

Rural Technology and Renewable Energy Entrepreneurship

Development Centre at Jalpaiguri, West Bengal

Function of the centre:

Self-employment generation for rural unemployed youth through non-conventional energy and rural technology based entrepreneurship development training to setup large numbers of small-scale production unit throughout the North Bengal.

Overall aims of the centre and its importance:

Dependency of rural people of North Bengal region only on agriculture generated a huge mass of unemployed youth those are facing constraint to continue their existence.

Present day industries are suitable only for qualified urban people. So, self employment generation through setup of simple renewable technology based small scale production unit is only the way to arrange earning for unemployed rural people.

Endeavour to setup an entrepreneurship development centre on rural technologies and non-conventional energy devices will arrange the profession for rural youth of North Bengal region by trained them to go through the venture as entrepreneur especially on wide source of simple and low cost non-conventional energy technologies with a vast potentiality of income generation.

Besides, through this centre mass people can be familiarized with the utility of different non-conventional energy gadgets like compact kitchen waste based biogas plant, solar water heater, solar dryer, solar cooker, solar distillation plant etc. Peoples will also come to know about fuel saving devices and rural technology based utility items such as improved biomass stove, wood charcoal gasifier stove, rice husk gas stove, briquette fuel making from agricultural waste, manpowered battery charger and so many other attractive products. The centre will also train people on agricultural implements and food preservation. Passive cool chamber for short-term storage of agricultural products, simple wheel hand hoe are the example of such agricultural implements. Energy plantation and know-how of small scale biodiesel production unit as village enterprise is also included in the training course. Brief particulars of some technologies selected as training items are described in the attached annexure.

Moreover, the centre has taken a plan to undertake comprehensive research programme on developments of simple and low cost non-conventional energy technologies and energy saving devices.

Techno-economic viability of such entrepreneurship development centre will surely get social acceptance in rural sector of North Bengal.

Implementing organization:

Jalpaiguri Akshay Rural Technology and-
Renewable Energy Entrepreneurship Development Centre
(Regd. under W.B Society Registration Act- 1961)
Mohanta para, (Lane Opp. to Muhuri Para Senior Citizens Park)
PO & DT- Jalpaiguri- 735 101, West Bengal.

Postal Address: House of Sankha Subhra Datta
C/O- Santosh Kumar Datta
Mohanta Para(Lane opposite to Muhuri Para Senior Citizen's Park)
P.O & Dist- Jalpaiguri -735 101. W.B
West Bengal. India

Facilities available at present:

Jalpaiguri Akshay Rural Technology and Renewable Energy Entrepreneurship Development Centre, Mohanta Para, PO & DT- Jalpaiguri- 735 101, West Bengal having the infrastructure of both theoretical and practical training. Total area of existing lecture hall is approximately 160 Sq.ft. and this hall is equipped with desk top computer, whiteboard, drawing board, furniture etc. Adequate space is available for further extension of this hall if necessary. Besides, the centre is provided with a large number seminar and conference proceedings, different manual and books on rural technology and renewable energy. A small workshop of nearly 100sq.ft area is presently available in the training centre which is equipped with various hand tools and prototype of few solar gadgets for demonstration purpose. Moreover, 3000sq.ft covered area is available to setup a big workshop if necessary in future for practical work of the trainees.

List of publications and patent applications of secretary of the centre:

Attached

LIST OF PUBLICATIONS AND PATENT APPLICATIONS OF SECRETARY

INNOVATIONS FILED FOR PATENT-

1. Suspended Box Solar Oven- Patent application No- 639/KOL/2006 dated 27/06/2006
2. Regenerative Brake System of Bicycle- Application No- 1205/KOL/2007 dated 30/08/2007.

LIST OF PUBLICATION

1. **Inclined Box Solar Cooker– An Innovative Design.** Proceedings of the International Seminar on Downsizing Technology for Rural Development, October 7 – 9, 2003, jointly organized by Technology Information Forecasting & Assessment Council, New Delhi and Regional Research Laboratory, Bhubaneswar
2. **A New Design of Box Type Solar Cooker – An Investigation.** Jointly published with Dr. Soupayan Mitra in the Proceedings of International Congress on Renewable Energy, February 8 – 11, 2006, organized by Solar Energy Society of India and Centre for Energy Technology, Osmania University.
3. **Suspended Box Solar Oven.** Solar Cooker Review – March 2007, Published by Solar Cooker International, USA.
4. **New Solar Cookers.** Akshay Urja, March – April, 2007, A Newsletter published by Ministry of New and Renewable Energy, Govt. of India
5. **Domestic Solar Water Heater,** Directory of Rural Technologies- Part–IV, published by National Institute of Rural Technology, Hyderabad, in January 2003.
6. **Variable Displacement Pump – A Concept Innovation.** Proceedings of 4th All India People's Technology Congress – February 22 - 23, 2003, organized by Forum of Scientists, Engineers & Technologists in collaboration with Dept. of Science & Technology & NES, Govt. of West Bengal.
7. **An Arrangement for Variable Valve Actuation of Spark Ignition Engine.** Proceedings of 5th All India People's Technology Congress – February- 2005, organized by Forum of Scientists, Engineers & Technologists in collaboration with Dept. of Science & Technology & NES & Dept. of Higher Education, Govt. of West Bengal.
8. **Insulated Food Cabinet with Two-stage Thermal Barrier.** Proceedings of 6th All India People's Technology Congress – February 10-11- 2007, organized by Forum of Scientists, Engineers & Technologists in association with All India People's Science Network, Paschim Banga Vigyan Mancha, Centre for Technology Development and in collaboration with Dept. of Science & Technology & NES, Dept. of Information Technology, Dept. of Agriculture and Dept. of Higher Education, Govt. of West Bengal.
9. **A New system to overcome the drawbacks of two-stroke S.I engine.** Invention Intelligence Magazine, November 1995 issue, published by National Research Development Corporation, New Delhi.
10. **Regenerative Brake of Bicycle.** Accepted for publication in the Proceedings of International conference on Advances in Mechanical Engineering, 14 – 16 December, 2006, organized by SRM Institute of Science and Technology, Chennai but author not agreed to publish his paper ultimately as he later decided to apply for the patent first before the publication of his innovation.
11. **Tile Box Solar Cooker-** Akshay Urja, SEP - OCT, 2007, A Newsletter published by Ministry of New and Renewable Energy, Govt. of India

West Bengal Form No. 264.



রেজিষ্ট্রেশনের পর প্রতি বছর কি
মহ (২৭নং) ডিটাইন' করা দেওয়া
সাইনড: বাবাজাহ্নক।

Registration granted in
anticipation of the
information/facts stated
in the documents being
correct and true.

Certificate of Registration of Societies

WEST BENGAL ACT XXVI of 1961

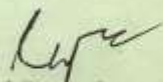
S/ILI 46822
No. _____ of 2007-2008

I hereby certify that Jalpaiguri Aranyak Rural -
Technology And Renewable Energy Entrepreneurship-
Development Centre ->

has this day been registered under the West Bengal Societies
Registration Act, 1961.

Given under my hand at Kolkata
..... fourteenth day of August
Two thousand and Seven




Registrar of Firms, Societies &
Non-Trading Corporations,
West Bengal.

**JALPAIGURI AKSHAY RURAL TECHNOLOGY AND RENEWABLE ENERGY
ENTREPRENEURSHIP DEVELOPMENT CENTRE**

(REGISTERED UNDER W.B. SOCIETIES REGISTRATION ACT- 1961)

**MOHANTA PARA (LANE OPP. TO MUHURI PARA SENIOR CITIZES PARK)
P.O & DIST- JALPAIGURI – 735 101
WEST BENGAL. INDIA**

**BRIEF PARTICULARS OF TECHNOLOGIES
INITIALLY SELECTED AS TRAINING ITEMS**

**COMPACT BIOGAS PLANT
FOR URBAN USE**

**(Source: Appropriate Rural Technology
Institute, Pune)**



A compact digester for producing biogas from food waste. The feed can be waste flour, vegetable residues, waste food, fruit peelings and rotten fruit. Fabrication cost is Rs.8,000.

DOMESTIC PARABOLIC DISH COOKER

**(Technology collected from Prof. A.
Chandak, PRINCE Group- Dhule)**



Parabolic dish, made of single reflector, or by joining smaller pieces of reflector, fixed firmly to a rigid frame. Dish diameter 1.4 m, minimum. Fabrication cost approximately

Rs.5000 Subsidy up to Rs.1500/- is possible.

INCLINED BOX TYPE SOLAR COOKER

**(Designed and fabricated by Secretary of
the training centre)**



Able to access solar radiation from perpendicular direction from 9am to 3pm. Application- To cook 2 kg of rice within two hours. Fabrication cost is approximately Rs.2200.

SUSPENDED BOX SOLAR OVEN

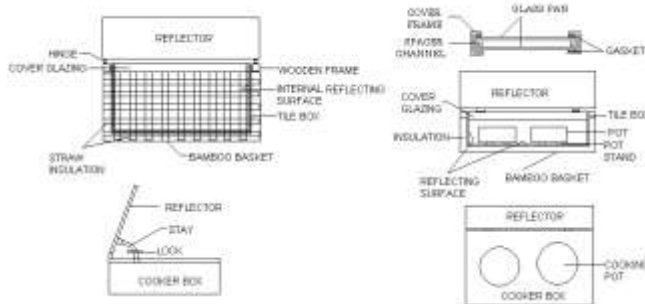
**(Designed and fabricated by Secretary
of the training centre)**



This new oven can be easily adjusted from 5 degree to 70 degree with respect to the ground to follow the sun almost throughout the day. Fabrication cost is approximately Rs.2100.

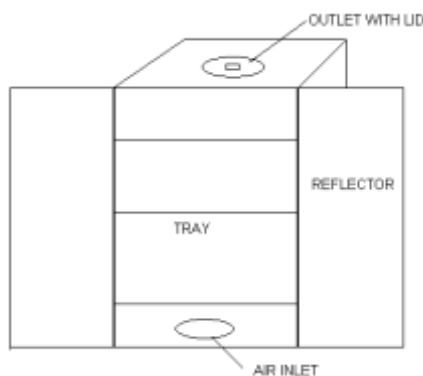
LOW COST BOX TYPE SOLAR COOKER (TILE BOX COOKER)

(Designed by Secretary of the training centre)



Cooker box is made of ½ inch thick earthen tiles. The box is kept in a bamboo basket and straw layer is put in all sides and bottom in between the basket and cooker box. Inside surface of the cooker box is covered by aluminium foil. Booster reflector is also fabricated by aluminium foil. Fabrication cost of the cooker is Rs.900.

A MULTIPURPOSE SOLAR COOK STOVE (Source: College of Technology and Engineering, Udaipur)



For drying, food products are kept in the trays and air circulation is maintained by the openings provided at the top and bottom. While using the units as cooker, the openings are closed with the help of lids and the whole device becomes airtight. The cost of cook stove is in the range of Rs2700-2800.

DOMESTIC SOLAR DRYER (Technology collected through netsurfing, cost estimation needs prototype formation)



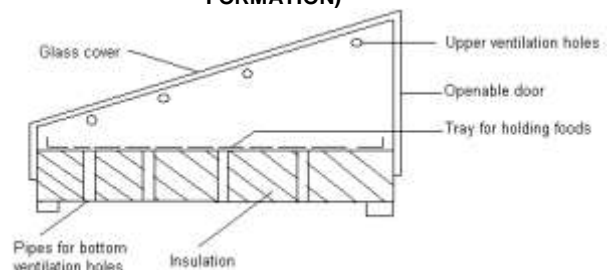
Specifications

Materials used for

Body	GI sheet & MS angle iron
Insulation	Thermocole
Aperture area (m ²)	0.36
No. of glazing	Single
Material of glazing	Plain window pane glass, 4 mm thick
Loading area/tray (m ²)	0.252
No. of perforated trays	3, arranged at 3 levels
Loading per batch (kg)	2-3
Aperture area between each level of trays (m ²)	0.10

SOLAR CABINET DRYER

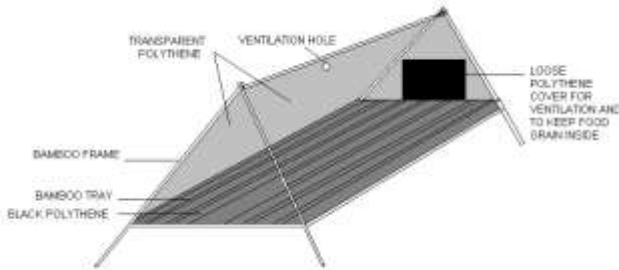
(COST ESTIMATION NEEDS PROTOTYPE FORMATION)



Solar cabinet dryer consists of insulated material box covered with a transparent roof. The inside surfaces of the box are black painted and the product to be dried is kept in the trays. Ventilation holes are made in the bottom and top.

BAMBOO SOLAR DRYER

(Source: Technology collected from training manual for rural woman, published by Centre of Science for Villages, Wardha, prototype formation is required for cost estimation)



Drying fruits and vegetables in the sun is easy and inexpensive. Even in partial sun temperatures will usually be high enough for proper drying.

COLLECTOR-CUM-STORAGE TYPE SOLAR WATER HEATER

(Designed by Prof. H. P Garg, Centre for Energy Studies, IIT, New Delhi, a prototype fabricated by secretary of the training centre)



Capacity- 70 Litre.
Hot water temperature- 50 degree Celsius
Fabrication cost is approximately Rs.3400.

LOW COST SOLAR WATER HEATER

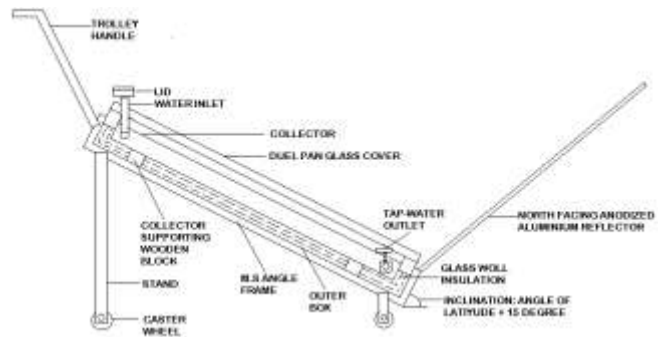
(Designed and fabricated by Secretary of the training centre)



Average maximum temperature during winter time- 40 degree Celsius. Warm water available till next day morning if covered by old unused blanket. Fabrication cost is approximately Rs.950 for 100Lt capacity heater.

PORTABLE SMALL CAPACITY SOLAR WATER HEATER FOR WINTER USE

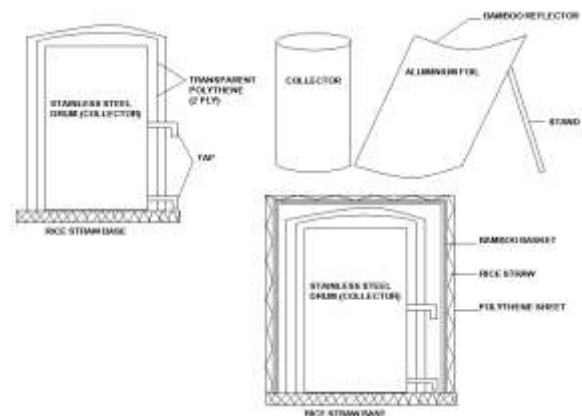
(Designed by Secretary of the training centre, cost estimation needs prototype formation)



Capacity- 40Litre.
Hot water temperature- 60 degree Celsius

SOLAR WATER PRE-HEATER FOR COOKING

(Designed by Dr. A. Jagadeesh, Nellore)



A black painted stainless steel drum of 50lts capacity with opening at the top and taps fitted in the middle and bottom. The drum is covered with two layers of thick transparent polythene sheet. A curved

reflector made of bamboo frame layered with aluminium foil. Hot water up to 60degree is available. The whole system along with storage costs Rs.1000.

SOLAR DISTILATION PLANT



Capacity to produce 2litres of distilled water per square metre per day, production capacity of single unit will be approximately 0.8 litre. A series of 30nos. small solar stills of total capacity 20lts/day costs Rs.58,000 as estimated by the secretary of the centre.

IMPROVED BIOMASS COOK STOVE

(Source: Designed by Central Power Research Institute, Bangalore, Cost estimation needs prototype formation))



The portable stoves are used for cooking in smokeless condition with reduced fuel consumption and pollution. The stove is used primarily to burn small pieces of wood.

WOOD CHARCOAL GASIFIER STOVE

(Source: Minang Jordanindo Approtech Research and Development Division, Indonesia, cost estimation needs prototype formation)



The wood charcoal gas stove is highly suitable for domestic use. The design of the stove is simple using locally available materials and skills in the fabrication. It is convenient to operate and requires less maintenance. It can effectively convert solid fuel into burning combustible gases for cooking and heating.

THE RICE HUSK GAS STOVE

(Source: Minang Jordanindo Approtech Research and Development Division, Indonesia, cost estimation needs prototype formation)

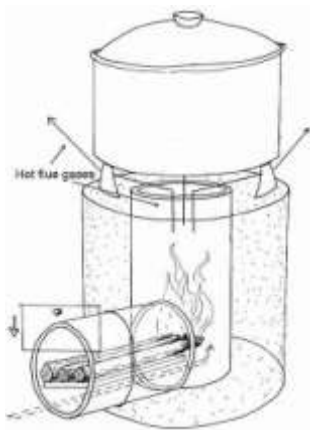


The rice husk gas stove is a developed for domestic cooking utilizing rice husks as fuel. The stove was designed to burn rice husk using limited amount of air for combustion to produce a luminous blue flame, which is almost similar to that of the LPG stove.

Dry leaves, left in field after harvest of sugarcane, are called trash. Pyrolysing the trash and converting it into fuel briquettes, can be a very profitable, small scale, rural business. The capital cost of two kilns with a set of 28 containers, and a small briquette machine is about Rs.50, 000.

ROCKET STOVE

(Designed by Dr. Larry Winiarski, Technical Director, Aprovecho Research Center, cost estimation needs prototype formation)



Efficiency: 12-42%. The efficiency depends on type of a heat exchanger used.

Construction: Simple to construct with a number of different materials. The simplest rocket stove can be built with thick tin cans and wood ash.

BRIQUETTE CHARCOAL FROM SUGARCANE TRASH

(Source: Appropriate Rural Technology Institute, Pune)



INSULATED FOOD CABINET

(Designed and fabricated by Secretary of the training centre)



A new insulated box is presently designed and fabricated using low cost two stage insulation system. Fabrication cost is Rs.2000 approximately.

PASSIVE COOL CHAMBER FOR SHORT TERM STORAGE OF FOOD MATERIALS

(Source: Central Arid Zone Research Institute, Jodhpur, cost estimation needs prototype formation)



This cool chamber has prolonged the shelf-life of the vegetables and reduces the spoilage. The shrinkage of the vegetables was found quite less than the vegetables stored in the room.

JATROPA CURCAS - CULTIVATION TECHNOLOGY



FRUITS OF JATROPA CURCAS

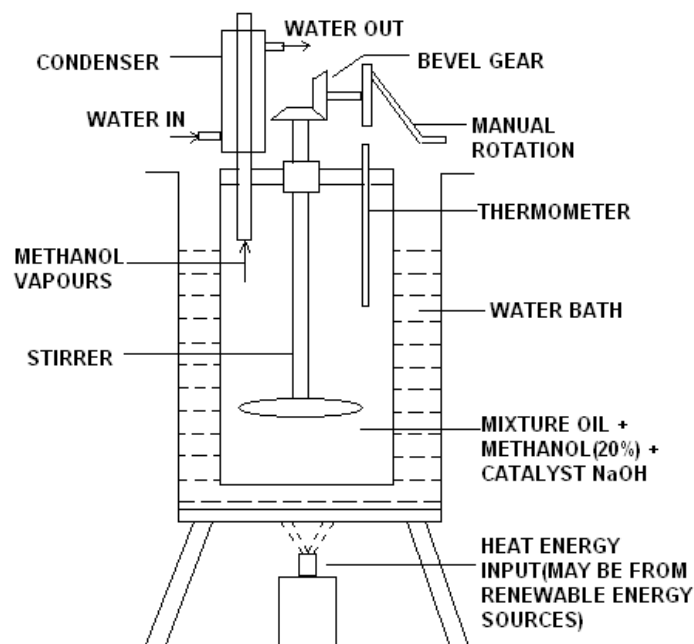


SEEDS OF JATROPA CURCAS

Jatropha can be planted by sowing seeds directly in planting area. The technology involves ploughing the land to a depth of about 10cm and application of farmyard manure followed by broadcasting or line sowing of seeds. For block plantations, generally 25kg of seeds required per hectare. Annual production of seeds from such plantations is expected to be at least 2000kg/hectare.

BIODIESEL PRODUCTION PROCESS

(Source: Centre for Rural Development & Technology, IIT, New Delhi)

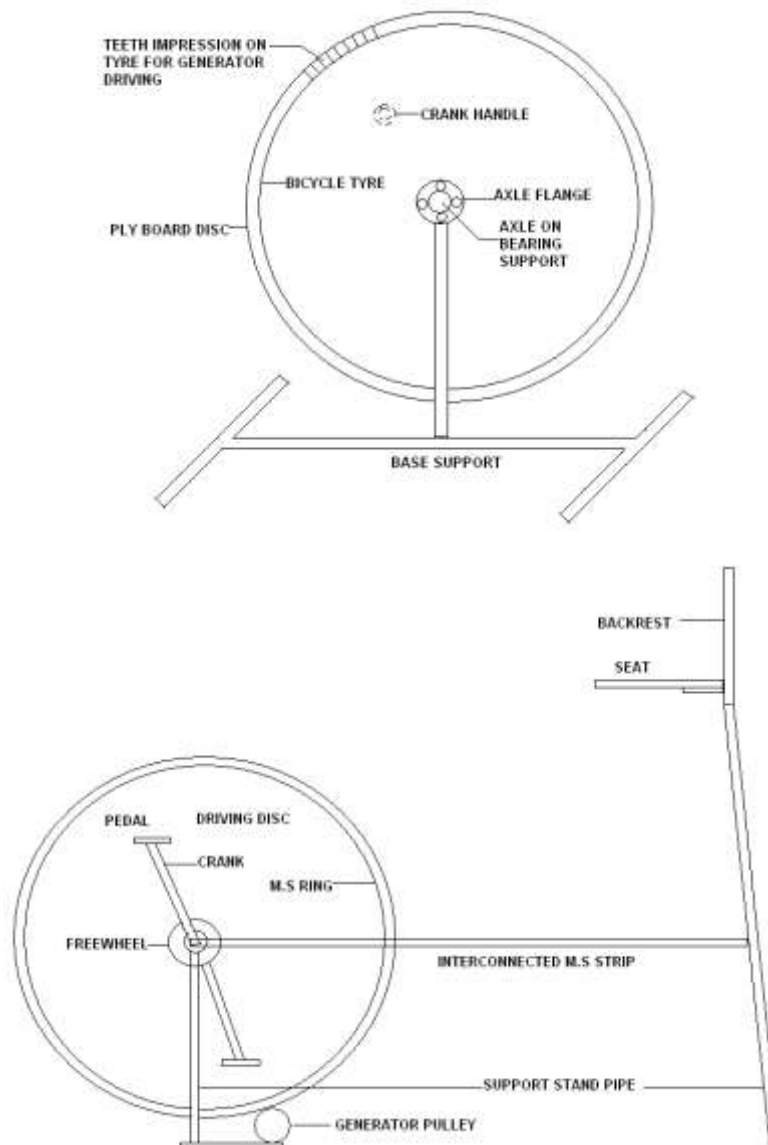


At first oil is extracted from Jatropha seeds in tiny oil expeller. Thereafter process involves trans-esterification of seed oil. Trans-esterification involves conversion of try-glycerides of seed oil into methyl ester by adding alcohol in the presence of catalyst Sodium Hydroxide.

Methanol and NaOH are premixed and added to the reactor containing oil. Manually operated stirrer stirs the mixture for 3 hours by maintaining the temperature at 60 to 70 degree Celsius. After 3 hours of reaction, then mixture is allowed for settling in separate tank for 8 hours. The glycerin settles to the bottom allowing biodiesel on top

MANPOWERED BATTERY CHARGER

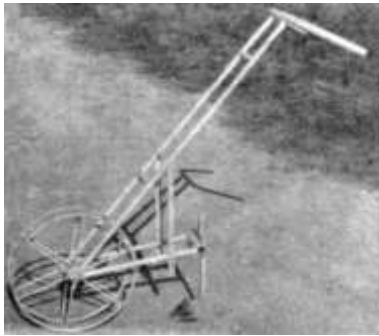
(Designed by the secretary of centre)



One manpowered battery charger is designed for light duty purpose and hand crank is used to produce rotational motion of the wheel which drives a 12 Volt bicycle alternator. Another design is pedal operated to generate comparatively more power than the charger with hand cranking system. In hand cranking system, 3/4th inch thick wooden ply board disc is used as drive unit of bicycle alternator. A M.S driving disc is used in pedal operating charger to get the flywheel effect and the pedaling system equipped with a freewheeling device to minimize the requirement of continuous uniform pedaling during operation. Fabrication cost of hand cranking system is Rs.1450 including alternator and storage battery. Cost of fabrication of pedal operated charger is Rs.1500 excluding the cost of electrical components.

SIMPLE HAND-HOE

(Designed by Dept. of Farm power & Machinery, Punjab Agricultural University, Ludhiana)



One person operating this low cost device can cover average 0.36 hecter per day. Cost of the device is approximately Rs.1000.

SIMPLE KITCHEN CHIMNEY

(Designed and fabricated by Secretary of the training centre)



SUCTION CAPACITY- 759 CUBIC METRES PER HOUR
BLOWER- EPC MAKE PROPELLER FAN
ALLUMINIUM MESH GREASE FILTER
STAINLESS STEEL BODY.
LENGTH- 26 INCH. TOTAL WIDTH-14 INCH. WIDTH OF TOP FLAT SURFACE- 11 INCH. HEIGHT- 8 INCH
ANGLE OF INCLIED FACE- 45 DEGREE
FABRICATION COST IS RS.2800 APPROXIMATELY.

Jalpaiguri Akshay Rural Technology and Renewable-Energy Entrepreneurship Development Centre

(W.B. Society Registration No- S / I L / 46822)

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