

## Multipurpose Food processing machine

State Award  
Haryana



**Dharamveer Kamboj**  
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*Sangharsh hi sabse badi kaamyabi hai. Agar badhna hai to peeche mud kar nahi dekhna hai.*

(The capacity to struggle itself is a big effort. There is no looking back, if one has to keep on moving forward)

A multipurpose food processing machine that facilitates on-farm processing of herbs, flowers and fruits has been developed by Dharamveer Kamboj (45), a farmer, herbalist and an innovator.

The youngest among five siblings, Dharamveer was born on 15 May 1963 at village Damla to Ramswaroop Kamboj and Savitri Devi. His father was a farmer and, along with agriculture, also operated a small flour mill and jaggery processing plant. Dharamveer used to assist his father sometimes. His mother was herbalist, with whom he was extremely close. He would often accompany his mother for collecting *kesu* (*Butea monosperma*) flowers, watching how those flowers were taken care of and made into colours for Holi. Unfortunately he lost his mother in childhood, but inherited from her, curiosity for nature and its herbal wealth.



Restless and inquisitive as a child, he had a special liking for water and used to play near wells and lakes catching frogs and snails. Not much interested in studies, he used to spend time bullying other children or making something or the other. While in class 7<sup>th</sup>, he used to make small heaters from old tin cans and coils and sell them for 15 Rs. All the while, his interest in herbs never subsided. He also used to read the biographies of successful people as he found them quite inspiring. The one he specially recalls is that of Abraham Lincoln.

In 1980, a saint visited their village. During the discussions he told him about the medicinal values of various herbs. He got curious and asked him if anyone can earn a good living by cultivating herbs to which the saint replied in affirmative. The words encouraged him and whenever opportunity came, he dedicated himself to know more and more about the herbs, their plantation and business. He earned his livelihood by farming on two acres of land, held jointly with his brothers.

He got married to Shyamudevi in 1986. But just after three days of his daughter's birth in December, after an altercation with his father, he had to leave for Delhi in search of better means of income. He started earning working as a rickshaw puller. He used to ferry traders to Khari Baoli area of Old Delhi, where they used to pay hefty amount for herbs. This amazed him and he would often converse with the passengers and vendors to know about the herbs and the income they could fetch. His passion for herbs was revived. Unfortunately his stay at Delhi had to be cut short as he met with an accident in 1987. Severely injured, he was brought back to village and it took a year to nurse him back to health.

After his recovery, he joined the village development society and went for a training programme in improving agricultural practices and organic farming techniques. During the six months of the program, he interacted with different farmers and experts in the agricultural sector and gained much knowledge. Subsequently, he began his work as an organic farmer and started conducting various experiments.

In 1990, he became the first farmer in his area to cultivate hybrid tomatoes and generate record production. He also developed some innovative devices viz. battery operated spraying machine using a tape recorder motor and an insect trapping device. He also tried new cropping patterns by cultivating coriander, bottle gourd and sugarcane at the same time. For the same he also developed a farm implement customized for ploughing without disturbing the sugarcane crop. 1991 onwards he slowly diversified into growing mushrooms, strawberries and baby corn.

Once, while waiting for his train at Saharanpur railway station in UP, he observed a sweeper cleaning the platform with his broom. Same year plague had spread in Surat killing many, the reason for which was unhygienic conditions. He contemplated that while many manual systems had got efficient and user friendly over time with technological advancement (such as the pen being replaced by the typewriter and then the computer), but the broom remained unchanged. He then decided to build a machine to make the sweeper's job easier. After spending around a month in development, he built a device to automate the sweeping operation and fitted an old auto engine with components and brushes. This machine, costing less than Rs 8000 became so popular that people from nearby places started visiting him to see the demonstration. Irritated, he finally disassembled the machine.

Subsequently, with the machine that he built for processing *Aloe vera* and *amla*, he expanded his business manufacturing and supplying plant extracts gels, essence and herbal product mix.

### **Genesis of innovation**

It was in the year 2002 a bank manager came to their village promoting *Aloe vera* farming. He also discussed with Dharamveer about the *Aloe vera* gel extractor machine. However, owing to the high cost of machine and the consultation charges, he decided to develop one on his own. In 2003 he started the initial work of designing the machine and in April 2004 handed over the final design to a local fabricator, Vijay Dhiman at Jagadhari who completed the first prototype in March 2005. During the process of

building the machine also, there were certain changes made by Dharamveer. The fabricator also did not have much idea about what he was making. When the machine finally completed and Dharamveer gave him a demonstration, he realised what he had fabricated.

In December 2004, Dharamveer also got an opportunity to visit various *Aloe vera* and *Amla* processing units in Rajasthan along with other farmers. This was facilitated by the Department of Horticulture, Haryana government. This experience made him understand the processing methodology better.

The first prototype had a problem of over heating when the material to be processed was less. He tried to improve but could not eliminate the problem in the second prototype. In the third one, he introduced castor oil bath, which could maintain the temperature till 200° C. This prototype was bought by GIAN North and send to Kenya on a pilot basis. Based on the feedback, GIAN asked him to modify it further incorporating provisions that would make it easily transportable, including making the legs foldable. In the fourth machine, he also incorporated a sieve to manage the flow of *amla*. In subsequent models he plans to add temperature and pressure gauges.

### **Innovation**

This machine is a multipurpose device capable of pulverizing and extracting oil/gel from various herbs.

The machine is a vertical free-standing cylindrical unit mounted on four legs. The raw material is fed from the top and the processed output can be collected at the bottom. The machine consists of an autoclave unit for sterilization, a boiler unit for boiling, the extractor unit for extracting juice or gel, a drive means for a source of power attached to the apparatus. The extractor unit comprises one frame, one condenser with flexible coolant, a set of blades connected to the frame and



a grinding system. The main chamber is enclosed with an oil jacket to avoid direct heating of the herbs.

First the leaves of the *Aloe vera* are washed, then they are individually peeled and skin is removed. The peeled skin is kept separately for secondary processing to generate the essence and gel. The jelly portion inside is washed separately and put into the boiler. The motor is switched ON for running of grinder arranged inside boiler. The boiler is then heated with the help of burner/heater upto 50-60 deg. This is done for about 10 minutes to prepare the juice. Then the *Aloe vera* juice is extracted from the main outlet which is fitted with an inbuilt filter.

For the secondary process of extracting the essence, the removed skin along with some portion of the jelly is washed and put into the boiler along with equal amount of water and is stirred and boiled to over 100 deg. The steam produced during heating is condensed with the help of condenser for producing the essence. The essence collected is mixed with specific quantity of Gelatin powder to form the gel.

To produce juice from plants or fruits, the heating is not done and once material is fed into the shell, the grinder is turned ON and the pulverizing, crushing and mixing produces the juice. The grinding unit is utilized primarily when the processing of dry fruits or spices is required. The temperature and pressure can be set manually using the gauges based on the raw material and desired product outcome. It can also be used for ancillary functions including boiling, sterilization (autoclaving), pulverizing, mixing or produce such as *amla*, *saunf*, mushroom and orange.

The unit can process 100 kilograms of *Aloe vera* in an hour. About 1.25 kilograms of *Aloe vera* leaves are converted to 1 liter of gel in the unit.

### **Innovativeness**

The prior art describes machines wherein the *Aloe vera* gel is extracted by way of squeezing the *Aloe vera* leaves, generally between roller pair or other pressing arrangements. There are dedicated machines which do

activities including washing, trimming, positioning, and peeling and squeezing of the leaves.

However, no single equipment could be found in prior art, which performed multipurpose activities such as extraction, pulverization, mixing and grinding the materials. This machine also acts as a boiler, sterilizer and cooker besides being used to extract the juice or essence from various plants or parts thereof. Interestingly, the machine also allows the operator to use heating as an option and not deploy it if only pulverizing and grinding is required for certain produce types. As compared to available options, this machine is cost effective, portable and suitable for on-farm processing. It can also be operated by an unskilled worker and be used to process a variety of herbs.

### Applications and Dispersion

Being a versatile unit, the machine is used differently for various types of produce. The device effectively provides a method for sterilizing, boiling and extracting gel from within the fibrous husks of harvested *Aloe vera* leaves, flowers, herbs, fruits, vegetables, groundnut, spices and other materials.

The complete specification for patenting the design was filed in February, 2009 in Dharamveer's name. Funding to the tune of Rs 2.8 lakh under the HDFC revolving fund scheme was provided by GIAN-North in the year 2008 to him to manufacture and sell a few units. Costing Rs 1.20 lakh apiece, he has sold more than 7 units in Haryana and neighboring states under the brand name of Prince, which is his son's name. He has also been



supported under the Micro Venture Innovation Fund (MVIF) for prototype development and test marketing. Having obtained the FPO license (A73) for the products obtained using the machine, he earns his livelihood by making and selling value added products from different herbs, fruits and vegetable. He has given employment to over two dozen ladies in his manufacturing setup.

His innovative work has been covered in many regional newspapers. Recently, *The Hindu* newspaper also carried an article on his multi-purpose machine.

### Future Aspirations

Dharamveer wants to develop a farm where he will grow, process and sell the herbs. Presently, he lives with his wife and children on the outskirts of the village near his two acres of land. His family was a great support when he decided to start his own enterprise of agro foods and organic farming. His wife always supported and motivated him in difficult times. She single handedly looked after the family so that he could continue to pursue his innovations. She was apprehensive in the beginning, worrying about the expenses of education and innovation. But she gave up her worries to let him pursue his passion. Pooja, his daughter, doing her masters in business administration, recounts how their neighbours made fun of her father, calling him insane. But now they consider him a worthy example for all. She along with her brother, doing computer engineering, helps him with technical tasks.

Dharamveer gives the credit for his achievements to his mother who instilled in him the urge to know more about herbs and their uses. He is also very appreciable of the efforts of GIAN North and NIF in supporting him. The only thing that Dharamveer regrets is that his parents are not around to see his success. His mother had inculcated love for herbs in him; his father had listened with him the insults and had borne with him the rejections.