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FUEL EFFICIENT HEARTH FOR BOILING CLAMS

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A simple and fuel efficient hearth was designed for boiling clams for recovery of meat. Experiments were conducted to study the efficiency of hearth using different fuels and compared with the conventional hearths and fuel used. The new hearth prevents much of the radiation loss of heat taking place in the conventional hearths which have an open area of about 70% on the circumference. The new hearth also allows for controlled burning of fuel by controlled admission of air using a hand blower. Any type of solid fuel can be used. Paddy husk has been found to be the most efficient and cheapest fuel for use in the new hearth.

Introduction

Live clam is collected in substantial quantities from inland water bodies of Kerala. For recovery of meat, clam is boiled in vessels over open fire after sprinkling little water. Heating is continued until all the clams open up and the meat is sufficiently loose from the shell facilitating its easy separation by little shaking in a suitable container. However, the traditional process is quite unhygienic and the product is very poor in quality. To increase the acceptability of clam meat, hygienic handling is a very important requirement. Only hygienically processed meat can be further used for converting into

other processed products like pickles for which there are good prospects and technology is already available (Vijayan et al., 1982).

The traditional method of boiling clam is by supporting cooking vessel on three granite stones and firing underneath using coconut leaves, husk etc. Though simple, this hearth allows for considerable wasting of heat since the sides of the hearth are open and the flames go outside the vessel. A lot more heat will be wasted if there is wind, which often is the case because processing is done in areas adjacent to backwaters. Incomplete combustion of fuel produce lot of smoke inconveniencing the operation besides affecting fuel efficiency. Therefore, as a first stop in improving the handling practices for recovery of clam meat, it was felt necessary to design and develop a fuel efficient hearth which can economise the process of recovery of meat. The experiments conducted and the results obtained are presented in this paper.

Materials and Methods

Taking into consideration the defects noticed inthe hearths presently in use, few hearths were made incorporating certain modificatins to overcome them and tested their efficiency in comparison with the hearth already in use. Based on the experience gained, a final design was made the details of which are given in Fig.1. The materials of construction are brick and clay. The hearth which is vertical type is 25 cm high with only one opening on side for admission of fuel and four small openings at the top for the escape of burnt gases.

Wastage of heat is minimised by this arrangement. A hand operated blower is provided for controlled admissin of air for proper burning of fuel. Fuels used in the studies were the conventionally used dry coconut leaves, old discarded coconut leaf thatchings and coconut husks as well as new fuels like coconut shell, charcoal, paddy husk, saw dust and a mixture of paddy husk and saw dust. To compare the efficiency of the hearth, the experiments were repeated using the conventional hearths retaining all the other conditions same.

Generally three to four charges will be made per vessel a day for boiling the clams collected by one person/family. Therefore experiments were carried out using only one particular type of fuel a day always employing four successive charges per vessel.

Results and Discussion

Details regarding quantity of clam boiled per charge, time taken for boiling sufficient to make shucking of meat easy, type and quantity of fuel consumed per charge etc. in respect of conventional hearth is given in Table 1. Results obtained for similar studies carried out using the new hearth is given in Table 2.

It can be seen from the tables that irrespective of the type of hearth or fuel used in time taken and the quantity of fuel consumed for boiling the first charge of clams is always considerably more than those for subsequent charges. This is so because initially a good quantity of heat energy is con-

sumed for heating up the hearth and the vessel. In the subsequent charges, consumption of heat energy on these accounts is minimal.

Comparison of the data presented in Tables 1 and 2 shows that the fuel consumption as well as time taken for boiling the same quantity of clams in same vessel using the same fuel is much less using the modified hearth than the conventional one. The conventional hearth has around 60-70% of open area in the circumference through which much of the heat is lost. Also there is no control over the burning of the fuel. The better system of management of burning of fuel and effective control on the loss of heat account for the better efficiency of the modified hearth. This is reflected in the lower consumption of fuel in this hearth.

It has been observed that the conventional type of fuel used in the locality like coconut leaves, husks etc. can be used in the new hearth also. However, cheaper fuel like paddy husk, saw dust etc. cannot be burnt in the conventional hearths because they can be burnt efficiently only with a continuous and controlled air flow. Paddy husk, saw dust or a mixture of both can be used as fuel in the modified hearth with better efficiency. Comparing their efficiencies it can be seen that paddy husk is the best among the lot tried whereas the use of saw dust alone is not as efficient as paddy husk. A mixture of these two provides a satisfactory performance.

It has been shown by actual field trials that the expen-

diture involved in using paddy husk as fuel, is only about 1/3rd of that of coconut leaves or husks. Paddy husk has the added advantage of convenience of procurement and its storage.

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Reference

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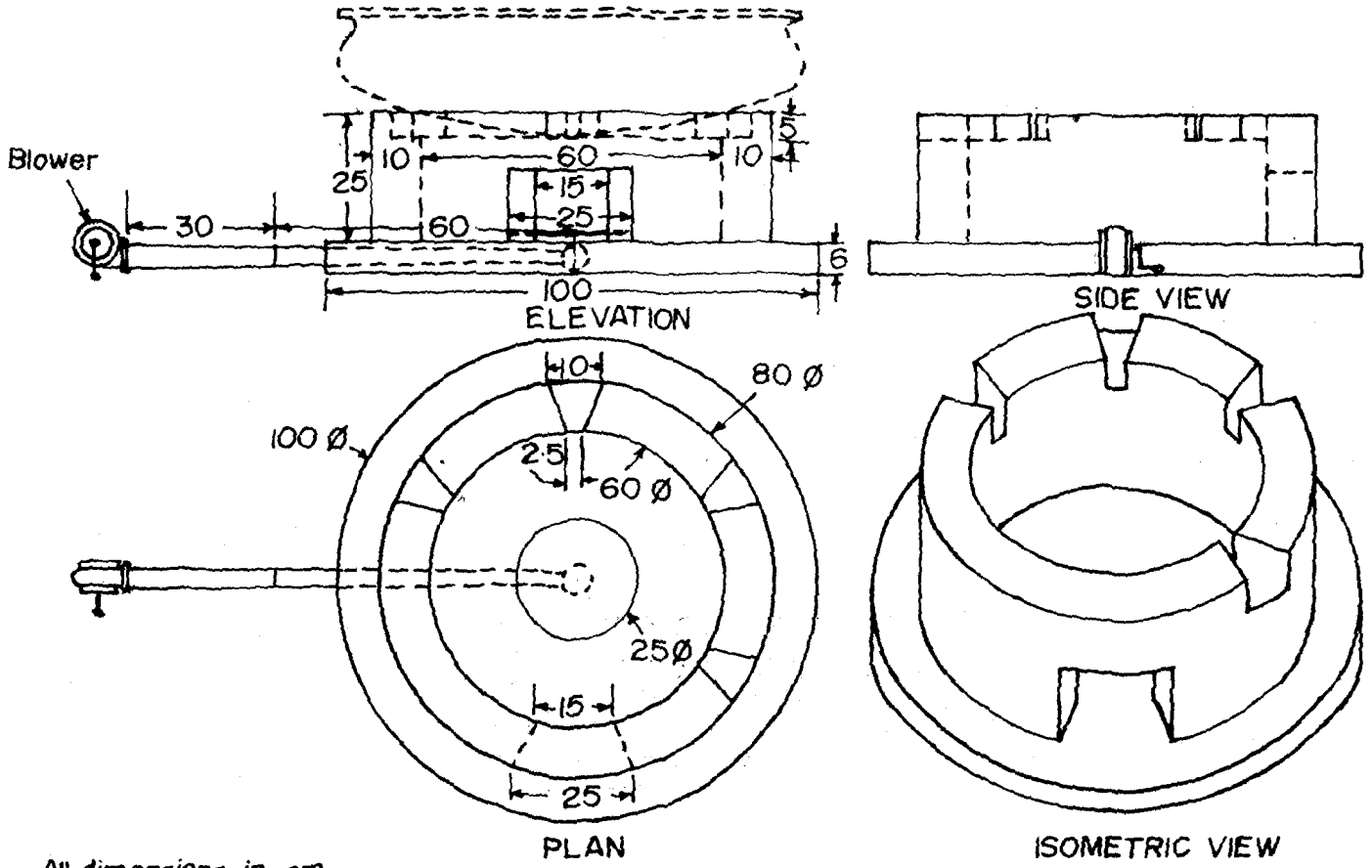

All dimensions in cm

Fig.1. MODIFIED HEARTH

Table 1

Fuel consumed and time taken for boiling clams while using the conventional hearth

Fuel used	Quantity of clams per charge kg	First charge		Second charge		Third charge		Fourth charge	
		time (min.)	Qty. of fuel (kg)	Time (min.)	Qty. of fuel (kg)	Time (min)	Qty. of fuel (kg)	Time (min.)	Qty. of fuel (kg)
Discarded coconut thatchings	80	50	7	40	6	40	6	40	6
Coconut husks	"	55	8	40	7	40	7	40	7
Coconut shell	"	45	7	35	5.50	35	5	35	5

Table 2

Fuel consumption and time taken for boiling clams in the modified hearth

Fuel used	Live clams used per charge	First charge		Second charge		Third charge		Fourth charge	
		Time taken(min)	Qty.of fuel(kg)	Time taken(min)	Qty. of fuel (kg)	Time taken (min)	Qty. of fuel (kg)	Time taken (min)	Qty. of fuel (kg)
Coconut shell	80 kg	45	5.50	30	3.75	18	3.50	18	3.5
Coconut hust	"	45	5.50	32	3.75	18	3.50	18	3.25
Charcoal	"	45	3.50	28	2.50	18	2.25	18	2.25
Paddy husk	"	48	2.75	30	2.00	18	1.90	18	1.80
Saw dist	"	50	4.00	30	3.00	20	2.80	20	2.50
Mixture of saw dust and paddy husk	"	50	3.00	35	2.00	18	2.00	18	2.00