

Walnut Cracker and Tree cum Pole Climber

State Award
Jammu And Kashmir



Mushtaq Ahmad Dar
Anantnag, Jammu and Kashmir

“A problem triggers a thought for innovation
(*Dikkat wuchthi banavo innovation*)”

Manually cracking walnuts is a very tedious, low output and time consuming task. Mushtaq Ahmad Dar (28), a young innovator from Kashmir, has developed a machine that can crack walnuts and peel the green ones. He has also made a portable climber that can be used to climb trees and poles. Presently he is developing a machine for cracking almonds.

Situated in the southern valley region and surrounded by agricultural plots, plantations and forests, his native village Kreri is around 16 kilometers from the headquarter Anantnag and is well connected with it. Most of the villagers are engaged in agriculture and horticulture. A number of good educational institutions, both public and private, provide education in both English and Urdu medium. It is here where a simple and unassuming man, Mushtaq was born to Late Ghulam Nabi Dar and Raja Bano. Second eldest among four brothers, he has always been the pampered one. While his eldest brother, Manzoor, owns a medicine shop in Anantnag his younger



brother Shaukat takes care of the family's orchards of walnut and apples. His youngest brother, Hussain got married recently and has shifted to live with his in laws. Though Mushtaq has been a 'full-time' innovator for some years now, he also helps his brothers in running the family business and managing the house hold.

As a child Mushtaq was always quiet and reclusive. Apart from the mandatory studies, he invested his time in making wooden toys with which he used to decorate his house.. Sometimes, he used to run away to the walnuts and apples orchards or simply stroll in the nearby meadows. Fishes have always been his object of fascination and the expression of creativity. Most of his wooden toys were fishes, in various forms, shapes and sizes. Once a teacher of his saw one of his creations and asked him to make one for her also. Appreciated, he gained confidence and slowly used his skill to develop other things also. While in eight class he carved Gandhiji working on a *charkha*, which was an electro-mechanical sculpture. This won him a lot of admiration in the entire district. The same was displayed during the National Science Day celebrations at Achabal, Anantnag for which he was awarded Rs 1000 by a voluntary organisation. This money was promptly used by him to buy materials for his innovations.

Knowing Mushtaq's creative nature, in 2005, his friend, Zahoor Ahmed Shah brought him to Ahmedabad for NIF's Third National Innovation Award Function. Mushtaq was intrigued to see and meet so many people from different parts of the country who were not trained or aided but had solved various problems by their own effort and hard work. He was immediately reminded of his troubled home state, which had been plagued with the problems of unemployment and unrest. He started imagining about an innovation that, apart from solving a persistent technological social problem, would also help in generating employment.

The Walnut Cracker

Upon returning back to his village, Mushtaq resumed his daily routine but the thought of doing something useful kept on chasing him. Suddenly one day, while breaking walnuts manually through his hands, an idea struck

him. Cracking walnuts manually is a plodding and tedious job with low output (maximum 10 kg/h). He thought of developing a machine that could mechanize this process relieving a person of his drudgery of doing it manually for hours. He discussed this with his friend Naseerul Haq who encouraged him and saying that if he was able to come up with such a machine, it would be wonderful for all those involved in this work. Motivated, he started working on various designs and finalized one in almost ten days. Then he started making the prototype, which took him about a month and an investment of Rs 3000 (which was later reimbursed by NIF) to develop. In retrospect, Mushtaq remarks that conceiving an idea is more difficult than actually translating it in reality.

"Mabashiyo idea chu padagasan demagasmanz demag shuazan athan athchu banawan magar idea chu wariyah mushkil model banawah khota", translated which means that while the mind conjures up an idea, the brain commands the hands to work and build a model, conceiving the idea is more difficult than materializing it.

The innovation

The device is a walnut cracking machine that can process dry walnuts of various sizes, shapes and hardness and crack them open without damaging the fruit inside.

The major components of the unit consist of a feeding hopper at the top, twin rollers with specific geometries to grip the walnut and deliver impact action, bearing support, a motor with a belt and pulley drive arrangement, related electrical circuits, and a metal flap angled at 45 degree located at the bottom to slide out the cracked walnuts.

The walnuts are fed from the top through the feeding hopper made of plywood. They slide down to the two grooved rollers, one of which is powered and the other free to rotate. The gap between the rollers can be adjusted from 0.5 to 2.5 cm depending on the walnut size and shape. This setting can be adjusted by the operator anytime from outside the unit.

The shear action of the roller cracks the walnut, which is then channeled down by the angled flap. It then gets deposited in the gunny bag or basket positioned near the exit chute. The machine can process around 80 kg of walnut per hour and 20 kg of almond per hour. The efficiency of the machine calculated using nylon and aluminum rollers came to be 79.5 per cent and 75.2 per cent respectively.

The innovativeness of the device lies in its minimalist yet versatile design, with a smart set of drives, the use of two grooved rollers, which can be set to handle the various sizes, shapes and rigidities of walnuts and facilitate peeling of green fruit. The roller design and arrangement has also been customized. They have been provided with grooves in specific geometries, which grip the nuts securely when passing through the rollers. NIF filed a patent for the machine in Mushtaq's name in September, 2006 (2347/DEL/2006) and facilitated its the incubation at GIAN J&K in Kashmir University, Srinagar; supporting it with technical inputs and finances whenever necessary.

The machine was originally designed to crack walnuts but Mushtaq found it suitable for peeling green walnuts as well. Green walnuts are difficult to peel manually and in the process the skin also gets irritated and sometimes it even flakes off. An improved model of the machine has been developed recently using food grade aluminum rollers for smoother impacting action. The motor RPM has been reduced to increase the efficiency and reduce damage to walnuts of different sizes.

The prior art describes manual and mechanized methods and devices for cracking walnuts. In manual methods, the cracking is done using hands or hammers, which often destroys the fruit inside the walnut. Some of the available machines use hammers, levers, and switch trips to break the nuts. However, most of these machines cannot handle variations in shape and sizes. In many of them the fruit gets damaged during the grip and the impact. Also, most of the imported machines are complex units costing more than Rs 70,000 and not suited to meet the needs of small growers.

Prospects of the machine

Walnut is a big industry in Kashmir and roughly over one lakh metric tones of walnuts are produced every year. The Kashmiri walnuts are known for their superior quality and taste. As a result they are popular across the world and most of the produce is exported to different countries.


As an affordable local solution (estimated to cost around Rs. 6000), which eliminates drudgery and increases productivity in a safe and simple way, this innovation is of immediate relevance to thousands of households in the Kashmir valley who are engaged in the dry fruits trade. With this machine, the innovator is able to process ten fold of what he would have with a skilled labour on one man day.

Further work planned on the machine includes incorporating and optimising the grading system for walnuts, redesigning the rollers to enable them handle very small walnuts, facilitating guide pins and bushes for more efficient roller movement and making the machine portable.

The tree cum pole climber

It is a small portable device that makes climbing trees/poles simple and easy. What is remarkable about this innovation is that it uses body weight to lock the climbing steps and is very light, low cost and easy to maintain.





In his childhood once while climbing a tree Mushtaq fell down and hurt his leg. The injury healed but a thought remained in his heart to make a device to help people climb a tree. The success of the walnut cracker encouraged him to think of such a device. He had heard about Appachan's tree climber that is used to climb coconut trees but had not seen it. All he knew was that it was bulky and could not be carried easily. He thought about developing such a climber that was portable, light weight and could be easily carried in a bag..

In November 2006, he started designing the tree climber believing that the cold and snowy winters would give him ample time to ponder over the design and complete the work. It took him six days and Rs 100 to come up with a small wooden climber that used a barbwire to wrap around the tree. Not satisfied with the design, the use of wire and wood he again started work and redid the climber using iron frame and canvas belt. The entry was subsequently sent to NIF, which, assessing the importance of technology and the possible uses, got it licensed to an entrepreneur in Ahmedabad for which Mushtaq also received a fee.

Once while moving around in snow, he saw two electricity department workers carrying a ladder on their shoulders. They took it off near an electricity pole and while one worker held on to it, the other climbed it to reach the street lamp. This made him think to possibly use this climber to ascend poles also.

The innovation

The tree climbing device consists of a pair of supporting frames for each foot; Velcro based straps for anchoring the foot to each frame, a sturdy strap with locking system to fix around the tree and a flexible safety belt that can be wrapped around the body and the tree.

The two supporting frames are rectangular units made of thin MS channels with cross ribbing in the center to take the load of the feet. While in the first prototype, the foot was fastened to the frame using a shoelace like

arrangement, the current design uses thick durable nylon straps to lock each foot to the individual support frame using Velcro straps.

Each of the two support frame is attached to the tree using a long thick belt, which is wrapped around the tree and then locked according to the tree's girth. The user is also provided with a safety belt, which provides shoulder and torso support and anchorage to the tree as the user climbs upward.

For climbing, the user first locks each foot into the individual support frames. Then he maneuvers each foot and frame close to the tree and wraps the linking strap as per the tree's girth. The user can now climb the tree by raising and lowering each foot in sequence. The device uses the body weight of the climber to lock the feet and the supporting frame against the tree. Because of this, the user can take rest at any point during the climb. Also weighing at less than 4 kg, it weighs less than half when compared to the available tree climbers and can be put in a small bag and carried along.

Prior art search discloses different types of tree climbing apparatus in technological and patent literature. NIF database also has various tree climbing devices those developed by Appachan, TNAU Coimbatore, Joy Verghese and Sunil Mahamuni. However, the weight, portability, and convenience associated with this device make it novel. Accordingly, a patent (1230/DEL/2007) was filed in his name.

Prospects of the device

Compared to the widespread requirements across the country, skilled tree climbers are few in number for climbing tall trees like coconut. Also for climbing electricity poles no such device exists except for ladders, which require another person to hold it in place. This device, thus, fills this gap and allows a normal unskilled user to climb trees for harvesting or to climb electric poles to do maintenance work.

Other Ideas

Mushtaq has come up with a number of useful ideas and innovations. He has designed a device to restrict nicotine inhalation for smokers, magnetic leveler for fields, manual electricity generator, handy fruit plucker and a seed broadcasting machine apart from developing a

model for demonstration of lunar/solar eclipses. In 2008 he developed an almond cracking machine, which helps to reduce the drudgery involved in cracking almonds manually and prevent fingers from being hurt. This machine is in the process of being improved and standardized. For this machine, he has also been supported under the Micro Venture Innovation Fund (MVIF) scheme of NIF.

Considering his inventive bent of mind, Mushtaq was invited for the Third Workshop on Inventors of India in October 2006 at IIM Ahmedabad. NIF also facilitated the grant of an Innovation Fellowship to him under the CSIR-NIF MoU in 2007-08, which provided him a monthly stipend to continue his work on the innovations. In all his pursuits he has always been supported by his family, which has tried to keep the burden of familial obligations away from him so that he could concentrate on his work. His father was especially appreciable of his work and never forced his opinion on him. It was him who gleefully provided him money to make his toys. His untimely death, while Mushtaq was in class ten, punctuated his studies and left him heart broken. He still fondly remembers the peppy talks and the gentle caresses of his father! Understanding his soft and introvert nature, his mother also always supported him. His friends and fellow villagers generously laud him for making their place famous and showing the creative side of the people. His innovations have been covered by a regional newspaper *Kashmir Images* and also an international Islamic website.

In context of the walnut cracker and the tree climbing device, when asked why he chose to work on two innovations simultaneously Mushtaq replied that the mind gets tired while working on one innovation and the idea flow reduces. The switch over from one innovation to other helps to clear the bottle necks in the thought process at the same time prevents unnecessary time wastage also. Apart from working on innovations, which take much of his time, Mushtaq is also a very active member of the Honey Bee Network in Kashmir and periodically sends innovations and traditional knowledge practices from the area scouted by him. He gratefully acknowledges the contributions made by NIF, TePP, GIAN North, and USIC in helping him and taking his technologies forward.



True to his name, Mushtaq (Mushtaq is a word of Arabic origin meaning longing or yearning or desirous) is hopeful for the commercial success of his innovations and of a prosperous and peaceful future for all.