

Wishing You a Happy New Year 2013!

From the Editor's Desk

Rural Technology Action Groups (RuTAGs) have been set up at various IITs at the inspiration and support of the Principal Scientific Advisor (PSA), Government of India to act as application oriented Research and Development (R&D) nuclei in order to provide much-needed Science and Technology (S&T) backup to promote potential technologies for rural entrepreneurs and users. Coordinated by the office of the PSA, these R&D groups are expected to scout for prospective technologies/systems useful for rural sector and needing some innovations/technical intervention to facilitate their widespread application.

In this sequence, RuTAG-IIT Delhi was initiated in the year 2009 and has been actively interacting with the field agencies and user-groups in the adjoining region including the states of Delhi, Rajasthan, UP and MP to contribute to the needful. It has been a highly educative and rewarding experience and we now feel that it will be useful to share the outcome and experiences of such an effort at a wider level among the faculty and students of technical institutions as well as the field agencies involved in S&T oriented development work in the rural area. Hence, we are starting this newsletter in the New Year. In the course of time, we intend to make it a regular quarterly feature for exchange of meaningful information in this context. It will also provide motivation to the students and faculty members of various technical institutions to increase their involvement towards such projects in collaboration with the field agencies.

Here, I wanted to share experiences of my students who worked for RuTAG projects. They were happy not only for doing something for their own society but also could solve some problems for the first time and see them implemented in real-life applications. Such experiences are not possible in many academic-oriented projects and could fetch them their dream jobs.

We shall be happy to receive any comment/suggestion on this newsletter. With warm greetings for the New Year!

(Prof. S. K. Saha)

Message from Principal Scientific Advisor (Govt. of India)

I am pleased to learn that RuTAG-IIT Delhi is bringing out a Newsletter on the activities under the RuTAG programme. Some of the achievements in technology up-gradation and delivery, both at IIT Delhi and other RuTAG centres, would be highlighted in the Newsletter which would help in disseminating the success stories to a larger audience. India's rapid growth demands both industrial and rural development.

I am sure that the Newsletter shall be well received by the field level S&T organisations and would further strengthen the interaction process between them and the knowledge institutions in the country.

I wish the effort all success.



(Dr. R. Chidambaram)

RuTAG: The Concept, Mechanism and Expectations

Maj. S. Chatterjee, Sr. Project Consultant

One of the areas of focus of the Office of the PSA is related to the development and dissemination of technologies for rural development. Though there are many entities interested in doing this, the spread of rural technology has been diffuse, uneven, slow, and its full potential for generating a rapid multiplier effect in rural economy has remained unrealized. The main constraint preventing advances in technologies for rural application from reaching most villages in India in full measure seems to be the lack of local technology action groups who can assist in assessment of current technology status and technology up-gradation needs of different rural occupation groups, i.e., farmers, rural artisans and the landless, to enable them to add value to their products and services. Rural Technology support is critical for realizing the vast potential of the Rural Farm and Non-farm Sectors.

Rural Technology Action Groups (RuTAGs), that could provide the mechanism and the support needed for this synergy, have, accordingly, been conceptualized. The programme is under implementation from 2003-04. RuTAG is a synergizing and catalyzing mechanism, and not a major funding mechanism. RuTAG has been conceived of as a mechanism to provide a higher level of S&T intervention and support. This intervention, which is essentially demand-driven, could be for bridging technology gaps, technology up-gradation, technology training and demonstration or through any other innovative method. RuTAG attempts to bring about a successful interface between the rural people and an institution of excellence through a field level S&T NGO.

RuTAG is an open platform innovation strategy. The technology delivery is mainly, though not exclusively, demand-driven. The PSA's office generally works with voluntary organisations led by scientists, or which have a large scientific component. All the RuTAG centres - seven so far - are centred in IITs; one each in Uttarakhand (IIT, Roorkee), Tamilnadu (IIT, Madras), North East (IIT, Guwahati), West Bengal (IIT, Kharagpur), Delhi (IIT, Delhi), Punjab (IIT, Ropar) and Mumbai (IIT, Bombay). The programme also draws upon the resources of other knowledge institutions.

So far a few very interesting demonstration and catalytic projects have been carried out to popularize the technologies developed.

Chairman's Column

IIT Delhi's Focus on R&D in Rural Technology and Rural Industrialization

Even though, IIT Delhi's involvement with RuTAG started only in 2009, there is a long history of application-oriented research activity in the area of rural technologies and Rural Industrialization at IIT Delhi. Realizing need for such an activity, a Centre for Rural Development and Technology (CRDT) was established at IIT Delhi nearly three decades ago and has been actively contributing to this multi-disciplinary R&D area in collaboration with several departments and centres of the institute. The broad work areas include the following:

- Rural Energy System
- Technologies for bio-mass production, conversion and utilization.
- Processing of food/natural products and food safety.
- Artisanal technology and traditional knowledge systems.

In the year 2001, IIT Delhi embarked on a unique collaborative project with Khadi and Village Industries Commission (KVIC) which continued for nearly eight years and resulted in the creation of a national institute called Mahatma Gandhi Institute of Rural Industrialization (MGIRI) at Wardha (Maharashtra) along with a network of about 13 technical interfaces located at various apex technical institutions of the country to provide a concerted thrust to innovative S&T backup for the rural industry sector. This project involved about 30-35 faculty members from CRDT, Mech. Eng. Dept. and other departments/centres who also contributed to the development of several new technologies for the rural entrepreneurs and their dissemination with the support of KVIC.

Rural industrialization was also recognised as one of the thrust areas for R&D by IIT Delhi about five years ago. We also have a Micro-model facility for pilot development and demonstration of the potential technologies and systems relevant to the rural sector. With this background, the RuTAG activity was a welcome addition in this direction. It has been our continuous effort to consolidate this network and make it more and more meaningful. The newly started RuTAG-IITD newsletter will be quite help in this process.

(Prof. R. R. Gaur)

RuTAG-IITD Core Group

| | |
|-------------------------|----------|
| Prof. R.R. Gaur: | Chairman |
| Maj. S. Chatterjee: | Member |
| Prof. Satyawati Sharma: | Member |
| Prof. M.R. Ravi: | Member |
| Prof. S.K. Saha: | Member |
| Prof. V.K. Vijay: | Member |

All Principal Investigators (PI) of ongoing projects:
Special Invitees

A Glance at Projects and Activities of RuTAG, IIT Delhi

Prof. R. Prasad, Project Coordinator

Completed Projects and Activities

1. Animal (Bullock) Driven Water Pump

Project Investigator: Prof. S.K. Saha, Mech. Eng. Dept., IIT Delhi
Collaborative Agency: M/s. Panchal Pumps and Systems, Kanpur

Domesticated animals are a holistic and natural resources for the rural economy and have been traditionally in use. However, the utilization of animal power has dwindled and pushed behind by the introduction of fossil-fuel/electricity in recent times. But for sustainable development of the rural sector it is essential that the animal power is efficiently harnessed to the maximum for this there is a strong need to develop appropriate technology. As a result of intense field interaction, two potential technologies vital for facilitating the use of animal powers were identified for further development, standardization, and wider dissemination.

Thus, the first project pertained to the evaluation, improvisation and standardization of a bullock-driven prime-mover coupled to a suitable water pump. For this, the basic design selected was the one developed by M/s. Panchal Pumps and Systems and Shri Vivek Chaturvedi, Kanpur (Fig. 1). The work included technical assessment, modification, and standardization of the gear box used for stepping up the speed (rpm) and connects it to an appropriate water pump. Adequate field testing was also done. This technology which is manufactured by M/s. Panchal Pumps and Systems, Kanpur has already been installed at several locations and also demonstrated in national exhibitions. It has been appreciated by Indian Council of Agricultural Research (ICAR), scientists and very much liked by small farmers who use bullocks. Now, strategies for its popularization are being considered. Also, further work on extending the use of this prime mover for variety of other rural application has also been taken up.



Fig. 1 Animal-driven water pump

2. Bullock-Driven Tractors

Project Investigator: Dr. S.V. Modak, Mech. Eng. Dept., IIT Delhi

The other project on facilitating the use of animal powers was focused on comparative evaluation of three prevalent designs of bullock-driven tractors (Fig. 2). As a result of this study, necessary modifications to make this device more user-friendly and field-worthy were suggested. Such a device has been found to be much more productive and convenient to use as compared to the conventional plough that can enhance the usability of bullocks.



Fig. 2 Bullock-driven tractor (Brahmpuri)

3. Biogas Engine Conversion Kit

Project Investigator: Prof. V.K. Vijay, CRDT, IIT Delhi;
Collaborative Agency: Govil Energy Solutions, Janakpuri, New Delhi

Bio-machination of all the available organic waste is becoming more and more popular for clean and sustainable development of biogas providing a valuable renewable fuel. However, to expedite this process in the field, it is also essential to introduce technology for proper utilization of bio-gas at large scale. One such technology is the engine conversion kit for converting



Fig. 3 Biogas engine conversion kit

the existing diesel engine used for variety of rural applications into bio-gas engines (Fig. 3).

Such conversion kit for smaller engines (upto 3-5 HP) had already been developed by IIT Delhi in collaboration with Dr. G. P. Govil of Govil Energy Solutions, New Delhi. This project was devoted

to develop suitable conversion kit, along with the governing mechanism for making available biogas engines in the power range upto 20 kW to cover the need of most of the rural applications. This technology is available with M/s. Govil Energy Solutions, New Delhi for wider dissemination.

4. Workshops Conducted

- One important activity under the RuTAG project is to conduct consultation workshop with the relevant NGOs, field agencies as well as the users' groups to identify appropriate projects for investigations in consonance with their actual needs and also to facilitate the dissemination of technological solution developed. The following salient workshops have been conducted so far:

- A national-level brain storming workshop was held on May 29-30, 2009 at IIT Delhi. It was attended by around 100 participants from different institutions and NGOs across the country, particularly from the neighbouring states. From the needs expressed, the first phase of projects was started.

- Regional Workshops: 1) The workshop for Rajasthan was held on Nov. 25, 2009 at Bharatpur which was attended by around 30 participants. The problems identified in this workshop are low cost garlic processing, milk chilling, chillies drying and biogas utilization, etc.; 2) The workshop for Madhya Pradesh was held on Mar. 26, 2010 with the support of Madhya Pradesh Council for Science and Technology (MPCoST), Bhopal and was attended by around 30 participants. The problems expressed are dehusking of minor millets, processing of Sisal fibres, and forest products such as Lac, Mahua, etc.; 3) The workshop for Uttar Pradesh was held during Sept. 14-15, 2011 at Deen Dayal Upadhyaya State Institute of Rural Development, Lucknow and was attended by around 60

participants. The main problems expressed are processing of food, milk, lac, forest products, use of animal power and biogas-based energy systems, decortication of Khumani, technology for Amla preservation and processing etc.; 4) Another regional workshop for Uttar Pradesh and Uttarakhand was held during Nov. 28-29, 2011 at Indo-Dutch Horticulture Technology Centre, Chaffi, Bheemtal, Nainital and was attended by around 25 participants. The main problem areas are food processing, renewable energy for green house/poly house, installation of ropeway, Panchgavya products, Micro-hydel, Bullock Driven Water Pump etc.; 5) Another regional workshop for Rajasthan was held on Dec. 26-27, 2011 at College of Technology and Engineering, Maharana Pratap University of Agriculture and Technology, Udaipur and was attended by around 60 participants. The areas identified for technical intervention are biogas related technology, fluoride in drinking water, low-cost equipment for milk processing, garlic processing, decorticator for Karanj seeds, etc.

- A consultation workshop on popularization and dissemination of potential rural technologies was held at IIT Delhi in September 2011, in collaboration with Vigyan Prasar, DST.

- A workshop on production and marketing of Organic Food products was held on Jan. 23, 2012 at IIT Delhi and was attended by 20 participants including organic farmers, certification agencies, traders, etc. The need for proper networking and facilitations among various stake holders was understood.

5. Management Development Programme for Rural Entrepreneurs



Fig. 4 Participants of the MD programme

Project Investigator: Dr. Vipul Jain, Mech. Eng. Dept., IIT Delhi

In the course of the interaction workshops mentioned above, the need for a suitable Management Development Programme for rural entrepreneurs and the persons working in NGOs and field agencies had been repeatedly highlighted. In response to this need, a special nine-day refresher programme was designed by RuTAG-IIT Delhi and was held from November 10-18, 2011. Thirty-three participants attended this programme which was highly appreciated. During this interaction, specific projects were identification related to their activities. There are frequent queries for repeating such a training programme.

A Recent Success Story: A Device for Making Tulsi Mala Beads

Project Investigator: Prof. S. K. Saha, Mech. Eng. Dept., IIT Delhi

A project recently completed pertains to the development of a simple device for making of Tulsi mala beads (Figs. 5-6) from the steams of Tulsi plants. This was carried out at the behest of Lupin Foundation, Bharatpur in response to the needs of a large cluster of self-help groups consisting of 400-500 rural women engaged in this task in the Brij area (Mathura, Brindavan, Bharatpur etc.). This low cost device has proved to be very helpful in reducing the drudgery and substantial enhancement of productivity and quality. This technology has been adopted by the users and has resulted in increasing their daily earning about three times. The device was demonstrated in Vatsalya Mela organised on November 15, 2012 at Delhi Haat by the Ministry of Women and Child Welfare, and highly appreciated. It was also demonstrated in National Fair-India Innovation Initiative, i3 2012 held in IIT Delhi on December 3, 2012.



Fig. 5 Existing

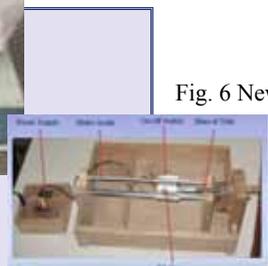


Fig. 6 New



Ongoing projects

1. A Testing-cum-training Facility for Ultra-micro Hydel Power Packages (under development at Micromodel at IIT Delhi), *Project Investigator:* Prof. P.M.V. Subbarao, Mech. Eng. Dept., IIT Delhi

A special testing facility for very small hydel turbines is under development at IIT Delhi through a RuTAG project. This facility (Fig. 7) will enable the testing and standardization of various ultra-micro hydel turbines including horizontal axis, vertical axis as well as pump operated as turbine (PAT), along with the associated loading equipment for the power package upto about 10 kW capacity. It will also be a valuable aid training of technical personnel/entrepreneurs. This project is likely to be completed by July, 2013.

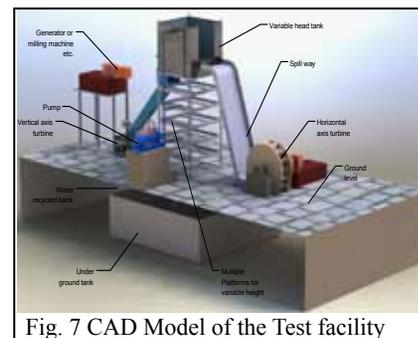


Fig. 7 CAD Model of the Test facility

2. Improvisation to Reduce Drudgery and Cost of Human-operated Treadle Pump for Irrigation, *Project Investigator:* Prof. S. K. Saha, Mech. Eng. Dept., IIT Delhi

Several variations of foot operated *Treadle Pumps* (Fig. 8) are being used and found very useful by farmers with small land holdings in regions where the water level is upto 10 meters. However the need for improving the design in order to reduce drudgery and cost and to increase the durability has been widely expressed. This project is being carried out in response to this need. This project is likely to be completed by April 2013.



Fig. 8 Treadle pump

3. Animal-driven Prime-mover for Multiple Rural Applications, *Project Investigator:* Prof. S. K. Saha, Mech. Eng. Dept., IIT Delhi, *Collaborative Agency:* M/s. Panchal Pumps and Systems, Kanpur

In the process of facilitating the use of animal power for multiple rural applications, the animal driven standardized prime-mover (i.e., gearbox of Fig. 1) mentioned earlier is being synthesized for various other applications such as the chaff cutter, as the floor mill, the paddy thresher and the electric generator. This is also being carried out in collaboration with M/s. Panchal Pumps and Systems, Kanpur and is likely to be completed by July 2013.

4. A New Technology Package for Garlic Processing, *Project Investigator:* Dr. N.K. Jain, College of Technology and Engineering (CTAE), Udaipur; *Collaborative Agency:* CTAE, Maharana Pratap University of Agriculture and Technology (MPUAT), Udaipur

A new, low-cost technology package for garlic processing targeted to Rural Entrepreneurs had been developed by Department of Processing & Food Engineering, CTAE, MPUAT, Udaipur. In this project, this technology package is being field tested and standardized to make it available for wider applications. This work is being carried out at Krishi Vigyan Kendra, Anta in collaboration with CTAE, Udaipur and is near completion.

5. A Machine for De-husking of Minor Millets, *Project Investigator:* Mr. Sukhbir Singh, Vivekananda Parvatiya Krishi Anusandhan Sansthan (VPKAS), Almora (Uttarakhand)

Need for a suitable machine for de-husking of Minor Millets such as Kangni (Foxtail millet), Ragi/Madua/Madia Dana (Finger millet), Kutki (Little millet), Sanwan (Barnyard millet) and Kodo millet, was identified from the tribals of the Mahakaushal region of Madhya Pradesh. In response to this need the machine is being developed through VPKAS at Almora (Uttarakhand). The prototype has been developed and is being field tested, and likely to be completed by July 2013.

Salient Collaborating Organizations

1. *Madhya Pradesh Council for Science and Technology, Bhopal, Madhya Pradesh.*
2. *Department of Science & Technology, Rajasthan, Jaipur,*
3. *Punjab Technical University, Kapurthala, Punjab.*
4. *College of Technology and Engineering, Maharana Pratap University of Agriculture & Technology, Udaipur, Rajasthan.*
5. *Paryavaran Sanrakshan Avam Adivasi Vikas Kendra, Jabalpur, Madhya Pradesh.*
6. *Sahajiwani Samiti, Shahadol, Madhya Pradesh.*
7. *Sarvodaya Shikshan Sansthan, Robertsganj, Sonbhadra, Uttar Pradesh.*
8. *Vivekanand Parvatiya Krishi Anusandhan Sansthan, Hawalbagh, Almora, Uttarakhand.*
9. *Lok Bharti, Lucknow, Uttar Pradesh.*
10. *Lupin Human Welfare and Research Foundation Bharatpur, Rajasthan.*
11. *Gramodaya Rachnatmak Vikas Sansthan, Deoria, Uttar Pradesh.*
12. *Panchal Pumps systems, Kanpur, Uttar Pradesh.*
13. *Swami Adgadanand Audyogik Prashikshan Sansthan, Gobari, Jagesharganj, Pratapgarh, Uttar Pradesh.*
14. *Akhil Bharatiya Samaj Seva sansthan, Chitrakoot, Uttar Pradesh.*

Acknowledgements

The help received from Mr. Mukesh and Mr. Ankush, (M. Tech 1st year students) during the compilation of this newsletter is highly appreciated. The analysis carried out by several graduated M. Tech students (Mr. Amit Jain, Mr. Sanjay K. Singh, Mr. Mayank Patni, Ms. Jyoti Bahuguna, Mr. Vinayak, Mr. Debashis Puhana, Mr. Soumyajit Roy, Mr. Hemanta Kumar Roy) for RuTAG projects are also acknowledged.

Contacts

For technical advice and collaboration:

Prof. R. Prasad, Project Coordinator

Ph. 011-26591157; E-mail: rprasadiitd@gmail.com

For general queries:

Dr. Jagpal Singh / Mr. Raj Kumar Gupta

RuTAG-IIT Delhi Office

Ph. 011-26591385

E-mail: drjagpals@gmail.com; rajkumardr@gmail.com

For newsletter-related correspondence:

Prof. S. K. Saha, Editor

Ph. 011-26591135, E-mail: sahaiitd@gmail.com