Kerosene - Plant oil - Steam - Pressure stove (Hybrid Stove)
Operation and Maintenance Tips

About the stove:

The hybrid stove has been developed in the context of fossil fuel shortages and renewable energy possibilities. The focus is on rural energy independence and hence the use of straight vegetable oil alone is considered. Bio-diesel which is a refined product is not to be used and the stove is not designed to use bio-diesel.

The stove uses up to 30 % plant oil and balance (around 70%) kerosene. In the event plant oil is costly or not available, the stove can function as a high efficiency kerosene stove using only kerosene.

Stove parts:

The stove has 3 tanks - a red coloured kerosene tank, a blue coloured water tank and a green coloured plant oil tank. The plant oil tank and water tank are constructed as a single composite structure with a dividing wall in the middle with a 2 mm hole at the top. This hole equalises the pressure applied for water and plant oil and the operation is by a single air pump in the water tank. The plant oil outlet alone is provided with an additional valve. The kerosene tank is having a separate air pump of its own. Water should be filled only in the blue coloured tank and Plant oil should be filled only in the green coloured tank.

Capillary system is used for conveying plant oil and water separately into a small mixer chamber and from there another capillary feeds the mixture into the hot zone of the burner. Small diameter capillary carries water and the larger diameter capillary carries plant oil. The proportioning of the capillary diameters and lengths are done to take care of the viscosities of plant oil and water. The joint before the burner can be opened and pressure applied for water and oil. The mixture that comes out should be ideally 60 % water and 40 % oil. More oil will lead to blockage of the burner. More water will not do any harm. Any independent flame just at the tip of the plant oil evaporator tube indicates more oil used.

The Spill tray is designed to improve the thermal efficiency of the stove also. At present the thermal efficiency stands at around 59 %.

The Burner is a regular Venus kerosene burner modified to burn around 30 % plant oil additionally.

Operation:

Keep the plant oil valve fully closed. Pump a little kerosene into the spirit cup and light it for preheating the burner. Once preheated, apply pressure in the kerosene tank to reach the desired flame. Once the burner top has reached red hot colour, water can be pumped. Once steam has passed through the plant oil evaporator tube for about 30 seconds, the plant oil valve can be opened in such a way there is no flame at the tip of the evaporator tube. Only very little pressure should be applied for plant oil and water. Plant oil should be used only when the stove is on high flame.

While switching off the stove, first the plant oil and water should be switched off and later kerosene can be switched off.

Pressure release valves are provided on all the three filler caps (ie. kerosene, plant oil and water filler caps).

Maintenance:

It is important that capillaries do not get clogged / blocked anywhere. Water and Plant oil should be strained while pouring into the respective tanks using the filter provided in the kit. It is also advisable to empty the water and plant oil tanks once in a while using the drain provisions for both water and plant oil to clear any sludge/deposits at the bottom.

Any blockage of the kerosene vapour nozzle can be cleared using the needle pricker provided in the kit.

Although capillaries are made of copper and hence flexible, the points where they are welded will be generally weak for any bending or twisting action. Proper care is needed in this regard.

Points to note:

There should be no independent flame at the tip of the plant oil evaporator tube at any point of time, since this indicates blockage inside the evaporator tube with carbon deposits. If such a flame is seen, close the plant oil valve for 2 minutes and allow only steam to pass through and then open the plant oil valve partially in such a way that there is no more flame coming at the tip of the evaporator tube.