

Minutes of the Meeting of the Core Group of RuTAG - IITD held on 29th March, 2012 in the CRDT Committee Room, IIT Delhi.

A Meeting of the Core Group of RuTAG, IIT Delhi was held on 29th March, 2012 in the CRDT Committee Room, IIT Delhi under the chairmanship of Prof. R.R. Gaur. Following were present:

1. Prof. R. R. Gaur, Chairman, Core Group, RuTAG, IIT Delhi.
2. Major S. Chatterjee, Senior Project Consultant and Member, Core Group, Office of the PSA, Vigyan Bhavan Annexe, New Delhi.
3. Prof. S. K. Saha, PI of the Project on Evaluation and Standardization of Animal Driven Water Pump.
4. Prof. P.M.V. Subbarao, PI of the Project on Technology Standardization and Testing cum Training Facility for Ultra-micro (Pico) Hydel Power Package for Rural Applications.
5. Dr. Vipul Jain, PI of the Project on Short Term Management Development Programme for Rural Enterprises.
6. Dr. G. P. Govil, Expert Advisor of the Project on Development of Biogas Engine Conversion Kit.
7. Shri Raj Kumar Gupta, Project Staff, Evaluation and Standardization of Animal Driven Water Pump.
8. Dr. Jagpal Singh, Senior Project Assistant, RuTAG, IIT Delhi.
9. Shri Ram Gopal Agnihotri, Project Assistant, RuTAG, IIT Delhi.
10. Prof. Rajendra Prasad, Coordinator/PI and Convener, Core Group. RuTAG, IIT Delhi.

Prof. R. R. Gaur, Chairman, Core Group, RuTAG, IIT Delhi welcomed the participants and started the proceedings of the meeting.

Agenda item No. 1. : Confirmation of the minutes of the last meeting of the Core Group:

The minutes of the meeting of the Core Group of RuTAG, IIT Delhi held on 3rd January, 2012 were already circulated to all the members/participants. No comment had been received. The minutes of the last meeting were deemed as confirmed.

Agenda item No. 2. : Brief overview of the activities undertaken by RuTAG-IIT Delhi in the last three years:

1. Review of RuTAG-IIT Delhi activities:

Prof. Rajendra Prasad presented a brief overview of the activities undertaken by RuTAG-IIT Delhi in the last three years. He mentioned about the four completed projects.

Regarding the completed project on **Evaluation and Standardization of Animal Driven Water Pump**, Prof. S.K. Saha, PI of the Project apprised that the gear box had been standardized using most up-to-date scientific tools and knowledge available. The improved Animal Driven Water Pump is 15% lighter than the earlier model. Cost reduced by one fourth and the power consumptions is about half.

A test facility has been created at IIT Delhi to compare the efficiency of the gear boxes using standard methods. Design checks can be done very quickly using MS-Excel programs developed which is extremely user friendly. Even a layman can check his/her design.

Prof. Saha told that the Final Report and Accounts of the project and Utilisation certificate are ready. He stated that Balance amount of Rs.23,365/- was to be received from RuTAG for settlement of Accounts with IIT Delhi. Prof. Saha requested for release of the amount soon.

Major Chatterjee suggested to include Sprinkler irrigation too. He was apprised that sprinkler irrigation had already been installed, tested and was found successful.

Prof. Saha suggested for extension and popularization of ADPM among the farmers. For this, he suggested to install few units under the umbrella of RuTAG-IIT Delhi to ensure smooth functioning and quality control for a period of three years. He also suggested subsidy by the Govt. Departments for adoption of the ADWP by the farmers so that the device would be disseminated at a large scale.

The Chairman stated that the technology could be a basic source of energy for small farmers. Many models are available. It is necessary to test the available models, designs, cost reduction, compactness etc. One model had been extensively tested and was found successful. Manufacturer will come in when there would be demand. It should be used in the field for a longer period and we should monitor with regard to its functioning in all possible ways. Possibilities may be explored for proliferation by ICAR as well as subsidy by Government Departments. We should also try to use it for other possible applications.

Major Chatterjee advised that Dr. Punjab Singh, Ex-Director General, ICAR may be contacted or invited to find out as how the ICAR could be brought in for promotion of the ADWP and how to approach for subsidy.

Regarding future applications, Prof. Saha mentioned that the technology can be used for other applications such as - Chaff cutting, Wheat grinding, Threshing, Electricity generation etc. He suggested an estimated budget of Rs. 1,00,000/- for nine months period to undertake RDD for such applications.

The Committee decided to meet this budget from seed money sanctioned to RuTAG-IIT Delhi. Major Chatterjee told that IIT Kharagpur had developed a device for lifting water using swing. He suggested to collect the detailed information from Prof. Bhadoria of IIT Kharagpur.

About the other completed project **Development of Biogas Engine Conversion Kit** Dr. G. P. Govil told that TATA - 407 engine with 20 KVA alternator was fitted with the conversion kit. The reconditioned TATA - 407 engine with 20 KVA alternator will cost around Rs.2.5 lakhs only. The usual generator in this capacity range working on CNG may cost about three times. Most of the components used in this conversion kit are readily available in the market.

About further planning Dr. Govil indicated that he would like to work on the following:

1. Further cost reduction
2. Efficiency improvement.
3. Conversion kit for a Petrol Engine.
4. Demand evaluation.

Another completed project was **A Comparative Study of Bullock Driven Tractors**. Prof. Rajendra Prasad told that three models were studied. Each model had their own advantages and disadvantages but none of the models could be recommended in their existing form. All the models had large scope for further adaptive RDD. However, there was need for comprehensive technical study in the lab and evaluation of operations in the field.

The problems identified could be taken up for further improvement:

1. Attachment for lifting the device when required.
2. To try to reduce weight of the device.
3. Use of wheels etc. for smooth and easy movement in the field.

The Chairman stressed to work out tangible advantages of Bullock driven tractors when bullocks are being used for ploughing. He specifically emphasized to find out real problem in adoption of Bullock driven tractors by the farmers.

Prof. Saha indicated to take up these problems as a second phase.

One more completed project was **Management Development Programme for Rural Enterprises**. Dr. Jain, PI of the Project apprised the Committee that a 9 days Management Development Program for Rural Enterprises was organized under RuTAG, IIT Delhi on November 10-18, 2011. 33 representatives of the 22 NGOs participated in this program to learn about the new development in the subject so that they could manage their units properly in an efficient and effective manner. The programme was conducted in two modules:

Module1:

- Basics of NGO: Who are the NGOs, their working style etc.
- Basics of starting a rural enterprise: opportunity, challenges, support structure, regulatory framework.
- Human Resource Management, Sustainable resources.
- Focus on Technology choice, Technology Management, and Innovative technologies for indigenous development.
- Basic accounting and Financial Management.

Module 2:

- Operations and Project Management, Marketing Management.
- Application of Engineering/Technology in rural enterprises.
- Learning through live examples (case studies, field trips, simulation/software exercise etc.).

Regular sessions were taken by the Speakers from IIT Delhi and outside experts from different specialized areas on different aspects for running a successful enterprise. The field visits made this training program even more useful. The resource persons shared their experiences in tackling the emerging problems in running the rural enterprises and inspired the participants to take up challenges in establishing and successfully running the rural enterprises.

- The participants got a good idea of what is a rural enterprise; how they can initiate, get facilitation and support from various sources; the challenges they can expect and approaches of possible solutions.
- They got at least an introductory exposure to the theory of various practices of sound techno management such as Operations, financial Management, Marketing, Information Technology, Human Resource Management, Appropriate technology etc.
- Since effectively managing operations is probably one of the biggest challenges of rural enterprises, the emphasis was on the various aspect, like supply chains, cost cutting, operations, day to day management, quality, maintenance etc.
- The participants got an understanding of the types of decisions involved at strategic, tactical and operational levels in rural enterprises and also the complexities/uncertainties associated with such decisions.

The feedback was collected from the participants on daily basis and necessary improvements were done.

Prof. Rajendra Prasad indicated that RuTAG intend to conduct one such Programme every year. He asked Dr. Jain to indicate tentative date for conducting one such programme in the current year. He also sought the opinion of Major Chatterjee on this.

Major Chatterjee opined that the programme is going to be conducted by all the RuTAG units at different IITs. It could be replicated by RuTAG-IIT Delhi after incorporating the feedback and suggestions received. He emphasized to collect the feedback from the participants on the following points:

- How the participants/the NGOs had transmitted the learning in to their Enterprises?
- How the participants/ the NGOs had been benefitted from the Programme?
- How many participants/NGOs have started their enterprises?

The Chairman was also in favour of collecting feedback from the participants/NGOs? He indicated that there might be some gaps in the Programme. So there may be need to conduct refresher courses for the participants to fill the gaps.

Major Chatterjee agreed that the refresher course might be conducted by RuTAG-IIT Delhi. The Chairman indicated to put up it in the next meeting of the Core Group.

Ongoing project:

Prof. Rajendra Prasad informed the Committee that a Project on Technology Standardization and Development of Testing-cum-Training Facility for Ultra-micro Hydel Power Package for Rural Applications is ongoing with Prof. P.M.V. Subbarao as P I of the project.

Prof. Subbarao informed the Committee that the site has been finalized at Micro Model. He requested the Committee to visit the site at Micro Model before commencement of the work. The Chairman decided to visit the site at 12 O' Clock on 30th March, 2012. Prof. Subbarao said that the construction of water proof tank will be completed in a month period after starting the work. Screw jack will be supplied by the supplier in a week time and the pump will be supplied in 15 days.

Prof. Rajendra Prasad informed the Committee that following **National and Regional Workshops were conducted by RuTAG-IIT Delhi in last three years:**

- A National Technology Identification Workshop on 29-30 May, 2009 at IIT Delhi.
- Regional Workshop at Lupin Welfare and Research Foundation on 25th November, 2009 at Hotel Kadamb Kunj, Bharatpur.
- Regional Workshop on 26th March, 2010 at Madhya Pradesh Council for Science and Technology, Bhopal.
- Regional Meeting Punjab on 8th November, 2010 and 10th March, 2011 at Punjab Technical University, Kapurthala.
- Regional Workshop Uttar Pradesh on September 14-15, 2011 at State Institute of Rural Development, Lucknow.

- Regional Workshop Rajasthan on December 26-27, 2011 at College of Technology and Engineering, Maharana Pratap University of Agriculture & Technology, Udaipur.

A number of Follow up meetings and visits were conducted by RuTAG-IIT Delhi at various places in different States mentioned above.

- Follow up meeting of Regional Action Group Uttar Pradesh on 9th October, 2011 at Bioved Sansthan, Allahabad
- Follow up meeting for U.P. on 28-29 November, 2011 at Indo-Dutch Horticulture Technology Centre, Chaffi, Bheemtal, Nainital.
- Follow up meetings on Organic Foods in U.P. on 17 December, 2011 at Saharanpur and on 23 January, 2012 at IIT Delhi.
- Follow up meeting of Regional Action Group, U.P. on 18th December, 2011 at Dhari-Kalogi, Yamuna Valley, Uttarkashi
- Follow up meeting of Regional Action Group, U.P on 19th December, 2011 at Maneri, Ganga Valley, Uttarkashi .
- Follow up meetings on Organic Foods on March 13-14, 2012 at Gram Vikash Sansthan Farah, Mathura, U.P

The team from RuTAG–IIT Delhi visited following Institutions:

- Paryavaran Sanrakshan Avam Adivasi Vikas Kendra, Jabalpur on 15th and 16th February, 2011.
- Sahajiwani Samiti, Shahadol, M.P on 17-18 February, 2011.
- Gramin Vikas Avam Takniki Anusandhan Sansthan, Chhipabarod, Baran on 16-18 June, 2012.
- College of Technology and Engineering, Maharana Pratap University of Agriculture & Technology, Udaipur, October 14-15, 2011.
- Punjab Agricultural Implements Pvt. Ltd., Saharanpur, October 31, 2011.
- Thana Bhawan, Prabudh Nagar on November 1st, 2011 & December, 08, 2011.
- Sarvodaya Shikshan Sansthan, Robertsganj, Sonbhadra on December 22-25, 2012.
- Vivekanand Parvatiya Krishi Anusandhan Sansthan, Hawal Bagh, Almora on January 9-10, 2012..

2. The activities to be taken up in the next year.

Prof. Rajendra Prasad apprised that in the meetings/workshops conducted by RuTAG-IIT Delhi, several problems emerged, out of which following problems were selected to be addressed in the form of new Projects:

1. De-husking and milling of Minor Millets.
2. Garlic Processing
3. . Technology for improving mechanical device for making Tulsi Mala.
4. Reducing drudgery in operation of Treadle Pump used for irrigation.
5. Alarm at overflow and below 10% of water in the Water storage tank
6. Equipment for mechanically removing the pulp and decortications of Khumani.

7. Technology for Processing of Potatoes in to Potato Powder.
8. Technology for production of milk products- Curd, Whey, Ghee.

These projects were presented in brief before the Committee. Some action had already been taken.

The problem related to **Treadle Pump** was raised by Shri C. P. Kushwaha, Gramodaya Rachnatmak Vikash Sansthan, Chariawaha Khas, Deoria, U.P. in the MDP for Rural Enterprise organized at IIT Delhi. Prof. Saha informed that a team of RuTAG IIT Delhi visited Deoria to find out the problems in detail. After interaction with the NGO and the users the **problems** identified were:

1. Stress on the knees, lower and upper side muscles of the feet.
2. An experienced person can operate the pump for about an hour, a new person can work for about 20-25 minutes only which is very short time.
3. The rubber washer need to be replaced after an interval of 15-20 days and thus proving costly.
4. The stroke (cylinder head) length is short due to which operator has to put more effort.
5. Approximately 20 kg. of load need to be applied on each pedal which is rather large.

It was also observed that:

1. The device was not scientifically tested and analyzed including the engineering aspects.
2. The design used was not standardized.
3. There was no upper flange to guide the movement of Piston rod due to which Rubber washer did not move in straight direction which caused inordinate rubbing to Washer.
- 4 The inner surface of the cylinder was not smooth due to which the rubbing of washer was more.
5. The lever length of the paddle was less due to which operator had to put more effort in operation.
6. The suction valve was placed on the side of the cylinder, not in the centre of the cylinder, due to which the stroke load increased which caused more effort in operation.
7. There was no proper support (handle) to maintain the position of the operator which caused uncomfortable situation to the operator due to which the operator got tired soon.

Prof. Saha told that a Treadle Pump is being purchased through the NGO for studying the problem more closely and its modification. Two students were assigned the task. We are considering adopting rotatory motion (Cycling) in place of reciprocating motion for operation of this pump.

Regarding the problem about **Tulsi Mala Making Device** was raised in the MDP for Rural Enterprise organized at IIT Delhi. Presently the operator had to hold the DC motor by hand which caused irritation due to vibration in holding the DC motor in hand and pushing it forward by hand. The other problem was neck and back pain due to continuous bending the body while working. One more problem raised was difficulty in finishing of smaller beads (1-2 mm diameter). Also the productivity was low.

The NGO had desired to connect a group of 4-5 workers with a common power supply. At present one 12 Volt battery is provided to each worker, which is costly. The problems had

been technically analyzed and observed that the DC motor provided for operating the device has been randomly selected. It is not based on the actual power requirement.

Two improved models will be tried. Accordingly, in one model the DC Motor would be held and pushed forward and backward by hand on the platform made for guiding movement of the DC motor. In the other model the DC Motor would be held by the chuck and pushed forward and pulled backward by tailstock. The machine would be fixed on table to overcome the neck and back pain. Four numbers of the machines could be fixed on a table and all four motors could be connected with a single DC power supply.

Regarding the problem related to **Alarm at overflow and underflow of water in the Water storage tank**, Prof. Rajendra Prasad informed that the problem was raised in the Workshop at Udaipur. A young graduate, Mr. Rahul Singhal has been engaged to look into the problem. He conducted market survey to find out an appropriate device available. Such a device may be available. It is low cost, around Rs. 1500/- . It could give alarm, put on or put off the motor for filling the water tanks at desired level. However, the NGO, who had raised the problem, that's the Dalmia Seva Sansthan wanted the information communicated through SMS about the water level in the tank.

The SMS can be sent using microcontroller. There are different sensing device available for measuring water level like Floating Switch, Electric Probes, Ultrasonic and Limit Switch etc. A suitable device will be selected and adapted to meet the requirements.

Further the following problems emerged in the workshops/ meetings for which information would be collected and communicated to the concerned NGO/person:

1. Agarbatti making machine (Paddle operated).
2. Honey processing machine.
3. Decorticator for Karanj and Castor.
4. Wheat crop cutting and bundle making machine.
5. Chana and Mashoor crop cutting machine.
6. Automatic weighing and Packing machine for oil, Pulses and Rice.
7. Technology for Amla Storage.
8. Setting up of Fruit processing units for Amla, Mahua, Chirongi, Harda and Behra at Sonebhadra.
9. Setting up of Fruit processing units for Tomato, Apple, Naspati, Apricot, Akhrot etc.

Workshops

Regarding the Workshops/meetings planned to be conducted in the next year, Prof. Rajendra Prasad informed that RuTAG-IIT Delhi is planning to conduct a **National Meeting in May-June or July, 2012 for a Brainstorming Session** in which besides all the IITs dealing with RuTAG units, selected NGOs dealing with S&T and State Councils of Science & Technology of U.P., M.P. and Rajasthan would be invited.

In the states of U.P., M.P. and Rajasthan the Regional workshops/meetings would be conducted tentatively at following places focusing on a particular subject as given below:

Uttar Pradesh

1. Gorakhpur (Treadle Pump)
2. Western UP: Saharanpur (Organic Food)
3. Sonebhadra (Food processing)
4. Mathura (Micro-hydel Power Plant)

Madhya Pradesh

1. Jabalpur (Millets)
2. Indore (ADPM)
3. Shahdol (Amla & Mahua processing)
4. Bhopal (with MPCOST)

Rajasthan:

1. Baran (Garlic Processing)
2. Jaipur (Fluoride)
3. Pilani (Alarm in Water Tank)

It was suggested during discussion that lot of work had been done on the Fluoride, therefore, it might be ignored unless we can contribute significantly in the matter.

Major Chatterjee emphasized to examine technical feasibility and economic viability of the projects keeping in view the period of availability of the raw material, collection, equipment and machinery, type of machinery available, how we could utilize the equipment and machinery throughout the year, processing, packaging and marketing aspects etc. Regarding the projects of food processing, such as Potato Powder, Milk processing, Fruit and vegetables processing etc., he suggested that some other commodities may be included in the project for processing to ensure utilization of the unit round the year regularly. He suggested that the proposal must be referred to CFTRI, Mysore (Dr. Prakash) for their experts' opinion before putting up for funding. He advised to call Dr. D. Raghunandan, Centre for Technology and Development, Saket, New Delhi for necessary guidance in food processing.

He specifically emphasized to prepare a concept paper with estimated budget on each project which RuTAG-IIT Delhi intend to take up and send the same to the Office of PSA for vetting/approval.

The meeting ended with a vote of thanks to the Chair.

(Prof. Rajendra Prasad)
Coordinator/PI, RuTAG-IITD

(Prof.R.R. Gaur)
Chairman, Core Group, RuTAG-IITD.