

Final Report of Sub-Project
A Machine for De-husking of Minor Millets*

(July 01, 2012 – June 30, 2013)

By

Prof. Rajendra Prasad

IIT Delhi

Centre for Rural Development and Technology

IIT Delhi, HauzKhas,

New Delhi 110 016

Tel: (011)2659 1157; Fax: (011)2659 1121

Email: rprasadiitd@gmail.com

**The machine was developed at Vivekananda Parvatiya Krishi Anusandhan Sansthan (ICAR), Hawalbagh, Almora, Uttrakhand under the guidance of Dr. J. K. Bisht and Engineer Sukhbir Singh.*

December 01, 2013

1. Background and Need

RuTAG-IIT Delhi had conducted a meeting on 26th March, 2010 at Madhya Pradesh Council of Science & Technology (MPCoST), Bhopal for problems identification. In this meeting Dr. B. K. Rai, Director, Paryavaran Sanrakshan Avam Adivasi Vikas Kendra, Jabalpur raised the problem of de-husking of Minor Millets. Consequent to the follow up of the meeting a team comprised of Dr. Jagpal Singh and Shri Ram Gopal Agnihotri from RuTAG-IIT Delhi along with Dr. Praveen Digharra, Senior Scientist, MPCOST visited Mahakaushal Region of Madhya Pradesh on 15-16 February, 2011 to shortlist the rural needs and technology problems. The team had also visited Paryavaran Sanrakshan Avam Adivasi Vikas Kendra, Jabalpur and had discussions with Dr. B.K. Rai and Dr. (Mrs.) Aradhana Rai. They told that their organisation is working among Gond Tribes in 30 villages of Mandla district. The tribals in Mandla Region produce following minor millets:

1. Kangni (Foxtail Millet)
2. Ragi/Madua/Madia Dana (Finger Millet)
3. Kutki (Little Millet),
4. Sanwan (Barnyard Millet)
5. Kodo Millet

They specifically highlighted the problem related to de-husking of Minor Millets. They told that for de-husking of Minor Millets (Rice making) traditional wooden Okhli and Moosal were used by the tribals which involved hard labour. There was a need of technology intervention in the process of de-husking of the grains of Minor Millets. The technology should be tribal friendly. It should be mechanical rather than electric/ diesel operated as it is not available in remote villages of the tribal districts.

The problem was discussed in the meeting of Core Group-IIT Delhi on April 15, 2013 and it was shortlisted to be addressed by RuTAG-IIT Delhi.

2. Objectives

To find out a suitable machine for mechanically de-husking of minor millets to reduce the drudgery of tribal's. If suitable machine is not available, develop a machine for the same.

3. Action Plan

1. Field visits and studies.
2. Find out machine for mechanically de-husking of minor millets.
3. Development of a prototype for de-husking of minor millets.
4. Design checks of de-husking machine.
5. Fabrication and Field Testing.
6. Modifications according to feedback, if required.

7. Development of final prototype machine.

4. Deliverables

Development of a prototype de-husking machine for mechanically de-husking of all Minor Millets to overcome the drudgery of tribals.

5. **Duration:**12 Months

6. Preliminary Investigation

The problem was shortlisted in the Core Group meeting of RuTAG-IIT Delhi. As per decision in the meeting of Core Group, Dehradun based NGOs- HARC and HESCO were contacted to find out if some machines had been developed by some institutions for mechanical de-husking of Minor Millets. We came to know through these NGOs that Vivek Thresher-cum-Pearler (Fig. 1) for Finger millet and Barnyard millet had been developed by Vivekananda Parvatiya Krishi Anusandhan Sansthan (ICAR), Almora (Uttarakhand). The Scientist behind the work was reported to be Dr. K. P. Singh who was working with Central Institute of Agricultural Engineering (CIAE), Bhopal. During interaction on phone, Dr. K. P. Singh indicated that CIAE Bhopal could take up the work for development of machine for de-husking of all the minor millets.



Fig. 1 Vivek Thresher-cum-Pearler

We had brought the problem to the notice of the Director, CIAE Bhopal and requested him to direct the concerned Scientist to formulate a project proposal for development of machine(s) for de-husking of Minor Millets and forward to the Coordinator, RuTAG-IIT Delhi. In response, Director, CIAE had indicated that they already had a project going on

for cleaning and de-husking of Minor Millets- Kodo and Kutki at CIAE, Bhopal. Therefore, in view of their ongoing programme, there was no need for another project.

With a view to explore the possibilities to identify a R&D Institution nearby Jabalpur which could work to address the problem, we had requested to Dr. B. K. Rai, Director, Paryavaran Sanrakshan Avam Adivasi Vikas Kendra, Jabalpur, who had raised this problem. In response, Dr. Rai contacted Agriculture University, Jabalpur but they expressed their inability.

We had also requested the Director General, MPCOST, Bhopal to suggest an Institution for addressing the problem but could not receive any response.

We were informed that the Thresher-cum-Pearler machine designed and developed for Finger millet and Barnyard Millets at Vivekananda Parvatiya Krishi Anusandhan Sansthan (ICAR), Almora, Uttarakhand performs the dual operation of threshing and pearling of Finger Millet simultaneously and threshing, de-husking and polishing operation of Barnyard Millet using separate runs with suitable sieves at a very low operational cost. The machine is being manufactured by M/s Punjab Agricultural Implements Private Limited, Railway Road, Saharanpur (UP). But it was not popularized. RuTAG-IIT Delhi might consider evaluating, standardizing and optimizing this machine. The Core Group indicated that detailed information about the machine may be collected.

7. Action Taken

A team of RuTAG-IIT Delhi comprised of Dr. Jagpal Singh and Shri Raj Kumar Gupta visited Mr. Sanjeev Kapoor, M/s Punjab Agricultural Implements Pvt. Ltd., Railway Road, Saharanpur (UP) on October 31, 2011 for collecting the information about Vivek Thresher-cum-Pearler Millets machine which was being manufactured by this firm. The team discussed the details of the machine and saw the machine in the workshop. Mr. Sanjiv Kapoor told that the machine was invented at an ICAR Research Centre 'Vivekananda Parvatiya Krishi Anusandhan Sansthan at Almora – 263601 (Uttarakhand). The machine performs the dual operation of threshing and pearling of Finger Millet simultaneously and threshing, de-husking and polishing operation of Barnyard Millet using separate runs with suitable sieves at a very low operational cost. Four sieves of different size are used in the operations. The machine was available in two sizes: One which run by a generator cost Rs.12,800/- and other one which was operated by Electric Motor costs Rs. 22,850/- We were told that they had supplied about 100 machines till then. Most of the machines were supplied through Vivekanand Parvatiya Krishi Anusandhan Sansthan (ICAR) and by Government of Uttarakhand. Some of the machines were supplied in Tehri Garhwal and Almora District of Uttarakhand. They manufactured the machines after receiving orders. About collecting the feed-back regarding the performance of the machine, the team was told that they had not received any complaint about the machine till then.

A team comprised of Dr. Jagpal Singh and Shri Raj Kumar Gupta from RuTAG-IIT Delhi visited Vivekananda Parvatiya Krishi Anusandhan Sansthan (VPKAS), Hawalbagh, Almora on January 09-10, 2012 in connection with testing of Vivek Thresher Cum

Pearler for Minor Millets developed by VPKAS. During testing, it was observed that one another machines -**New Millet Dehuskar**(Fig. 2), a Prototype of which was developed at VPKAS, Hawalbagh could solve the problem of threshing and de-husking of all the Minor Millets being grown in Mahakaushal Region of M.P. However, the team suggested to Mr. Shiv Singh, Technician, VPKAS, Hawalbagh to replace the electric motor from 5HP to 3HP as 3 HP Motor would run on single phase electric connection. Besides, some minor modifications were also suggested in the existing Prototype model for which Shri Shiv Singh was also convinced and agreed. The team had requested him to develop one modified Prototype Unit for demonstration at Mahakaushal Region among tribals. We had consented for purchasing this modified Prototype model from VPKAS.



Fig. 2 Prototype New Millet Dehuskar

A Team comprised of Dr. Jagpal Singh and Shri Raj Kumar Gupta from RuTAG-IIT Delhi visited Vivekananda Parvatiya Krishi Anusandhan Sansthan (VPKAS), Hawalbagh, Almora (Uttarakhand) on August 16-17, 2012 for testing of the modified machine developed by VPKAS for de-husking of Minor Millets. The machine was for the first time tested before the team for de-husking of Kodo, Cheena (Common or Proso millet) and Sawan (Barnyard) Millets at 700 and 900 RPM. It was observed that vibration of Jali was more due to more RPM of the pulley of 4" size fixed for movement of the Jali. Shri Shiv Singh told that Bigger size (8") Pulley was not available in Almora and Haldwani. He requested the team to purchase a Pulley of 8" Size from Delhi and send by Courier to

VPKAS for its replacement to reduce the RPM for movement of Jali. The required modifications were carried out by VPKAS in new version. It was field tested and found working satisfactorily. The improved millet de-husker is shown in fig. 3.



Fig. 3 Improved Millet De-huskar

As the machine was ready and could be used for demonstration. RuTAG-IIT Delhi conducted a two days demonstration/training programme at VPKAS, Hawalbagh, Almora on June 13-14, 2013 for the farmers/entrepreneurs and manufactures. The farmers/users and interested manufacturers from Uttar Pradesh, Madhya Pradesh and Utrakhand and RuTAG-IIT Delhi team participated in the programme. The performance of the machine was found satisfactory.

One of the manufacturers - M/s DMT Hydraulics, Agra was agreed for manufacturing of the machine. Shri Rajinder Singh (Kukku), Managing Director of M/s DMT Hydraulics, had interacted with the VPKAS authorities regarding the terms and conditions to be agreed for manufacturing of the machine. The Memorandum of Agreement is to be executed between the M/s DMT Hydraulics, Agra and VPKAS, Almora.

An NGO – Sahajivan Samiti, Shahadol had indicated to provide the machines to the SHGs for which finance is being arranged from financing institution.

Acknowledgements

The PI sincerely thanks to the Office of the Principal Scientific Advisor to the Government of India for their support to RuTAG. The PI expresses thanks to Prof. P.K. Verma, Director General, Dr. Praveen Digharra, Senior Scientist, Madhya Pradesh Council of Science & Technology (MPCoST), Bhopal, Dr. B. K. Rai, Director, Paryavaran Sanrakshan Avam Adivasi Vikas Kendra, Jabalpur, Dr. Giridhar Mathankar, Sahajivan Samiti, Shahadol (Madhya Pradesh), Dr. J. C. Bhatt, Director, Dr. J. K. Bisht, Chairman (PME Cell), Engineer Sukhbir Singh, Senior Scientist, Farm Machinery and Power, Shri Shiv Singh, Technician, Vivekananda Parvatiya Krishi Anusandhan Sansthan (VPKAS), Hawalbagh, Almora (Uttarakhand), Mr. Sandeep Kapoor M/S Punjab Agricultural Implements Private Limited, Saharan Pur (UP), Shri Rajinder Singh (Kukku), Managing Director, DMT Hydraulics, Agra for their cooperation and help in developing the machine.

The PI also acknowledges the support of Dr. Jagpal Singh and Mr. Raj Kumar Gupta of RuTAG–IIT Delhi for their contributions in the project.

.....