

# SUPER TURBO RICE HUSK QUASI GASIFIER STOVE

by

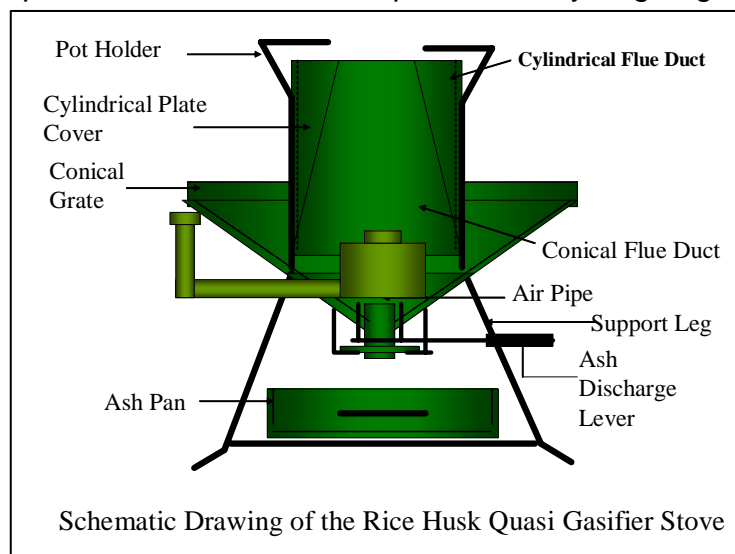
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Good news and Glory to God!!!

A super turbo rice husk quasi gasifier stove was a recently discovered technology for burning rice husks with the use of super heated steam jet. Enhancing the firing of rice husk with steam, efficient and clean burning of fuel can now be achieved. This super turbo technology of burning rice husk was recently discovered at the Appropriate Technology Center of the Department of Agricultural Engineering and Environmental Management with the assistance from agricultural engineering students -- Daniel H. Belonio, Lucio E. Larano, Xykster Pelaez, and Raymond Paul Aungon. By injecting steam into the burning rice husks, a pinkish color flame is generated during combustion of fuel. The pinkish-color flame is suspected to be due to the separation of hydrogen gas from water.



This stove, as schematically shown, employs the conical grate rice husk stove for domestic use developed at CPU way back in the 90's. The cylindrical plate cover has a diameter of 20 cm and a height of 25 cm. The steam tank has a capacity to contain 650 ml of water per load. Instead of the side-in steam injection, steam is



introduced from the center of the stove. One distinct feature of the stove is that even it is designed for domestic size cooking, it can suitably be adopted for slightly bigger pot (5-liter capacity) that is commonly used for small restaurant and/or institutional cooking.



Performance tests have shown that ignition of fuel can be done in just a minute using 2 to 3 pieces of burning paper. When the firing has started, saturated steam can be converted to superheated steam within a period of 3 minutes. This superheated heated enhances the firing of the stove. Water boiling tests have shown that 2 liters of water can be boiled in the stove in a shorter period of 6 min as compared with that of without steam which boils the same amount of water for 11 minutes. Fuel consumption rate is slightly reduced to 3.19 kg rice husk per hour when operated as super turbo with a steam consumption rate of 1.34 liters per hour. The overall thermal efficiency of the stove is 50 to 70% higher than when operating the stove without steam injection. The power output of the stove is 1.28 kW which is higher as compared to 0.93 kW without the steam. The percentage rice husk char produced is 35%. It was observed that the color of the flame turned from yellow to pinkish color right after the superheated steam is injected into the burning gases. Hydrocarbons and soot are eliminated upon injection of steam. The measured level of CO during the tests averages to 215 ppm, which is the same with the amount of CO in the ambient air.



Pictorial views of the stove operated by injecting saturated and superheated steam are shown below. As can be seen from the photos, the stove that was injected with superheated steam produces a luminous flame with pinkish color whereas the one with no steam has yellow-orange color and the one with saturated-steam injection has enhanced firing with yellow color.

The stove as it is shown in the picture above can be fabricated locally using available materials and labor in the locality. Using stainless steel liner at the combustion chamber will require an investment cost of P2,500.00 per unit.



(a)



(b)



(c)

Comparative Pictures of Rice Husk Quasi Gasifier Stove: (a) without steam, (b) with saturated steam, (c) with superheated steam.

The technology is presently being improved in terms of design and being readied for commercialization. Interested organizations or individuals who wish to collaborate in this project may contact the Project Director, Appropriate Technology Center, Department of Agricultural Engineering and Environmental Management, College of Agriculture, Central Philippine University, Iloilo City, Philippines. Our landline is 063-033-3291971 loc 1071. You can also send email to [cpu\\_aprotech@yahoo.com](mailto:cpu_aprotech@yahoo.com). Good day and God bless!!!

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1 US\$ = 55 PHP