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Article/Paper

ROLE OF VOLUNTARY ORGANISATIONS IN PROTECTION OF WATER BODIES FROM POLLUTION

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The voluntary agencies (VA) have been working in socio-economic development programmes including the field of providing safe drinking water and sanitation facilities in villages. In doing so, some of them have developed expertise and professional competence to carry out a variety of technical services. The VII Five Year Plan has emphasised on involving VAs in development and promotional activities, and accordingly defined their role. The VAs were also involved in the National Drinking Water Mission (NDWM) of the Government of India. Hence, the involvement af these agencies and NGOs in the programme of pollution abatement in water bodies, has much relevance in achieving the environmental and health objectives. This subject, however, needs to be related with the definition of overall activities involved, roles and responsibilities of participating institutions and government agencies, and the expectations from VA/NGOs. The paper discusses these aspects for exchange of views.

INTRODUCTION

The state of unchecked and growing pollution in water bodies in general and in perennial rivers in particular, has been a matter of great concern since long. This worry further increased as this polluted water gets its way to drinking water sources in rural areas through canals and ground water routes. While legislation can check drain of pollutants and effluents from organised sectors, no check can be imposed on run-off of farm lands (with excess dosing of agricultural chemicals), and of habitations with pollution loads of solid wastes and waste water. This situation, therefore, required a holistic approach to the solution of the problem in terms of identification of all sources of pollution; causes of pollution; and sectoral organisation and management for prevention and control at various levels. These sectors also needed to be coordinated and monitored.

In order to implement this pollution abatement, monitoring and control systems, and treatment of polluted water (where ever possible), and its dispo-

sal (reuse), it would be advisable first to define the activities and sub-activities involved with it and the related backward/forward linkages required.

POLLUTION ABATEMENT AND CONTROL ACTIVITIES

These activities can be divided into following broad categories :

1. Survey, and investigation and preparation of state of art according to geographical and administrative areas covered by the river basins;
2. Assessment of water quality of the river and its tributaries periodically at several points or representative location and time and on a regular basis;
   - 2.1. Assessment of water quality of the indirect nature of pollution ;
   - 2.2. Development of water quality surveillance infrastructure, and its networking ;
   - 2.3. Collection, collation dissemination of above data in the form which could help in drawing attention of the public, government, industries,, municipalities, villages institutions. etc., about the seriousness and magnitude of the problem in their area and the likely environmental and health impact ; and
   - 2.4. Development of data base and MIS for monitoring and evaluation of above activities ;
3. Preparation of action-plan for planning, implementation and O & M of the programme and decision as who will do what with what resources and within what time-frame. This should include identification of gaps clearly indicating the priorities and viabilities of areas requiring bridging of the gaps ;
4. Human resources development with special reference to sensitisation of managers of water bodies ;
5. Development of software and a common management strategy and systems both for 2 and 3 above ;
6. Harnessing and optimising water quality assessment and problem water treatment technologies in terms of their viability, cost-effectiveness and O & M ;
7. Definition of 'environmental management' activities to be adopted by participating agencies in terms of (present and proposed) organisation, management, people's participation, legal and sociological factors, etc. ;
8. Defining the role of organised sectors in the above including the state governments ;
9. Dissecting areas requiring Research and Development (R & D) and sponsoring such projects to recognised institutions ; and
10. Deciding the convergence point of all the above activities and their networking.

The above is just an illustrative list.

ISSUES

The issues which emerge in the implementation of such a vast and complex programmes are :

1. Commitment of participating agencies ;
2. Cost-effectiveness ;
3. Programme implementation effectiveness ;
4. Active participation of voluntary agencies and the public/community ;
5. Inter and intra agency coordination (district, state, centre) ; and
6. Recognition of NGOs/VAs by the government managers.

These issues draw our attention towards seeking support of decentralised non-governmental agencies particularly the voluntary agencies and creating an 'enabling environment' for them to share some of the responsibilities which participating agencies

are not able to do and to compliment and supplement the programme at the decentralised level.

AGENCIES INVOLVED IN WATER POLLUTION

The following is tentative list :

1. *Government of India* : Ministry of Environment, Central Pollution Control Board, Ganga Action Directorate and Department of Environment ; Ministry of Water Resources, Central Water Commission, CGWB, and Irrigation ; Ministry of Urban Development ; Ministry of Rural Development (NDWM) ; Ministry of Health ; Ministry of S & T ; Ministry of Agriculture ; and Ministry of Industrial Development.
2. *State Governments* : State departments handling above subjects viz. environment, irrigation, command area development, forest, PHED/ Water Boards, Agriculture, and rural development. industries, etc.
3. *Municipal Corporations* : District Board, Town Area Administration, DRDA, Zilla Parishad, etc.
4. *NGOS* : Fertilizer Association of India ; Pesticides Association of India : Voluntary Health Association of India : Centre for Environment Education.
5. Council for Advancement of People's Action and Rural Technology (CAPART) of the Ministry of Rural Development, Government of India.
6. Bureau of Indian Standards (BIS),
7. Universities and agricultural universities.

After we have defined the activities related to pollution in water bodies and agencies already involved, it would be advisable in chart out each ones responsibilities terms their in put in network activities, manpower, budget, and points where their activities would converge. What is the coordinating and monitoring mechanism of these agencies. These are some hard questions and have a significant bearing on the proposal for involvement of voluntary agencies.

ROLE OF VOLUNTARY AGENCIES (VA)

The strength of VA lie in their capabilities to harness, local resources. execute labour intensive project as low cost, enthuse people to participate in the plan and operate micro-level programmes which are environmentally or contextually more relevant and offer programmes of a scale and complexity that the comunity can handle, Here, it should be clearly understood that voluntary work which implies selfless and dedicated service is done by a group of like-minded people (men and women) who have joined together without any external compulsion to work for the betterment and for the development of the community.

By the end of the Seventh Plan, a substantially stable relationship between government and VA has already taken place. Several ministries and departments have special windows for voluntary agencies. This, therefore, also needs to be demystified CAPART is an autonomous organisation with a clearly defined role to motivate VA/NGOs to implement projects and to galvanise their potential, particularly of those with roots in and related projects. Broad role of VA could, therefore, be

1, to supplement government efforts to cover identified activities ;
2, to generate awareness and conciousness on the need for prevention and protection of water bodies from pollution ;
3. to demystify the programme and make knowledge and skills understandable, accessible and inexpensive ;
4. to organise forums where the feedback mechanism is effective enough to create the necessary impact on the planning and implementation of the programme ;
5. to encourage an integrated approach and evolve cost-effective methods in dissemination of all related information.

6. to promote health education in terms of impact of pollution on environment ;
7. to create structures where involvement of the community in planning and implementation at various levels is assured and institutionalised ;
8. to assist in organising training programmes and awareness camps ;
9. to assist in monitoring and evaluation of water quality and in data generation ; and
10. to activate the delivery system and make it effective.

CONCLUSION

The contributions of VA are well known and recognised, The question is not why, but how and when they can be involved in a significant way, It is also recognised that the alternative approaches and methods adopted by them have proved to be cost-effective as well as socially acceptable. The major problem, however, is one of the identity of such VA and a change in the attitude of government sector particularly the managers of pollution batement programme in terms of their recognition and provision of required resources to them. These issues can be tackled only when we are able to solve the problem of coordination betwen different agencies participating in the programme.

RECOMMENDATION :

Action–Plan (3 years)

1. Identification of VA who have interest and strengths.
2. Sensitisation in the over all context of the project.
3. Roles expectation with qualitative and quantitative out put parameters, within a time frame,, training.
4. Provision of maintainance cost and cost for social mobilisation.
5. Monitoring and evaluation—jointly decided by the sponsore and the VA.

BIOGAS PRODUCTION-FROM SHEEP WASTE AND WITH CATTLE DUNG

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It is well known that cattle dung is not available in sufficient quantity to meet the biogas production from Biogas plants. That is why needs for additional feeding material which may mix with cattle dung and enhance the biogas production. Like other organic waste sheep as a suitable feed material for more biogas recovery and is available in rural areas. In view of this laboratory study have been made to study the effect of mixing sheep waste with cattle dung. The result shows that for maximum biogas recovery from sheep waste and cattle dung can be obtained by mixing it in 3 : 1 ratio.

INTRODUCTION :

Cattle dung is very resistant organic material for biogas recovery cellulose is natures most wide spread and abundant natural organic material. Unlike fossil fuel it is annually renewable and dependent only on the sun for the Synthesis. Each year a large fraction of organic waste cellulose on the earth is Synthesized from carbon dioxide water and chlorophyll. The process is termed as photo-synthesis. At present village is dependent mostly on the bullock and manual power for draught power and on twigs and wood for fuel. Among the village sources for energy and fuel as even the poor can avail of them and to avoid destruction of its tree vegetation. the biogas is the most common and easily workable. Construction of a 2 M^3 plant cost Rs. 4500/-. This equivalent to one years earning of a family. Now even though we have the techniques in biogas. we will have to translate them into trades and create biogas walls (artisans of biogas) and create an infrastructure. In this way we have to search instead of cattle dung which can be useful for more biogas recovery.

METHOD OF STUDY :

Cattle dung and sheep waste empl yed in the study were obtained locally. Chemical Analysis of the collected material was done, total solid, Carbon, Nitrogen percentage was determined. Cattle dung and sheep waste were mixed in different ratio using water as diluent and biodigested slurry as inoculum. In this way Nine Laboratory bottle plant of capacity 3 Litres each were used as batch digesters, which were fed with different proportion of sheep waste and cattle dung, water and effluent slurry. Bottle plant No. 8 & 9 was set as dung control and sheep waste control. All laboratory bottle plant were fed with 50 C. C. of effluent slurry as inoculum. The effluent slurry was obtained from a KVIC type of biogas plant which was operating on cattle dung All the above nine bottle plant were kept at laboratory temperature. Each digester was provided with gas exit part attached to water displacement gas measuring system. The generated gas was measured and recorded daily and the digestion was continued for a total period of 60 days.

The following is the list of test methods used for the analysis of samples.

(i) MOISTURE CONTENTS :

By keeping a known weight of the sample in an oven at 75°C for 24 hours and the loss in weight was determined.

(ii) CARBON :

By using standard formula (Tumlos, 1981).

(iii) TOTAL NITROGEN :

By Kjeldahl's digestion method (Bassett. J. et. a. 1978).

The ratio details of all the seven laboratory bottle plant is given in table. 1 where as the set up no. 8 and 9 are Dung control and sheep waste control.

Table—1. Detail of Bottle Plants :

Bottle Plant	Ratio of Mixing	Quantity of Sheep waste + Cattle waste. Mix	Total	Water Added	Effluent Slurry as Inoculum
1.	1 : 1	300 gms + 300 gms	156 gms	910 C. C.	50 C. C.
2.	1 : 2	200 gms + 400 gms	168 gms	1030 C. C.	50 C. C.
3.	1 : 3	150 gms + 450 gms	174 gms	1090 C. C.	50 C. C.
4.	1 : 4	120 gms + 400 gms	170.66 gms	1116 C. C.	50 C. C.
5.	2 : 1	400 gms + 200 gms	144 gms	790 C. C.	50 C. C.
6.	3 : 1	450 gms + 150 gms	138 gms	730 C. C.	50 C. C.
7.	4 : 1	480 gms + 120 gms	134.40 gms	694 C. C.	50 C. C.
8.	Dung Control	600 gms	120 gms	550 C. C.	50 C. C.
9.	Sheep waste control	600 gms	192 gms	1270 C. C.	50 C. C.

CHEMICAL ANALYSIS :

Total solid cerbon and nitrogen percentage of intial feed and spent slurry (Plant No. 1, 4, 5 and 6) have been determined is given in table–2.

Table—2. Chemical Analysis :

Feed Material	Total Solid %	Carbon %	Nitrogen %
Cattle dung	20 %	30 to 32.15 %	1.12 %
Sheep Waste	32 %	27.53 %	1.26 to 1.37 %

Effluent Slurry	Total Solid %	Carbon %	Nitrogen %
Plant No. 1	8.23	13.44	1.876
Plant No. 4	6.04	10.32	1.798
Plant No. 5	9.02	12.45	1.742

DATA ANALYSES AND DISCUSSION OF RESULT

All the digesters i. e. Nine bottle plants were kept at room temperature i. e. 26.81°C. Biogas production was recorded for a period of 60 days of each setup. Detail of biogas production in each bottle plant can be seen in table–3 as given.

Table—3. Biogas Production in Bottle Plant :

Bottle Plant	Ratio Sheep : Cattle Dung	Total Gas Production for 60 days
1	1 : 1	11.4 Litre
2	1 : 2	6.6 „
3	1 : 3	7.8 „
4	1 : 4	10.6 „
5	2 : 1	12.2 „
6	3 : 1	13.5 „
7	4 : 1	9.5 „
8	Dung Control Sheep waste	8.5 „
9	Control	8.4 „

CONCLUSION :

The result of experiment conducted on mixing sheep waste with cattle dung in different proportions and to see the feasibility of biogas production from sheep waste the following conclusion can be made.

1. Maximum biogas production 13.5 litre/600 gram was found in bottle plant number 6 in which the sheep waste and cattle dung ratio was 3 : 1.

2. Bottle plant No. 6 produced 58% more gas than Cattle Dung control (Nos) and nearly 60% more to Sheep Waste Control i. e. No. 9.

In this way deficiency of the Cattle dung can be better compensated by Sheep waste.

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A NEW ASPECT OF CORROSION IN BIOGAS PLANT

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LUCKNOW—20

Certain acids like acetic, formic etc. are precursors of biogas generation which during the biomethanation process promote corrosion of metal and Ferrocement in presence of alcohol. A trace amount of some alcohol is also produced from microbial biodegradation of organic waste materials in biogas plant. In the present investigation, the effect of the presence of acetic and formic acid on corrosion of ferrocement has been studied. It was observed that the corrosion value increased with the increase in the acid concentration from 10 ppm to 1000 ppm. Formic acid was generally more corrosive than acetic acid.

INTRODUCTION :

Most of the biogas plants are made of underground cemented dome in which few plants have gas holder as well as central guide frame which is made up of iron. A major drawback of such model having iron gas holder, which after few years get corroded. In India generally biogas plant is applicable to rural areas which are made of cement and bricks or ferrocement, because it is much cheaper than dome made of PVC or other organic materials.

Generally such type of plants are governed by two corrosion factors, in an anaerobic condition i. e. iron reacts with water inside the plant, resulting in the formation of rust, where as outside the plant it reacts with atmospheric oxygen, carbon dioxide and moisture and thus causes corrosion. Besides these, it was found that certain acids in the presence of alcohol may cause corrosion to cement and concrete. The possible reaction mechanism as :

$$2\,Fe + O_2 + 4\,CO_2 + 2\,H_2O \rightarrow 2\,Fe(HCO_3)_2$$

$$4\,Fe(HCO_3)_2 + O_2 \rightarrow 4\,Fe(OH)\,CO_3 + 4\,CO_2 + 2\,H_2O$$

$$2\,Fe(OH)\,CO_3 + 2\,H_2O \rightarrow 2\,Fe(OH)_3 + 2\,CO_2$$

or

$$Fe_2O_3 .\, 3H_2O$$

The effect of acid on iron rod as corrosion can be represented by this equation :

$$4\,Fe = 4\,Fe^{+2} + 8e^-$$

$$8\,H^+ + 8e^- + 2\,O_2 = 8\,H_2O$$

$$4\,Fe^{2+} + O_2 + 10\,H_2O = 2\,(Fe_2O_3 .\, 3\,H_2O) + 8\,H^+$$

$$4\,Fe + 3\,O_2 + 6\,H_2O = 2\,(Fe_2O_3 .\, 3\,H_2O)$$

Various factors affecting the corrosion of alloys and ferrocement exposed to organic solvents have been discussed by Demo[1]. He reported that although there was little or no corrosion in pure organic solvents, small amount of mineral acids caused unexpectedly severe corrosion, i. e. higher than that caused by exposure to aqueous solution at the same acids level. Presence of water can either accelerate corrosion by increasing the solvent conductivity or in case of already conducting solvents inhibit corrosion by aiding passive film formation on some metals, e. g. on aluminium. Corrosive process can be promoted rapid in organic media, sometimes more rapid than in aqueous solutions.

It is known that corrosion process in aqueous solution is of an electrochemical nature. It has been stated that corrosion can be electrochemical even in liquids of very low conductivity, since the corrosion products are polar substance which conduct electricity for better than the dielectric itself[3].

Corrosion and electro-chemical behaviour of steel, ferrocement and copper in ethylene glycol solution (2.0-99.6%) containing chloride ions (upto 2N) has been investigated by Tysygankova et al[4]. Wyllei and Morgan[5] have reported corrosion and sludge formation in aqueous solutions glycerine. It was also observed that initial corrosion was due to the water content of the solution. The corrosion behaviour of metal aluminium in CH_3OH, C_2H_5OH, ethylene glycol and glycerol of various concentrations has been reported[6, 7]. The corrosion rate of various grade of steel in different organic fluids have been given by Polar[8]. The corrosion of hyper-eutectic aluminium silicon alloys, coupled with various metals like iron, copper, brass, cast iron etc. in ethylene glycol and methyl alcohol has been reported by Craig and Wood[9].

Considering the above observations the authors are prompted to investigate the nature of few acids with a view to find out the corrosive nature of metal and ferrocement of biogas plants.

EXPERIMENTAL :

The specimen metal of biogas plant cut into small pieces of size 12.5 sq. cm. (2 in. × ½ in.) washed with methyl alcohol, dried and weighed before exposure to corrosive fluids. The specimens were placed in 20 ml. of solvent and kept at room temperature for 9 days. The corrosive adherent products were removed from metal mechanically. After drying the specimen reweighted, their weight losses were determined and expressed as mg/dm^2 of metal surface.

In this concern number of experiments have been performed, where different concentration of solvent as well as different concentration of formic acid and acetic acid were used, as represented below :

(1) Effect of Formic acid in aqueous glycol solution (1 : 1)

  (a) Different concentration of Formic Acid in aqueous glycol solution.

  (b) Different concentration of glycol in Formic Acid.

(2) Effect of Acetic Acid in Glycol.

  (a) Different concentration of glycol in acetic acid.

RESULTS AND DISCUSSION :

Experiment No. 1

(a) Different concentration of Formic Acid was added to aqueous glycol solution, and also in water, the results of corrosion occuring in 9 days at 28-3-°C as given in Table-1. This indicates that, when formic acid (10^{-6}N) was added to water, produced measurable corrosion of 30.8 mg/dm^2. However, when formic acid of 10^{-1}N in aqueous glycol solution causing corrosion at the rate of 218 mg/dm^2. In the lower concentrations ($10^{-2}-10^{-6}$N) formic acid only caused some darkening of but no measurable weight losses. But when higher concentration of formic acid (0.174—1.22 N) were used the rate of corrosion of ferrocement increased with

rise in cocentration of formic acid. It has been observed that 5 times higher in 1.22 N formic acid than in 0.174 N formic acid.

(b) In this experiment different concentration of glycol were used in the fixed concentration of formic acid. The results recorded as shown in Table—2. This shows that the corrosion in Pure Glycol (100%) is 1015 mg/dm^2, which is three times lower than that produced by the same concentration of formic acid in water (39–72 mg/dm^2). This indicates that corrosion increases with rise in water content of glycol.

Thus the addition of formic acid in pure glycol, which is non-corrosive, causes attack on metal. The attack is increased in more diluted glycol solutions. The increased conductivity of dilute glycol solutions due to presence of larger amount of water, in which the ionisation of formic acid is favoured, i. e. responsible for this behaviour.

Experiment No. 2

Here different concentration of glycol were used in fixed concentration of acetic acid. The results presented in Table—3 were similar to those occuring in presence of formic acid. The attack was increased in more dilute solution of glycol.

In general, acetic acid proved to be less corrosive than formic acid, particularly in more concentrated glycol solutions.

CONCLUSION

It is therefore obvious that the rate of corrosion is accelerated by the presence of formic and acetic acid as observed in the investigation covering the concentration range from 10 ppm to 1000 ppm. Formic Acid has been found to be more effective in accelerating the rate of corrosion as compared to acetic acid.

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Table—1

Acid content (N)	Weight loss mg/dm^2
10^{-1}	218
10^{-2}	+12.00
10^{-3}	+11.24
10^{-4}	Nil
10^{-5}	Nil
10^{-6}	Nil
10^{-6} in water only	30.8
1.22	3968.4
1.0453	3512.0
0.8711	3007.6
0.697	3052.8
0.5226	2157.3
0 348	1481.5
0.175	692.00

Table—2

Glycerol (% by vol)	H_2O content (% by vol.)	Weight loss mg/dm^2
100	0	1015.0
90	10	1243.52
80	20	1367.8
70	30	2251.3
60	40	2132.0
50	50	3296.5
40	60	3474.18
30	70	3510.0
20	80	3497.8
10	90	3643.29
0	100	3972.1

Table—3

Glycol % by vol.	H_2O content % by vol.	Wt. loss in mg/dm^2
100	0	7.5
90	10	35.8
80	20	115.9
70	30	321.94
60	40	217.0
50	50	1396.8
40	60	1758.0
30	70	2136.5
20	80	3142.24
10	90	3662.0
0	100	4356.87

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EFFECT OF OLD AND NEW BEARINGS ON DRAUGHT REQUIREMENT OF TWO WHEEL CAMEL CART

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Investigations were carried out with the help of old (discarded from automobiles) and new bearings to find out the effect of bearing friction on draught requirement in a camel cart. It was found that there was no significant difference in draught requirement by the use of old or new bearings. The present results form the basis for the use of old bearings and thus reducing the manufacturing cost of a camel cart.

INTRODUCTION :

Camel carts are the only means of transportation in desert tract of Rajasthan. There are overwhelming supporting evidence from archaeology literature, arts, numismatic as well as religious and social aspects which reflect the presence and importance of camel carts in India from pro-to-historical period to the present times. Very little changes were made so far in the design and construction of camel cart. Technically the most complex element of cart is the wheel-axle assembly. This is likely to constitute the major part of the cart, Present day camel carts use pneumatic wheels. The type of wheel, tyre, axle and bearings used have a major influence on the overall characteristics of the complete carts.

Raghavan and Parsanna (1979) reported that bearing friction contributes 3 to 8 per cent on draught requirement (by the use of old bearings) in bullock carts. It was noticed that the camel cart manufacturers are using discarded automobiles bearings on the wheel-axle assembly of camel cart. The present investigation was carried out to determine the effect of old or new bearings on draught requirement of the camel cart.

MATERIALS AND METHODS

Camel cart was used as a loading device and the same cart was used throughout the investigation and only changes were made on the wheel axle assembly. Dimensional details of the wheel axle assembly are shown in Fig. 1 & 2. For camel carts, the manufacturers make a special rim. The rims were made from 1.5 mm thick mild steel sheet by giving it a cylindrical shape and then closing the sides by plates made of 4.1 mm thick mild steel sheet and a hole of 120 mm diameter was made for fixing the hub. Two rings of a $25 \times 25 \times 3$ mm size angle iron were provided on both the sides of the rim to check the slippage of the tyre. A ring of 8 mm mild steel rod was welded on outer end of the rim to check the peripheral movement of the angle iron ring.

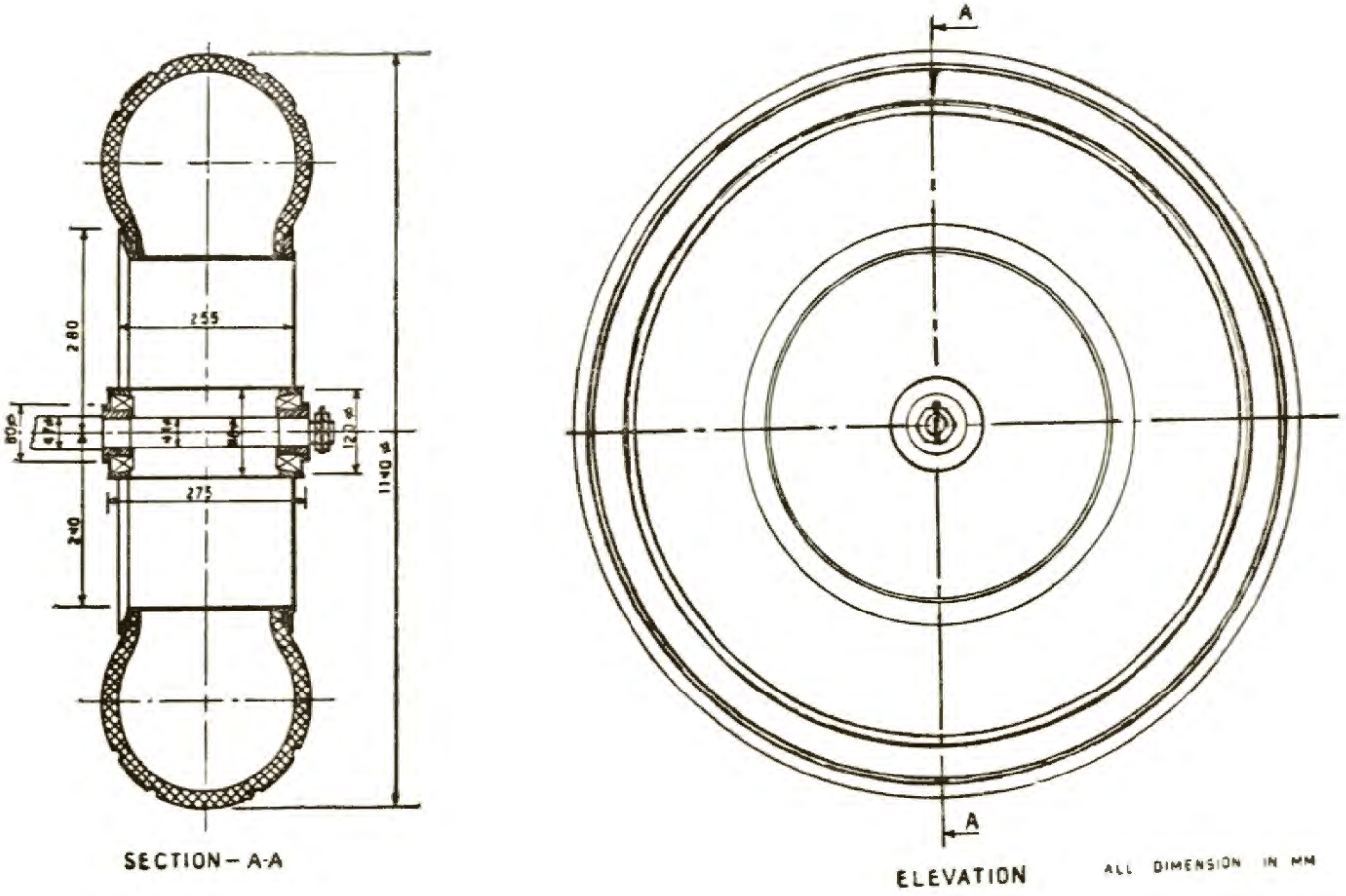
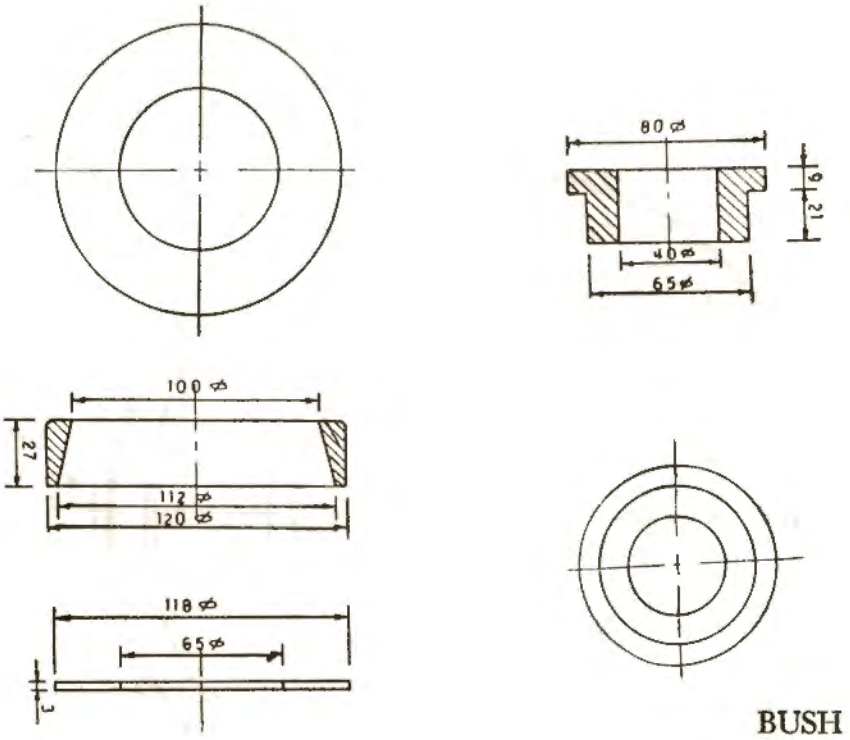
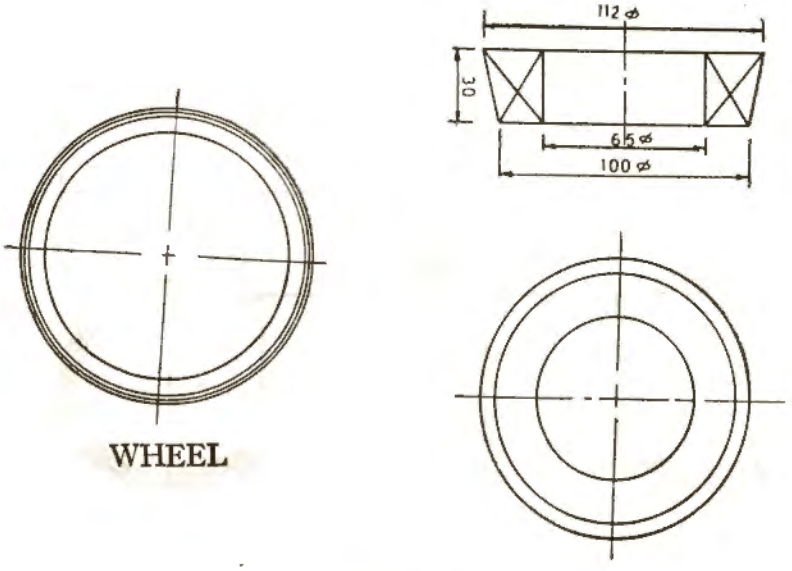


FIG. NO. 1 CROSS SECTION OF WHEEL AXLE ASSEMBLY OF CAMEL CART



BUSH



WHEEL

FIG. NO. 2

DIFFERENT PARTS OF CAMEL CART

A dead axle was used in camel cart. It was made from a round section steel bar. The size of round section was 47 mm diameter. The wheel axle assembly was fitted in the middle of the platform. The tapered roller bearings of size 32-213 were fitted in both the wheels. The bearing housings made of mild steel were welded on both sides of the rim. Major specification of the wheel-axle assembly are as follows :

SPECIFICATION OF WHEEL-AXLE ASSEMBLY :

Tyre size	—	11-20"
Rim	—	Made of mild steel thickness of the closing plates 4.1 mm.
Width of the rim	—	255 mm.
Axle size	—	47 mm diameter.
Length of axle	—	1810 mm.
Diameter of bush	—	40 mm.
Bearings	—	Tapered roller bearing 32-213 old
	—	(discarded from automobiles).
Checknut	—	32 mm diameter.

The experimental parameters involved in the study they are as follows :

EXPERIMENTAL PARAMETERS :

Independent and dependent parameters involved in the study are given in Table 1.

Table—1 Parameters involved in the study

Parameters	Specification/Level
(A) INDEPENDENT PARAMETERS :	
1. Type of tyre and tyre size	Balloon tyre (360 mm 508 mm)
2. Load of the wheels	Tare weight of the cart-446.35 daN, 1231.15 daN, 2015 daN.
3. Terrain	Tarmacadam Road
4. Inflation pressure	241.32 kPa
5. Bearings	Tapered Roller Bearing (i) 32-213 Old (Discarded from automobiles (ii) 32-213 New Bearing
6. Speed	(i) 3.5 km h^{-1} (ii) 5.0 km h^{-1}
(B) DEPENDENT PARAMETERS	
Draught requirement	

Previous researcher International Labour Organization (1986), Jain (1987) reported that speed of two wheel camel cart on tarmacadam road varies from 3.5 km h^{-1} to 5.0 km h^{-1}. Therefore two aspects of general interest were encountered in this study. First was the draught requirement at low speed of the cart (3.5 km h^{-1}) and second was the draught requirement at high speed of the cart (5.0 km h^{-1}) by the use of old and new bearings. The investi,ation was conducted at National Camel Research Centre. Bikaner on standard tarmacadam test track. The cart was properly balanced such that the load coming on both the wheels should be equal and the vertical load at the point of hitching should be negligible or zero for all the payloads. The observation at fixed points were taken for each load and at each speed of the cart, by the use of old and new bearings. The data were analyzed using "Student t-test".

RESULTS AND DISCUSSIONS

Mean draught requirement for each load, standard deviation and coefficient of variance for the draught requirement of two wheel camel cart are presented in Table-3. By observation the data of draught requirement by the use of old and new bearings at low and high speeds of the cart (Table-2) it seems that there is no significant difference in draught requirement. Therefore data were analyzed by ' Student t-test" for each load separately. It

was found that there were no significant difference in draught requirement by the use of old or new bearings at 5 per cent level of significance. This may be due to the fact that tapered roller bearings are designed for much more higher loads and speeds as compared to the maximum load carrying capacity and speed of the camel cart. Therefore proper greased old bearings (discarded from automobiles) perform nearly give the similar performance as the new bearings.

Table—2. Draught requirements by the use of Old and New Bearings on Two Wheeled Camel Cart on Tarmacadam Road.

Speed kmh^{-1}	Observation point	Draught requirements at the load					
		446.35 daN Draught (kgf)		1231.15 daN Draught (kgf)		2015.95 daN Draught (kgf)	
		Old bearing	New bearing	Old bearing	New bearing	Old bearing	New bearing
3.5	A	25.20	24.01	51.8	50.9	64.92	63.34
	B	24.23	24.68	53.6	51.1	63.24	64.08
	C	25.70	25.30	50.9	49.8	65.0	65.22
	D	24.84	23.76	52.2	52.3	63.83	63.54
	E	27.11	25.02	53.4	51.2	65.95	62.63
	F	25.30	24.22	51.7	52.3	64.80	61.75
	G	27.20	26.30	51.6	51.7	66.28	63.18
	H	25.48	25.32	52.4	50.8	63.70	64.37
	I	27.10	26.34	51.9	51.0	62.80	63.92
5.0	A	28.2	26.2	57.05	56.70	70.4	66.40
	B	27.6	26.6	56.66	55.96	68.8	65.60
	C	28.4	27.7	56.88	57.20	66.3	65.40
	D	29.3	28.4	57.14	47.42	67.7	67.30
	E	27.6	27.4	55.89	56.88	71.1	69.50
	F	26.7	26.9	56.28	55.46	69.8	65.80
	G	30.3	28.8	57.12	56.38	68.4	66.60
	H	28.8	28.2	58.31	56.73	66.8	67.80
	I	27.4	26.9	59.20	53.94	67.2	66.08

Table—3 Standard Deviation (SD) and Coefficient of Variation (CV) for Draught requirement at Different Payload and Speed by using Old and New Taperad Roller Bearing (32-213 SKF) on Tarmacadam Road for two Wheeled Camel Cart.

S. No.	Speed	Land on the	OLD BEARINGS			NEW BEARING		
			Mean Draught Required	SD	CV	Mean Draught Required	SD	CV
	Kmh^{-1}	Wheels (daN)	(kgf)		(I)	(kgt)		(I)
		TARE CART (446.35)	25.79	1.026	3.970	24.99	0.8701	3.48
1.	3.5	1231.15	52.16	0.815	1.560	51.23	0.7393	1.44
		2015.95	64.50	1.121	1.739	63.55	0.9513	1.49
		TARE CART (446.35)	28.27	1.000	3.540	27.45	0.8328	3.03
2.	5.0	1231.15	56.84	0.636	1.118	56.58	0.6128	1.08
		2015.95	68.50	1.571	1.293	66.75	1.208	1.81

CONCLUSION :

No significant difference in draught requirement was observed by the use of old or new bearings. Therefore, by using the old discarded bearings from automobiles instead of using the new bearings. The manufacturing cost of a camel cart can be appreciably be reduced.

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THERMAL BONDING MACHINE

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Prof. K. Jayachandran

In this paper the author has discussed about the principle of thermal bonding. The author has also discussed about constructional feature, principle of operation of thermal bonding machine.

INTRODUCTION :

Bonded fabrics are generally produced from non-woven principle with stitch bonding and adhesive bonding techniques. They are widely used in the manufacture of garments, lining fabrics. transportation fabrics and covering materials such as postal and shipment. In this study, simple thermal bonding m/c of Rotary type and Fixed type designed and fabricated for producing various types of bonded fabrics. Although the thermal bonding is normally carried out by means of spraying adhesive powder, applying adhesive liquor and providing adhesive layer between two fabric layers, the last technique is successfully adopted. The bonding principle, the bonding machine design and construction, its operation, the performance and application of different types of bonded fabrics produced with this machine are discussed in detail.

PRINCIPLE OF BONDING :

Fabrics can be bonded by means of adhesive, using heat and pressure. The amount of heat and pressure can be adjusted by suitable mechanisms, according to the construction, thickness and type of material. The bonding of fabrics is successfully carried out with a simple principle by providing sandwich adhessive layer between two layer of fabrics and adequate heat and pressure are applied according to the type of fibrous material.

The feed and delivery rate can be adjusted by a suitable modification in the drive section. It can be used as a continuous and batchwise processing system. The flow process diagram indicates the way in which principles of bonding has been applied in the production of bonded fabrics.

Feeding the sheet of material
with sandwich adhesive layer.
↓
Bonding by High pressure
heat cylinder
↓
Delivering the bonded fabrics
by the rotation of the cylinder.

DESIGN AND CONSTRUCTION OF BONDING MACHINE

A simple bonding machine for fabrics is fabricated using the principle of thermal bonding. The Fig, shows the general assembly of the machine. It shows clearly the way in which different sections connected with one another. The machine has three important sections.

(i) Feeding section
(ii) Tension zone
(iii) Bonding section.

(i) FEED SECTION :

The feed section consists of a feed roller with a handle and a V-groove pulley to drive the pair of cylinders. This mechanism can be made automatic

by a motor and a reduction gear assembly. The feed roller is ahout 2" diameter with 16" length, to feed the sheet of fabrics for bonding action. At present the width is maintained at 30 cm.

(ii) TENSION ZONE :

Guide rollers have been provided to develop adequate tension during the process of feeding. The rollers can be adjusted precisely to vary the tension according to the requirement. The diameter of tension rollers is 35 cm. and the length is 40 cm.

(iii) BONDING SECTION :

This is the most important part of the machine where the bonding action is introduced into the fabric. The bonding section consists of a pair of rollers, pressure assembly and an electric heater. The pair of rollers are driven by a V-belt from the feed mechanism.

The bottom calender roller has a diameter of 12.5 cm. and the top roller has a diameter of 1. cm. which is heated by an electric heater. The rating of the heater is 1000 watts and is mounted inside the top cylinder with suitable arrangements. The pressure assembly mechanism consists of a screw thread arrangement, a pair of bevel gears on both sides and handle wheel. The wheel can be rotated by the handle and the cylinders are pressurised by the screw mechanism. The top cylinder can be made to move up and down by the rotation of the handle. Fig. 2 shows clearly the way in which the top cylinder can be raised by the screw mechanism.

Electric heater assembly is mounted inside the top roller to generate the required quantity of heat for bonding action. Fig. 3 shows clearly the arrangement of heater coil provided in the top roller of the bonding section. The bottom roller is in the same position and the top roller applies pressure on the bottom roller with the screw mechanism. The bevel gears are provided in this section to traverse the screw mechanism for applying pressure on the top and bottom rollers.

The top and bottom rollers are provided with bearings for smooth running action. The feed rate can be adjusted precisely by the rotation of hand wheel.

OPERATION OF THE MACHINE :

The machine is designed for 30 cm. width fabrics. Two sheets of fabrics with adhesive media as a sandwich layer, is to be fed through the feed roller. The continuous rotation of handle will draw the fabric and pass towards the tension zone, where the tension rollers are provided. Then the fabrics enter into the pair of bonding rollers and the fabric layers are bonded by the application of heat and pressure. The bonded fabric is delivered at the delivery section continuously by the rotation of the handle.

ADHESIVE MEDIA :

Adhesive powders, adhesive liquor and adhesive sheets are the common adhesives available commercially which can be applied as a sandwich layer. The adhesive powders and liquors can be applied uniformly by a sprayer, on the surface of the fabric, which is to be bonded. This process can be made still simple and easy by means of providing an adhesive sheet of material. These adhesive sheet materials can be classified as :

(i) Polyester sheets of different thickness.

(ii) Other thermoplastic sheets.

This method is more simple and very easy to apply in the production of better quality bonded fabrics. The adhesive sheet of layer and the fabric sheets are mounted on rolls, at the feed section and these layers are drawn slowly and fed towards the bonding section.

TEMPERATURE AND PRESSURE :

Temperature can be precisely adjusted by a thermostat control mechanism for different types of fabrics to avoid any deterioration or degradation of fibrous material. The pressure can also be precisely adjusted by a screw mechanism for different types of materials, having different thickness levels with various construction parameters.

APPLICATION FLEXIBILITY :

This newly developed machine can be used for bonding materials other than fabrics also, such as paper and thermoplastic sheets i. e. paper to paper, paper to fabric and fabric to fabric.

The present model can be used for bonding fabrics upto 30 cm. width only and the machine can be designed for any width according to the requirement. The newly developed machine can be used as a continuous process machine and batch process machine.

The bonded fabrics produced from this machine can be used for various applications as follows :

(i) Lining materials.

(ii) Stiff collars.

(iii) Postal covers and bags.

(iv) Transportation covering cloth.

(v) Covers for special purposes.

eg. examination papers, reports, insurance policies, and other valuable items.

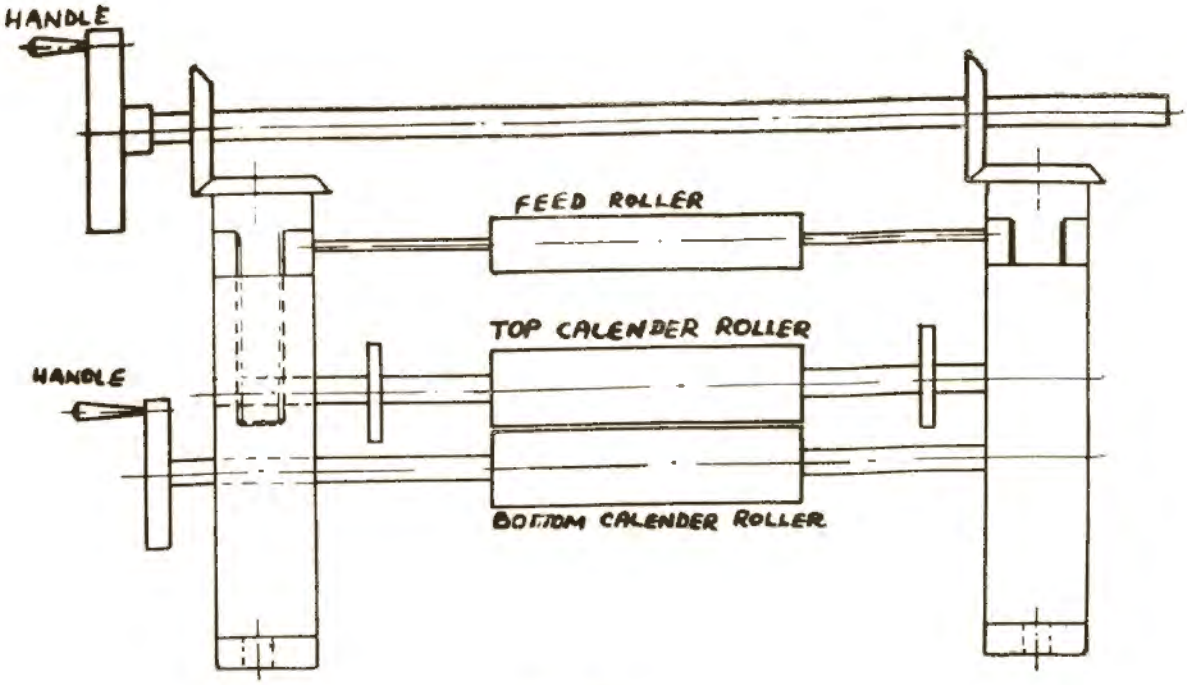


Fig. No. 1

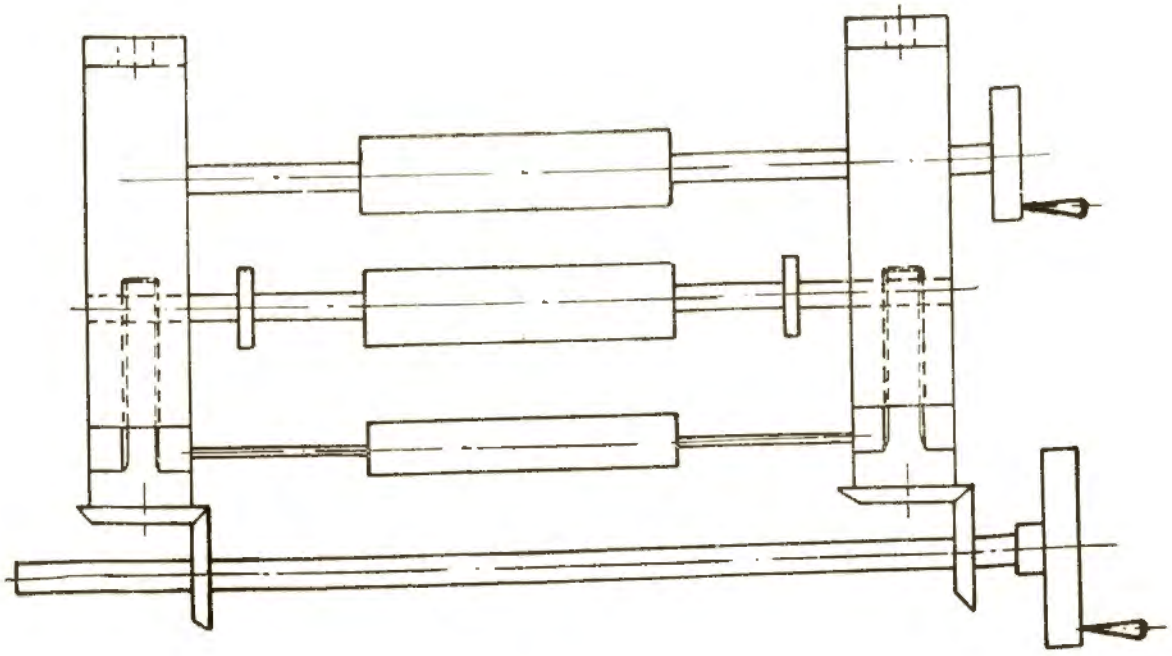
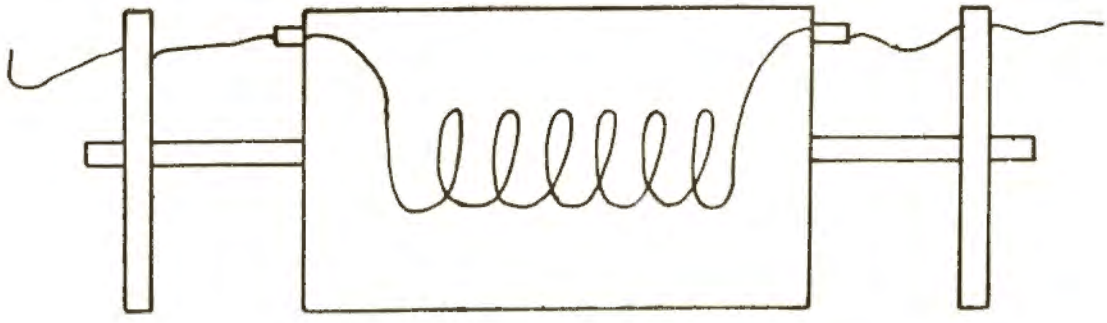


Fig. No. 2



HEATING COIL IN TOP ROLLER

Fig. No. 3

Bee Keeping

INTRODUCTION :

Honey-Bees are social insects that live in hives and each hive inhabited by one family. The Bee-families consists of three groups : queen (fertile-female), drones (males) and worker-bees (infertile females). Thus a Bee-Family comprises one queen, several-hundred drones and ten thousands to one lakh or more worker-bees.

HOW BEES MAKE HONEY :

Honey-Bees are seen on bright days hovering above the flowers to collect sweet-drops of NECTAR. To produce a hundred grams of honey, a foraging bee must visit a million-flowers, and to produce a hundred grams of honey a foraging bee must bring in 12,000 to 15,000 loads of nectar.

HYGIENIC CARE TO BE TAKEN IN THE APIARY :

The collection of honey from wild bee hives has been practised since time immemorial. Efforts to develop modern hives with APIS—MELLIFERA have been made since 1880's. However a bee keeper must be a paragon of cleanliness, as honey-Bees have a very delicate sense of smell and soon become irritated by unpleasant odours. If the proper care is taken the BEE-KEEPING gives us the ATMOSPHERIC-VITAMINS, and for better results one must keep air in the bee-garden quite pure. fresh and heavy with scent of flowers.

THE FOOD AND COMMERCIAL VALUE OF HONEY :

Honey contains some eighty different-substances of importance to the human-organism. but mainly the sugar (glucose and Cellulose or fructose). Moreover, honey contains a number of ENZYMES and other substances, such as diastase, invertase, saccharase. catalas. peroxidase and lipase. It's enzymatic content is one of the highest of all foods.

Honey is prescribed as to preserve youth. It is used to heel even infected-wounds. Honey is stomach's best friends and has a beneficial-effect on the heart as it causes the veins to expand and improve circulation through the coronary arteries. Sterile-honey from honey-comb has remedial effect for many eye-diseases. Even Bee Venom-a curative toxin has beneficial-effect on blood-pressure and cholesterol-level.

Being the base of cosmetic and polish industries, bees-wax has very rich commercial value.

STORAGE OF HONEY .

Honey can be stored for a long-time and has been known to keep for centuries. Even the weight of honey can increase by 33 percent through moisture absorbed from the air.

BEE-GARDEN OR BEE-FLORA REQUIRED FOR BEE-KEEPING :

Honey-Bees approaches selected-plants for nectaries. They are found in following plants which are grown in Indian ecological conditions :—

Tree plants : Sandal, neem, sisum, tamarind, drum-stick, soapnut etc.

Crops : Sorghum, maize, til, berseem, mustard, toria etc.

Fruits : Apple, Jamun, cherry, citrus, banana, lichi, guava, pears, berries etc.

Flowers : Sun-flower, portula, cosmos, coral-creeper, corn flower poppy etc.

The colour and chemical-composition of honey depends on various kinds of bee-flora used by the Honey-Bees.

EQUIPMENT REQUIRED :

For Bee-keeping industry minimum equipments required are Beehive-Boxes, smokers, and Honey extractors.

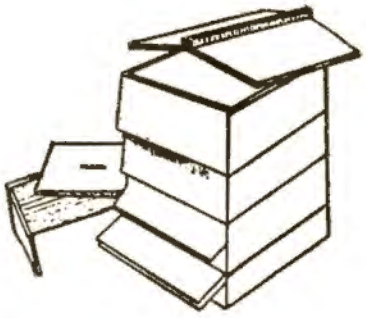


Fig.—1
MODERN APIARY

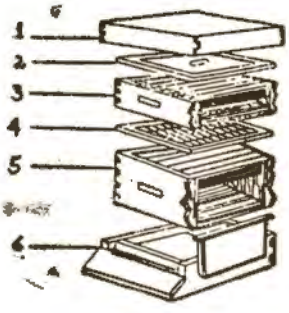


Fig —2

COMPARTMENT OF BEEHIVE BOXES :

1. Roof 2. Improver 3. Super Chamber 4. Partition wall 5. Brood Chamber 6. Floor-Board.

Beehive boxes are usually made of teak-wood. It contains various seperable-parts termed as chamber, top-cover and floor board. The chamber used for honey-making is called super-chamber where as brood-chamber is used for brood-rearing. These chambers contains several seperable-frames numbering 8 to 10 and each containing a comb parallel to one other.

Fig.—3
FRAME CONTAINING HONEY

Fig.—4
METHOD OF WATCHING THE BEEHIVE BOXES

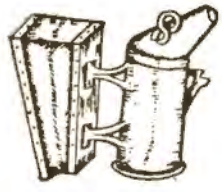


Fig.—5
SMOKER

Smoker is used at the time bee-rearing and honey extracting.

Fig.—6
HONEY EXTRACTOR

Honey is extracted only in honey-flow periods fallen in different floral and climatic-conditions.

The protection of Bee-hives from scorching sunlight is necessary.

PROTECTION OF MUD HOUSES

Villagers like to build houses using materials which are familiar to them. Such familiarity is developed through a process of trial and error over a long period of time. The trial and error in their experience relate to aspects to availability, utility, workability, durability, low cost and similar other factors.

Mud is the cheapest and readily acceptable building materials commonly available in most parts of the world.

PROBLEMS IN TRDITIONALLY CONSTRUCTED MUD HOUSES :

Major problem with mud is the threat of water. Because during rains mud walls not only get eroded but its become soft and loose their compressive strength. Therefore mud walls are cut down by heavy rain and produces seepage in every year which causes a great loss (see the figure No. 1 and 1-a as shown below) to dwelling.

PROTECTION OF MUD WALLS (By using Bitumen)

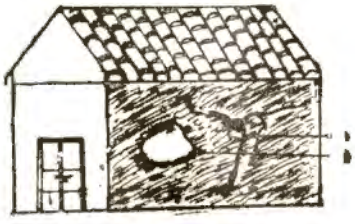
Maxphalt (Bitumen) has been used since long time as a water profing material. Bitumen coating are widely used for different purpose because of their low cost, excellent resistance to water, easily availability, chemical inertness and adhesion.

Therefore in view of the economy and to protect the life of mudwalls the product is very useful. Same can also be used directly over the huts on which mud coating are applied. With this product a hut can be made fire proof and water proof.

The accidents due to fire and heavy rain may be avoided (minimise) by using Bituminous in our villages.

Bituminous Emulsion can be coated along with mud over conventional mud wall in two coats. It will form a water proof and hard coating mud wall thus same can be protected from 4/5 rainy seasons. Bituminous Emulsion has black or dark brown colour. It is very simple process.

(Fig—1)



[Fig.—1 (a)]

PREPARATION OF MUD MORTAR :

First we prepare the mud mortar. Preparation of mud mortar is an age old convention and is quite known to villager's as shown in figure No. 2.

For 50 m^3 wall surface 0.6 m^3 mortar is required.

SOIL CONTENTS

Volume : 0.7 m^3

Sandy Contents : 40 – 50%

Clay contents : 60—50%

Mix wheat or paddy straw to obtain better result before adding the water (fig. 3).

Add water sufficient to form consistent paste (fig. 4).

PUDDLE :

(1) Mud Mortar should not be allowed to dry during the process (fig. 5).

(2) Knead daily 3—4 times till decomposition of straw.

(3) TIME TAKEN—

In summer—6 to 7 days.

In winter—13 to 14 days.

(Fig.—2)

(Fig.—3)

(Fig.– 4)

(Fig.– 5)

PREPARATION OF BITUMINOUS CUT BACK

Maxphalt (Bitumen of 80/100 grade) and kerosene oil are mixed by weight in the proportion of 5 : 1. For preparing 32 kg of cut back is needed for 0.5 m^3 of the soil, 26.7 kg of bitumen are required to be mixed with 5.3 kg. of Kerosene oil.

MATERIAL REQUIRED FOR 0.6 m^3 of MORTAR :

Cut back required	45 kg.
Bitumen	37.5 kg.
Kerosene oil	7.5 kg.
Total	45 kg.

PREPARATION :

Heat Bitumen till melting then pour Bitumen into Kerosene oil and keep stirring while pouring Bitumen. (Fig—6 & 7)

NOTE : It is to be noted that Kerosene oil should never be poured into the hot Bitumen.

Now, Stir mixture of Bitumen and Kerosene thoroughly to get Bitumen cut back (Fig. 8).

The Bitumen cut back so obtained is added to the mud mortar prepared traditionally.

Pour Bitumen cut back in mud Mortar (fig. 9). 45 kg. cut back in 0.6 m^3 mud mortar.

Then mix thoroughly with spade and puddle (fig—10).

Now, Mortar is ready for plaster which has a good workability and plasticity (fig.—11).

DRESSING OF WALL SURFACE :

Mud brick Walls to be plastered should be checked before application of the plaster. You should check and do the following :—

(1) Fill all cracks (fig. 12).

(2) Make the Mud wall surface uniform and level.

(Fig.—6)

(Fig.—7)

(Fig.—8)

(Fig.—9)

(Fig.—10)

(Fig.—11)

(Fig.—12)

APPLICATION OF PLASTER :

Now first you make wall surface moist by sprinkling water before starting of the plaster, then start plastering from the upper portion of the wall towards the bottom (see fig. 13).

Apply the 12 mm thick plaster over the wall and left for drying.

Now, allow plaster to dry and crack for a day. Remember that in humid and higher rain fall areas a subsequent second layer of 6 mm thick plaster should be applied over the 12 mm thick first layer after it has dried. (Fig. –14)

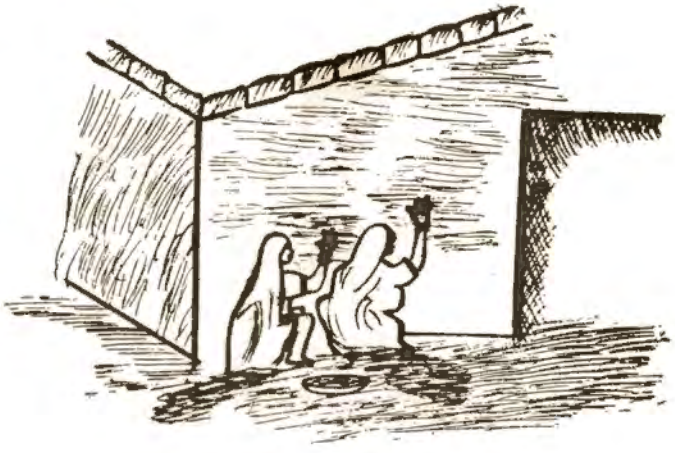
FILL ALL CRACKS WITH PLASTER :

Now, fill all cracks with plaster and allow it for dry. To get the crack free plaster surfaces fill cracks by bitumen again may appear again.

Fig. 15

To achieve a good looking wall you can apply the white wash over the prepared plaster surface of the wall and you can also apply the mud-cowdung slurry (Gobri) on the same wall before making the white wash.

((Fig.—13)



(Fig.—14)

(Fig.—15)

PRECAUTION :

(1) All undulation and irregularities of wall surface should also be corrected.

(2) Sprinkling of water is very necessary before application of plaster.

(3) You should start plastering from the upper portion of the wall towards the bottom.

(4) You should apply the 12 mm thick plaster over the wall and left for drying.

(5) You should allow plaster to dry and cracks for a day.

(6) The cracks that would appear on the plaster surface should then be filled.

(7) You should apply a second layer of 6 mm thick plaster over the 12 mm thick first layer after it has dried It depend upon the area because if area is humid and higher rainfall then its necessary).

SPOT LIGHT

IMPROVED SOLAR CELLS MAY MAKE SUN-POWER CHEAPER THAN COAL :

Scientists in sun-drenched Australia are improving the efficiency of solar cells, offering hope solar power will be cheaper than coal-fired electricity within a few years.

Researchers at the University of New South Wales (UNSW) in Sydney are perfecting techniques using lasers to make solar cells with the world's highest efficiency.

"We're aiming to reduce solar power production costs to about half the level of coal-fired plants, and we think this is achievable in the next 10 years. There are certainly no technical impediments," said Professor Martin Green, group leader at UNSW's Centre for Photovoltaic Devices and Systems.

Unlike coal-fired power, solar energy does not pollute the air or contribute to global warming. Solar collectors have no moving parts and produce power continuously for 30 years before needing maintenance. Excess solar energy can be stored in batteries for use at night or on cloudy days.

But solar power has remained largely untapped because it is significantly more expensive than coal or hydro-electric power.

Photovoltaic cells use the sun's energy to dislodge electrons from atoms of silicon or other materials. The electron, with a negative charge, and the atom that released it with a positive charge, migrate to separate terminals, generating an electric current.

UNSW scientists say their cells have the world's highest efficiency—the ratio of the energy deposited as sunlight to the electricity produced—at 24.2%, 40% better than existing cells.

Scientists in the United States and Japan have recorded slightly higher efficiencies, but these were attained with concentrated, not natural, light and were not independently confirmed.

Existing cells generate power for between 20 and 40 US cents per kilowatt hour, about the same as diesel generators.

UNSW scientists believe they can eventually boost their efficiency to 26%, or nearer to what is considered the theoretical limit of 30%. This would cut costs to around five US cents per kilowatt hour.

If so, solar power would be a viable alternative to existing energy sources, allowing utilities to lessen their reliance on oil as a source of power.

UNSW scientists are boosting their cell's efficiency by using lasers to remove defects that impede the flow of sunlight into the electric contacts.

The cells are composed of tiny crystalline pyramids that capture and direct light energy into contact leads. The concept was invented at UNSW and is now used by researchers worldwide.

The researchers are working to reduce the cost of the silicon wafer on which the cell is mounted, which represents most of its cost.

Production engineering may be as important as cell efficiency. Not until cell manufacturing becomes automated and efficiencies of scale achieved will solar cells become widely commercially viable.

Group leader Green believes his team will streamline the process and make it easier for mass production. Cells would then be as affordable as the glass that coats them, making solar power cheaper than energy from coal-fired plants.

An early generation of cells made with laser grooves has efficiency of around 20%. These cells were a boon for solar power since they could be connected to existing solar arrays and deliver more power for the same cost and same amount of area exposed to sunlight.

WIPING OUT PESTS WITH SUN-LIGHT

A SOLAR heated polythene pouch is the latest in the offing to protect grains from pests.

The polythene sheet pouches, or solacutors for the technically-conscious, have been developed by scientists at the Central Food Technological Research Institute (CFTRI), Mysore, who report that loss of food grains due to insect attacks can be considerably checked by storing the grains in such pouches left in the sun.

The natural heat from the sun leads to a high internal temperature that kills any pests present in the grain. The insects are killed when the grains are heated to about 60 degrees celsius for 10 minutes.

The method is believed to be specially useful in tropical countries where pests sometimes severely damage stored grains.

Here scientists fill the grain in the pouches made of black polythene wrapped with wood which forms the sides, and seal them.

FIRE-RESISTANT WOOD SUBSTITUTE :

Scientists at the Regional Research Laboratory (RRL) in Trivandrum, have produced a fire-resistant substitute for wood from coir fibre, a renewable resource found abundantly in southern and coastal states. The substitute "polycoir" has mechanical properties of touch plywood and can be used on door and acoustic panels, Polycoir is a thermoset mouldable natural fibre polymer composite. The major equipment needed are needled —felting machine, polymer impregnation unit, hot air drier, and hydraulic hot press.

The material is fire-retardant, water resistant and termite proof. According to RRL scientists, the cost of production of high density polycoir intended for door panels would be about Rs. 300/- per square metre, while low density polycoir for use as acoustic panels would cost about Rs. 80 per square metre. The process involves four basic steps : making needled-felt coir, impregnation of this coir, with a resin, hot pressing the pre-preg into final shape, and finishing operations.

NEEMRICH PESTICIDES :

The National Chemical Laboratory in Pune has come up with two pesticides extracted from the seeds of the age-old neem tree (Azadirachta indica), which have proved beneficial when sprayed on several crops. The two, Neemrich-I and Neemrich-II, are the result of intense screening of neem fractions by the NCL scientists in their quest for pest control agents from plants.

Of the two fractions, the first, Neemrich-I, contains unsaturated lipids, triterpenes, sulphur compounds, straight-chain esters and hydrocarbons, It is effective against several aphids, jassids, thrips, cotton white fly and sorghum shoot fly when given in doses of 4000 parts per million (ppm). Neemrich-II, the second fraction, contains at least 25 triterpenoids and was found to act against many agricultural pests when it was administered in doses of 1000 ppm during field trials. Regular sprays at 15 days interval gave optimum results in a range of crops, including rice, cotton, tobacco, sorghum, oilseeds, vegetables such as cabbage, tomato and chillies, pulses and cardamom.

HARNESSING THE SUN :

IN TIBET, solar energy is being used increasingly to heat homes, cook food, run television sets, milk cows, shear sheep and, of course, provide light. Tibet gets 3,000 hours of sunshine each year, compared with New Delhi which gets 2,525 hours annually.

In an area slightly is excess of one million sq. m. *National Conserva.ion Strategy Newsletter* (*Vol. II No. 3-4*) reports, an estimated 15,000 solar stoves are in operation and 750,000 sq mt of greenhouses,

which have helped considerably to increase both vegetable and fruit production.

A Chinese government survey estimates that by the turn of the century, there will be 75,000 solar stoves, about 10,000 homes will be lit by solar powered lighting and greenhouse space will hit one million sq. m.

WARRING TOMATOES :

IMPERIAL Chemical Industries of England and Calgene of USA are at war over owns the patent rights to a "fresh" tomato. Both companies have developed a genetically improved longer-lasting nonsquishy tomato that retains its flavour and firmness longer. Each pinpointed the enzyme that causes tomatoes to rot and researched a method to neutralise it. The US Patent and Trademark Office is investigating the validity of the two patent claims.

NEW SOLAR HOUSE

A solar house has been constructed where all energy is provided by the thermal inertia of the building and is controlled and distributed by solar energy. The massive walls, ceilings and floors are made of solid wood impregnated with salt, which allows them to soak and dissipate heat in the summer and radiate heat in the winter. The living area is insulated within an outer 'envelope' that acts as a convection loop to regulate the temperature without using electricity.

GOSWAMI MODEL GOBAR GAS PLANT

A new model of gobar gas plant has been patented, which is an improved version of the popular KVIC (Khadi Village Industries Commission) model. The Goswami model has following advantages over the KVIC one : (1) the inlet and outlet pipes are relocated for maximum circulation of the slurry in the digester. This results in an increase in biogas production by about 20%, (2) it can be installed in 34% less land area. (3) there has been a reduction in the total masonry construction for installation which has saved 8.4% of the masonry cost, and (4) the internal central guide system has been replaced with an external central guide system which is simpler, cheaper and easier to maintain.

BIOGAS FROM VEGETABLE WASTES

A new plant design developed by Gujarat Agricultural University, Anand can convert vegetable wastes into biogas. This plant called the "Vanaspati kachara-biogas sanyantra" operates on the principle of continuous fermentation. Field residues mainly comprising of biomass wastes are collected and stored in a 6 feet deep pit with a diameter of 5 feet. A sigmoidal blade fitted through a shaft at the side of the pit, and driven manually as well as mechanically, is used to disintegrate the bulk fibrous material to small aggregate fibrous body. To begin with the digester may be filled with water and about 200 kg of partly composted chopped plant material. The gas holder can then be placed in its position on the digester rank. There is no need to add water along with the daily feed.

BIOGAS FROM TEA-LEAF WASTES :

Two gas plant owners late Shri Ram Singh and Shri Bhairoo Lal Kothari of Bap village in Jodhpur district, Rajasthan, had been initially utilising cattle dung for feeding their gas plants. But the continuous drought in the region repleted their cattle stock and it was out of desperation that they fed the plant with tea-leaf waste which was available with them in good amount as one of them owned a tea stall. The results were stunning and now they regularly use tea-leaf waste only, procuring it from their own source and from also nearby tea-stalls. Earlier, they tried vegetable waste also for feeding the plant, but the output of gas was much less, than in the case of tea-leaf waste, one kg. of Tea waste produce 12 cft gas which is equivalent to approximately 10 kg. of cow dung.

SPOT LIGHT

NEW SOLAR COOKER :

Though there is no need of fuel to be used in Solar Cooker for cooking, it has not gained popularity mainly because it takes a long time to cook due to the glass reflector that is in vogue at present which is unable to collect sunlight in good measure.

Keeping this point in view, now a new Solar Cooker with a rectangular shape and a folded mirror has been modelled, to quicken the cooking time. In this cooker it takes on an average : 30-40 minutes to cook 750 gm of rice, 40-50 minutes to cook 350 gm of pulses, 20-30 minutes to cook 500 gm of vegetables and 100-120 minutes to cook 750 gm of meat. The cooker costs about Rs. 1,000.

EFFICACY OF BIOGAS SLURRY MANURING

APPLICATION of dung manure to field crops either directly or through conventional compost methods is the general practice of farmers. Now, with the advent of biogas technology, dung is used effectively for the production of biogas. Further, the digested slurry which comes out of the biogas plant is superior in nutrient value. Slurry manure application to the field increases the crop yield and improves soil fertility.

Under a programme, launched by Government of India to transfer the know-how to the farmers, the Extension Education Unit, University of Agricultural Sciences, Dharwad conducted demonstrations on field crops, cotton and groundnut. The demonstrations were laid out in one acre plots of medium black soil. Hybrid cotton (DCH-32) and groundnut (Dh-8) were grown. An increase in yield up to 11.76 percent in hybrid cotton and 33.34 percent in groundnut was obtained when compared to control. The ground-nut crop retained green foliage even at the time of harvest and the pod number per plant ranged from 60 to 70 in biogas manure applied plot as compared to 45 to 55 in the control.

SOLAR AIR CONDITIONER

Solar powered air conditioner developed by Sanyo Electric, consists of a five square meter photovolatic array—generating peak power of 500 watts; an outdoor unit which contains the compressor, condensor and power converter; and a slim wall mounted indoor evaporator unit.

Approximately 50 percent of the power required to operate the inverter air conditioner can be generated by the system's solar panel on a sunny day. In cloudy weather the power generated is less, but so is the power demand, allowing the same percentage of the unit's power requirement to be provided by the system. The balance of the power required comes from commercial electricity.

With a cooling capacity of 8,530 BTU/h (2.5 Kw), the new air conditioner draws 900 watts or more as it brings the air conditioned space up to the desired temperature, yet requires as little as 300 watts to maintain the temperature once it is reached —well within the rated output of the solar panel, allowing 100 percent solar power generation.

TYRE RECYCLING PROJECT

Landfill is still the most popular method of disposing of waste tyres, but recent efforts have concentrated on burning the tyres for electricity generation. Market research has shown that there is a ready market for rubber granules or "crumb", which can fetch £100-300/t depending on its grade.

Waste management company Leigh Environmental has opened what it believes is the largest tyre recycling plant in the UK, designed to deal with around 40,000 tyres a week. The new £1m plant at the company's Four Ashes site near Birmingham can produce up to 20,000t/y of rubber granules which are used in making carpet underlay, car bumpers and other products.

Tyres are only 60% rubber, the remaining 40% is made up of roughly equal amounts of steel and textile fibres. Leigh's tyre plant first shreds the

waste tyres into lengths of around 1 m the shredder can cope with all sizes of tyres from tractor tyres to small car tyres. One granulator then cuts the shredded tyres further and the metal is separated by a magnetic separator. A second granulator reduces the size even more and the fibres enter an air separator. Finally rubber crumbs of about 4mm in size are produced for use as a raw material for carpet underlay, car mud flaps and bumpers and and playground safety surfaces. More than 80% of the tyre—the rubber and the steel—can be recycled, uses for the cotton fibre are being investigated.

KITCHEN COMPOST

The innovative "Kitchen Compost System" offers homeowners a practical, convenient way to recycle food scraps instead of directly disposing them into municipal sewer lines or septic tanks. This system deposits scraps into a grinder that reduces bulk waste to tiny particles that are then collected and dried in a separate chamber. The mineral-rich waste can be added to compost piles or sown directly into the ground. This product may be be installed in existing homes, apartments, schools, and restaurants.

NEW SOLAR SYSTEMS

RECENT studies by four independent teams of astronomers indicate that planetary systems resembling the young solar system may exist in nearby parts of the galaxy. Three of these studies, presented at a recent meeting of the American Astronomical Society, focussed on a star called Beta Pictoris, which is visible from the southern hemisphere.

The astronomers found chemical substances in a disk around the star that were identical to substances believed to have been in a similar disk of dust and debris that once surrounded the sun.

The fourth study found evidence of gaps in the dust disks encircling eight other more distant young stars, which are in a giant gas cloud spanning the constellations Taurus and Auriga.

CARDBOARD SOLAR COOKER :

It is claimed that a cardboard solar cooker, can reduce the consumption of cooking gas by half or save up to 600 kg of firewood for a family annually The solar cooker is made of cardboard, ordinary glass, aluminium foil, glue and some waste paper. It has an outer box and an in inner box, with aluminium foil for insulation, the space between the boxes is stuffed with waste paper to prevent the escape of heat. A rectangular piece of glass covers the top of the box. A board of aluminium foil placed on top, forming a right angle with the box, focuses the sun's rays on it. Once the box is set airtight vessels containing the foodstuffs are placed inside. No stirring is needed because the temperature in the box remains at little over 100°C.

DEVELOPMENT OF A WATER TURBINE :

Tamar Designs. Tasmania has built a turbine for an irrigation system in Western Australia, where water from a large dam is to be pumped at the rate of 200 litres per second up a 100 m hill, with a 200 m fall down the other side, to the turbine site, 4 km away. The turbine has been designed in such a way so as to recover 350 kW from the water flow. which is more than enough power for the pump at the start of the system. The company has a well established range of turbines developed since it began operation in 1975. Their range currently covers systems up to about 1,5 MW capacity. They have developed a reliable electronic governing system that normally avoids the use of a flywheel.

PRESERVING MANGOES :

Bamako—The technology and energy unit of the nongovernmental organization GRAT, Bamako, Mali, recently carried out a series of tests on processing dried mango into mango powder without

this resulting in colour and flavour loss. By using grinding stones, a pested and mortar or motarized mills, dried mango can easily be processed into mango powder. Mango powder has a very low moisture content, so it is easier to preserve and to handle than dried mango. It can be used in various ways. For example, it can be eaten as it is, by the pinch, spoon or ladleful. It can be used to make a mango drink, mango cream or mango jam.

REPORT LINKS HUMAN RIGHTS ABUSE WITH ENVIRONMENT

A RECENTLY—released report, *Defending the Earth*, prepared by the US-based Human Rights Watch and Natural Resources Defence Council, is a first-ever effort at documenting state harassment of individuals and groups protesting environmental degradation in different countries. The report covers nine countries, including the now-defunct Union of Soviet Socialist republics, (See box: Record of Repression). The authors' assertion of a causal relationship between repression of human rights and environmental abuses in a view that found acceptance even in the Rio Declaration on Environment and Devclopment.

The report highlights the contention that a government that usually oppresses human rights will abuse the environment. A censored press, restricted access to information, controls on the right to association, repressive laws and heavy policing are tools to "block meaningful and efiective efforts" in dealing with environmental abuse by citizen groups.

The report castigates repressive governments that defend their practices with atsertion that human—and environmental—rights are "esoteric", which means that these rights must take a "back seat to the need to preserve order for foster economic development".

The report, however, is incomplete and partisan in that it does not explore whether the premise that the earth's environment should be "clearly a matter for global concern", gives more power to the North and its multilateral agencies.

The branding by Malaysian Prime Minister Mahathir Mohamad of such concern as "eco-imperialism"—a phrase ridiculed in the report, betrays a partisan attitude, even if it is in the name of human rights. The authors do not address the larger issue of the rights of soverign state in a skewed international political order.

The author's somewhat blinkered determination to see all violations of human rights only in the context of the environment is also evident in the description in the reports of Eritrea. The guerilla war of indepedence is seen only in terms of environmental degradation, while the suffering and human losses that took place during the war are referred to almost entirely in relocation terms.

PIPED BIOGAS THROUGH SELF-FINANCING

Shanglijia village in Yin County, Ningpo City is quite developed. The newly rich farmers are eager to use high quality fuels, though there is a shortage of conventional energy supply. The livestock farm was built, bringing pollution problems. To solve the problems, a biogas system was set up with a total investment of 0.38 million RMB yuan coming from the farmers themselves and the collective who had originally earmarked the money for office buildings and cars. Now the farmers use piped biogas as urban residents do.

From 1978 to 1987, the village increased its grain production from 7.4 ton/ha to 11.5 ton/ha and its average income from 200 RMB yuan to 1,520 RMB yuan person. As a rich village, all the farmers have moved into new houses. Recently, a collectively owned farm of 3,000 pigs and 1 million chicken was built. All this help to provide economic might and resources with which to develop biogas.

The biogas system with a high comprehensive efficiency is composed of three parts gas producing and gas controlling, residue collecting and sewage treatment. The system's gas output is 250 cubic meters daily, or about 0.1 million cubic metres annually. It collects 150 tons of residue as fodder and saves 120 tons of coal equivalent. Its total output is 0.154 million RMB yuan. Biogas is centrally supplied to 200 households for domestic purposes all year round Animal manure drops from the livestock farm are treated to lessen the pollution problem and its purification rate has reached more than 98%. As a high-grade organic fertilizer, the residues help to fertilize the soil. Ningpo municipal government has decided upon the gradual extension of this experience.

CLEAN BIOMASS FUEL COMES NEARER TO REALITY

The idea of using green plants as a clean substitute for fossil fuels is moving out of the realm of science fiction and becoming a viable option, recent research shows.

Scientists said that an organic substance produced mainly from non-edible, fast-growing plants farmed on subfertile land—can technically provide non-polluting fuel to run cars and aircraft.

Now the scientific community is being urged to back up its research with economic studies to show governments and corporations the precise cost benefits.

About 400 delegates from 27 countries gathered at the sixth European Conference in Biomass organised by the European Community (EC).

After processing, biomass yields fuels—like oil and ethanol—that burn without emitting any gases which cause global warming.

By using biomass one uses substitutes for fossil fuel with short-term results on the greenhouse effect and other environmental hazards.

About 15% of the energy used in the world is renewable, such as solar, wind or water, and of all these energy sources, biomass has the biggest potential.

Delegate' research showed certain plants can yield fuels ranging from charcoal to ethanol capable of fueling engines at a cost comparable to petrol.

The EC, eager to utilise unused farm land and reduce subsidies to its surplus-producing farmers, is showing increasing interest in biomass.

The Community has eight to ten million hectares (20 to 24 million acres) of abandoned agricultural land and 20 million hectares (50 million arces) of marginal land not in use. At the same time it is necessary to limit surpluses.

By encouraging farmers to produce biomass the Community could limit farming subsidies, create jobs in agriculture and manufacture valuable energy instead of importing oil.

Each ton of biomass can produce 1,840 kWh of energy. This amount—equivalent to the energy produced by two barrels of oil—is enough to light a medium-size house for 280 hours.

Using high technology you can technically make whatever you like from biomass ; methanol, ethanol, electricity, heat etc.

One of the plants producing biomass is sweet sorghum, which is similar to sugar cane but adapted for the European climate. It can yield starch, organic fertilisers, paper pulp, charcoal, light fuels and ethanol.

Sweet sorghum was studied in Italy with "amazing results".

The Italian experience has given a tremendous push to the issue in the EC, showing that no other industry can so ideally produce electricity.

It's an imortant message for political people and we need to give them more examples.

Delegates emphasised the use of high technology as the only way to allay sceptics' fears that the process of treating biomass may itself be potentially polluting. They also said governments and corporations would be more easily convinced of the benefits of biomass if economic studies showed exactly how profitable it could be.

SOLAR POND TO HEAT WATER

The BVB engineering college in collaboration with the Karnataka State Council for Science and Technology (KSCST), Indian Institute of Science (IISC), Bangalore. and the Department of Non-conventional Energy Sources has constructed a solar pond which has been meeting the needs of nearly 400 hostelites. It is 2.15 metres deep with inner sides sloping at 45 degrees. It is lined with low-density polythene to prevent seepage. Tiles are fitted to protect the lining. About 100 tonnes of common salt is stored at the bottom of the pond and water is let in to a height of one metre, which is the lower zone.

The hot water at the bottom is not allowed to rise as it is made heavier by adding salt. A solar pond can deliver water which is 50 to 90 degrees centigrade hot. The thermal energy stored in the pond can also be used for generating electricity. Solar ponds also being used for desalination of sea water in Italy and for extracting sodium sulphate from are in Argentina. The total cost of the project was around Rs. 3 lakh, of which 50 per cent came in as Central subsidy.

ENERGY-SAVING CHULHA :

An official of the Maharashtra Forest Service has Vanjyoti Chulha developed an energy saving chulha which burns compressed dry leaves from forests. The gadget is cylindrical tin 22.5 cm. tall and 22.5 cm in diameter. Closed on both sides, it has a central hole 7.5 cm in diameter at the top and bottom. One kilogram of dry leaves is pressed into the tin from the top end with the help of a piece of bamboo and is tightly packed. The fire is lit from the hole at the bottom and it will continue to burn for at least two hours, sufficient for cooking for a family of four or five, The compressed leaves give four times more heat than the traditional firewood. It is priced at Rs, 60, but as an incentive for use in villages it is being sold for Rs. 20 to Rs. 30.

CARBON DIOXIDE RISE MAY BENEFIT CROPS

The greenhouse effect may not be all bad, say scientists who have found that the projected carbon dioxide increase in the next century may benefit crops.

The findings come in the wake of the first Indian studies on the effect of climatic changes on plants, initiated at the plant physiology division of the Indian Agricultural Research Institute (AIRI), New Delhi, under an Indo-US project.

Studies by a team led by Dr. Y. P. Abrol on wheat, mungbean and mustard indicate that plant biomass may increase by 25-30 percent at the enhanced carbon dioxide levels anticipated by the turn of the century—about 600 parts per million (PPM).

The high gas concentration increased plant biomass, leaf area and plant weight in the three crop-plants during trials at the institute.

Wheat also recorded a six to eight percent rise in yield. Although the studies are prelim nary, they underscore the need to conduct similar trials in the different ecological zones of India and ultimately determine what new crop strategies need to be adopted in the changed climatic conditions, he said.

Similar findings have been reported by scientists in the United. States who say that the climate is changing but there is no reason for panic.

Scientists in Arizona estimate a 56 percent increase in crop yields worldwide at the enhanced temperatures and carbon dioxide levels predicted by some climate modelers.

A review by US scientists of more than 140 studies shows that crops will produce more, with cotton heading the list, at the elevated carbon dioxide levels. The most dramatic changes are expected in citrus trees that appear to grow three times faster.

Carbon dioxide, the least harmful of the five greenhouse gases that will contribute to global warming by 2010, is expected to almost double to 600 PPM from the current levels of 350 PPM.

LOW COST BIODEGRADATION SYSTEM FOR WATER PLANING

A low-cost biodegradation system can treat low levels of organic compounds in water, research by the Hydro Group Inc, in Bridgewater. New Jersey, has shown, reports *Pollution Engineering*.

The tests were designed to develop a low-cost transportable bioreactor to treat low levels organic compounds found in groundwater such as benezene, toluene, xylenes and ketones, the journal said.

The tests demonstrated removal rates of 99 percent at water flow rates upto five gallons per minute, the journal said.

The results are significant because biodegradation processes are difficult to sustain with influent levels below 40 mg / L—a level usually considered inadequate to sustain microbial metabolic function, the journal has quoted Frank Lenzo, senior engineer on the project, as saying.

Influent levels of total problem hydrocarbons averaged below 0.5 mg/L. according to Lenzo.

The treatment system is a submerged fixed-film, aerobic biodegradation process. It operates in a counter current flow. Structured media provide the necessary surface area for biofilm development, according to the report in *Pollution Engineering*.

In a field test, the process demonstration unit successfully treated petroleum hydrocarbons in groundwater contaminated by a leaking underground oil storage tank.

INFORMATION MANAGEMENT FOR RURAL DEVELOPMENT

Society for Information Science. New Delhi, will organise its twelfth convention and conference with the theme. "Information Management for Rural Development : Its Parameters" at Indian Institute of Chemical Technology Hyderabad from January 28-30, 1993.

The theme of the conference is aimed at building up of an information bank for Rural Development and working out strategies, how to exploit the available resources for the benefit of rural masses.

For further information contact :
The Secretary,
Society for Information Science
C/o PID Buillding
Hillside Road
New DELHI
110012.

WOMEN AND ENVIRONMENT

World Health Organisation in collaboration with UNEP are organizing an "International Conference on Women and Environment", at Alexandria, Egypt from 1-3 December' 92.

The main point to be discussed in the conference is the role of women as environmental conservationists; obstacles to women's role.

For further information contact :
Prof. Dr. Samia Galal Saad
Deptt. of Environment Health
High Institute of Public Health
165 El—Horriya Ave
Alexandria,
EGYPT.

PEOPLE, THE ENVIRONMENT AND FORESTRY

Forestry Department Headquarters, Malaysia will conduct 14th Commonwealth Forestry Conference on the theme. "People, the Environment and Forestry-Conflict or Harmony", from 13-18 September' 1993 at Kuala Lumpur.

For further information contact :
The Secretary General CFC-14 m
Forestry Department Headquarters,
Peninsular Malaysia
Jalan Sultan Salahuddin
50660 Kuala Lumpur
MALAYSIA.

INNOVATIVE APPROACHES TO RURAL HEALTH

Association of Agricultural Medicine and Rural Health in India will couduct its Sixth Asian Conference on "Innovative Approaches to Rural Health" from 22-24 January' 1993 at Loni. Ahmednagar India.

For further information contact :
Dr. N. S. Mhaske
Organising of Agricultural
Medicine & Rural Health
Loni-413736
Dist. Ahmednagar.

SECOND INTERNTIONAL CONFERENCE ON SCIENCE AND TECHNOLOGY

Manchester University will be organise Second International Conference "Science and Technology in Third World Development", at Glasgow, Scotland from 5-7 April' 1993.

The Conference will focussed on Intermediate Technologies, Community Development and poverty alleviation, technology and the environment, specific technologies such as water and sanitation and renewable energy, new science and technologies, technology transfer and international organizations and Science and Technology eduction.

For further information contact :

Mr. Richard Heeks
Programme Secretary
STD' 93, IDPM,
Manchester University
Precinct Centre
Manchester M 139 QS
United Kingdom.

RECENT ADVANCES IN BIOMASS GASIFICATION

Karnataka State Council for Science and Technology, Indian Institute of Secience, Bangalore, will organize "Fourth National Technical Meet" at Maysore from 6—8 Januray 1993. The technical meet is sponsored by DNES. New Delhi.

The main objective of this technical meet is to provide a common platform for scientists, technologists and manufacturers to exchange their views on various aspects of biomass gasification. This technical meet provides a common platform for scientists, technologists and manufacturers to exchange their views on various aspects of biomass gasification. This technical meet provides opportunity for administrators and field level staff involved in the dissemination of biomass gasifiers to have first hand information about the latest developments in this area.

For further information contact :

M. S. Rama Prasad
Director-CREDA
KSCST
Indian Institute of Science
BANGALORE-560012.

OUR PLANET, OUR HEALTH

Every year, biological and chemical agents in the environment cause or contribute to the premature death of millions of people and to the ill health or disablement of hundreds of millions more. Surprisingly, in spite of the fact that concern for health usually underlies discussions about the environment, health itself is not often specifically considered and is seldom given a high priority in development plans.

The various ways in which the environment interacts with health in the context of development have never been analysed in depth at the international level. This report, produced by an independent commission appointed by the Director-General of the World Health Organisation, is an attempt to give health its rightful place at the centre of the discussion about the environment and development. In view of fact that health issue are not attracting as much attention as purely ecological issue in contemporary discussion of the environment and development, it might legitimately be asked whether there is some sort of incompatibility or conflict between protecting and improving the environment and protecting and improving health. Development strategies in a member of sectors can have adverse consequences for health and environment. The commissions conclusions are enquivocal : not only is there no conflict between these two objectives, but the kind of development needed to safeguard health and welfare will depend on many conditions, including respect for the environment, while development without regard for the environment would inevitably result in impairment of human health.

The report looks in particular at food and agriculture, water, energy, industry and urbanisation in each case, examining the adverse health effects of various sectoral policies and recommending appro aches and action aimed at mitigating or preventing them.

The report is useful for policy makers. scientists, and specially for those who are working on Environment and Health.

"Our Planet. Our Health", Report of the WHO Commission on Health and Environment" Geneva, WHO, 1992 pp. 282, English.

DEVELOPMENT AND THE ENVIRONMENT

Between 1990 and 2030 the World's population will grow by 3.7 billion', demand for food will almost double, and industrial output and energy use will probably triple world wide and increase sixfold in developing countries. Under current practices, the result could be appealing environmental conditions in cities and countryside alike. The main message of this Fifteenth Annual World Development Report-1992 is the need to integrate environmental considerations into development policy making. The value of the environment has been under estimated for too long, resulting in damage to human health, reduced productivity, and the undermining of further development prospects.

Report also presents an alternative path-one that, if taken, would allow the comming generation to witness improved environmental conditions but this will require major policy, programme and institutiona shifts. An adequate two-fold strategy is required. First, the positive links between, efficient income growth and the environment need to be agressively exploited. Second break the negative links between economic activity and the environment.

The discussion and research involved in the preparation of this Report have encouraged our economists, Sector specialists, and environment staff to think more clearly and constructively about the link between environment and development and

about the design of policies and programmes for development that is sustainable.

"World Development Report 1992–Development and the Environment." Oxford University Press, 1992, pp 308, English.

INDIAN ENVIRONMENT

India can provide a lead to develop a pollution free life and live in harmony with nature. Because the Indian culture and the way of life is in tune with the nature, they worship sun, land, water, animals. etc. with a view to preserve the harmony in nature and have respect for its creations. But now the environmental deterioration is going very fastly in the country since 2nd five year plan due to adoptation of the social economic, cultural background of the country. The population explosion, multiplication of the desires of the people, wrong orientation of science and technology, construction of major dams, growing poverty, problems of haves and have not with deterioration in forest cover, explosion in cattle population, violence and development of a new culture, and discard of our old philosophy are increasing rapidly.

The present book emphasise to think over the present philosophy of the development. The detailed problem of the country has been discussed and suggestions have been made to think again to reorient our philosophy for the sustainable development and environmental conservation for our future generations.

"Indian "Environment", by Pramod Singh, New Delhi, Ashish Publishing House, 1992, pp.328, English.

NEW TREND IN INDIAN IRRIGATION.

The Eastern region of India is marked by existence of abundent ground water and highest concentration of poverty. Access of ground water to the poor farmers in this region holds key to agricultural development. Therefore the crucial concern of the development planners and administratiors has been how to make ground water accessible to the poorest of the poor former who inhabit in region. This study tries to find answer to this crucial question.

It is generally assumed that public tubewells serve the interest of poor farmers. The study however, finds that the smallest farmers with land holdings up to 0.4 hect. are the biggest beneficiaries of ground water markets and they gain the least from public tubewells. The data also reveals, that among this category of farmers 60 per cent irrigate their wheat cropet by water purchased from owners of private pumps. As against this only 7 percent irrigate their wheel crop by water obtained from public tubewells. This clearly manifests that, while public tubewells enhance inequity, water markets reduce it by making ground water accessible to poor farmers.

This report makes specific recommendations in respect of the energy for ground water pumping, subsidy for ground water development, consolidation of holdings, crop plannings, the World Bank Tube-, wells and research.

'New Trend in Indian Irrigation–Commercialisation of Ground Water" by Niranjan Pant, New Delhi, Ashish Publishing House, 1992 pp 116, English.

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