
Development of a Sand Separator/De-gritting machine

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Today, consumers world over are becoming increasingly concerned over health standards of the food and beverage they consume. As a consequence of consumer awareness, it is inevitable that stringent quality measures and standards are demanded, from both processing and supply channels in the consumer product chain.

In black tea processing, green leaf is used as the starting material. It is possible that green leaf could get contaminated with sand, grit and other foreign matter, when the leaf bag is placed on the ground without a stand. The situation is even worse when leaf is wet. Also contamination with sand could take place during processing due to damaged surfaces in the factory.

Sometimes withered leaf sifters are used to remove sand from green leaf, but they are not capable of removing the sand completely. Therefore, at present, withered leaf sifters are hardly used. Sand particles sometimes could turn into grit during rolling and other operations in the processing. Although removal of sand particles is possible using a simple suction winnowing in the grading room, removal of grit particles using the same technology is difficult, owing to the fact that both tea and grit particles have the same weight. Due to this problem, several bought leaf factories have large quantities of BOPF and Dust grade teas getting accumulated in the factory without going to the market resulting in loss of income. This problem is more acute in the bought leaf sector, which contributes to about 65% the national production. A rough estimation points to a loss of about Rs 15 million to the National economy.

The continued collaborative efforts between the TRI and Department of Agricultural Engineering of the University of Peradeniya have made it possible to design and develop a model to separate sand from tea. This development is based on the model previously designed and patented, by the same team, and it was the first of its kind in the country, and may be in the region. The latest unit is now in operation at St. Joachim factory, Ratnapura.

The basic principle of operation of the tea sand separator is centered around an inclined oscillating corrugated bed. The vertical component of oscillation, together with the fluidizing airflow, lifts the lighter particles leaving heavy particles on the wire mesh. The horizontal component of the oscillation moves the heavy particles towards the upper end of the bed while allowing the lighter particles move down the slope. The corrugated bed prevents lateral flow of materials and the electronic motor speed controller smoothly controls the oscillating frequency. Adjusting the inlet opening of the blower controls the airflow rate. The slope of the bed could easily be adjusted using screw jack mechanism. The feed rate of the material can be controlled by varying the oscillating magnitude of the electro-magnetic vibrator fitted under the hopper.

The machine is being tested for its throughput, and the levels of separation for different tea grades, mainly using BOPF and Dust grades. The results revealed that it has a throughput of about 50 – 90 kg/ha, depending on the extent of contamination. Lesser the contamination higher will be the throughput. The current model is energy efficient and light-weight compared to the previous model. The advantage of this machine is that it adds value to the broken tea grades contaminated with sand/grit, which would otherwise be discarded. The research team, who developed the machine, hopes that the tea manufacturers would find the machine profitable, and would start using it in time to come.