

Innovation Incubation at Grassroots

Multi crop Thresher

Madanlal Kumawat, Rajasthan, India



A Case Study

By

Rajeev Singhal

Grassroots Innovations Augmentation Network - North (GIAN - North)
Science Park, Shastri Nagar, Jaipur, Rajasthan, India

Executive Summary

Madanlal Kumawat of Rajasthan, India is a grassroots innovator who could get formal education only till class fourth. The circumstances forced him to stay back at home and learn how to work. He was born and brought up in a village of Rajasthan and has four sisters and one brother. His father was a carpenter and gave him initial education at home only. At 15 he trained himself as a tailor, shifted to carpentry profession after a few years and finally got some satisfaction at a metal engineering workshop. There he learned engineering skills on various farm machineries and also developed an improved multi-crop thresher. This thresher had the output much cleaner than the existing threshers and after this development Madanlal started gaining popularity among the local mechanics of his region.

He setup his own workshop in 1997 and further modified his thresher to improve its efficiency, low power consumption, use for other crops for which it was not used and different models to suit the requirement of the users. Most of the improvements carried out by Madanlal were based on the feedback and requirement of the users. It took about 7-8 years for him to come to this stage after setting his own unit. During this phase he also got introduced to Honey Bee Network, which gave him recognition, market linkages, financial support, formal evaluation of his work and social fame.

Today his threshers are tested by Rajasthan Agriculture University, India and he has four different models varying in size, capacity and features. His is the only thresher which is claimed to be used on almost all kinds of crops including groundnuts and switching over from one crop to other takes minimum time and efforts. His work not only gained recognition by National Innovation Foundation and support by GIAN-North but also got appreciation by the scientist involved for the formal testing. He was so impressed by the work that he wrote a formal paper for a scientific journal, keeping Madanlal a co-author. Madanlal also gained a patent for his innovative work and today is doing well in his business in some areas of Rajasthan with a vision to spread it all over India.

His objective of life is to keep working with honesty and hardwork and never cheat anyone. He often says *“imandaari aur mehnat se apna kaam karte raho..... musibat main usse chodo nahin, accaha samay aayegaa..... kisi ka bura mat socho, ant accaha hoga...”*

Background

The innovator Madanlal Kumawat was born in 1964 in a village called Gopalpura in Distt. Churu of Rajasthan, India. His father was a carpenter and use to earn his livelihood by working on daily wages in the village. The innovator had his initial education at home till he was 10 years and was admitted to a village school in class first. After studying for 10-15 days in class first and second his teacher realized that Madanlal can be promoted to next class and he was shifted to class third. He was a good student but could not continue his studies after class fourth due to a major accident. After the accident he was quite weak physically and thus decided to learn tailoring which would not involve much physical labour. Simultaneously, he also learned carpentry from his father and contributed a little in that too. After engaging himself in work he started gaining physical strength and he full time shifted to carpentry profession. He and his father were so good in their profession that there was a demand of their work in other villages too. Once Madanlal was invited by a known from other village called Rampura for carpentry work which took about 15-20 days to execute. During those 15-20 days he became popular for his work and noticed a great demand of his work in that village. He shifted to Rampura and started his work there. After about three years he got inclined towards the metal engineering work and got himself associated with a workshop in village Bagru through a villager to learn the skills. He learnt almost all the technicalities of agriculture implements manufactured there and soon gained the confidence of the owner. He spent about 9 years in that workshop and improvised a few agriculture implements there.



He then setup his own workshop at Danta in 1997 and started manufacturing threshers and other agriculture machinery.

Madanlal has one brother younger to him and is engaged with him in his workshop. Madanlal is staying with his wife and three children who are currently studying. He wants to support them for studying till they want to study. Madanlal works about

15-18 hours a day. When his wife was asked that his so much involvement in work effects his social life, she said *dhando phele* mean work is the first priority !

Genesis and details of present innovation

During 80ies and early 90ties manufacturers and dealers of agriculture implements in Rajasthan use to bring threshers from Punjab and sell. The workshop owners mainly use to conduct repair work as per demand. Once Madanlal realized, why not to manufacture the same at his facilities and the thought process began. He started developing the first thresher at the workshop he was working. After about 20-30 days of efforts he could develop a thresher whose performance was comparable with the existing ones. During the development phase he found that there is tremendous scope of improvement in the performance of the thresher and started working on the ideas generated during the development.

He observed that the grains coming out of the threshers were not so clean and needed to be cleaned before bagging. He developed a mechanism of cleaning the grains while threshing by incorporating a blower and canalizing the air in such a way that the straw mixed with grains gets separated before reaching the outlet. The flow and speed of blower needed optimization for various crops and that was achieved by incorporating a set of gears & pulley mechanism.



Development stages

- 1991 - Incorporation of blowers to get much cleaner output : The need was felt to develop a thresher of his own in Rajasthan and developed a thresher based on the basic design of existing threshers. During the development it was observed that there is tremendous scope of improvement to get the better output. The various moving parts in the thresher generated flow of air and Madanlal modified it into a built-in blower and canalized the air to clean the grains. A cutting mechanism was also introduced at the first stage to simplify the threshing mechanism.



- 1991-93 - Covering the remaining crops : Till now the multicrop threshers were unable to thresh the crops which were quite heavy or quite light. Madanlal made modifications in the beating mechanism and optimized the blower speed etc. to the extent that it became suitable to use for these crops also.



- 1997 - Optimized the size of the drum and the beater and increased the length of the thresher to reduce the load on the prime mover. He again optimized the design to reduce the changeover time of the fitments. Thresher needs to be modified to make it suitable to different crops. This changeover in conventional threshers takes about 2-3 hours. Madanlal made the fitments in such a way that minimum needs to be changes and it takes only 10-15 minutes to make it suitable for other crops.



- 2005 - By this time also the threshing of groundnuts was done using a separate thresher. Madanlal modified this thresher to be used as a groundnut thresher. The only difference was that the modifications took about 2-2.5 hours to convert it into a groundnut thresher.



- 2006 - Different Models : Till now Madanlal was manufacturing only one model of thresher with high capacity (about 20-22 Q/hr) but than he noticed that farmers with lesser requirements are not preferring his thresher. He than came out with two more intermediate models with lesser capacity (about 7-15 Q/hr) which gave him more market.



Introduction with Honey Bee Network

After Madanlal setup his own workshop at Danta, he became more popular for his work and was noticed by Sundaram Verma, a Honey Bee Collaborator and scout from the same place in 2000. When the scout first approached him to know details about his work, he was not entertained by Madanlal for the reason that he might get into some trouble. But in second or third meeting he got convinced and shared the details about his work . Madanlal was thus linked with Honey Bee Network and his innovation was nominated in the First National Competition on Grassroots Innovations and TK.

Recognition & Award

He was recognized by National Innovation Foundation under the consolation category in the above said competition in the year 2001.

He has also been awarded first by the State Government for the same innovation in November 2004.



Extension of support in further development by network partners

- After the work of Madanlal got recognition, it was supported by GIAN-North for getting formally evaluated by organized sector. The details were submitted by Maharana Pratap University of Agriculture and Technology, Rajasthan. They appreciated the work and suggested a few areas which may be improved upon.
- Further the innovator was supported financially to incorporate the feature of groundnut threshing in this multi-crop thresher in 2002.
- The patent for the innovation was applied in the year 2002 and has been granted.
- This prototype was developed and submitted to Rajasthan Agriculture University for further evaluation. The detailed formal testing and evaluation has been conducted and this innovation has been found much better than the existing ones.
- The expert involved has also co-authored himself with the innovator to write a paper for a National Journal.
- Market inputs have been provided through business linkages for the need of low capacity and low cost threshers. As a results three different models ranging from 6-7 Q/ hr. capacity to 22 Q/hr capacity to meet the requirement of various farmers.



The product

Abstract

The multi-crop thresher developed by Madanlal Kumawat of India is a unique device which can be used for threshing almost all the kinds of crops by changing a few fitments in the minimum time. The device as compared with the existing alternatives given much cleaner grains which can be bagged directly and at a lesser expense.



Features




- The only multicrop thresher, having the provision of Groundnut Threshing
- Minimum effort to switchover to other crops.
- It uses 35 to 45 HP. (26.1 to 33.6 kilowatt) diesel engine.
- The feed mechanism of the “improved thresher” has a gearbox, which is used to rotate five cylinders of the feed mechanism with different speeds to enable effective feeding to different crops requiring different rate of feed.
- It is a machine in which both cutting and threshing can be done in succession.
- It has different feeding arrangement for different crops.
- It has variable blower speed to blow off the chaffs of different crops.
- It is high capacity thresher and its output is higher than standard threshers.
- Due to optimized design it consumes lesser fuel as compared to other threshers.

Advantages

1. More efficient and consumes less power for same output
2. Grains are cleaner and do not need further cleaning before bagging up. Thus can be directly bagged and save time, energy and cost.
3. Easy to operate for Multiple crops: Rearrangement time for fitments for different crops is very less as compares to the other multicrop threshers. This takes only 10-15 minutes to replace the necessary accessories while the others take about 2 - 3 hours.
4. Has the added feature of Groundnut threshing for which the design and concept is being made and new improved prototype is proposed.

Comparison with available alternatives

Innovation	Madan Lal Kumawat's	Semi Axial Flow thresher	Other <u>Multi-crop threshers</u>
Source	NIF database	CIAE Bhopal	http://www.agridept.gov.lk/FCRDI/FM_imple.htm#thresher1
Summary	It is Spike tooth type, high capacity thresher, which can handle multiple crops including groundnuts with minimum machine adjustments, it can be run by the tractor engine power.	It is a spike tooth type thresher. It has provision of adjustment of thresher to achieve better cleaning for all crops over other commercial threshers.	It is a throw-in type high capacity thresher with blower fan winnowing and can thresh paddy, maize, sunflower and soybean with minute adjustment.
Components	Threshing drum, concave, feeding chute, blower, aspirator, belt and pulley drive for shaft and aspirator and chain and sprocket for varying speed.	Threshing drum, concave, feeding chute, blower unit, belt and pulley drive and power source (tractor/engine).	Threshing cylinder, concave, belt and pulley drive, feeding chute and power source (power tiller / stationary engine)
Material of construction	Mild steel and cast iron	Mild steel and cast iron	Mild steel and cast iron
Principle of threshing	By cutting, rubbing and beating action	By rubbing and beating action.	By rubbing action
Power source	Tractor (35-40HP)	7.5 hp electric motor	7.5 hp power tiller/electric motor
capacity	1500-2200 kg of dry crop per hour depending on crop	350 kg of dry crop per hour	700-1000 kg of dry crop depending upon the crop.
Changeover time	10-15 minutes (except groundnut)	Not known	2-3 Hours
Labour requirement	3 labours are required.	4 labours are required	3 labours are required.

Cost	1. Rs. 165,000/- 2. Rs. 135,000/- 3. Rs. 110,000/- 4. Rs. 65,000/-	NA	Rs. 65,000/- per unit excluding the cost of power source
Applications	Useful for threshing maize, pea, gram, sunflower, soybean, paddy, wheat, groundnut and other crops	Useful for threshing pigeon pea, gram, wheat, soybean, maize sorghum, etc.	Useful for threshing maize, sunflower, soybean, paddy, etc.
Photo			
Ergonomics	One of the model is designed in such a way that it can be fed in at ground level with ease.	One has to step up to come up to the level of feed in at section	One has to step up to come up to the level of feed in section

Business Development

- Market Research has been conducted with the help of a group of students from a management institute. The report showed the potential of the innovation and confidence to support further.
- Business Planning was done by National Innovation Foundation and GIAN-N and Madanlal has been supported with venture funds to expend the business. He also enhanced his manufacturing facilities and today he has a capacity to produce 10-15 units each day.
- Madanlal has also been given the opportunity by GIAN-N and NIF to showcase his work in various National and International Exhibitions and Trade Fairs to create new opportunities.

Future plans

Madanlal is a dedicated innovator with creative brain but lacks in entrepreneurial skills. He worked with many partners but could not succeed much in business. In spite of owning a unique technology which he sells at almost 1.5 times (and people prefers) he has not made much profit.

He has plans to make his thresher popular all over India after covering his own state and also to launch a few more innovative products. He is currently working on a unique weeder which is expected to be developed in another 4-5 month.

Madanlal has seen many ups and downs in his life but is very determined. His philosophy of life is very simple “Never leave Honesty and Hard work, and the success will be achieved one day. This path may take long to get the success but the end will be better.”

