

absorber sheet for floor, supporting frames of CPVC and GI rod. The trays are placed on holders inside the dryer for spreading the fishes for drying. The tunnel dryer is a stand-alone system as it does not require any external power source. The fans were operated by means of a solar PV panel fitted on roof top of the dryer and associated battery setup. This is an affordable bulk dryer.



and gear arrangements, discharge chute and control panel. Drying experiments were conducted in this infrared dryer using various fishes and found that the drying time requirement was significantly less than that of conventional dryers.

### 5. Solar-gasifier hybrid dryer (50 kg)

In this dryer, water was utilized as a sensible heat storage (SHS) material as well as heat transfer fluid and biomass gasifier as an indirect backup heat source. The coconut shell was used as a biomass feedstock for the operation of a downdraft biomass gasifier to generate producer gas.



### 6. Hot-air assisted continuous infrared dryer (8 kg)

The dryer consist of feed hopper, belt conveyor arrangements, infrared radiation heating source, hot air generation unit, motor

### 7. Biomass dryer (20 – 30 kg)

The dryer consists of a drying chamber, blower, biomass furnace, and hot air re-circulatory system. It is suitable for drying all types of materials including fruits, vegetables, spices, and condiments. It will be highly economical to operate if biomass availability is abundant and cheap.



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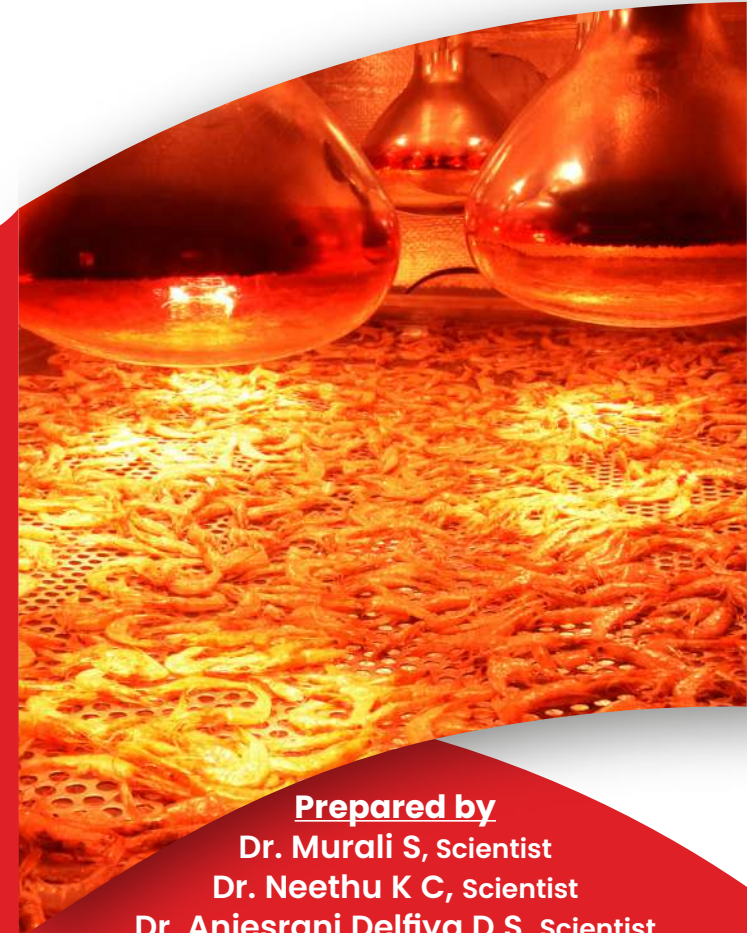
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## Green, Clean and Affordable Dryers for Fish Processing and Value Addition



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## ICAR-CIFT DRYERS

Drying preserves fish from decay by removal of moisture from fish, thereby arresting the growth of bacteria, action of enzymes and chemical oxidation of the fat. In India, 20-30 % total catch of fish is dried or processed for export and local consumption. Open air sun drying is the traditional method employed in India to dry fish and fishery products, but it often results in inferior quality products due to uncontrolled drying depending on the weather conditions and vulnerability to the infestations of dust, rains, insects, pests, excreta of birds, foreign bodies, microorganisms etc. Also, open sun drying demands prolonged drying time.

ICAR-Central Institute of Fisheries Technology (CIFT), Cochin has developed low cost, energy efficient and eco-friendly dryers like Solar-electrical hybrid dryer, Solar-LPG hybrid dryer, Solar tunnel dryer, Solar-gasifier hybrid dryer, Infrared dryer, Biomass dryer etc. for hygienic and quality drying of fishes. These multipurpose dryers are also suitable for drying of agricultural products including fruits, vegetables, spices and condiments. An additional/supplemental heating source is provided in these dryers to continue the drying process during off-sunshine hours.

### 1. Solar-electrical hybrid dryer (20 kg)

The dryer consists of solar air collector, drying chamber with trays and an exhaust. The capacity of the dryer is 20 kg. In this dryer, supplemental heating is provided by electrical coils kept inside the drying chamber.



### 2. Solar-electrical hybrid dryer (40 kg)

Solar air collectors transmit solar energy to the air flowing through the collector which in turn directed into the drying chamber by blower. Electrical back-up starts automatically whenever the desired drying temperature is not attained in the drying chamber, particularly during rainy and cloudy days.



### 3. Solar-LPG hybrid dryer (60 kg)



The dryer helps to dry fish using solar energy supported by environment friendly LPG based water heating source. In this dryer, fish could be dried using solar energy during sunny days, and when solar radiation is not sufficient especially during cloudy/ rainy days, LPG back up heating source will be automatically actuated to supplement the heat requirement.

### 4. Solar tunnel dryer (50 kg)



The tunnel dryer is made of UV stabilized transparent polythene sheet for roof cover, black