This is the 25th year of HBN. Let me recall some of the thoughts developed on the way by Honey bee Network during last 25 years of its journey through the villages and slums of India and also many other countries. During the late eighties, an informal network of volunteers and grassroots innovators began to reflect on the need to learn from, and share others' innovations with creative individuals and communities at grassroots level using an open innovation 'honeybee' philosophy (see Box 1). There were several interactions organised between innovators and experts in formal and informal

science and technology sector to sow the seeds of HBN: International Conference on Plant Physiology held in India, 1988 chaired by Dr S K Sinha had a special session in which farmer breeders and innovators presented their work to an international community of scientists including Nobel laureate Norman Borlaug. International conference on Agronomy held in 1990 had a whole track on people's knowledge. An annotated bibliography of literature on the subject was brought out by HBN. Later international conference on soil and water conservation had a similar session. The Network started with following philosophy borrowed from the behaviour of honeybees, which cross pollinate, don't make flowers feel short changed when their nectar is taken away and don't keep all the honey with themselves. The first issue of honey bee newsletter came out in 1990 and observed:

Key purpose thus is : a) To respect, recognise and reward creative people, b) Help them add value to their innovations and traditional knowledge with or without blending with modern science, technology and other institutional knowledge, c) Reinforce conservation ethic so that nature, from which we draw so much, is nourished, d) Lobby to protect their intellectual property rights, and generate material and non-material incentives for individuals and communities, to learn, share and grow together and e) Embed their values, creativity and knowledge systems in the educational system and governance of the society.

SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions), which means 'creation' in Sanskrit, was born in 1993 to address the felt need for institutional support to the activities of the Honey Bee Network. SRISTI was established to provide organisational, intellectual and logistics support to the network. The primary objectives were to: Systematically document, disseminate and develop green grassroots innovations; Provide intellectual property rights protection to grassroots innovators; build open source knowledge databases to promote open innovation and learning across language cultures; Work on the *in situ* and *ex situ* conservation of local biodiversity, and strengthen nature and common property institutions; Provide risk capital/micro venture support to grassroots innovators and sustain the educational, cultural and institutional creativity for larger social good.

Honey Bee Network, NIF, SRISTI and GIAN try to use synthesis of eight Es, as a pivot of their pursuits viz.

Excellence, Equity, Environment, Efficiency, Ethics, Empathy, Entrepreneurship and Education. These will lead to the development of a more inclusive and sustainable society.

The need to engage youth, promote originality, put unmet social needs and idea of grassroots innovators on the agenda of technology students and link students with MSME and other social actors gave birth to a portal Techpedia.in /techpedia.sristi.org. Gandhian Young Technological Innovation Awards are given every year to the outstanding frugal, socially relevant projects and also those on the technological edge. Some of the important milestones of the journey so far are described in the roadmap diagram (see page 12)

Creation of GIAN (Gujarat Grassroots Innovation Augmentation Network) in 1997 was a key recommendation of the first International Conference on Creativity and innovation at Grassroots (ICCIG) at Indian Institute of Management, Ahmedabad (IIMA). Gujarat government joined hands with HBN and created an institution that aimed to link innovation, investment and enterprise, a kind of incubator, perhaps one of the first in the country. It is not without significance that it shared the best incubator award with IIT madras later at the hands of the President of India. It must be stressed that no academic Institution may have given so much support to a new social movement like Honey Bee Network as IIMA has given and continues to provide. The support from students, faculty and staff at IIMA has been most invaluable to the Network and various institutions spawned by it. In fact the boundaries of management science have been continually expanded.

Establishment of National Innovation Foundation in 2000 with the help of Department of Science and Technology, Government of India was an unprecedented effort in institutionalising the HBN approach in national polity. India is the first country which has incorporated innovations in the informal sector in the National Innovation system. MVIF (Micro Venture Innovation Fund) was set up with the help of SIDBI in 2003 at NIF as the first such formal fund after GIAN pioneered the idea. The transition will take place globally from micro-finance to micro venture finance when the potential of grassroots innovations is realised worldwide.

The partnership of NIF with CSIR, ICMR and ICAR has helped in linking the best of the formal and informal

science in the country. These partnerships will grow in years to come and NIF's ability to serve many more creative communities will also increase in the process. Special efforts are being made with the ever enthusiastic help of Department of Science and Technology, GOI to disseminate green extremely affordable innovations in tribal areas through mobile exhibition and also on farm trial and demonstration. Already follow up action has started after the 34th Shodhyatra in the Djungu region of north Sikkim, inhabited by Lepcha tribe.

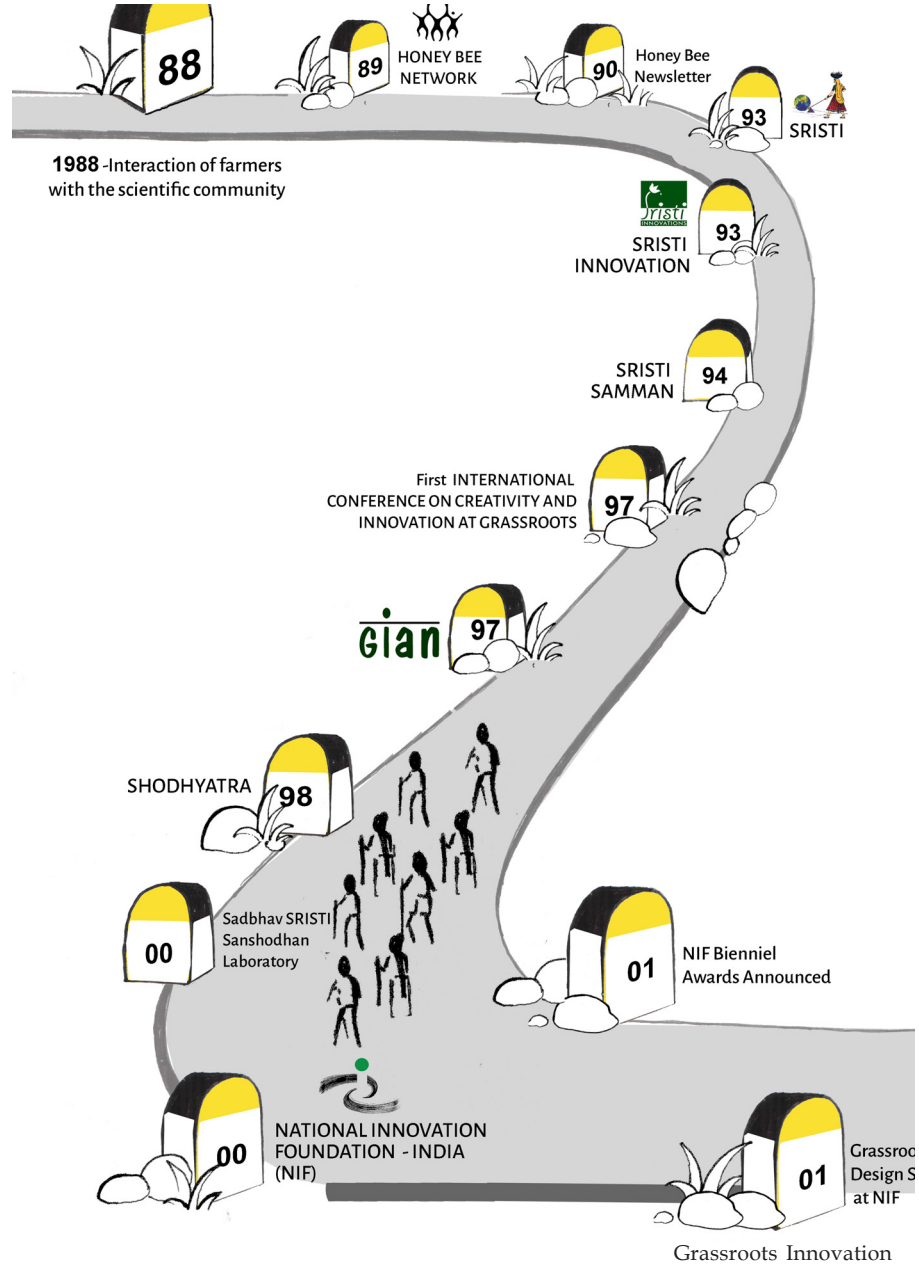
A journey of 25 years has raised enough questions for the next 250, and may be 2500 years. We invite readers and fellow travellers on this exciting journey to help us answer these questions and where need be, raise counter questions! While the gains from the efforts of Network's have been significant, there can be no room for complacency as we have 'miles to go before we rest'! When the new dawn of an inclusive, sustainable society breaks over the Indian and global horizon, NIF and Honey Bee Network must be counted amongst those who made a small contribution towards it.

Anil K Gupta

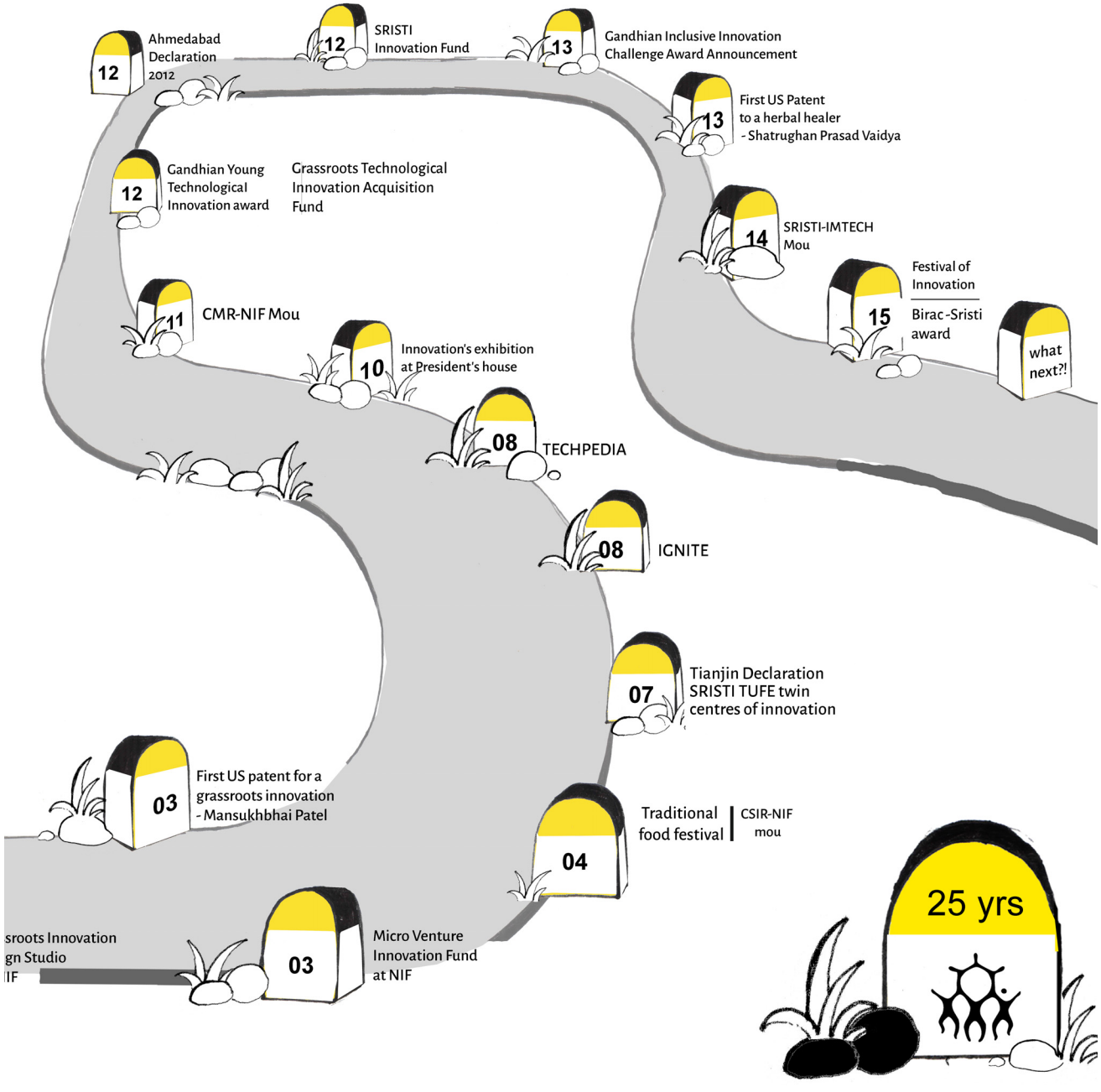
Box 1
The Honey Bee Philosophy

Honey Bee Network's mission is best explained through the metaphor of a honey bee which does what many intellectuals and other privileged people don't do. It gathers nectar from the flowers without impoverishing them. The Network similarly seeks to ensure that people do not feel short-changed when they share their knowledge with outsiders. Sharing our findings and learning openly with local communities in local language became a norm. Promotion of lateral learning among the creative individuals and communities through local language newsletters in an open manner is one of the important missions of the Honey Bee Network.

Further, it is not enough to recognize or respect the innovators. They must also get a fair share of the benefits resulting from value addition and the wealth generated by the commercial or non-commercial diffusion of their knowledge/ innovations.



Grassroots Innovation Design Studio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25 yrs

Vipin Kumar
Director and Chief Innovation Officer
NIF, Ahmedabad

The last fifteen years have been a long, difficult but inspiring journey for us. The database of ideas, innovations and traditional knowledge maintained at NIF has crossed 2, 00,000 mark. It has filed over 700 patent applications apart from 27 applications under the PPV&FR Act. It has licensed over 85 technologies mostly to small to medium level companies in India and received large numbers of requests from around the world for various products, either for technology transfer for exclusive/non-exclusive marketing/ manufacturing rights or for simple purchase of innovative products. NIF has supported more than 1000 innovations for their validation or value addition. Financial support to 192 projects has been extended under the Micro Venture Innovation Facility (MVIF) scheme at NIF supported by SIDBI for commercialization of innovations. Grassroots Technological Innovation Acquisition Facility (GTIAF) at NIF acquires the rights of useful innovations for making them available through decentralized manufacturing or declaring them open source for people to copy. Similarly, NIF has provided technical as well as financial support to the potential innovations for various incubation activities like prototype development, testing the innovation, design optimization and development of concept proof model.

For the Eighth National Biennial Competition, which ran from April 1, 2011 to March 31, 2013, NIF received more than 35000 ideas, innovations and traditional knowledge practices (not all unique or distinctive) from 31 States and Union territories of the country. A total of 41 awards will be given to 40 innovators and 6 communities in the 8th National Award function. These grassroots innovation awards have been decided after a rigorous screening at different levels. All the entries

were subjected to technical and patent prior art search to ascertain the novelty/distinction, social applicability and/or cost effectiveness. The Research Advisory Committee comprising the Heads of the top R&D institutions, experts from Engineering, Agricultural and Veterinary Colleges, Vice Chancellors of various Universities from all parts of India screened the short-list of potential awardees.

NIF works with over dozens of institutions simultaneously for its various activities and I wish to thank everyone associated with us for being a partner in the grassroots innovation movement and supporting us in best possible way. What we are doing is not something we can or should do alone, we solicit partners and their continued engagement to serve the creative people of our country in the best earnest possible. I wish to specially thank Indian Institute of Management, Ahmedabad, Council of Scientific and Industrial Research (CSIR), Indian Council of Medical research (ICMR), IIT Guwahati, University of Kashmir, Srinagar, State Agricultural Universities and Research Stations and other institutions, partners from industries who have proactively helped to test, validate, value add, commercialise innovations and also support us in many other ways.

The volunteers and collaborators of the Honey Bee Network deserve special appreciation for their continued commitment to the cause, without which it would have been almost impossible to reach thus far. The teams of NIF, SRISTI and GIANs have to be specially acknowledged for their untiring efforts while undertaking various incubation activities.

I put on record my special appreciation and regards for Prof Anil K Gupta, Dr. R A Mashelkar and Governing Board members who have always provided us guidance and supported our recommendations, bestowing highest faith in us. I also acknowledge the generous support of the former and current Secretary, Department of Science and Technology and its officials, without which our journey may not have been possible.

I also wish to thank all the innovators, traditional knowledge holders, and local communities who reposed faith in NIF by sharing their knowledge. I take this opportunity to assure them that NIF will continue to serve them in the best possible manner always. My congratulations to all the award winners!

Vipin Kumar

Lifetime achievement

Posthumous

National I

National II

National III

State Awards

Consolation Awards

Student Awards

Lifetime Achievement Award

Abdul Khadar Nadakattin
Dharwad, Karnataka

Abdul Khadar (62) is an innovator, a social worker and an environmentalist. Believing in the principles of sustainability, he has always advocated cost-effective, eco-friendly and socially acceptable methods in agriculture. He has also developed a number of user friendly and useful innovations.

He hails from a place called Annigeri in Navalgund taluka of Dharwad district, which has a population of about twenty five thousand people. Annigeri and the surrounding areas have deep black soil and are well known for chilli and Bengal gram crops. Growing up in a place surrounded by agricultural fields, it was natural for Abdul to have inclination towards agriculture. The only son of his parents, Abdul was keen on going to school but his father wanted him to focus on agriculture solely. Right from childhood he had an observant nature and a very innovative bent of mind, as evident from his first innovation.

A Wa(h!)ter Alarm

No matter how hard he tried, Nadakattin could never get up early in the morning. None of the alarms just seemed to break his slumber. His innovative mind started thinking of a mechanism that could solve this problem. This led him to develop a 'water alarm' - his first innovation. He tied a thin rope at the end of the key of the alarm in such a way that when the key unwound itself, the string tied to the key got wound. The string was in turn tied to a bottle filled with water, when the key was completely unwound, the bottle would tilt and the water would fall on his face.

Growing Tamarind

Abdul had inherited 60 acres of land from his father. As in any other dry area, agriculture there faced the risk of unpredictable rain along with scarce

groundwater reserve. Facing similar problem and looking for an alternative, he decided to practice horticulture. He planted mango, sapota and ber with chilli as an intercrop in 16 acres of his land. Sapota and ber were planted alternatively in between mango rows. Owing to the lack of sufficient water, the idea failed to take off. He then decided to cultivate tamarind when he observed that in an orchard that was left uncared for a long period, only tamarind plants were standing green and had borne fruits also.

In 1985 - a year of severe drought, he managed to transport water from a distance of two to three km. With much difficulty he planted 600 tamarind plants in pits in rows with spacing of 20 ft. The plants not only survived but continued to grow well. In 1990, inspired by the success he planted 1,100 more plants in ten acres. He thus was able to establish a 16 acre grove with about 1800 tamarind trees.

One Innovation Leads to Another

The success of growing tamarind with scarce but alkaline water was an innovation in itself. To overcome water constraints, he tried reclaiming water by a three-part filtration process and dug as many as eleven bore wells at a cost of two lakhs but only two of them yielded water. Later he dug six farm ponds to harvest rainwater. After monsoon, water from the bore well was used to pump into the ponds. The water was then used for flood irrigating the plants. He has also constructed underground tanks to preserve the pulp of tamarind. Pulp preserved in such a manner had a long shelf-life and could retain the original quality and flavour for a longer period. He then started value addition to the raw fruit by manufacturing pickles and jam. His wife and daughter made the pickle and jam, which was marketed as far as Hyderabad. He thought of another new experiment when he faced problem in making pickles. The process of making pickle was labour intensive and tedious as one had to first harvest tamarind from the trees and then

separate seeds from the fruit manually. He conceived a unique technique for harvesting tamarind from the trees but did not go ahead due to high cost involved.

A Device to Separate Tamarind Seeds

After spending about three lakhs rupees and six months of hard and intensive labour in 1994, he could finally design and develop a machine to separate tamarind seeds. It had a system wherein due to the sliding action of the pegs that were tapered at the end, the seed gets thrown out of the tamarind pod.

Tamarind Slicing for Pickles

The next step in pickle making was to cut the unripened tamarind into small pieces. The process was difficult and tedious. This led him to design a machine for slicing tamarind. The machine served multiple purposes and could do the job more efficiently and effectively.

Due to his work related to tamarind, people nick named him "*hunase huccha*", which means tamarind maniac.

Other Innovations

Abdul has been striving and struggling hard to discover the progressive methods that can fit into modern agriculture. In this direction he developed many other innovative, low-cost and farmer friendly technologies.

In 1974, as soon as he left school he developed a new kind of bullock drawn tiller capable of deep ploughing. Due to financial constraints he was not able to produce the tillers at lesser cost for market. Followed by the tiller, he developed a plough blade in which whetting

was not needed. The blade did not get damaged much and hence remained sharp for a long period. The blade could be used in tractor ploughing too.

Ploughing blade manufacturing machine: This machine was used for sharpening the tractor harrow blade. Once the blade gets sharpened, it lasts long without much wear and tear. This reduced the fuel consumption to some extent.

Seed cum fertilizer drill: This machine was used for sowing seeds of different sizes ensuring proper spacing. It could be used for sowing seeds ranging from jowar to groundnut. It had a wooden roller with various sizes of depression to suit the size of the seed. The machine could also facilitate dispersal of fertilizers, mud and grass.

Water-heating boiler: It could boil water sufficient enough for bathing 20 people by using just five kg of wood chips, that too in five – ten minutes. The boiler had an in-built mechanism for multi-stage heating, which kept the water hot for nearly 24 hours.

Automatic sugarcane sowing driller: This was developed in response to the request of some farmers from Maharashtra to automate the sowing of sugarcane. Abdul Nadakattin took only 6 months to develop this driller, which was purchased by many farmers.

He also developed a wheel tiller, which has wheels on both sides and helps to maintain uniform speed of the tractor engine, iron wheel to avoid the wear and tear and high fuel consumption occurs normally with the rubber button tyres in the tractors and a bullock drawn tiller and ploughing blade.

He has many such small and big innovations in his name but all his creative pursuits have taken a heavy toll on his financial resources. He struggled with a debt worth lakhs and was forced to sell his agricultural implements. However, he did not relent to any of the hardships and continued to struggle. He established Vishwashanti Agricultural Research Centre at Annigeri, through which he sells his innovations. Through the support of Karnataka Government, many of his products are available to farmers at subsidised rates. He also works closely on some projects with the University of Agricultural Sciences, Dharwad. His factory is being managed by his sons and his daughter-in-law looks after the financial aspects.

Despite all the hardships, Abdul Nadakkattin continues his innovative spirit. His in depth knowledge in the agro-climatic conditions and the soil characteristics has made him an inspiration to the other farmers in his area.

Acknowledgements: Abdul Nadakattin's profile published in Honey Bee newsletter (Honey Bee, 11(4) & 12(1): 11-12; 2000- 2001) is gratefully drawn upon.

Posthumous Award for Promoting Innovation

Late Chandrakant V Pathak
Pune, Maharashtra

Hailing from Satara district of Maharashtra, Chandrakant V Pathak was a serial innovator, social entrepreneur and a dedicated social worker. Not only did he himself develop various utility machines for common people, he helped upgrade technical skills of thousands of school dropouts, contributed to many social causes and promoted science, technology and innovation among the common people.

Chandrakant completed his schooling at Satara only. Since childhood he was quite creative and had a keen sense of observation. He kept on experimenting something or the other. His interest in tools and machineries made him pursue engineering. He worked in various setups in Maharashtra and Gujarat for a few years and then returned back to Pune, where he had relocated.

Innovations for The Society

Chandrakant was motivated to do something new and unique since the very beginning. Being an engineer and having a special liking for machineries, he worked on a number of innovative products, which were energy-efficient and appropriate for the rural and as well as urban areas.

He devised a bullock lifesaving system wherein sturdy accessories were designed for the bullock carts to update their safety. He also has developed a 'flat belt brake system' fitted to the rubber tyre of the cart so as to help in regulating the speed and stopping the cart without causing

injury to bullock. Then he made the 'Vanarai bicycle pump', which was mounted on the carrier over the rear wheel of a bicycle. It can be used for lifting water for various purposes like development of dry land, as a fire extinguisher, for construction work, use in gymnasiums and for irrigation. The bicycle can be taken to the water source, parked and peddled on its stand to operate the pump. His other innovations include bicycle-mounted spray pump, stump-drip-irrigation system, vegetable grinder, sprinkler, flourmill, etc., and were well received by the people.

Skill Development and Technical Training

While working in Gujarat, Chandrakant observed people from lower income section and identified the lack of technical skills in them as one of the causes of low income/ poverty. This motivated him to do something about it. After returning to Pune in 1964, he established Modern Technical Centre, a non-governmental organisation, with an aim to impart technical education and skills to the 7th grade students who could not afford further education. The quality training provided by the NGO helped many students and some of them got recruited by renowned companies such as Kirloaskar, Telco and many more. Later Modern Technical Centre started giving training to deaf and

disabled students as turner and fitters as well. Before undertaking this, Chandrakant undertook a short term training course himself so that he understood what was to be trained and how.

After his marriage in 1970, the centre established a technical division for the women, Chandan Enterprises in 1974, primarily due to the encouragement and support of his wife, Neeta. The women training activities were discontinued in 1998 however other activities of enterprise are being carried on. Their two sons, Madar and Kedar, are also engineers and well settled with their family. They also helped their father in his activities and have been taking care of the centre after his demise. Many thousands individuals have been trained at the centre in all these years. He also had started his own Science Energy Park off old Pune Mumbai Road, which is still dispensing information and technologies to common people. Continuing his legacy, in the last two years, his sons have commissioned more than seven Science Energy Parks in different parts of Maharashtra.

Supporting Innovators

With time, the Modern Technical Centre changed its focus from only providing training to coming out with innovative solutions to different problems and providing technology based solutions on alternative source of energy. Situated in the old city of Pune, the Modern Technical Centre is open to the innovators to perform their own experiments; they can stay there, develop their concepts into products and try to disseminate them.

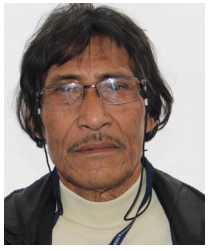
Other activities

Chandrakant was not only an expert in machinery; he was an excellent cook too. In his free time he liked preparing authentic Maharashtrian food. He liked driving as well; perhaps long drives rejuvenated his mind and helped him get fresh ideas for his work. He was also supporting a number of social causes. He was

associated with Sakal Relief Fund, which provided him the opportunity to visit many unprivileged areas of the country, where he observed the poverty and lack of basic necessities. This was perhaps the trigger for many of his compassionate innovations for the common people. Even on the day he expired, he had attended a meeting for providing relief for Uttarakhand disaster.

Recognition

His work on bullock life saving and other innovations was recognised by NIF in 2002 in its Second National Award Function. He was also honoured by the Sheti Mitra award (2003) by Government of Maharashtra, award for Innovation for Non-Conventional Energy Equipment at the hands of the then President of India (2002), Ashden Award (United Kingdom, 2007-08), MCCI Parkhe Puraskar (1997) among others. However, more than awards and accolades, helping people with skills and technology were his major source of satisfaction. Chandrakant lived a fulfilling life full of hard work, dedication and devotion to the causes he felt close to. He has been an inspiration for all who have known him closely and would continue to do so.



National First – Energy

Scout: Direct

Solar multi muga reeling cum spinning machine

M Manihar Sharma
Imphal, Manipur

Manihar Sharma (65) is a mechanicand a serial innovator who has come up with a number of useful innovations like a handy incense stick making machine, an innovative dryer, automatic pump operation system for overhead tanks, *etc*. To simplify the tedious task of reeling silk traditionally, Manihar has come up with a solar operated machine, which can simultaneously perform reeling and spinning of different types of silk.

Background

After working as an auto rickshaw driver, running a small restaurant, serving as an assistant to his doctor friend, Manihar Sharma has been a full time innovator for some time now. Economic hardship and lack of support did not deter or hamper his innate creativity. For his lack of practicality, the society and his own family mockingly brand him as "*numikadoba*" (the man who would go to the Sun).

The Early Beginning

Manihar's aunt brought him up as he lost his mother when he was just eight years of age. After matriculation, he abandoned his studies because of financial problems and started working as a mechanic in a small local workshop. Giving shape to his imagination, he made toys and other small gadgets from the left over parts in the workshop. With his perseverance he soon mastered all the nuances of repair and maintenance of small light vehicles and other engines. His constant source of inspiration has been his late mechanic teacher, who used to repair or modify complicated machines without needing any sophisticated tools and equipment. The backbone of his innovative spirit has been the informal yet logical and practical mechanical tips shared by his mentor.

While he tinkered day and night, the availability of mechanical and electrical parts needed by him in the

local market became a problem. They could only be brought in bulk, either from Kolkata or Guwahati. The inability to buy expensive parts from the markets outside the state, forced him to manufacture those plastic parts himself. So this frugal innovator enrolled for a three months course on plastic molding techniques at Central Institute of Plastic Engineering and Technology (CIPET), at the age of 50+. And he was the only trainee, among the hundreds, who actually made use of the technology. The obsession to do the things perfectly made him first practice the art of manual molding of plastic for years. His hard work and sheer perseverance makes even the CIPET send him job works sometimes.

After having gone through different phases in life which molded his personality and gave impetus to his aptitude for innovating, he became a full time prolific innovator. His most recent innovation is the 'solar multi muga reeling cum spinning machine'.

Genesis

Conventionally, in Imphal, mostly women are involved in silk reeling. Manihar realized how difficult it was for the women to judiciously balance the available time between household activities and silk reeling. His desire to help reduce the drudgery involved in the work, made him want to develop an automated silk reeling system, which did not require constant monitoring. This would help the women to simultaneously carry out their household work and silk reeling task with optimum output. Since all places in Manipur do not have access to electricity, he thought about using solar unit as source of energy. His machine is sosimple that an untrained person can operate it.

Solar multi muga reeling cum spinning machine

This is a portable user friendly machine, which can simultaneously carry out the reeling as well as spinning

for different varieties of silk like Mulberry, Muga, Eri and Tasar without any arduous human effort.

Slightly bigger than a harmonium (musical instrument), the machine has five reeling heads with an electric switch each. This enables one or more reeling heads to operate even if the switch of remaining head(s) is off. The reeling is automated once the filaments from the cocoons are fed to the reeling end. The machine speed can also be regulated with the help of feeding pipes attached along the thread lines. The reeling speed adjustment mechanism ensures silk production of desired quality.

The salient features of these machines are its compactness, easy portability and strong durability. The machine can use both solar energy and electricity. Solar energy makes it environmental friendly and appropriate for rural interiors where electricity is not available or is erratic. It performs effectively even in cloudy weather and at night through a DC battery, the use of which reduces the chances of accidents considerably. The machine can be operated twenty four hours thereby increasing productivity. Compared to the existing local or traditional methods of reeling this machine produces superior quality of threads in less time and with reduced labor. The machine is ideal for women who strive to manage household activities along with silk reeling process.

The Untiring Mind

Manihar is not touched by complacency and drudgery. He does not let his mind and hands rest until he has developed every part of different innovative machines to a finish to his choice. His three main innovations *viz.* automatic pump operator, innovative dryer and incense stick making machine have been much appreciated. His first innovation an automatic pump operator could minimize the wastage of water and human power. It facilitated a hassle-free household water management. He won a National Award in 2009 for the same at the hands of the then President Smt. Pratibha Devisingh Patil in National Innovation Foundation – India's 5th National Award Function.

Manihar's wife, who was previously extremely apprehensive of his innovative bend of mind, today appreciates and supports his innovations whole heartedly. All her complaints vanished after Manihar Sharma developed an incense stick making machine which reduced her workload and made highly improved quality of incense sticks with minimal

wastage of bamboo. The couple has three daughters and a son. One of his daughters is differently abled. By preparing *dhoopbatti*, *agarbatti*, doing embroidery work and tailoring, his wife is the bread earner for the family. His innovations are just an erratic source of income.

Despite all difficulties, Manihar has been helping other innovators or those who need his mechanical help, without any qualms. He has aided his doctor friends by repairing their hospital equipment. He has also helped desperate individuals by making plastic spare parts which are not available in the market (such as photocopy machine gears, or wheels for gym equipment) thereby preventing their machines from becoming redundant. In his home-cum-makeshift workshop, if not engrossed in innovations, he is busy in the repairing work of local machines brought in by his neighbours, friends and relatives or fabrication of small plastic equipment. He has this exceptional inborn talent to identify the fault of the machine in just a look. This he considers a God-given gift and so he does not charge the people who come to him to get their gas stoves, radios, TV, lighter, torches, table clocks, umbrellas, etc., repaired, unless there is a component to be replaced.

In a place where kinship and personal relationships count more than anything else, his absence at social functions never calls for a reprimand. Initially, his neighbors considered him mad, but soon they realized his caliber and their perceptions changed when he had many government officials visiting him and he got some grant to work on his innovations.

Manihar has been single-mindedly pursuing his passion, which at many times, is quite inspiring for other people. His mind is continuously buzzing with new ideas and his eyes are always on the lookout for problems, which he can engage his mind with.

National First – Plant Variety Scout: Direct

Sitara Sringar – an improved mustard variety

Hukam Singh Lodha
Bharatpur, Rajasthan

Sixty two years old Hukam Singh, a progressive farmer from Bharatpur, has developed a high yielding improved variety of mustard through natural hybridization. The variety has high oil content as well.

Background

After completing his class 10th studies, Hukam Singh started traditional farming using bullocks and conventional farming tools in his father's farm. After a few years, when he trained at the Farmers' training Center, Bharatpur, his interest in modern agricultural techniques and tools started to grow. He then started visiting exhibitions, agricultural fairs and training centers. His interest in developing an improved variety of mustard developed after one such visit to Mustard Research Center, Bharatpur. He is known as an innovative and progressive farmer in his village and around. Apart from his wife and two daughters, he has four sons in his family.

Genesis

Hukam Singh was growing locally popular mustard (*Brassica juncea*) variety in his field, which had small seeds, yellow flowers and jointed siliqua. He was also growing *sengri* (*Raphanus sativus*), which had bold seeds, robust stem and siliqua. The mustard variety was tolerant to water logging and had good plant height with appressed siliqua angle.

In 2005, he sowed the seeds of both the crops in alternate rows. He then harvested seeds from plants selected on the basis of plant height, tolerance to water logging, pod shattering and alternaria leaf blight disease for the next sowing. He continued the process for three years. In 2010, he found that the desirable characters were stable. Sitara Sringar thus got developed as a result of natural hybridization. Hukam Singh started multiplying the seeds in sufficient quantity thereafter.

Improved Mustard Variety

Sitara Srangar is an improved variety developed through natural hybridization from Sengri (*Raphanus ssativus*) and local variety of Sarso (*Brassica juncea*) followed by selection.

The salient feature of the variety are high yield (30 - 35q/ha), high oil content (42%), tolerance to pods shattering, water logging and Alternaria leaf blight. The variety takes about 120-130 days to mature. It also performs well in saline water.

The verification of the variety was conducted at Rajasthan Agricultural Research Institute, Jaipur where Sitara Sringar was found significantly superior over all check varieties in terms of seeds yield, primary and secondary branches and highest test weight.The variety has been registered under PPV&FR Act 2001. He has now distributed the seeds to a number of farmers of Bharatpur, Dholpur, Alwar and Dausa districts of Rajasthan. The variety is well known for its performance in Bharatpur and surrounding region.

Recognition, Other Interests and Plan Ahead

For his efforts Hukam Singh received an award from Maharana Pratap University of Agriculture and Technology, Udaipur at the hands of the President of India and during Kisan Divas celebration at Haryana Agriculture University, Hissar, both in 2010.

He has been harvesting rain water for the last thirty years and trains people in doing so as well. He also undertakes social activities like building/ repairing bore wells, building underground tanks for rain water harvesting. He has also adopted 20 malnourished children from disadvantageous background and is taking care of their dietary and other needs. He also provides mineral mixture, dewormer, and topical medicines for ectoparasite to livestock owners at subsidized rates.

National Second – Agricultural Engineering Scout: Direct

Compost maker for mushroom cultivation

Jeetender Mallik
Panipat, Haryana

Jeetender Mallik (37) is a young farmer who has developed a compost making machine for mushroom cultivation to address labour shortage issues. This machine can properly turn and mix the compost, remove lumps and add moisture to it as well as a result good quality compost can be prepared in lesser time.

Background

The village Seenkh, where Jeetender lives, is the border village between Panipat and Jind districts and is predominantly agriculture based. Most of the people grow wheat, paddy, maize and sugarcane. Theirs is the only family undertaking mushroom cultivation in the entire village and nearby areas. Jeetender has studied upto class 10th and has been engaged in agriculture ever since. He lives in a joint family with his parents and three brothers and their family. He is married and has a daughter and a son. In his free time, Jeetender likes to play volleyball.

He played basketball as a school student and won a few awards as well. As a child he was not much into studies but sports. His mother recalls that he used to break the toys given to him by her to see what was inside and how it worked. His parents wanted him to study like his brothers but he was totally disinterested. He started experimenting with machines when he became a full time mushroom cultivator and felt the need of making machines for his work. Apart from the mushroom compost making machine, he has also made a sieve for casing soil for mushroom cultivation and a manual drill to make holes for putting bamboos for erecting bamboo shades.

Genesis

Jeetender started mushroom cultivation in 1996 after a visit to his maternal uncle in Himachal Pradesh where he saw mushroom being cultivated. He learnt the cultivation techniques there and came back and started

his work at his paternal farm. Low cost mushroom production technology involves the use of thatched houses erected on bamboo sticks drilled in the ground by making holes. The mushroom shed of 100 q compost capacity is erected by making 80 holes, which requires two man days. The quality of holes made by the labour remains uneven and stability of thatched house is comparatively less. In 2002, a bed of mushroom did not give good results as the bamboo stilts were not properly placed. This led Jeetender to develop a mobile electric motor operated hole digger, which has productivity equivalent to eight man hours and yields holes of even depth and diameter. This imparts greater stability to the thatched house which makes it possible to increase the spacing between two adjacent holes which further reduces the cost involved in the construction of a thatched mushroom shed. Later, in 2006, he also developed a simple machine for turning dry compost on the ground.

In 2008, while the compost for mushroom farming had been collected, labour shortage threatened to spoil it as it could not be processed. Jeetender realized that the compost should be mixed in time before it gets spoiled. Borrowing money from his brother, after some hits and trails he could develop a machine in a couple of weeks' time.

The Compost Making Machine for Mushroom

This is an electricity operated machine, which moves in a straight line cutting through compost heap, turning and mixing all material, adding moisture whenever required, and heaping it back in a line.

The innovator grows the white button mushroom variety whose season is September to March. Compost making and preparation of bed and shed (using bamboo) for cultivation are started in parallel. The material to be made into compost is mixed and spread in the field in rows about 4 feet wide and 4 feet high, it is continuously mixed and moisture added so that it does not dry. Each row needs to be turned/mixed 8-9 times with a gap of two days between each turning. The whole process takes about 28 days. The compost generally gets ready by the 7thturning/ mixing. The pH and moisture content is also monitored regularly.

The compost prepared needs to be moist but not sticky, just optimum.

The compost making machine has two motors, 10hp for rotating the blades and 2hp which powers rear wheels. It can cover a heap of 200 ft. in length, 4 feet width and 4 feet height in 25 minutes. Only one person is required to operate it. Towards the end of the heap, the machine has to be manually turned. The innovator claims that using this machine the production of mushroom is about 5-10 % more than that through conventional manual process.

The machine has several advantages. It can properly turn and mix the compost ensuring that no lumps remain in it. As a result, the incidence of disease (yellow mold) is also less. This machine can add moisture and fungicide as well to control diseases. It can be operated on both hard (*pakka* like cemented floor) and soft (*kachcha* like farmer's field) surface easily. Using the machine, the time required for compost preparation also gets reduced considerably.

He has made only one machine, there have been some mushroom farmers who have visited him to see his machine. While the ladies of the family do not know much about machine, his brothers have supported him in developing the machine and filing the patent. He plans to further improve it by incorporating a steering so that it can be turned easily at the end of the compost heap.

Considering his contribution to the mushroom industry in the country and Haryana in particular, the Directorate of Mushroom Research, Solan gave him the 'Progressive Mushroom Grower Award-2013' during the National Mushroom Mela, Solan.

National Second –Utility

Scout: GIAN West

Cotton wick making machine

Vijaybhai Solanki and Dipakbhai Vyas
Ahmedabad, Gujarat

Cotton wicks for diyas are mostly made by women using their hands manually. Though machines for making long cotton wicks are available however, there is no machine available for making cotton wicks with bulbous base. The innovators have developed a machine to automate the process of making round cotton wicks.

Background

Vijaybhai (45), a school dropout, had been a television and radio mechanic at Veraval. Not being able to earn enough for sustenance, he shifted to Ahmedabad in search of better opportunities. He started working as skilled labour in a workshop and later also started providing tiffin services to augment his income. While working as a mechanic he came in touch with Dipakbhai (44) who hails from Rajkot and has been in the business of cotton wicks making since the age of 18 years. His father was an ayurvedic doctor. The fifth among seven siblings Dipakbhai could only get basic education. He is now settled in Ahmedabad with his family.

Genesis

As a teenager, Dipakbhai saw a person selling cotton wicks on his bicycle. He inquired about the prospects of the business and availability of raw materials. He got interested and purchased the raw material from the market, made some wicks and sold them. This he did for a few days and then realised alone he would not be able to earn much money. He then went from door to door inquiring with ladies if they wanted to earn some income by making wicks from the raw material provided by him. Many of them agreed and he thus expanded his business. However, many other traders engaged the women trained by him by offering higher rates. Dipakbhai returned to his village and trained ladies there in cotton wick making. He used to fill the cotton wick packets in a gunny bag and bring to

the city for selling. He identified many wholesale and retailers for selling his wicks. He also moved around on a bicycle selling them himself. To explore possibilities of business he went to nearby states Rajasthan and Madhya Pradesh as well.

With time he realised that there was only one kind of cotton wick being sold in the market, the long ones. He started trying to make wicks in different shapes and sizes for different use. Once successful, he trained the women working with him as well. When his business became successful, he started exploring ways to scale up. Being a trader, he realized the supply constraint in a highly demand driven market. He further observed that this mismatch existed due to unavailability of machines for making round cotton wicks unlike the once available for long cotton wick.He realised that instead of manually making the wicks, if one could use a machine, it would improve productivity. This will help women earn more money for their effort and reduce the drudgery in the process as well. But he did not have any idea about making the machine.

He shared his concern with his friend Vijaybhai, whose creative mind instinctively accepted this opportunity as a challenge. He left his job and started to dedicate his time working on the machine. Since he had given up his job, Dipakbhai started giving him sustenance allowance so that he could indulge in research for the machine. Both started work on the cotton wick making machine. While Vijaybhai continued his research during the day, Dipakbhai went around selling the cotton wicks. In the night both of them used to sit together to discuss the progress and way forward.

However, even after multiple efforts they failed to develop even the basic mechanism. Once going to work on a rainy day in an auto, Vijaybhai noticed the wiper on its windshield. It struck to him that the same mechanism could be incorporated in their machine. The idea progressed by finance was the other issue. With not much available with them, they had to borrow money on high interest rates from lenders. The lack of mentoring and limited resources delayed the process of development for almost four years with expenses mounting to almost five lakh. They mention that during the phase of development they used to put up their 100 per cent effort with the output only being 10 per cent, which was very frustrating. In 2012, struggling to get resources, both of them had almost given up their project and stopped working on the innovation. Uncertainty of the demand in his tiffin service also

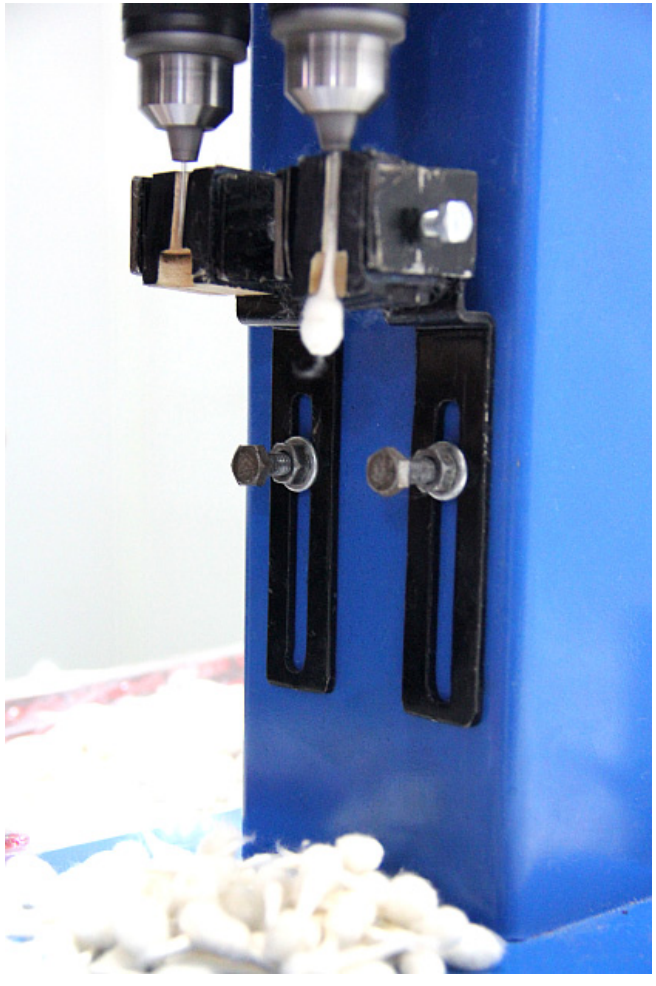
forced Vijaybhai to return to his native place. It was at this time GIAN West/NIF came into picture and provided them much needed financial, design and other technical inputs, mentoring and moral support to move ahead with further work.

The Cotton Wick Making Machine

This machine, which can make cotton wicks with a bulbous base, is available in two versions – semi automatic and automatic. In the automatic version, mechanism to drop the cotton wick has been incorporated.

Compared to the manual process where one can make only about 8 - 10 wicks per minute, this machine can produce 20 - 25 good quality wicks per minute. This is portable, affordable and easy to use machine, which has the potential to provide livelihood generation opportunities.A fully automatic version is also under development by GIAN/NIF in consultation with the innovators.

The duo has sold more than 100 machines in Ahmedabad and nearby regions. The users have opined that the machine is very simple to use and is affordable. It is also a very good technology based intervention for livelihood generation and provides income generation opportunity for rural and urban people and SHGs.



National Second - Engineering

Scout: SRISTI

Brick/Block making machine

Arjunbhai M. Paghdar
Keshod, Junagadh

Manually block/ brick making is a very laborious and time consuming process where mostly women and children are employed as workers. Arjunbhai has developed a block making machine, which has mechanized the process and improved efficiency.

Background

Arjunbhai (52) was born in an affluent family with his late father being the Nagarpalika Pramukh of Keshod. His father was an administrator and a social worker and earned a lot of social capital for his work. Arjunbhai has two brothers and four sisters; all of them are married and settled. His mother lives with his younger brother who is into construction business. Arjunbhai and his younger son live together while his wife lives with his elder son and his family. The younger son is also in the business of brick making like Arjunbhai while the elder one is in construction business.

As a naughty and mischievous child, Arjunbhai used to get reprimanded by his teachers and parents alike for his acts of mischief and disobedience. He was keen on tinkering with anything he could lay his hands on. Not able to pass class 12, he dropped out and started the manufacturing of box strapping machine in 1984 with the help of his father and a partner. With no local competitor, his business grew significantly however as local manufacturers started making the machine, business slowed down. He moved to Ahmedabad and continued his business however eventually returned back to Keshod after a few years and settled there.

Arjunbhai is not only an innovator; he is also good in sketching and poetry. He recalls that in school when the teacher turned to the blackboard, he used to start sketching anything that came to his mind in his notebook. He has also sketched the portraits of his father, mother and uncles in pencil. Among other

things, he has written a Gujarati poem where a person is complaining to God about the late rains with God replying back that it is a result of the misdeeds that man has done to nature. Apart from the brick/block making machine, he has also made a wood splitting machine, cow dung log & pot making machine and a mobile *chabootra* (bird feeding platform).

Genesis

During 2005-06 he purchased a JCB machine and two tractors trying to make foray into another sector. However, late payments, diesel theft by his staff, and the ban of stone digging at the Arabian Sea coast by the government, forced him to sell his machines and wrap up this business. But this short business stint was very useful as he learnt about hydraulics using his JCB machine, which led him to start working on a brick making machine in 2007. Brick making requires a number of labourers and much time. Generally women and children are employed in the brick making plant. The process includes breaking of soil lump manually by legs, mixing of soil, fly ash, lime and water and tightly packing the mixture in moulds. Sometimes, scarcity of labour and high demand of bricks creates operational problems. After a number of trials over a period of two years, and developing three versions of the machine, he could finally come up with the complete machine in 2009. He has been engaged in the business of making bricks and blocks using this machine ever since.

The Brick/Block Making Machine

The brick making machine can efficiently undertake all operations like soil lump breaking, raw material mixing and block/brick making.

The machine consists of three units, *viz.* material mixing unit, conveyor unit, and block moulding unit, which can make

approximately140-150 blocks (of size 15 x 9 x 7 inches) per hour. It can also be used for making conventional and interlocking bricks of different sizes by changing the mould. This machine eliminates the need to employ woman and child labour in the brick making process.

Among his other innovative works is ahydraulic wood splitting machine**,** which splits wood logs by dropping a vertically mounted hydraulic plunger having conical shaped tool at the bottom end. It is very useful in cutting big sized knots or joints in a log/ trunk, which otherwise are difficult to cut using an axe or a saw. The machine can split any width of trunk and height up to 3 feet. He donated one machine to the Keshod graveyard on the first death anniversary of his father. This machine has helped workers as splitting trunks can be done in minutes, which took hours earlier.

In Gujarat there is a traditional of making bird feeding platforms of various kinds, shapes and sizes. Using a waste plastic bottle and plastic tray, Arjunbhai has made a mobile bird feeding platform, which can be hung anywhere. The tray is set around the bottle, which is filled with seeds and has holes. The birds sit on the tray and punch the bottle by their beak releasing the seeds on the tray through the holes on the bottle, preventing wastage of seeds.Using his cow dung pot/log making machine is a manual machine that can be used to make pots or logs from cow dung. The logs are used as fuel while the pots are used in nursery replacing plastic bags.

Arjunbhai is a social innovator and has dedicated his life to come up with more innovations to solve the problem of common people.

National Second – Plant Variety Scout: Ranjay K Singh

***Surjeet Basmati 1*- High yielding and salt tolerant paddy variety**

Surjeet Singh
Karnal, Haryana

Surjeet Singh (62) is an innovative farmer who has developed a salt tolerant, high yielding paddy variety having long grain size through selection method.

Background

Surjeet Singh's district is well known for producing high quality aromatic basmati rice. Owning about eighteen acre of land with good irrigation facilities, he has been practicing agriculture for over four decades now. He is a farmer well-known in his region for his agricultural pursuits. Surjeet wanted to complete his graduation in arts but got attracted to agriculture and dropped out. His wife and their two sons have been supporting him in agriculture. The family owns modern agricultural tools and machineries and also have a cattle herd. Behind his home, he has leased a pond for pisciculture. With the help of the government subsidy, he has also installed a bio gas plant, which produces enough gas for their daily cooking requirements.

Genesis

Surjeet Singh has been growing wheat, rice, pea, mustard, potato, gram, chilli and tomato in his agricultural land. In 2008, he sowed the paddy variety Pusa 1460 in his field but due to sheath blight disease all plants got severely affected except one. He harvested the plant separately and prepared a nursery in 2009, which was then transplanted in the main field. During harvesting he selected 225 plants based on the number of tillers, lengthy spikes and resistance to foot-rot disease (*Bakanae rog*), a major disease of basmati rice. The selection continued for another two years and the desirable characteristics slowly got stabled. The variety was named as *Surjeet Basmati-1.* He distributed the variety to ten farmers in Karnal district who appreciated it and mentioned that it performed well under saline and less fertile soil conditions.

The Paddy Variety

Surjeet Basmati 1 is a salt tolerant, high yielding paddy variety developed from the variety Pusa 1460 through selection.

This variety, which takes 125-135 days to mature, is high yielding (55-60q/ha) with recovery percentage of 67 %. At 11.16mm length, its grain size is also long. It is foot-rot and sheath blight resistant as well. This variety does not require any particular soil type for growth. The seeds of the variety are soaked in water for 24 hours, spread over a cemented platform and then covered with the jute bags. Water is sprinkled at regular intervals of time. As soon as the seeds sprout, they can be taken for growing in nursery beds. The optimum temperature range is between 35 – 40 degrees for sowing and the harvesting period is October - November. The variety fetches high market price as well due to its quality.

The characteristics of the variety were confirmed by the experiments conducted in sodic and saline stresses condition at Central Soil Salinity Research Institute (CSSRI), Karnal. Surjeet Singh has received certificate of honour from Haryana Agricultural University, Hisar and KVK, Bhiwani, Haryana. The application for registration of the variety has been filed at the PPV&FR Authority, Delhi.

National Second – Plant Variety

Scout: Peermade Development Society

Zion Mundi-Improved Black Pepper Variety

PG George
Idukki, Kerala

Farmer P.G George (63) has developed an improved variety of black pepper called Zion Mundi, which gives high yield even under shade conditions and is resistant to foot rot disease.

Background

Originally hailing from Kottayam, George could only study upto class 8th due to the lack of educational facilities in his locality and financial constraints of his family. Land for agriculture was a problem not only for him but also for his tribal community. They had to protest against the government demanding land entitlement for which teenager George was jailed briefly as well. His early life was a continuous struggle for survival. In late 1970s, he migrated to Idukki district after his marriage. With some money the couple had saved, George purchased an acre and a half land from community members and started preparing the land for agriculture.

He started planting cash crops such as rubber, black pepper, coffee, areca nut and coconut trees. Following conventional methods, George used chemical pesticides and fertilizers to get more earning from his farm. Overtime agricultural expenses started getting high while the yield started declining. The situation further got aggravated due to natural calamities. This led him to explore new avenues of farming to improve his condition. Gradually he adopted organic and natural methods, which have made him a successful farmer today. He lives with his wife, and their four children and their families. All of them stay together so that the farming activities can be very well taken care of.

Genesis

Black pepper is one of the major crops cultivated as an intercrop by George. He has grown several local and released varieties of black pepper. However, the yield has been an issue due to the shady conditions at his

farm. Moreover, he lost a number of crops to heavy monsoon and outbreak of foot-rot disease in 1985-86 and 1990. This made George to think about developing a black pepper variety, which gives high yield even in shade cultivation and which can resist the foot rot disease.

George noticed that two varieties *viz.* Thottamudi and Neelamundi could survive in the conditions. Thottamundi, also known as Arayakkodi is one of the major varieties being cultivated by the tribal groups in the locality. While Thottamundi was disease resistant, its yield was low. On the other hand, Neelamundi gave good yield but has poor resistance to diseases. For cross pollination, in 1990, George planted the two varieties together and collected seeds selectively for further propagation. Finally, after several rounds of propagation, he got the Zion Mundi variety in 1998-99. Zion refers to the place where God resides and Mundi has been taken from the name of the mother plant, Neelamundi.

The Black Pepper Variety

The Zion Mundi black pepper variety is high yielding, resistant to rot and exhibits its high yielding characters even under shade cultivation.

Apart from the high disease resistance, other features of the Zion Mundi variety include big size of the berries, long and uniform sized spikes, high recovery percentage etc. The length of the spikes is longer than the other varieties of black pepper. This variety gives high yield in the mixed crop plantation being cultivated organically. The flowering of Zion Mundi occurs after one year of propagation giving long spikes of 15-20 cm with more fruits (80-100). The recovery percentage is 46% with dry yield of 7 kg from a single vine and 7700 kg from a hectare. The appropriate time for harvesting of Zion Mundi variety is from the end of December to

the mid-January. George has sold the variety to more than 500 farmers all over Kerala who have good opinion about the variety. He believes that his innovations should benefit not only him and his family, but also other farmers of his state and elsewhere.

In his farm, he is also growing over 200 types of medicinal plants in addition to all the local varieties of different crops being cultivated by tribal groups. He specialises in mixed cropping system with the integration of all possible natural methods so less external input for farming is required.

George has also developed a black pepper tree by grafting Zion Mundi on Brazilian Thippali through 'Georgian method' and calls it 'Black pepper tree of Pulianmackal'. He has about a thousand of this black pepper tree. Apart from this, he has about 1500 plants of Zion Mundi growing over fruit trees as support. He has about 26 varieties of black pepper in his farm. He has also developed an innovative method of cultivating tapioca in shades without threat of rodents. It is claimed that using the innovative method of cultivation the yield is many times more than that obtained in normal way of cultivation in natural light. He has also developed a neem based formulation for pest control purposes.

Media has widely covered his work. Doordarshan, Jeevan TV, Reporter TV, and Goodness TV, All India Radio, have telecasted programs on Zion Mundi variety and his integrated farm. With a number of awards and recognition to his credit for his contributions to agriculture and organic farming, George continues to experiment in his farm and share the results with fellow farmers.

National Second - Veterinary

Scout: Direct

Herbal medication for respiratory distress in poultry

Shatadal Ghorai and Narugopal Ghorai (Community representatives)
Purba Medinipur, West Bengal

Respiratory distress is one of the fatal and infectious diseases among poultry. The affected birds show symptoms of sneezing, gasping and infection in bronchitis, which may lead to sudden death also. Shatadal Ghorai, and Narugopal Ghorai, both herbal healers, administer a herbal formulation to treat the medical condition in birds.

Shatadal Ghorai (55), a widow, has been practicing herbal medication since her teenage. Her husband was a daily wage labourer who died early leaving behind young children and family for her to take care of. She managed by doing odd tasks at times and receiving alms. She now lives with her son and his family. Her son is a daily wage van driver. Shatadalis not educated but has good knowledge of herbs, which she learnt from her father. Her father was an expert herbal healer who used to give medicines free of cost to the people.

In early 1970's, lot of chicken in her village died due to respiratory distress. She tried to cure them using herbs she had been using. The medication showed moderate results, Shatadal continued to work upon improving the method of preparation and got better results. She was thus able to help a number of poultry keepers. She has, since then, been using this particular medication to cure respiratory distress and for the same is recognized in her village and around. She does not charge any money for her services however sometimes people give her rice or paddy as token of their appreciation. She is very active in community and social work in her village. In 2013, she also actively participated in a regional workshop of poultry healers and other traditional knowledge holders at Purba Medinipur, which was organized by NIF.

Narugopal Ghorai (51) is a casual labourer from a nearby village and earns his living by traditional folk

songs. He stays with his wife, four sons and a daughter. He learned herbal medications from a Guru, whom he reveres a lot. He does not charge any money from people whom he administers herbal medicines however accepts if they give him voluntarily. He is helped by his wife and children in collection of the herbs and preparation of the medications. His desire is to help people with whatever knowledge and resources are available with him.

Respiratory distress is a virus borne infectious disease, which spreads very fast from one bird to another. Commonly known as Ranikhet disease (Newcastle disease), it is widespread all over India. The symptoms include watery discharge from nostrils, gasping, trembling, facial swelling, and sometimes twisting of the neck. Depending upon the severity of infection, mortality ranges between 10 to 80 per cent. Under the effect of the infection, adult laying birds decrease their feed and water consumption with considerable drop in egg production as well. This disease thus also poses a severe economic challenge for broiler and layer poultry industry. Further, backyard poultry farming is one important activity to avail balanced nutrition in most rural areas. Availability of modern drugs, and vaccination of small stocks affected with such conditions remains a great challenge.

Both Shatadal and Narugopal use a local herb (name withheld for IPR reasons) in combination with other herbs to prepare a medication to treat respiratory distress in birds. Medication is given orally twice or thrice in a day depending on severity of the condition. It is administrated until the affected birds get cured, generally within five days.

Detailed prior art search did not yield any report of the use of the particular local herb to treat respiratory distress among flocks.NIF facilitated the testing of the herbal formulation on some affected flocks in Nagpur region. The results revealed that there was significant increase in immunity against the Newcastle disease. The mortality also reduced considerably. In addition to protection against respiratory distress, the medication was also found to be effective against the bacterial infection caused by *E. coli* in poultry. NIF filed a patent in the name of the healers and is trying to commercialise the product, so that the benefit may reach the poultry farmers.

National Third – Agricultural Engineering Scout: Direct

Sugarcane Bud Planting Machine

Roshan Lal Vishwakarma
Narsinghpur, Madhya Pradesh

Sowing of sugarcane buds in field is laborious and time consuming. Not maintaining uniform distances between the buds and/or varying the depth while sowing manually, may result in less productivity. To address these problems, Roshan Lal (47), a prolific innovator from Mekh villager has developed a tractor operated sugarcane bud planter.

Background

The son of a farmer, Roshan Lal has evolved into a master craftsman and skilled technician. He repairs farm implements and equipment, and develops innovative machineries at his workshop in his house. Apart from his craft, he shares a passion for painting. His family consists of his wife and four children, two daughters and two sons.

After completing his schooling, he took admission in a graduate course in the Government College at Narsinghpur. Being the only son and with three sisters to marry off, he had to drop out midway to help his father in the farm. The creative streak in him expressed itself at a young age. When he was fourteen, he developed a gun that could fire matchsticks and scare away the monkeys from the fields. Some of his friends bought a couple of these guns and used them. In 1988, he purchased a sprinkler irrigation system for his farm. One day, someone stole one of the nozzles from the sprinkler. He could notice the drop in pressure only after sometime. He began thinking of ways by which he could have detected the leakage and the consequent fall in pressure earlier. Materializing his thoughts, he developed a valve connected with two-way switch and fitted it in the delivery line. Any damage or loss of nozzle created a pressure drop in the line, and this in turn, triggered the two way switch to turn the signaling bulb on.

In the same year, he worked further on the idea and developed a light weight coupler. With his naiveté and ignorance about Intellectual Property Rights, he disclosed this idea to a reputed manufacturing company. The company adopted the design in their sprinkler system without giving him any credit or royalty.

The next year, he redesigned the wooden plough, which is subject to much wear and tear and developed a durable metal plough. In 1990, he started working on a thresher. He modified the stud type drum, used primarily for wheat and fitted a rasp-bar type attachment to handle gram, peanut, barley, soybean and pigeon pea. He added an aspirator to clean the grains, added an extra fan to separate the accumulated crop feed and extended the chute to make the feeding safe. In 1996-97, he developed an automatic starter with timer for irrigation pumps after spending close to four years and Rs. 30,000. The unit allows the farmer to use it on rural power grids, which suffer from erratic supply and unavailability of three phases.

2004 was a very productive year where he did a number of things. He developed a miniature pressing iron measuring 1" ×1.5", which could be carried easily while traveling. Next, he extended the use of the sprinkler system and developed a fertilizer applicator, which could be coupled to the distribution line of the sprinkler. Fertilizer or pesticide could be mixed in the irrigation water by this attachment and dispersed in a standardized manner. The same year, he also developed an automatic temperature controller for the stationary engine, which cut the fuel supply after reaching 95°C temperature. He had been using it since then.

The next year, he started working on the problem of electrical theft. While people hooked up a line from existing consumers, the consumers were left with huge bills from unauthorized use and thefts. He developed a device with an overload detector, which could be fitted to the distributor controller on top of the electric pole. When someone tries to steal from that line, an indicator

and alarm goes off and supply to all the users on that line is interrupted. This can be set right only by authenticated users on the grid.

In 2006, Roshan lal developed three machines for the sugarcane farms. These machines were the sugarcane leaf stripper, set cutter and the bud chipper. The leaf stripper removed the leaves so that the marauding insects cannot lay their eggs on the leaves. He improvised the machines a number of times to get the optimum cutting action, reduced the number of flaps, and introduced curved blades with serrated edges after collecting feedback from the users. The sugarcane bud-chipper is a device used to efficiently chip off a piece of the sugarcane node. For this device he received a consolation award in NIF's Fifth National Awards in 2009. This technology has been taken up by Tata Agrico for marketing. Later in 2008, he developed a three-wheeler pesticide sprayer with a tank capacity of 60 liters and which can be pushed manually over the field. It covers more than one acre in an hour and is provided with 8 adjustable nozzles and has coverage of 4 meters.

Genesis

While marketing and promoting the sugarcane bud chipper, Roshanlal realized that in sugarcane farming, many drudgery related issues have remained unaddressed. He observed that farmers prefer to plant sugarcane buds directly inthe field manually, which is a cumbersome and time consuming process. Once the problem got identified, he started working on the solution. Initially he developed a manually dragged planter with one particular type of metering mechanism. He tried it in his field and when he obtained successful results, he converted the manually dragged version to a tractor mounted planter.

The Sugarcane Bud Planter

This is a tractor mounted sugarcane planter with a unique metering mechanism for planting sugarcane buds directly into the field.

As per claims the field capacity of the machine is 0.5 acre/ hour. Using this planter the plantation cost is estimated to reduce to about Rs 800/acre from about Rs 6000/acre using labour. The plant to plant sowing distance can also be adjusted according to the requirements. It can also be used for simultaneous application of fertilizer, pesticides or herbicides in the field. For this purpose, the machine is equipped with a sprayer pump.

The machine can also be used for intercropping along with sowing of sugarcane buds. Pulses, wheat, and peanuts can be planted in between two rows of sugarcane. Apart from these, the machine can also be used for planting potatoes. The machine becomes helpful for the farmers to overcome the scarcity of labourers in the peak season due to high work rate. The machine requires manpower only to fill the bud box whenever it gets empty.

National Third - Engineering

Scout: Palle Srujuna

Brick Making Machinea

K Chandrasekhar
Guntur, Andhra Pradesh

Chandrasekhar (53), a landless labour, who has worked in brick industry since his childhood has come up with a low cost manual operated brick making machine to reduce drudgery in the process.

Background

Chandrasekhar was born in a farm labourer's family. He had to drop out of school after class third due to a TB infection and never returned back. Poor financial conditions of his family necessitated him to work. Since then he has worked as an agricultural labourer, porter, and in brick making industry, where he has spent the longest period of time. Despite economic hardships, he has tried to be creative and innovative all his life. He has made a manually operated sugar cane crusher and manually operated neem oil extractor. He is married and has three children.

Genesis

In brick industry, the tasks are assigned on a gender basis. Men are engaged in bringing raw material while women are engaged in making bricks by sitting on a small piece of stone as a chair. Sitting in a squatting posture and working often causes exposure of women's body parts sometimes leading to harassment in a mixed gender working atmosphere. Witnessing many such occasions, Chandrasekhar decided to make a machine to reduce drudgery and to enable brick making without the requirement of sitting. He designed the machine without power requirement so that people do not have to rely on electricity for their work. Frequent power cuts in the villages would not have helped if it was an electricity operated machine.

Chandrasekhar recalls that in the initial stages of development of his innovation, there was no one to support him. Gradually his family realized the

significance of the machine and started to encourage him. However, he expresses disappointment at the response of the society for his initiatives. He tells that people suggested him to look for work to earn money rather than develop a machine. When he was able to make the machine, people still thought why a labour is trying to become a scientist and not do what he is supposed to do. Without any financial support from anyone, slowly he could manage to make a prototype of the brick making machine on his own. But then the bitterest experience of his life happened. The prototype was stolen by somebody. As he had put all his resources to make the prototype, he did not have any money left to make another one, making ends meet was already difficult. During this time, Chandrashekhar appreciates the support provided by Palle Srujuna, which was followed by support from NIF as well to develop the prototype.

The Brick Making Machine

This is a manual brick making machine, which has mechanised the process of moulding, removing excess mud and pressing enhancing the productivity.

This machine can be operated by standing thereby eliminating the requirement of continuous sitting in awkward position. The device has been designed in such a way that apart from reducing the drudgery, it can also increase the productivity to almost three times the conventional method. It can make fifty bricks at a time as compared to other brick making machines, which make 10-15 bricks at a time. In the conventional method, a team of 6 people can make 1500 bricks in 8 hours, which gives them earning of Rs. 1000-

1500. This machine also requires a team of 6 labourers for its operation however, high productivity of machine helps them to earn more income i.e. Rs.4000-5000 in 8 hours' time. Another social advantage of the machine is that due to its design, child labour cannot be involved, which is quite common in brick making industry.

The first prototype developed by him weighed about 300kg, which he has worked upon and reduced to 120kg in his second prototype. Chandrasekhar is still modifying the machine and trying to reduce weight and improve efficiency further so that it can then be given to people for their livelihood generation.

National Third - Energy

Scout: Swabhiman

Modified boiler based *mawa* maker

Subhash Ola
Alwar, Rajasthan

Mawa is an important milk product used to make sweets. It is traditionally prepared by boiling milk until it becomes semi-solid by heating it over firewood. Subhash Ola (35) has made modifications in the boiler of conventional *mawa* making machine making it energy efficient.

Background

Subhash hails from a farming family of Alwar and has three siblings. Though he was very good in studies, he had to drop out to assist his father. Apart from farming, his father also used to drill bore well. Subhash was initially engaged in bore well digging, then he took up farming and tried his hands at computer assembling as well. He married early and has two daughters and a son, all school students presently.

As a child, looking at the silencer of vehicles, he used to wonder whether the hot air emitted by silencer could be used in any way. He had deep interest in steam based technology. In class 8th he developed a small steam turbine of ½ kW where steam was recycled. The turbine could light a bulb of 6W. With time, his interest in steam technology grew further and he undertook more research on steam technology on his own. In 2000 he developed a 2 kW engine with a modified design. Later in 2013, he designed anefficient heat exchanger for exhaust steam of a steam engine and the feed water (economiser).

Genesis

Traditionally, *mawa* is being made in *kadai* on an open stove by burning fire wood. An improved technique for the commercial production of *mawa* is by making use of steam for heating milk. In place of direct flame heating, the wood is burned in the boiler and steam produced is distributed to a number of *kadais* fitted with steam jacket. After heating the milk, exhaust steam is collected at

bottom and condensed in open tank. As the systems are not properly fitted, a lot of steam escapes from various joints. These leakages reduce the efficiency of the system, which results in higher steam consumption, more wood consumption and also more of the water. As the water used in steam generation is normal (untreated) water, higher throughput of steam causes more scaling in boiler, further reducing the heat transfer efficiency and also the life of the boiler.

Subhash saw a boiler based *mawa* making machine at an industry in Jaipur. At that point of time, he was trying to design improved boilers. After interacting with the industry person he got perturbed by the amount of wood and water consumed to make *mawa*. The machine used over 100kg of wood and 4000lit of water to extract *mawa* from 100 lit of milk. It also consumedconsiderable amount of electricity for running chiller pump to condense the rejected steam, making the whole process very costly.

He started to improve the design of boiler in the *mawa* making machine and after almost ten years of hard work, he successfully developed the improved boiler based machine for making *mawa* in year 2009.

Modified Boiler based *Mawa* Maker

This is a *mawa* maker where the steam circuit (boiler, *kadai*, condenser, pipes) has been made as a closed leak proof design resulting in better fuel efficiency and minimal wastage.

The used steam is also fed to the boiler alongwith condensate water through gravity. The close circuit design stops leakages, thereby reducing the additional water requirement (reducing from 1ton per hour to few liters per hour). Also the wood consumption has reduced drasticallyusing redesigned boiler with horizontal fire tubes, preheating of air with flue gases, and recycling of the steam back to boiler without condensation. The water filled in the boiler can be continuously used for a long time unlike traditional *mawa* machines, where it has to be filled almost every half an hour.

Further to reduce human efforts, he has made the stirring operation automatic. In conventional practice of *mawa* making in *kadai*, continuous stirring is needed to prevent milk fat from sticking to the walls of container. For this, at least one person is needed at each *kadai*. Subhash has designed an automatic machine, which can process 10-12kg milk in a single batch with

mechanized stirring and unloading of the prepared *mawa*. The heating requirements are accomplished by steam supplied from a wood fired horizontal fire tube boiler in closed circuit. The boiler is supplied with preheated air (heated using flue gases) by a blower, which is connected via a pressure actuated switch. The automatic operation of the boiler and machine reduces the wood consumption per unit of *mawa* produced considerably, while saving labour costs. This concept can also be used for efficient heating in dairy & food processing, textiles, rubber, plastic industries.

Subhash is making machines with capacity ranging from 40 lit/h to 3000 lit/h (Costing Rs 60,000 to 10 lakh) depending on demand of customers. He has sold over 60 machines in different parts of North India.

In all his creative pursuits, his mother has been a continuous source of help though his father believed he was wasting money. Being in a joint family also helped as he never had the pressure to make ends meet. A couple of other people also helped him to file a patent and generate resource for his work.

National Third – Plant Variety

Scout: Peermade Development Society

Punnathanam Jathy – An Improved Nutmeg Variety

Varkey Thomman
Idukki, Kerala

Varkey Thomman (76), a progressive farmer from Idukki district has developed an extra-large nutmeg variety called Punnathanam Jathy through selection from a local variety.

Background

The youngest among seven siblings, Varkey grew up in an agricultural environment and studied till class seven in Kottayam district. Their family migrated to Idukki when he was about 14. The place they shifted to was a forest, with no roads, electricity or other basic facilities. Sometime in 1970s they got the legal rights to their lands by the government. Varkey had to start work at an early age, helping his father and other siblings. They cleared an area of forest for cultivation and started with banana, tapioca and (non-flooding) paddy cultivation. Couple of years later, they shifted from paddy to areca nut, coconut, black pepper etc. At that time, they were one of the first farmers cultivating the Karimunda variety of black pepper at a large scale (approximately 4000 plants). Nutmeg cultivation was started with some 4-5 saplings brought from their native place. Once the yield got better, more area was brought under nutmeg cultivation. Initially, kernels were used for propagation to selectively develop improved varieties of nutmeg. With some experience, Varkey became independent farmer about 1960, got married and settled. Other siblings also settled nearby.

Genesis

About twenty years ago, Varkey Thomman developed the Punnathanam nutmeg variety from the local varieties he brought to Idukki from his grandfather's farm in their native place. This was achieved through years of observation and experiments. He developed the improved variety through several rounds of propagation through nutmeg kernels. At present he has about 120-125 plants of fruiting period.

The Nutmeg Variety

Punnathanam Jathy is an extra-large nutmeg variety developed in 1994 through selection from a local variety and further multiplied by budding.

The variety gives nutmegs of extra-large size (4.5 cm long & 3 cm wide). A full bearing Punnathanam Jathy tree gives an average of 3000 fruits/tree/year and the weight of 50 dry fruits is 1kg & weight of 250 dry maces is 1 kg . There is comparatively less breakage of fruits and the variety is tolerant to pests. The variety is being cultivated organically and requires less maintenance.

Indian Institute of Spices Research, Calicut, Kerala & Krishi Vigyan Kendra, Idukki, Kerala confirmed the extra-large size of fruits & nuts, high yield, dark red mace with fully covered seed and tolerance to pests. It has upright growing habit. The variety has already been diffused to Idukki, Ernakulum, Kottayam and Trivandram districts of Kerala with over 500 saplings being sold.

Varkey has a small nursery of Punnathanam Jathy started about three years ago. The saplings developed from the kernels include both male and female ones. It is his special skill which enables him to select the female samplings, which he sells, by visual selection. Varkey says that he is the only one farmer in the locality who sells the saplings raised from kernels. He prefers kernel-raised saplings over budded ones because he claims that the kernel-raised trees live longer, even more than 90 years with good yield.

Apart from nutmeg, he cultivates black pepper, cocoa and cardamom. He completely follows organic methods for all the crops and uses a special mixture of fertilizer called *jaivamrutham*. Even in his late 70s, Varkey is still quite active in his farm and feels happy about his life as a farmer. For his contributions in agriculture, he has received recognition at various levels and his work has been published in vernacular newspapers and periodicals.

National Third – Human health

Scout: SRISTI

Herbal medication for Diabetes

Bhikhiben Prahladbhai Bajaniya (Community Representative)
Ahmedabad, Gujarat

Diabetes is a condition in which the glucose level in the blood increases more than the normal level.As per the Diabetes Atlas 2013, India ranks second in the world in terms of the most number of diabetic people. Bhikhiben Prahaladbhai Bajaniya (47)has developed a medication to treatdiabetes.

Bhikhiben is a housewife; she takes care of household jobs and assists her husband in agricultural activities. She is also associated with local anganwadi. Her husband has six bigha of agricultural land. The couple has two sons and three daughters.Allthe daughters and one son is married while the younger son is studying in tenth. Bikhiben has an inclination for social service and is always ready to help others in need. Her husband is also very supportive of her.

About a decade or ago she was diagnosed with diabetes. Bikhiben got really scared as someone told her that it was a fatal and an incurable disease. She consulted her family who suggested going for allopathic treatment. As she was aware that allopathic treatment has its own share of side effects, she got further worried and decided to opt for an alternative treatment. While discussing with her family members, she came to know about a herbal medication used by her paternal aunt late Siviben Karsanbhai Bajaniya. While the knowledge about the medication was available, there was no one to actually confirm that the medication worked. Despite opposition from her family, Bikhiben decided to go ahead.

She tried the herbal medicationand found her condition to improve within a month. She continued using it and controlled her diabetes considerably. She then started giving the medication to others as well. Many people have benefitted from her medications.

In the diabetic condition, body fails to produce enough insulin or cannot use insulin effectively.This causes

glucose levels in the blood to rise, leading to symptoms such as increased urination, extreme thirst, and unexplained weight loss, etc.

Depending upon the medical condition, Bhikhiben administers 25-100g seeds of a local herb (name withheld due to IP reasons) orally with water once a day for a period of one month initially. NIF facilitated the validation of her practice for anti-diabetic claim at Shri B V Patel Pharmaceutical Education and Research Development Centre, Ahmedabad. It was observed during the tests that the animals treated with the medication showed significant reduction in blood glucose level as compared to the diseased control. No other changes were observed in biochemical, physiological and behavioral parameters at the given dose, which confirms the safety of the drug. Further research will be facilitated ensuring all mandatory provisions/ requirements are fulfilled.

National Third – Human health

Scout: CRSD

Herbal medication for Diabetes

Thakor Makvana Panchabhai Virabhai (Community Representative)
Patan, Gujarat

Diabetes is condition where the blood sugar level remains high for a prolonged period of time. Thakor Makvana Panchabhai Virabhai (80) is aherbal practitioner who has developed a herbal formulation to treat diabetes.

Panchabhai Virabhai was born in an agricultural labourer's family in Banaskantha district. His family had migrated to their present place of stay in Patan district when he was 17years old. Through his hard work, Panchabhai has been able to own ten bigha of agricultural land now, which he maintains with the help of his sons. Of late he has been taking off from agricultural activities and concentrating more on herbal medications, where his family especially grandchildren also assist, both in collection of herbs and preparing the medication.

About two decades back, Panchabhai recalls, a friend of his approached him with problem of frequent urination, increased thirst and weakness. As he had knowledge about herbs and their uses, he prepared a medication, which was not too effective. He tried many combinations and after a few modifications was able to prepare a herbal formulation, which could control the condition. When the news spread, many people with similar symptoms started to come to take his advice and medicine. Over the years he claims to have treated hundreds of people using the formulation. He does not charge any money for the medicine and considers it as a service to humanity. His wife, till she was alive, helped and supported him in preparing the medicine. Now he is assisted by other family members in doing so. He feels that his medicine should be tested and incorporated in the formal medicinal system so that maximum people can be benefitted.

Diabetes is a metabolic disease where the person has high blood glucose level. This may either be due to inadequate insulin production, or due to the body cells not responding properly to insulin, or both. People with high blood glucose level have the urge to urinate frequently, feel thirsty and hungry. Panchabhai Virabhai administers the extract of a local herb (name withheld due to IP reasons) with water to diabetic patients twice a day till he gets cured. Generally, if the condition is not in advance stage, relief is obtained within a month or two.

NIF facilitated the validation of the herbal medication at the Shri B V Patel Pharmaceutical Education and Research Development Centre, Ahmedabad. During the tests, it was observed that the animals treated with the herbal medication showed significant reduction in the blood glucose level when compared to the diseased control. No other changes observed in biochemical, physiological and behavioral parameters at the given dose, which confirms the safety of the drug. Further research will be facilitated ensuring all mandatory provisions/ requirements are fulfilled.

National Third - Veterinary

Scout: SRISTI

Herbal medication for curing mastitis

Becharbhai Samantbhai Devgania
Amreli, Gujarat

Becharbhai (62) is a farmer and native of the village Hadida in Amreli district. He has been herbal practitioner and has developed a useful cure for mastitis, common problem in cattle.

He studied up to class fourth and thereafter started helping his father in agricultural activities. Presently, he has nine acres of agricultural land and some cattle head. All his nine children are married and settled. Becharbhai is soft-spoken and a generous person. He likes animals and spending time with them. He suggests everyone to take good care of their animals as they cannot communicate their feelings like humans do. He also has interest in herbal medications and keeps experimenting.

Many years back, he saw one of his cows feeling restless and uneasy. While milking her he observed swelling of the udder and a watery discharge instead of milk. He discussed with other villagers and came to know that it was a common condition affecting many animals in the village but they did not have any solution. He carefully observed and realized that one of the reasons for the infection may have been the unhygienic conditions in which the cattle are kept. Further he started experimenting with various herbs and tried to develop a lotion/ ointment, which can help control the infection. With some observation based trial and error, he was able to make anherbal paste, which could treat the condition. He then also gave the medicine to others who needed it.

While he was experimenting with different herbs fellow villagers made a lot of fun of him. His family and a friend Manjibhai supported him as he was trying something, which would not only help him but all others as well. Becharbhai's experimentation has not

stopped and he keeps on looking for herbal solutions for various ailments.

Mastitis is an inflammation caused by bacterial infection in udder, which results in an increase in blood proteins and white blood cells in the mammary tissue. This also results in loss of milk output and damage to tissue. The disease may become fatal if the infection spreads to the blood and when medication gets much delayed. Becharbhai uses the paste of the leaves of a local plant along with moist black soil and salt. This is applied topically over the udder twice daily until the condition improves. The medication generally shows its positive effect in a couple of daysbut if the condition is severethen it might take about a week to get completely cured.

The herbal formulation was tested for its efficacy at the College of Veterinary Science, Jammu, Jammu and Kashmir. The results revealed significant positive effects of the medication in the infected animals *viz.* decrease somatic cell count, change of milk colour and consistency, normalization of the inflammation. Further, it was also tested on farm animals in the villages of Gandhinagar, Gujarat and found to be effective.

National Third – Veterinary

Scout: Direct

Herbal medication for curing bloat in animals

Sukhdev Rai and Kailash Mistry (Community Representatives)
Sitamarhi and Paschim Champaran, Bihar

Bloat is the buildup of gas in the rumen of cattle. It is produced as a part of the normal digestive process and is released by belching. However, it may become discomforting and sometimes life threatening for animals. Sukhdev Rai and Kailash Mistry administer herbal medicines for treating bloat in animals.

Background

Sukhdev Rai (70) is a poor farmer. His struggles in life started with the death of his father when he was ten years old and have continued till date. In order to supplement his income he also rears cattle. His sons work in cities as daily wagers while his wife helps him in agriculture and cattle rearing. The only resource he is rich in is knowledge, Sukhdev mentions, crediting his guru from a nearby district for the same. He is a well-known herbal healer and people from nearby areas also come to him for medicine and advice. He believes that what he has learned in life should be passed on to the next generation hence he has trained three persons who administer herbal medications in different regions. The only condition stipulated by Sukhdev was they would only use the knowledge in the service of humanity and not for commercial gains.

Fourth child among six siblings, Kailash Mistry (50) was born in a goldsmith family. His father had a small jewelry shop where he also learned some ornamental work. He studied only up to the 7th standard and thereafter left studies to support the family financially. However, machines were where his heart was and not ornaments. His father was supportive and asked him to pursue the work he liked. He became a mechanic and currently works in a motorcycle workshop. He has his wife, four sons and two daughters in his family. His wife takes care of the household chores while he struggles to make ends meet. Kailash had a goat few years back, which fell sick one day with an enlarged

stomach. He recalled a treatment suggested by one of his acquaintance earlier and tried it. The medication worked well and his goat got relieved. He shared his experience with others also.

Bloat is a medical condition in which the stomach becomes overstretched by excessive gas content. This gas is generated as a result of the anaerobic microbial fermentation processes taking place in the rumen (front part of the stomach in ruminants). It is a serious medical condition and results in severe pain, mortality if not treated properly.Both the knowledge holders use the leaves of a local plant (name withheld due to IP reasons) to prepare the herbal medication. It is administered orally twice a day for two to three days by which the animal is expected to get cured.

The testing of the herbal formulations was facilitated by NIF at the Department of Clinical Veterinary Medicine, Nagpur Veterinary College, MAFSU, Nagpur. The results showed significant positive effects of the medicine, *viz.* decrease in abdominal girth and improved motility of rumen. NIF filed a patent in the name of the herbal healers and is now trying to identify channels for the diffusion of the medication.

State Award - Asom

Scout: Direct

Interlocking Brick Making Machine

Umesh Chandra Sarma
North Lakhimpur, Asom

Umesh Chandra (55), an innovator entrepreneur from North Lakhimpur, has developed interlocking bricks and a machine to make the bricks. These bricks facilitate faster and cheaper construction due to the interlocking design, which further reduces consumption of mortar and requirement of skilled labors.

Background

Umesh is one such person whose strong will to own a home despite financial constraints led him to first develop a new kind of interlocking bricks and then a machine for making those bricks. Only class tenth pass, Umesh makes his living by selling stone chips, construction sand, cement etc. Now a considerable part of his total earning comes from selling his innovative product. In his family he has his wife and two sons, who are school students.

Genesis

To fulfill the aspirations of his family, Umesh decided to build a *pucca* house. As the work progressed he had to face a lot of difficulties in dealing with the masons. Hiring them was not only expensive but also very erratic as they often went out to look for better paying work even while engaged here. After having a bitter experience of dealing with masons, he started thinking of a way to make brick construction without the help of masons.

After a long trial and error process, he developed different designs of interlocking bricks and then zeroed down on a particular design. The utility of the interlocking bricks is that it facilitates construction even by unskilled labor, reduces consumption of mortar, labor and construction time. Umesh developed interlocking bricks using concrete, cement and sand mixed with water. The interlocking was achieved by projections and depressions in the blocks on the upper and lower faces of the brick. To produce a few bricks was easy but to make thousands of them to build a

house was difficult hence he looked around for various kinds of machines available. As per day production of interlocking bricks by manual production method was limited, the supply was also inadequate. This limitation inspired the innovator to develop a machine for making interlocking bricks so that efficiency of production increases.

Interlocking Brick Making Machine

The interlocking brick making machine consists of a brick forming mould and a vibration unit mounted on a chassis. The machine can make 44 bricks at a time in a cycle of 20 minutes. Not requiring a hydraulic press, this machine can make normal bricks as well by simply changing the mould. Occupying about 50 cubic feet (4"x5"x2.5") of space, this machine is a compact unit and weighs about 600 kg. The interlocking brick produced has the same dimension as that of normal brick (2.5" ´ 4" ´ 9").

The machines available in the market are electricity operated and have a cycle of 19 seconds producing 4-8 bricks. These machines cost upward of Rs. 10, 00, 000 while the one of Umesh is less than one – fourth the price. He has made a couple of such machines and sold one of them. He is presently working to reduce the cycle time to improve the per day output.

The use of interlocking bricks has a lot of advantages. Unlike in other brick constructions, there is no bonding of the bricks using mortars except at the base and top of the wall constructed. After reaching the desired height of a wall, a lintel is placed on top of the wall.

This not only strengthens the wall but also prevents any possible lateral movement of the interlocked bricks. These self-aligning interlocking bricks enable automated speedy construction, substantial reduction in the consumption of mortar during construction and a huge reduction in labor cost.

Umesh has constructed his house and also his neighbor's compound wall using the interlocking bricks. The innovator has also received enquiries from the district administration for making rural roads using the interlocking bricks. Beside this NIF has also received interests for setting up an interlocking brick making units in rural areas.

State Award - Jammu and Kashmir Scout: Direct

Kashmiri Gas Samovar

Shazia Jan
Kulgam, Jammu and Kashmir

'Samovar' is the traditional Kashmiri kettle used to brew, boil and serve tea and uses coal as fuel. Shazia Jan (24), a young Kashmiri innovator,has come up with an innovative modification in traditional Kashmiri samovar enabling it to use LPG as a fuel. The innovation not only enables people to prepare Kashmiri *namkeen* tea commonly known as *'noon-chai''* in a much easier, hygienic, attractive, rapid & innovative manner, but maintaining the culture of making itas well.

Background

Born in a farming family, Shazia is the youngest among four siblings. She dropped out of school early as the family's financial conditions did not permit her to continue her studies. She contributed to the daily chores of the household, helping in farming, even repairing electric switches, maintaining electric appliances, etc. Her father's new job as a peon eased out finances a bit in the meanwhile. Being a tinkerer himself, her father did not mind his children playing around with things. Her father's support later played a crucial role in giving direction to the idea of Shazia. As she was engaged in a variety of tasks during the day, she got exposed to a number of problems and challenges that one went through daily.

Genesis

Using the samovar at home to prepare tea and also carrying it to the field for her father and brother, she realized the problems associated with itshandling. Putting effort to place coal inside and airing it repeatedlyfor hours in order to get a cup of *namkeen* tea. While sipping tea with her family one day, an idea to use LPG in the samovar struck her mind. Conventional method of using coal is time consuming, causes irritation to eyes, produces lots of ash, causes black patches on hands & clothes etc. She immediately shared the idea with her father, who was shocked as

samovar was a traditional artefact being used since centuries and his daughter was suggesting changing a piece of culture. Convinced about her idea, Shazia wasted no time in sketching a rough diagram and explaining her father about a possible design and its functioning.

Convinced, her father agreed to support her in making it a reality. Though the concept was ready but there was no one to make modified burner & regulator that can be used in a samovar. Also instead of Shazia, her father used to discuss the concept with prospective gas mechanics who could not follow the exact requirements. Unable to find a suitable vendor to execute the task, Shazia went ahead on her own. It took her about a month's time and numerous attempts to come up with a curved burner, which could be used inside the samovar. The very next day, she went to a blacksmith with her father to get the burner fitted in the samovar. It was a proud moment for her to see her idea in reality for the first time. People got surprised when they first saw a samovar making tea without using coal and at the same time, water being boiled on it. The news spread quickly. GIAN Cell J&K, University of Kashmir noticed her work and took it further.

Kashmiri Gas Samovar

This is a modified version of traditional Kashmiri Samovar, which uses LPG as fuel instead of coal.

Shazia has modified the traditional Kashmiri Samovar by inserting a modified curved shaped gas burner inside the cylindrical shaped fire container. She has modified the size of the common regulator by replacing the inside nipple of it, so that it (regulator) would be convenient for the small gas cylinders. She has also added supports to the rim of the samovar so that one can place a container for cooking as well.

The working of the samovar remains exactly the same as that of the traditional one however the labour involved in handling coal and time involved in preparation of tea gets reduced drastically. Kashmiri Gas Samovar takes only 10 to 15 minutes to serve 25 cups of tea (as against 40-45 minutes doing it

traditionally) hence not only saves precious time but a lot of human effort as well without producing ash. Moreover, extra heat which got wasted in traditional samovar can also be utilized in this innovative gadget as external supports on the rim have been provided to hold utensils. While till tea gets prepared inside the samovar, one can place an extra utensil on the external supports and can boil water or milk, make rotis, etc.

She also particpated in the 101st Indian Science Congress respectively where technology received wide appreciation and coverage. Her innovation has also been popularized through various forms of media. NIF and GIAN Cell J&K have been trying to optimize the design by taking care of the safety aspects and considering the feedback received.

Plans Ahead

Shazia Jan further plans to reduce human effort in handling the samovar and wants to develop a modified lighter for ignition purpose of gas samovar. At least one samovar is there in every Kashmiri household and Shazia plans to make available her samovar for them so that it can benefit them. She is grateful to her family especially her father and to her husband for all the support they have provided to her. While the urge to do something new is main cause of her innovation, she further wishes to come up with more innovative ideas and puts her message across by inspiring belief;

"Agar Hasa Akh Problem Prath Kahe Nafar Panine Zindagi Manz Kar Solve
Dunyai Manz Hasa Roozi Kheen Ti Problem Yus Ni Hal Gachi"

(If every individual in his/her entire life solves at least one problem, one day will surely come when there will not exist any such problem in world that remains unsolved).

State Award - Karnataka

Scout: PRITVI

Low cost bore well Scanner

Girish Badragond
Bijapur/Bangalore, Karnataka

Water availability in the bore well is one of the major concerns to the farmers for irrigating their crops. Girish Badragond (35), an electric technician from Bijapur, has made a bore well scanner, with a number of advance features, to scan and explore the water availability in bore wells.

Background

Though Girish hails from an agricultural family, he always had a keen interest in making electronic and electrical gadgets. His father is a farmer but also has good knowledge in repairing electronic motors and vehicles. The youngest among five siblings, Girish has had the experience of repairing electronic gadgets, film projector as he helped his father since his school days. While in class 7, he started reading Electronicfor You (EFY Magazine), which made him understand electronic circuits. He started experimentation on the circuits and in1996, he made first project of IR sensor successfully. In 2005, he collaborated with friends for aroadlightsaver project. His friends invested in the project but due to some reasons, they withdrew their support and insisted Girish to return the investment in cash, which Girish was unable to do. He had to sell all his equipment to repaythem.

This pushed him to the brink of committing suicide. However, sanity prevailed and he realized that he could still use his mind to turn around the situation he was in. With backgroundinagriculture and knowledge of electronics;hestarted thinking of providing solutions to farmers.With time, he developed many automated agriculture products namely bird repeller, energy saver devices, automated irrigation devices using mobile and solar energy, borewell scanner etc. Girish also helps and assists school/ college students in designing and assembling the electronic projects for their science and

engineering project works. He got married in 2011 and has a son.

Genesis

Poor and sporadic rainfall in Bijapur in 2006 resulted in shortage of ground water. The bore wells failed to show any ground water. The farmers were in dilemma toinstall motor pumps or not at their bore wells. Girish tested the water presence manually at different places using manual soundreflection. Then he realized that there was need to see the problem from inside the dug bore well. He experimented with normal camera, but could not succeed. Then he looked out for solutions and found that the bore well scannersavailable are too expensive and not easily availablearound his place. He wanted to build up multifunctionaldevice, which can check stones blockages, water inflow and outflow direction. The device thatcould also withstand underground conditions like pressure, temperature and can be monitored it from remote place. This triggered him to design a bore well scanner system.

After many trials and failures, he could develop the first prototype bylate 2006. However, within an hour only while testing the device got damaged due to water. After few more trials, changes of components, modification in circuitry, improvements in design and casing, he finally developed his first successful prototype in July 2009. He started testing it atvarious bore wellsnear his village. His device worked wonderfully and soon he was scanning bore wells around his village, taluka and other places. Gradually he started providing his services to more than 300 customers spread across North and South Karnataka. While he expanded his work, he simultaneously kept on identifying the problems associated with his device and kept on improving.

The Bore Well Scanner

The bore well scanner is alow cost automated capsule shaped bore scanningdevice, which detects ground water availability, its pressure and temperature. In

addition to these features, it also measures inflow/ outflow rate and direction of ground water.

Borewell scanners are used to ascertain the depth, inflow and outflow of water, kind of water source and the borewell formation (structure and material around the bore). It helps farmers to make an informed decision about going ahead with the installation of motor/ pump and the kind of crop to be sown in particular season. This particular borewell scanner is equipped with a High Definition camera, digital compass, temperature and pressure sensors, flow and depth detector, GPS device and a LCD screen to display the assessment results. It weighs about 1.5 kg and can scan the bore well up to a depth of 600 feet.

Girish charges Rs 1500 for the servicesand the availability and status of water inside the borewell. Raichur University has also purchased one unit for its research purpose bore well scanners and study of underground water table. Central Ground Water Board, South Western Region in its communication to NIF has mentioned, "developed technology is very innovative and useful to common men at a very low cost. It is useful to know about the depth of well, depth of casing, water yielding zone/zones and depth of fractures, temperature etc." They have suggested improvement from an instrumentation point of view to refine it further.

State Award - Kerala

Scout: Peermade Development Society

Wireless electricity sensing machine

Rishikesh C S
Alappuzha, Kerala

A lot of accidents happen due to accidental exposure to high voltage/ electricity. To prevent such mishaps, Rishikesh (40) has developed a device capable of sensing an electric current of 11 kV from a distance of 11m. This device, which eliminates the need of climbing on electric poles, can also sense electric current in transformer and concealed wiring.

Background

Rishikesh was born in a farming family in a region famous for its back waters. His father was also a fisherman and later worked for State Water Transport Department as well. His mother is a homemaker while his sister also works in State Water Transport Department. During his high school days, he used to see his classmates playing radio/transistors. He used to wonder from where the voice was coming from and how? At home, he meddled with the transistor radio, which upset his mother as it was the only means of entertainment for the entire family. Once in school, he tried to tap a telephone line, by connecting to a speaker. While he was holding the wire, the phone rang, giving him an electric shock. Laughing at this silly incident, he says that was how he became hands on. Having a curious nature, he started casually reading electronic books, which went on to become a hobby and then a passion. A number of people also helped and guided him from time to time, which helped him understand the subject.

He opted for science stream in his pre-degree course but realized that electronics was only a chapter in Physics and started skipping his classes to attend degree classes in electronics. But this did not last long and left studies altogether to start his work of repairing electronic devices. He worked on electronic chokes, fused tubes, lighting circuits and services induction

cookers and security systems but the desire to do something different was on his mind always.

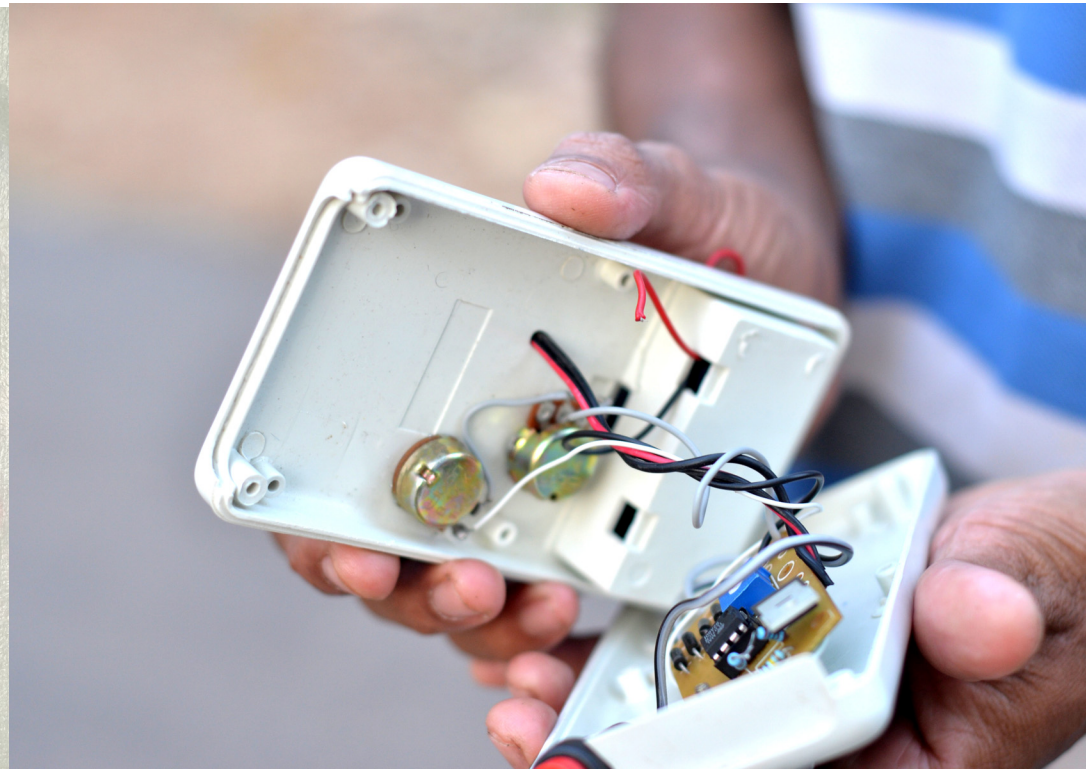
Wireless electricity sensing machine

The sudden demise of his friend who was a line man in state electricity board due to electric shock while working on 220V line (power which surged through 11kv feeder line), left him at aghast. It was then he thought of making a device, which could prevent such incidents in the future.

Conventionally, small testers are used for detecting electric current with direct human body contact. Rishikesh has come up with a handheld electricity sensing device, which is compact, portable and light in weight. This device is wireless and can sense electric current upto 11 KV from 11 meters away from ground. It can check electric current in transformers and concealed wires too.The device has been tested and certified by Kerala State Electricity Board.

He has been a crusader for the 'Save Energy Campaign' in his area. As a result of this campaign, a village, Muhamma, could boast of having received electricity 24 hours during a period when load shredding exercise was going on in entire Kerala. This was possible only because the villagers had been trained to use electricity judiciously. He organizes small camps on energy

conservation practices and conducts voluntary classes for police cadets, school children, and SHGs. He also participates in anti-drug campaigns. He is a good singer and likes to sing song when he is free. Rishikesh is currently developing a device, which will stop electric supply when a line would accidently be snapped.



Nutmeg Desheller

Consolation

Sachidanandan V R
Ernakulam, Kerala

Traditionally nutmeg is decorticated manually using a hammer or mechanically using a cracking hand tool. The dried seeds are cracked by tapping the end of the nuts with a small wooden mallet. Another method for shelling the nuts is to tip them onto a sloping cement floor from a height of three to four metres. This is a time and labour consuming process. Although decorticated nutmegs get almost double the price of whole nutmeg, it becomes uneconomical to decorticate the nutmeg when the cost, time and effort invested are considered.

Sachidanandan (72) has come up with an efficient desheller, which addresses these issues and reduces drudgery as well. This machine has the capacity of decorticating 75 kg nuts/h with about 90 % efficiency in two passes. Thus, providing farmers an opportunity for enhancing their income from nutmeg cultivation by about 40 – 50%.

He has been interested and involved in agricultural activities since his childhood. Wall painting, clay modelling, wood art etc. are some his other interests. In his life spanning over seven decades, Sachidanandan to his credit has over 50 different types of machines customised as per the requirements of the farmers and these include onion cutter, pulverizer, oil expeller, hydraulic screw press, ratchet press, *papad* making mixer machine, chip cutting machine, *etc.* and the list just goes on. Sachidanandan is a very down to earth person who wanted to help the ordinary people and farmers with his knowledge, experience and creativity.

Biba Fruit Shelling Machine

Sachin Subhash Jagtap
Jalgaon, Maharashtra

Biba/Bhilava (*Semecarpu sanacardium*) plant has medicinal properties, which are extremely beneficial in diseases like piles, colitis, diarrhoea, dyspepsia, ascites, tumors and worms. The shell of *biba* fruit is generally removed by hammering, but this causes infection in the hands of workers due to *biba* oil.

Sachin has made manual and automatic machines for processing of the *biba* fruit. In the manual machine, the fruit is kept in a container covered with transparent fibre glass. The force is applied through a hammer. One can process 150fruitsinan hour using this machine. The automatic version uses a chain based conveying mechanism tolift and put the fruit at the cutting section where it is cut by rotating blades. This machine running on a single phase motorcan shell about 400 *biba* fruits in an hour.

Power Operated Passive Weeder

Consolation

Kadivendi Mahipalchary
Warangal, Telangana

The weeder developed by the innovator is a self-propelled cultivator having passive tillage tool (reversible shovel type with tynes) where the operator needs to walk behind the machine. With an average coverage of 0.4-0.5 acre/h at average fuel consumption 0.5 lit/h, this weeder fills the gap between small tractor and draft animal operated tillage machinery. The can also be used for secondary tillage operation, sowing and applying fertilizer/insecticides apart from hoeing and weeding.

Tapioca slicing machine

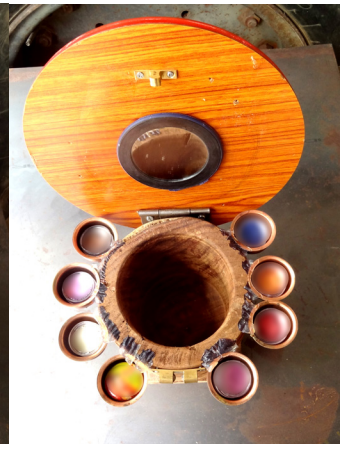
J R Dhanraj and K Mani
Namakkal, Tamil Nadu

The machine can make tapioca chips of variable thickness (2 mm – 25 mm). It can also be used to cut vegetable and fruits. It is capable of processing 200 kg/hr of tapioca and 100 kg/hr of vegetable and fruits. Being portable (50 kg in weight), it can be used for processing of raw material in the field itself. It can run on electricity, engine or can even be attached to a cycle or run by pedalling mechanism.

Multipurpose Kitchen Tool

Jasveer Kaur
Hanumangarh, Rajasthan

This versatile kitchen tool can be used to cut vegetables, make chapatti, store spices, etc. It is a wooden box with small containers attached to its periphery. These containers are used to store spices. The lid, which has a larger diameter, is used as a base to make *rotis*. A steel hollow rod, used to roll *rotis*, also has a cylinder cutter on one side and a wooden pounder on the other side.



Community Rice Cooker

H Paokholien Lhungdim
Churachandpur, Manipur

Cooking for community where food is to be prepared for hundreds of people sometimes becomes difficult. The innovator has developed a rice cooker where steam generated by boiling water in a drum is used to cook 25 kg of rice each in two different cookers. The cooking time for the first batch is an hour but reduces to 45 minutes in successive batches as water is already hot. This cooker is used in community functions to cook large quantities of rice. The innovation was scouted during the shodhyatra there.

Modified Hacksaw

Kapil Dev Thakur
Sitamarhi, Bihar

In normal hacksaws, the blades are tightened with the help of a wing nut/screw, which gets loose after some use. The innovator has fit the nut inside the frame of the hacksaw and the bolt inside the handle. The bolt of nut passes through the lower end of the frame to hold the blades. To tighten the blade one only has to rotate the handle as per the requirement.

Pappalu - pest tolerant cardamom variety

KV Paulose
Idukki, Kerala

This is a high yielding variety with an average yield of 2000-2500kg of dry weight of cardamom in a year per hectare. The variety registers 25% dry weight recovery and shows tolerance to thrips, stem borer, root grub and capsule rot. The panicles are long (130-147 cm), ovoid in shape and has higher seed per capsule. The variety exhibits early flowering than the parent plant and a longer cultivation period than the other varieties.

Kochukudy - Improved nutmeg variety

Consolation

Jose Mathew
Ernakulum, Kerala

The specific characteristics of the variety are high yield (4500- 5000fruits/tree), early bearing (3rd year) and coniferous shape, dark red mace and nut. It has bold nuts and thick mace with the average weight of 70 - 80 nuts and 450- 500 mace being about one kg.

Arjun variety of cardamom

Menuwin Thomas
Idukki, Kerala

The *Arjun* variety of cardamom is suitable for cultivation at high elevation area of about 3000 ft from sea level. It gives a dry yield of about 2000-3000kg/hectare. The variety is resistant to thrips and stem borer. About fifty percent of the capsules exhibits comparatively bigger size (10 mm length and 8 mm width) and the recovery percentage is also high.

HZKB-1 - Traditional brinjal variety

Consolation

Laxmibai Zulapi
Bagalkote, Karnataka

This traditional brinjal variety is suitable for growing in red soil under temperature of 26-30°C. The specific characteristics of the variety are: high yield (35-40 ton/ acre), big, round, glossy, dark purple colour and good taste.

Herbal Healing Traditions Consolation

The following traditional knowledg holders have also been recognised in the 8th Awards for their knowledge for the particular disease/ condition

Medication for anestrus

Nathabhai Waghajibhai Patel
Dahod, Gujarat

Medication for lactogogue

Prahallad Jala
Orissa

Medication for bloat

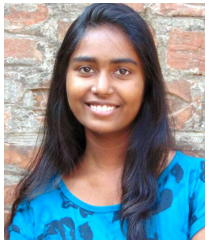
Naresh Ishwar Singh
Uttar Pradesh

Herbal treatment for high blood pressure

Badri Mahato
Bihar

Herbal treatment for high blood pressure

Abdul Rehman Sada
Jammu and Kashmir



Student Award

Modified Walker with Adjustable legs

Shalini Kumari
Patna, Bihar

It is quite difficult for old, physically challenged or person recuperating from lower limb problems to climb up or down stairs using conventional four leg walkers. Shalini, gave an idea to mechanically alter the height of the legs of the walker so that they can be adjusted as per the height of the stairs. The front legs of the walker can be raised while climbing up the stairs and lowered while climbing down. She has also thought of including a folding seat so that the user can rest for a while when required and fitted a horn and a light to it as well. NIF facilitated the transfer of technology to Kaviraa Solutions which will manufacture and market the product.

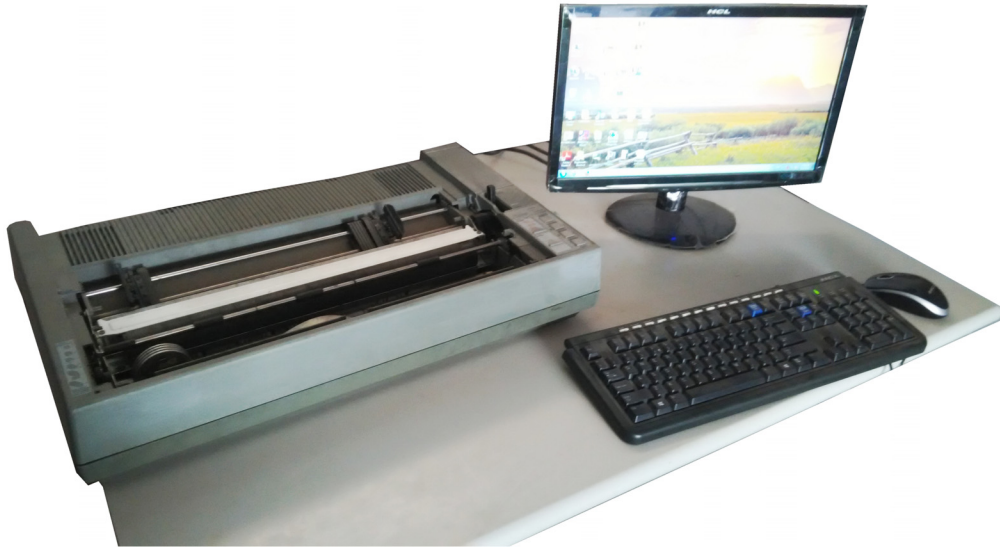
She loves to watch movies with her family and play cricket and badminton in free time. She also enjoys cooking, sketch, paint and dance. She is been training in Kathak dance for the last one and half years. Biology has been her favourite subject and she wants to become a doctor for which she has been preparing along with her regular school studies.

Student Award

Low Cost Braille Printer

Santokh Singh and Khushwant Rai
Jallandhar, Punjab

The low cost Braille printer developed by innovators is a modification in conventional dot matrix printer. The dot matrix printers have 9, 18 or 24 pins, which strike over the ink ribbon. This prints letters on a paper when pins strike over it. The paper is supported by a roller when letters are printed on it. By altering the size of the roller and removing the ink ribbon, the pins are made to strike the paper directly and give the desired impression.This innovation is very low cost as compared with Braille printers available in the market.



Both the friends once visited a blind school for a school project where they saw much of the printing work done manually, which was quite

time consuming. One of the teachers there asked them to see if anything could be done in this regard. They came back and did some background search and found that while Braille printers were available they were quite costly. Zeroing down on dot matrix printer, they decided to go ahead with their plans to develop a Braille printer of their own.

Khushwant has been fond of experimenting with electronic gadgets since his childhood and has developed gadgets like electronic stethoscope, water level indicators, LED displays, etc. He likes to play cricket and chess, do Java /C++ programming and surf the net. A budding poet, Khushwant wishes to be an astronaut and explore space. Currently he is enrolled in a degree course in electronic engineering.

Santokh is also pursuing his engineering course and wants to become an aeronautical engineer. Mathematics and Physics have been his favourite subjects. He likes to play football and volleyball and make friends. He is a spiritual person and likes being in the serene environment at the Golden Temple. He enjoys the company of his visually challenged friends. Both of them had participated in NIF's competition as school students.

Student Award

Use of Helmet as an Ignition Switch to Start Two Wheelers

SM Arthi, S Vinotha and Lailaa Banu
Thiruvarur, Tamil Nadu

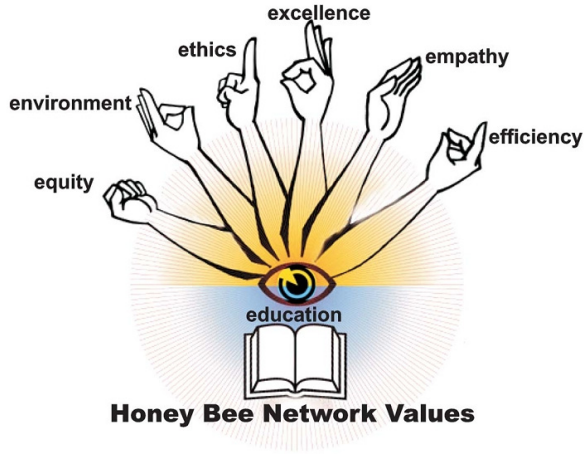
While there are laws preventing a two wheeler driver to ride without a helmet, yet many young people do not follow it properly. A lot of deaths in road accidents occur due to this. Arthi, Vinotha and Lailaa independently thought about this problem. The innovators wondered if the helmet is so useful and life saving, why it cannot be used to switch on theignition to start two wheelers. It effectively means that until the rider has worn the helmet, the vehicle would not start.

S Vinotha, who is presently pursuing graduation in science, wishes to be a civil servant and wants to serve the people. Specifically she wishes to improve public transport, health and hygiene system. She is a trained Bharatnatyam dancer, plays chess and participates in debates. She has a huge collection of motivational books and speeches of inspiring leaders, especially freedom fighters. Laila Banu is pursuing graduation in science specializing in Computer Science. She wants to become a software engineering after her post-graduation in IT. At school level, she had participated in chess and carom competitions and won prizes in quiz competitions. She is a nature lover and loves visiting serene beaches and hills. She is an artist and likes to watch television and read story books.

S M Arthi is pursuing Civil Engineering and has been a National Talent Search and has won the Rajya Purashkar Award2012 for her scout and guide activities. Her hobbies are to paint, make hand crafts and watch Discovery channel. She also likes reading classics like Othello. All the three of them had participated in NIF's competition as school students.


Pulsar

www.honeybee.org



National Innovation Foundation - India

Autonomous Body of Department of Science and Technology, Govt. of India
Satellite Complex, Prem Chand Nagar Road, Satellite
Ahmedabad 380015 Gujarat, India
Tel +91-79-2673 2456/2095 Fax +91-79-2673 1903, +91-11-43851803
Web www.nif.org.in Email info@nifindia.org

National Innovation Foundation - India
Satellite Complex, Premchand Nagar Road, Ahmedabad 380015 Gujarat
Web: www.nif.org.in Email: info@nifindia.org