



UPDATES FROM CSAM

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## Development of Pedal Operated Finger-Millet Thresher-cum-Pearler

### Introduction

Finger-millet is a staple crop in the hills of Nepal, the crop is particularly important in subsistence farming systems. Because of the high storability, this crop has assumed paramount importance on the food security of poor people. Compared to other cereals finger-millet is very rich in iron, calcium, minerals and phosphorus. It is a good ally in limiting amino acids like lysine and methionine and is rich in vitamins like thiamine, riboflavin, and niacin.

The total finger-millet cultivated area in Nepal is 271183 ha and production 304105 mt with a productivity of 1121 kg/ha. (Statistical Information on Nepalese Agriculture 2013/2014).

Hill farmers play a vital role in the post-production stage of operations. However, manual threshing and dehulling finger millet is a tedious and time-consuming. In addition, manual threshing has low output, higher grain damage and involve more drudgery to the farmers.

To address these problems, the Agricultural Engineering Division of Nepal Agricultural Research Council (NARC) has designed and developed a millet threshing machine which significantly reduces the work load and time for postharvest processing of millets and is ergonomically sound with respect to traditional method of threshing. Currently, this technology is widely accepted by Nepalese farmers especially in the hills.

### Major parts of millet threshing machine

- i) Hopper: where the millet panicles are fed into the threshing drum. it is made of cast iron material and has a 27 cm height.
- ii) Threshing chamber: where the millet grains are beaten out of the panicles and separated from the bulk of the straw. It is made of cast iron material with a diameter 45 cm. It consists of a rotary drum with beater pegs and a stationary concave grid.
- iii) Threshing drum: it is made of cast iron and it is housed inside the threshing chamber. it accommodates the shaft on the concave with a clearance of 3 mm.
- iv) Cleaning chamber and grain collector: it is made up of single sieve that undergo to and fro motion and grain is collected in the chamber by gravity.
- v) Drive and driven assembly: Pedal operated .

### Major features of millet threshing machine

- i) Threshing and pearling capacity: 40-60 kg/hr
- ii) Threshing efficiency: 97%
- iii) Pearling efficiency: above 98%
- iv) Total grain loss: <5%
- v) Unthreshed grain: 2%
- vi) Shattered grain: 1.5%
- vii) Weight of the Threshing machine: 50 kg

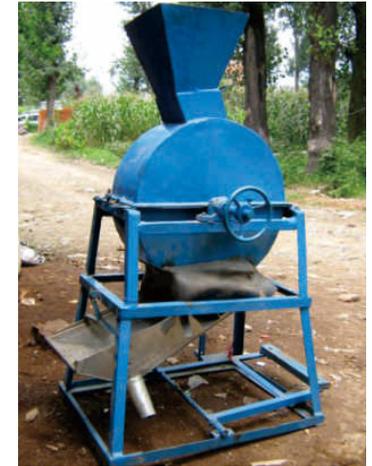


Figure 1. Millet Thresher cum Pearler



## Development of Improved Animal Drawn Metallic Plough

Animals are the major power source for agriculture in the mid and high hills of Nepal. Tillage is done with animal drawn traditional wooden plough which is low in efficiency and wears out in short time. Thus, the Agricultural Engineering Division of Nepal Agricultural Research Council (NARC) has designed and fabricated a metallic plough to improve the performance and efficiency of traditional plough. This metallic plough is similar to the traditional wooden plough in furrow opening shape, but has an additional slice turning boards integrated with it. It can be used in dry land ploughing as well as wet land ploughing and for furrow and bed making. Compared to the traditional model, wooden attachments are less likely to wear out fast since the metallic plate of proper thickness and share of spring iron have been used in this improved plough. It has lower weight (11.5 kg) compared to traditional plough is more than 18 kg in wet condition, so lower load to the draft animal and better performance of the plough. This plough has been constructed with different style wooden part as per local tradition of eastern, central, mid western and far western regions of Nepal.

### Construction details:

The metallic body is made of about 3 mm thick mild steel. Two soil turning boards are also made up of same mild steel which are joined thorough welding. The share made up of spring steel is bolted in the main body which can be slide in later when it gets worn out. To facilitate the joining of the main body with wooden beam and handle, one piece of wood about 21"x4"x3" is attached to the metallic main body through nut bolt system. The rest of the system is similar to the traditional plough making system as shown in figure 1 below.

### Benefits:

- Light weight (2/3 of traditional wooden plough)
- Improved durability as compared to traditional wooden plough
- Adjustable share so single share can be used for long time
- Similar to traditional plough, thus there is no need for adaptation of old equipment
- Compatible to different types traditional beam and handle arrangement
- Useful in furrow and bed forming

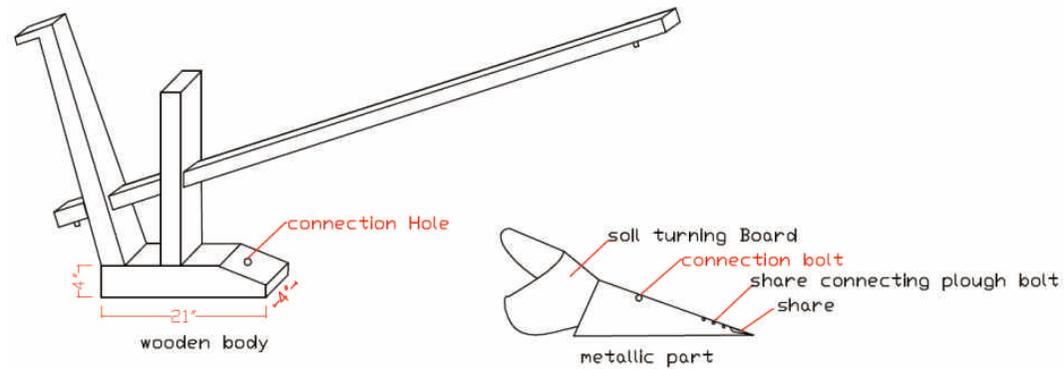


Figure 2. Schematic  
Diagram of Modern Animal  
Drawn Plough



Figure 3. Local carpenter  
Joining Plough  
in Central Nepal

# Policy, Strategies and Innovations



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Figure 4. Plough fabricated in Eastern part of Nepal



Figure 5. Plough fabricated in Mid Western part of Nepal



Figure 6. Ploughing in the Field with improved metallic plough

## OECD and FAO see likely end to period of high agricultural prices but urge vigilance

The recent period of high agricultural commodity prices is most likely over, say the OECD and FAO in their latest 10-year Outlook. But the two organizations warn of the need to be vigilant as the probability of a major price swing remains high. The OECD-FAO Agricultural Outlook 2016-2025 projects inflation-adjusted agricultural commodity prices will remain relatively flat overall in the coming decade. However, livestock prices are expected to rise relative to those for crops. As incomes improve, especially in emerging economies, demand for meat, fish and poultry will demonstrate strong growth. This creates additional demand for feed, particularly from coarse grains and protein meals, causing their prices to rise relative to food staples such as wheat and rice. Globally, the increased demand for food and feed for a growing and more affluent population is projected to be mostly met through productivity gains. Yield improvements are expected to account for about 80 percent of the increase in crop output. According to baseline analysis made in the Outlook, under a "business as usual" scenario -- in which agricultural productivity grows at the current trend rate and no major action is taken to reduce hunger -- projected growth in food availability would result in a reduction in the number of undernourished people in the world from around 800 million now to under 650 million in 2025.



Other findings from the report include:

Global agricultural trade is expected to grow by 1.8% per annum in volume during the next ten years, compared to 4.3 percent per year over the past decade.

Food consumer prices are expected to be less volatile than agricultural producer prices over the coming decade. In developing countries, human sugar consumption is expected to rise by 15 percent per capita and that of dairy products by 20 percent over the projection period.

After stronger gains in recent years, crop production is projected to increase at around 1.5 percent a year globally.

In South and East Asia, agricultural output is expected to expand by 20 percent over the next decade.

In Latin America, soybean cultivation is projected to drive most of the estimated 24 percent increase in crop area over the next 10 years.

The OECD-FAO Agricultural Outlook 2016-2025 is available for download at FAO website:  
<http://www.fao.org/documents/card/en/c/f0589695-58d9-425c-8be2-7dc065e5602f/>

## China G20 Agriculture Ministers Communiqué



On June 3rd the G20 Agriculture Ministers met in Xian, China, to discuss members contribution and modalities to collectively promote food security, sustainable agricultural growth and rural development worldwide. The communiqué, stressed the importance of promoting sustainable agriculture for the attainment of the Sustainable Development Goals (SDGs). It was noted that climate change is an important challenge related to agriculture and the commitment toward the Paris agreement of COP 21 was renewed. Moreover, it was stressed that innovation, research and development are important tools in facing the threats to sustainable intensification of agriculture. In addition, the agricultural ministers renovated their commitment toward numerous international initiatives such as the 2011 G20 Action Plan on Food Price Volatility and the G20 Technical Platform of Measurement and Reduction of Food Loss and Waste established in 2015.

To read more visit: [http://english.agri.gov.cn/news/dqnf/201606/t20160606\\_185158.htm](http://english.agri.gov.cn/news/dqnf/201606/t20160606_185158.htm)

# Member Countries Snapshot

## Malaysian Agricultural Research and Development Institute (MARDI)

The Malaysian Agricultural Research and Development Institute (MARDI) was established with the main objectives of generating and promoting new, appropriate and efficient technologies towards the advancement of the agriculture, food and agro-based industries. MARDI is managed and guided by the regulations and policies set by the MARDI Governing Board and consented by the Minister of Agriculture And Agro-Based Industry. Whereas, the Scientific Council ensures that MARDI technical programs attain the highest quality and level of competence.

MARDI is mandated to fulfill the following functions:

To conduct researches in the fields of science, technical, economy, and social with regards to: production, utilization and processing of all crops and integrated farming.

To serve as a center for collection and dissemination of information and advisory services pertaining to scientific matters, technical and economy related to food, agriculture and agro-based industry. These functions are accomplished through publication of reports, periodicals and related papers and organizing of exhibitions, conferences and seminars, and lectures.

To serve as a center that provides expert services in food, agriculture and agro-based industry such as consultancy services, laboratory analysis, quality assurance and contract research and development (R&D).

Provision of various forms of trainings to cater for the development of the food, agriculture and agro-based industry.

Provision of grant-in-aid for pure and applied scientific, technical and economic research and development related to food, agriculture and agro-based industry.

To maintain liaison with local and foreign public and private organizations engaged in scientific, technical, economic and social researches related to food, agriculture and agro-based industry.

To conduct commercial research and production.



# CSAM Activities in Focus

## Asian and Pacific Workshop on Whole-Process Mechanization of Potato Production, 27-28 June 2016, Kunming, China

On June 27- June 28 CSAM facilitated the Asian and Pacific Workshop on Whole-Process Mechanization of Potato Production, held in parallel with the China International Potato Expo 2016 co-organized with the Agricultural Mechanization Chapter of China Society for Agricultural Machinery and the Agricultural Trade Promotion Centre of the Ministry of Agriculture of China.



Around 120 participants from 13 countries, i.e. Bangladesh, Cambodia, China, India, Indonesia, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam, participated in the workshop exchanged knowledge and practices on potato and root crop mechanization in the Asia Pacific region.

Country presentations illustrated common challenges and constraints such as: small and fragmented land holdings, farmers' limited purchasing power, and low development level of potato mechanization. It was also underlined the need for small, efficient, affordable, and high-quality machinery for the whole value-chain of potato production. As a result of the fruitful discussion it was proposed that a regional cooperation mechanism shall be established for research and academic institutions on tuber and root crops mechanization in the region. Potential activities could include technology transfer, information sharing, joint research, value-added production, and capacity building. As a first step, CSAM will compile the country papers of respective countries and develop a concept note for the establishment of the cooperation mechanism.

Participants were also invited to attend the Potato Industry Development Forum, where Chinese and Dutch experts illustrated the latest progress in potato production and introduced the China International Potato Expo 2016. The workshop was concluded by a field visit, where participants had the occasion to observe different factories and establish links for future collaborations with local businesses.

## Nepal joined the Asian and Pacific Network for Testing of Agricultural Machinery (ANTAM)

In July 2016, Nepal joined the Asian and Pacific Network for Testing of Agricultural Machinery (ANTAM).



The Agricultural Engineering Unit was established on August 23, 1953 under the Ministry of Agriculture with the purpose of developing infrastructures such as farm building, farm road and irrigation facilities in various newly established farms/stations and agricultural development offices throughout Nepal. The unit was later upgraded to section and then to division. After the establishment of Nepal Agricultural Research Council (NARC) in 1991, the Agricultural Engineering Division (AED) was mandated to develop appropriate technology in Agricultural Engineering for various agro-ecological zones of the country. In 1994, the Agricultural Engineering Division under NARC was designated as National Institute (NI) and focal point of Regional Network for Agricultural Machinery (RNAM), later Asian and Pacific Centre for Agricultural Engineering and Machinery (APCAEM) and now Center for Sustainable Agricultural Mechanization (CSAM). In 2016, the AED was designated focal point of Asian and Pacific Network for Testing of Agricultural Machinery (ANTAM).

More info is available at ANTAM network website: <http://www.antam-network.net/2016/aednarinarnc/>

# CSAM Activities in Focus

## The 2nd Member Meeting of the Regional Council of Agricultural Machinery Association in Asia and the Pacific (ReCAMA), 16-18 July, Coimbatore, India

The 2nd Member Meeting of the Regional Council of Agricultural Machinery Association in Asia and the Pacific (ReCAMA) was held on 16-18 July, 2016 in Coimbatore, India, in parallel with the Indian Agricultural Machinery Manufacturers' Meeting (AMMM – 2016) during the Indian Agricultural Machinery Exhibition (AGRI INTEX 2016). The 2nd Member Meeting of ReCAMA was co-organized by the Centre for Sustainable Agricultural Mechanization (CSAM) and the India Agricultural Machinery Manufacturers' Association (AMMA-India) with the support of the Coimbatore District Small Industries Association (CODISSIA). Around 80 participants attended the event from 13 member associations of 11 member countries, including Bangladesh, China, India, Malaysia, Nepal, Philippines, Russian Federation, Sri Lanka, Thailand, Turkey, and Vietnam.

The Meeting admitted three new member associations from Malaysia, Turkey and Vietnam. Namely: the Malaysia National Farmers Organization, the Turkish Association of Agricultural Machinery & Equipment Manufacturers, and the Vietnam Society of Agricultural Engineering.

Sri Lanka Agriculture Machinery Manufacturers and Suppliers Association and Thai Society of Agricultural Engineering were elected respectively as Chair and Vice-Chair Associations for 2017 facilitating the work of the Council together with CSAM – the Secretariat of ReCAMA.

The work report and work plan of the Council in 2016-2017 was discussed, refined and endorsed at the Meeting. It is agreed that the 3rd Member Meeting of ReCAMA will be held in October 2017 in Hefei, China, in parallel with the AgriEvolution Alliance Summit 2017 during the China International Agricultural Machinery Exhibition.

In addition, sessions for fostering cooperation among member associations and business matchmaking were arranged. Later, the participants also visited the Sandfit Foundries Private Limited in Coimbatore.



## Future Events

### ReCAMA Training and Study Tour for Agricultural Machinery Manufacturers and Distributors, 16-28 October 2016, Wuhan, China

According with the work plan of ReCAMA, a Training and Study Tour for Agricultural Machinery Manufacturers and Distributors will be organized in October 2016 in Wuhan, China. In line with the outcome of the 2nd Member Meeting of ReCAMA, the Training and Study Tour will focus on conservation agriculture and transplanting of rice and vegetables. The event will include classroom lectures, group discussions, visit to relevant machinery manufacturers and the China International Agricultural Machinery Exhibition 2016.

The Training and Study Tour aims to improve the knowledge and understanding of the participants on conservation agriculture, transplanting and pertinent machinery as well as enhance mutual understanding and trigger cooperation/business development opportunities among the ReCAMA Members.

The Training and Study Tour is co-organized by Centre for Sustainable Agricultural Mechanization (CSAM) and the Centre of International Cooperation Service (CICOS), Ministry of Agriculture of China with the support of the China Agricultural Machinery Distribution Association (CAMDA), China Agricultural Mechanization Association (CAMA), and China Association of Agricultural Machinery Manufacturers (CAAMM). The overall coordination and liaison of the event will be conducted by CSAM.

The Training and Study Tour is expected to be attended by around 40 participants from the 14 ReCAMA Member Associations including representatives of associations, manufacturers, and distributors of agricultural machinery from 12 countries, including Bangladesh, India, Malaysia, Mongolia, Nepal, Pakistan, Philippines, Russia Federation, Sri Lanka, Thailand, Turkey, and Vietnam.

### The 2nd Training of Trainers of Trainers on ANTAM Codes, 18-30 October 2016, Nanjing, China

The Centre for Sustainable Agricultural Mechanization (CSAM) in collaboration with China Agricultural Machinery Testing Centre, Ministry of Agriculture (CAMTC/MOA) will organize the 2nd Training of Trainers Programme on ANTAM Test Codes in Nanjing, China from October 18-30, 2016.

The training aims to provide participants with an in-depth understanding of ANTAM procedures and guide participants in the practical application of the Codes. The Training will be conducted in two parallel sessions based on two sets of Codes for Power Tillers and Knapsack Misters-Cum-Dusters recently renewed and enlarged by the Technical Working Group of ANTAM.

A pool of international trainers from China, France, and India in collaboration with CAMTC will provide participants with theoretical instruction, laboratory demonstrations and guidance in hands-on practice. After the training, to facilitate knowledge sharing on standard testing in participating countries the ANTAM Secretariat will publish the training manuals on the ANTAM website ([www.antamnetwork.net](http://www.antamnetwork.net))

The **4th Regional Forum** on Sustainable Agricultural Mechanization will be organized in Hanoi, Vietnam on 23-25 November, 2016 with a theme on "Climate-Smart Agriculture – Practices and Machinery"

The **3rd Annual Meeting of ANTAM** will be held in Colombo, Sri Lanka, on December 8-10, 2016



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The Centre for Sustainable Agricultural Mechanization (CSAM) is a regional institution of the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), based in Beijing, China. Built on the achievements of the Regional Network for Agricultural Machinery (RNAM) and the United Nations Asian and Pacific Centre for Agricultural Engineering and Machinery (UNAPCAEM) CSAM started operations in 2012.

CSAM serves the 62 members and associate members of UNESCAP. It is guided by the 2030 Agenda for Sustainable Development and other internationally agreed development goals, as well as, the resolutions and mandates adopted by UNESCAP.

The vision of CSAM is to achieve production gains, improved rural livelihood and poverty alleviation through sustainable agricultural mechanization for a more resilient, inclusive and sustainable Asia and the Pacific.

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