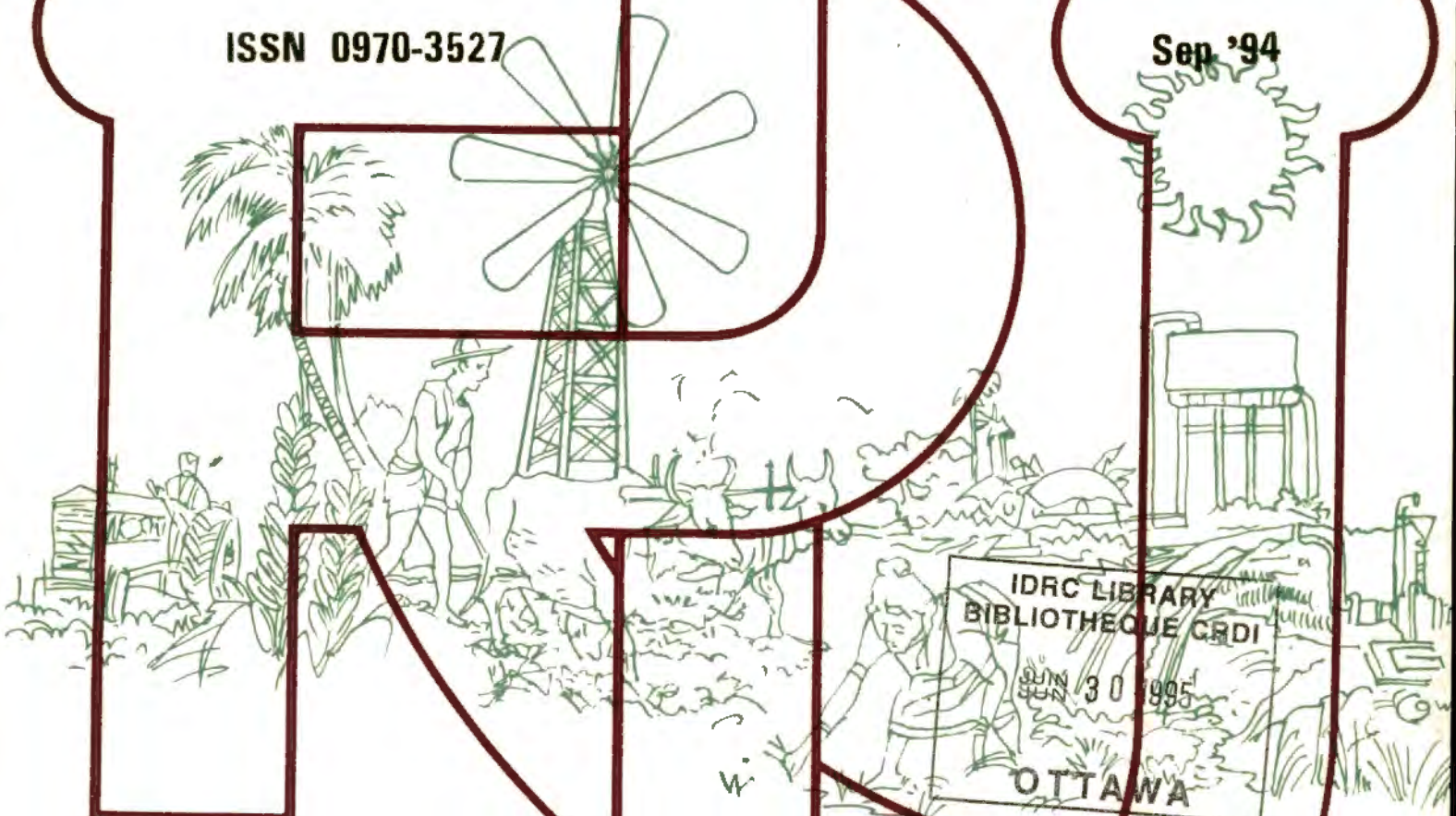
RURAL TECHNOLOGY

ISSN 0970-3527

Sep '94



JOURNAL

Volume 12
Number 2
September 94

Cover Designed by : T. Zaidi
Published by : Information Service Division, C. D. R. T., I. E. R. T., Allahabad.
Partially Supported by : Deptt. of Science & Technology, Government of India

Editorial

Scientific community seems to have taken a back seat rather preferred hibernation (God knows temporary or for ever) in the wake of on slaught of economic liberation- a craft, so poorly disguised, with some sprinklings of real reforms that it has led to false belief amongst our so called intellectuals, scientist and planners that technological marvels like automation, information highway, supercomputers, space techno-logy and all that will, through the archaic concept of growth and trickle solve the gigantic and growing problems of poverty and unemployment.It is disappointing to read lead economic dalies, status papers of economists and to hear even scientist and technologists that, economic reforms, open market and free enterprise based on high/frontier technologies will solve the problems of unemployment and will lead to rise in standard of living and per capita incomes. Even an elementary analysis of the prevailing scenario will reveal that, if not all, then most of the measures mentioned in the foregoing cater to the needs, rather sickening opulence, of a thin segment (a bare few percents) of the population, a temporary reprieve in the macro-economic situation based on parameters of foreign exchange reserves, increased food production and food supplies can never give relief to atleast 40% of population which is still lives in abject poverty. Even if we take the basic necessity of food we find that the substantial increase in food-grain procurement prices have led to steep rise in open-market prices. And before one jumps to dismiss it by resorting to the argument that food surpluses and consequent strengthening of public distribution system, one must know that according to reputed studies PDS serves only the big cities and is almost non-available to 85 percent of urban and 90 percent of rural population in northern India. There could be many more such hard core evidences to highlight the fact that high production levels and high surpluses, based on technological advancement, do not automatically lead to mass employment generation and equititious distribution to the masses in a sustainable manner.

* * *

Publication List 1994

1. Rural technology : Report of National Seminar, 1981, 20 papers on Rural/Appropriate Technology.
   English pp 288 Rs. 200/-
2. Renewable Sources of Energy : Proceedings of Short Term In-Service Training Programme, 1983, 20 papers on solar Cookers Smokeless Cookstoves, Micro Hydro Power, Wind Energy, Biomass and Biogas etc.
   English pp 250 Rs. 200/-
3. Selection of Windmill and Agricultural Pumpsets : Course manual of Training Programme for Senior Officers of NABARD, 1984, 3 papers on Water Pumping Windmills, Special features : Paper on agronomic aspects of Windmill Irrigation.
   English pp 39 Rs. 30/-
4. Course Synopsis of ISTE : Summer School on Renewable Sources of Energy, 1984, 12 Papers on Biomass, Biogas, Wind Energy, Solar Energy and Micro Hydel sets etc. and 4 project reports on Solar Water Heater, Solar Cooker and Biogas plant.
   English pp 165 Rs. 150/-
5. Paper and proceedings of National Workshop on Energy from Agricultural Residues, 1986 : Background paper, recommendations, keynote and valedictory address and 28 papers on the topic.
   English pp 208 Rs. 200/-
6. Paper and proceeding on National Workshop on Decentralised Energy Planning for Rural Development : recommendations, keynote and valedictory address and 12 papers on the topic.
   English pp 200 Rs. 200/-
7. Course synopsis of ISTE : Manual of Training Programme for Junior Engineers of Rajya Krishi Utpadan Mandi Parishad, U.P. 1987, 17 papers on biogas. Agricultural Implements. Windmill, Agriculture marketing, water lifting devices etc.
   English pp 235 Rs. 225/-
8. Course synopsis of ISTE : Manual Training Programme on Renewable Sources of Energy for Project Officers of Non-Conventional Energy Development Agency, Government of Uttar Pradesh, 1987, 13 papers on Biogas, Biomass, Solar energy, Cookstoves, Human and Draught Animal Power, Aero Generators etc.
   English pp 196 Rs. 200/-
9. A case study on Smokeless Cookstove
   English pp 32 Rs. 25/-
10. Report of Sample Survey and Evaluation of the Smokeless Chulha Extension Programme of the Non-Conventional Energy Development Agency U.P., in the District of Varanasi, Faizabad, Nainital and Bijnaur.
    English pp 150 Rs. 200/-

SEND ORDERS TO :

CDRT Information Services
Institute of Engineering and Rural Technology
26, Chatham Lines, ALLAHABAD - 211 002 INDIA.

DEVELOPMENT ASPECTS FOR WOMEN TRIBES OF PATALKOT VALLEY, CHHINDWARA DISTRICT, M.P.

Mohini Saxena, Arati Roy, Sulbha Amlathe & Rupa Dasgupta
Regional Research Laboratory (CSIR)
Habibganj Naka, Hoshangabad Road
Bhopal - 462 026
INDIA

The position of women in Indian society specially in Rural and Tribal Areas has always tormented the minds of social reformers, planners and administrators. Many efforts have been made, particularly after the Indian independence to raise women from their present state and to bring them at par with men. As a consequence several legal measures have been adopted with the fond hope that women would become self-reliant and would move towards social equality. Present article is the brief report of the survey conducted in Patalkot Valley of Chhindwara District (M.P.) to explore the appropriate techniques for development of tribal women.

Improvement in the condition of women remains a great creative challenge for Indian planners. Although several programmes have been launched for their upliftment for the last almost four decades. It is therefore essential to strengthen their productive role. Some clear and concrete and systematic steps are required for this purpose. Women constitute nearly one-half of the population which live and work in rural area. These women do most of the work in agriculture and allied occupation. But the role of women in rural life in both productive and social sphere has been ignored.

The state of Madhya Pradesh has the largest concentration of tribal people (120 lakhs), in the contry [1]. Out of total 45 districts in the state, tribals are found in 38 districts. There are five well defined tribal

zones in the state. The southern zone comprises parts of Durg and Rajnandgaon district. The south-eastern zone comprises of Raipur and Baster district and is inhabited by tribal like Kamars, Bhunjias, Halbas, Bhattras, Dhurwas, Murias of three different types (Raja, Ghotul, Jhoria), Parja, Gada, Pando, Dorla, Bisconhorn Maria and the Hill Maria and the Gonds. In the eastern region, there are Oraons, Nagesia, Korwas of two types (Pahadia and Deharia), Pandos, Kodaku Dhanka and Dhangal. The central zone has the Kawars, Gonds, Binjhwara, Baigas, Kol, Korkus, Bharias, Pardhans, Dholias and Bhumias. The western zone is the area of Bhills of various types and the pratty Bhilalas. The Saharias live in the north-western zone.

The tribes utilize a large number of plant species occuring wild in the district as herbal remedies in various diseases and ailments [2, 3]. An ethno-medicobotanical survey was conducted in the tribal villages (Palani-Gel-Dubba, Karrapani, Dudhi-Chatri, Chimtipur, Pachgonl, Jhiran, Sukhaband, Chhindi, Malni, Rater, Karеam and Harra-Kachhar) of Patalkot valley, Chhindwara district, which is mainly inhabited by Bharia tribe [1]. Earlier [2, 3] have conducted studies on the ethnomedicinal uses of plants by the tribals of Madhya Pradesh. A list of 275 species of medicinal plants of Patalkot valley has been published in [4].

Chhindwara district is situated at 680m above sea level on Satpura Plateau and lies between 18°8' - 20°9' N and 78°9' E respectively. Patalkot is situated on the slopes of Satpura mountains in the north-west corner of Chhindwara District. Nature has artistically carved out the deep valley amidst lofty mountain walls. The valley is located at about 62 km away from Chhindwara and is flanked by three mountain wings of the Satpura range. In Patalkot valley, there are 20 villages of which three are deserted. Bharias collect forest product like Mahua flower, Harra, Mangoes etc. A major portion of which consists of food-stuff and thus when they face the shortage of food material produced from the land they call upon the forest produce. The forest are mainly of mixed deciduous type. Teak and Sal forest are found in the valley. The grasslands are found along slopes and clearings. The soil is mostly sandy having predominance of limestone. The maximum temperature reaches to 40-50° c and lowest 4.4° c. The total rainfall varies from 127-152 cm.

Survey : In Patalkot area enormous treasure is available in the form of medicinal plants. For fetching good price raw material procesing is required. In a first step Harra, Bahera and Amla can be powered by machine to get the good product for marketing. A very good market is available for selling these materials in the form of powder (all ayurvedic institutions/hospitals need these materials). A training programme can be arranged for tribal for giving them knowledge about how to identify, collect and preserve these medicinal and aromatic plants.

According to the survey of the villages of Patalkot region, at present the tribal women are making ropes using sawai grass by hand. Efficiency as well as the quality can be improved by providing training to them for making ropes by using rope machines and polymer coatings. It is a well known fact that there is always a great demand of ropes by forest department. By using Science and Technology they can improve their quality by utilisation of natural resources through rural technologies providing them a good income and employment.

As in Ashram school of Bihouri, chalk making, candle making and soap making programmes are in progress. To suplement them training cum demonstration camps can be started to teach both women as well as children of tribal schools. This is not only make the children self sufficient and confident but prepared goods can also be sold in the market.

Safe drinking water is a primary requirement in a village and existing supply pattern is likely to spread water borned diseases. Women are mostly responsible for providing drinking water to the family members. It could be proposed to provide the drinking water pitchers fitted with filter candles to meet the requirement of average families. This will improve the health conditions.

Some basic knowledge of reading, writing and calculation would be required by the tribal women to implement the above technologies and finally markettirıg their products. As the tribal women of the region are mostly illiterate, adult literacy mission could be undertaken with a view to improve knowledge in reading, writing and

basic mathematics so that the tribal women do not face problem in dealing with the customer for marketting their goods.

Conclusions :

By educating and opening the minds of the tribal women towards the benefits of Science and Technology through audio visual training and demonstration media. The following outcomes expected :

(a) Utilisation of natural resources through rural technologies.

(b) Upgradation of skills of tribal women resulting in generation of gainful employment.

(c) Tribal women may be selected as target group because whatever they will learn through demonstration and training will be disseminated into the whole family.

REFERENCES

1. Maheshwari, J.K. and Dwivedi, R.P. 1988. Ethnomedicinal plants of Biharia tribe of Patalkot valley, Chhindwara district, M.P. Indigenous Medicinal plants symp. New Delhi, 139-155.
2. Jain, S.K. 1963. Plants used in medicine by the tribals of Madhya Pradesh Bull. Reg. Res. Lab. Jammu 1, 126-128.
3. Jain, S.K. 1965. Medicinal plant-lore of the tribals of Baster. Econ. Bot. 19, 236-250.
4. Saxena, H. O. and Shukla, C.S. 1971. Medicinal plants of Patalkot (Chhindwara) Madhya Pradesh. Technical Bulletin No. 13, State Forest Research Institute, Jabalpur.

☆☆☆

FEASIBILITY OF PLASTIC LINED WATER HARVESTING STRUCTURE FOR ARAVALLI FOOT HILLS

P. K. Singh
Assistant Professor, Soil Conservation Training Programme
College of Technology and Agricultural Engineering, Udaipur
S. C. Mahnot
Assoc. Professor, Soil Conservation Training Programme
College of Technology and Agricultural Engineering, Udaipur
Rahul Gaur & Rajendra Prasad
Ex-Student, College of Technology & Agricultural Engineering, Udaipur

Harvesting of local rainwater and recycling if for life saving irrigation is an old concept in India. Uneven and erratic distribution of rainfall caused the use of water harvesting structure traditionally as a mean of irrigation. Small plastic lined water harvesting structure/farm pond not only control the seepage losses but the stored water could also be recycled to provide life saving irrigation to agricultural and horticulture crops to increase production. In this paper an attempt has been made to design the plastic lined water harvesting structure for Aravalli foot hills where the problem of seepage losses is very severe. The total cost for plastic lined farm pond with brick work and 10 cm earth filling were estimated to be Rs. 77062 and Rs. 58568 respectively which is economically viable and socially acceptable.

INTRODUCTION

Runoff water harvesting has been in practice for thousands of years particularly in hilly region of India. Most of the annual rainfall comes from the south-west monsoons which last for three to four months (June-Sept.) in year. The occurance and distribution of rainfall are not only uneven but also erratic, marked by prolonged rainless days. The rainfall fails especially at the time when it is regained most for agriculture during the year. This happens most often in the state of Rajasthan, Gujarat and part of southern

states, where eventhough lands are fertile but agricultural output is very small due to drought condition. The rise of population and the ever increasing demand for food and fibre has received the interest on harvesting of water resources and its effective use.

In India, about 70 percent crops are rainfed. Unirrigated area acounts for 42 percent of food grain production. While the scope for installation of large, medium and minor irrigation projects are limited by the availability of site and finds in hilly and plateau areas, the scope for installation of runoff water harvesting structure have a large potential which need to be tapped judiciously for making the soil and water conservation programmes and community irrigation programme more attractive and acceptable to the rural community.

The rainwater is being harvested in Aravalli foot hills by constructing dugact, embankment or dug cum embankment type farm ponds. In general there is rarely any location available which is impervious to check seepage losses in its natural course. Seepage losses in the farm pond are the main constraints therefore to mitigate the seepage losses, the lining of farm pond is essential. The most effective and economic way of storing runoff water is by using Agrifilm (wide width black LDPE film) as a lining material in the storage ponds. A rain water harvesting system once installed will provide water for supplemental irrigation and drinking purposes.

METHODS AND MATERIALS

The designed plastic lined water harvesting structure viz., dugout farm pond is located at Soil and Water Conservation Demonstration Farm, CTAE, Udaipur above mean sea level of 582.15 m. The total catchment area of farm pond is 5.63 ha. having average slope of 11.55 percent. The average annual rainfall of the area is 642 mm out of which 90 percent is received during monsoon months of June to September. The quartzite and phyelite are the dominant rock in the area. The ground water potential in the micro watershed area is not sufficient to fulfil the irrigation requirement and watertable is 15 m below the ground level. The mean maximum temperature is over 43^0 C in May-June and minimum around 2^0 C in January. The average annual panevaporation is 2230 mm. The monthly PE exceeds rainfall except in months of July and August.

The catchment area of farm pond was treated with soil and water conservation measure viz., staggered contour trend, gradonies, loose stone check dams, vegetative check dams and seeding of cenchrus grass for efficient moisture

conservation and to reduce the sediment land. The storage capacity was designed with 10% expected runoff from the effective rainfall of 336.34 mm (average of 5 yrs) already reported for C.T.A.E. watershed, after the analysis of rainfall data from 1982-1986.

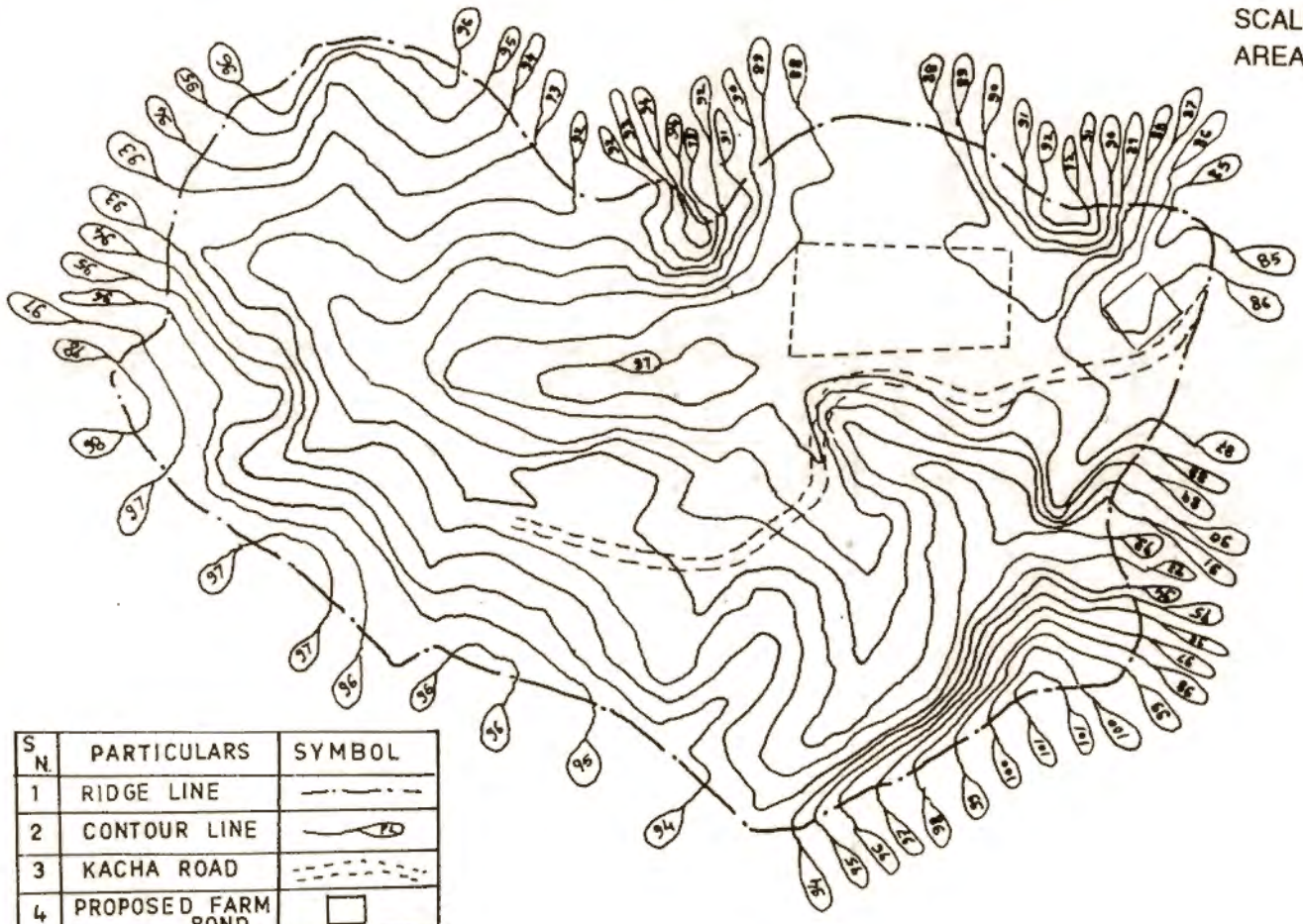
Sample Calculation for Farm Pond Design :-

Catchment area	:	5.64 ha.
Expected runoff (10% of effective rainfall)	:	1897 cum.
Top length	:	28.5 m
Top width	:	28.5 m
Area A	:	28.5m x 28.5m = 812.25 m^2
Mid length	:	Top length- 2 x slope x depth to mid section 28.5 - 2x1.5 x 1.75 = 23.25 m
Mid width	:	Top width- 2 x slope x depth to mid section 28.5 - 2 x 1.5 x 1.75 = 23.25 m
Mid area B	:	23.25m x 23.25m = 540.56 m^2
4 B	:	2162.25 m^2
Area C	:	18m x 18m = 324 m^2
Volume V	:	$\frac{A + 4B + C \times D}{6}$ $= \frac{812.25 + 4 \times 540.56 + 320 \times 3.5}{6}$ = 1924.12 cum.
Surface area	:	4x1/2 (28.5 + 18) 6.31 + 18 x 18 = 586.83 + 324 = 910.83 m^2

The catchment area and cross section of dugout farm pond is shown in Fig. 1 and 2 respectively.

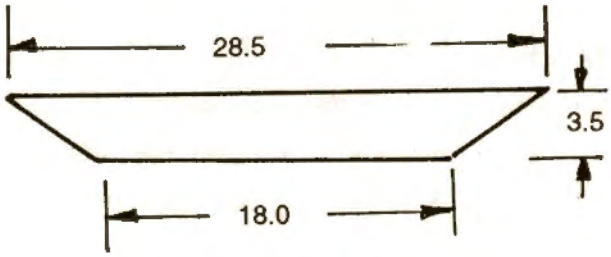
CONTOUR PLAN OF C.T.A.E. MICRO-WATERSHED

SCALE :- 1:1500
AREA :- 5.46 ha.

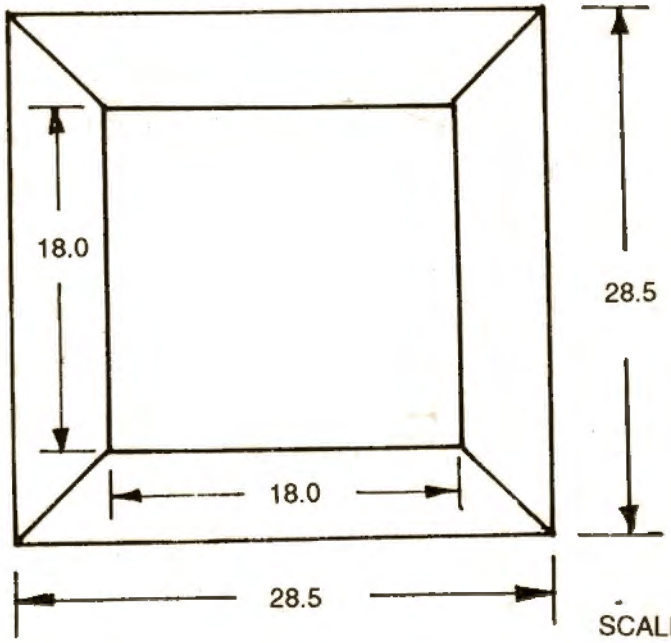


S.N.	PARTICULARS	SYMBOL
1	RIDGE LINE	
2	CONTOUR LINE	
3	KACHA ROAD	
4	PROPOSED FARM POND	

Fig. - 1



CROSS - SECTION



SCALE :- 1 CM = 5.0 M.

PLAN

Fig. - 2 : DESIGN OF FARM POND

RESULT AND DISCUSSION

The designed plastic lined dugout farm pond having catchment area of 5.64 ha. the total expected runoff for this treated catchment were estimated to be 1897 $m.^3$ The size of the farm pond were proposed to be 28.5 m x 28.5 m x 3.5 m based on the expected runoff to be stored for which the surface area is 910.83 m^2 and storage capacity is 1924.12 cum. including free board. The stored water on the pond will be used to provide supplemental irrigation to the crop in the downstream field.

The total cost incurred on the construction of plastic lined farm pond were estimated to be Rs. 77062. Out of which 54.93%, 29.87% and 10.59% will spend on earth work, brick work and on agrifilm respectively. It was also estimated that in place of brick work the earth filling of 10 cm is laid, the cost of structure will reduced to be Rs. 585.68. The detailed and abstract estimate is given in Table 1 and 2 respectively. The cost/cum. of stored water comes to be Rs. 40.62 with brick lining whereas in case of earth cover of 10 cm thick, the cost/cum comes to be Rs. 39.87.

This plastic lined farm pond constructed with brick work/earth filling will serve as a marked estimate of farm pond in Aravalli foot hills where the problem of seepage losses is very severe and most of the water harvested for recycling purposes is being lost, that can be saved by constructing plastic lined farm pond in the area.

REFERENCES

1. Pandey, V. K. and Hiran K.S. (1992). Earthen Embankment Reservoir planning for water harvesting. A case Study of Vagpura watershed. Indian Journal of Soil Conservation 20 (3) : 39-47.

2. Ram Babu (1987). Economic evaluation of water storage structure. Indian Journal of Soil Conservation. 15 (3) : 145-151.

3. Singh, A.K., Singh, Jaspal and Mahnot, S.C. (1988). Effect of soil conservation measures on ground water recharge. Proc. of Silver Jubilee Convention, ISAE, Soil and Water Engineering, Jan. 1988.

Table - 1 : Detailed Estimate of Fram Pond

S. No.	Detail of work	Measurement L (m)	B (m)	H.D.T. (m)	Quantity
1.	Dag belling 5 to 7 cm deep	114	-	-	114.00 m
2.	Earth work for excavation in hand and dry soil including breading of clads and dressing with compacted roller and initial lift of 1.5 m.	-	-	-	1924.12 m^3
3.	Brick work for lining of farm pond:				
(a)	Brick work lining (4"x9"x1')	910.83/0.0232		-	39259 nos.
(b)	Wet mortar	910.83/3	0.04	-	12.14 m^3
(c)	Dry mortar	-	-	-	15.17 m^3
(d)	Cement mortar (1:7)				
	(i) cement	1/7 x 15.17	-	-	2.16 m^3
		1 cum.=30 bags			65 bags
	(ii) sand	6/7 x 15.17	-	-	13.00 m^3
		1 cum =900 kg			11.7 tons
4.	Plastic film of 150 for lining				106.03 kg.
	@ 5.72 m^2/kg	910.83/8.59	-	-	10.60 kg
	10% additional film				
	Total plastic film	91.08/8.59	-	-	116.63 kg
5.	If the earth cover of 10 cm thickness is put in place of brick work	910.83 m^2	0.10	-	91.08 m^3

Table - 2 : Abstract Estimate of Farm Pond

S. No.	Item	Quantity	Rate (Rs.)	Per	Amount (Rs.)
1.	Dag belling 5 to 7 cm deep	114 m	0.15	m	17.10
2.	Earth work for excavation in hard soil	1924.12 m^3	22.00	m^3	42330.75
3.	Brick work for lining of farm pond				
(a)	Bricks	39259 nos.	400.00	1000 Nos.	15703.60
(b)	Cement	65 bags	100.00	bag	6500.00
(c)	Sand	11.7 ton	70.00	Tonns	819.00
4.	Plastic film of 150 for lining	116.63 kg	70.00	kg	8164.10
5.	Labour charges (10% of material)	-	-	-	3527.26
	Total cost				**77061.81**
				Say Rs.	**77062.00**
1.	When in place of brick work. earth cover if 10 cm thick is placed for lining (2.5 km. lead)	91.08 m^3	75.00	m^3	6831.00
2.	Dag belling 5 to 7 cm deep	114m	0.15	m	17.10
3.	Earth work for excavation in dry and hard soil	1924.12 m^3	22.00	m^3	42330.75
4.	Plastic film of 150 for lining	116.63 kg	70.0	kg	8164.10
5.	Labour charges for laying and fixing of plastic film (10%)	-	-	-	1225.00
	Total Cost				**58567.95**
				Say Rs.	**58568.00**

RURAL SANITATION IN BIHAR

Dr. M.M.P. Shrivastava
Adviser, Gaya District Sulabh Shauchalaya Sansthan, Gaya.

The author has described about rural sanitation programme in Bihar. He has discussed about problems arised in Central Rural Sanitation Programme CRSP. In the end he has suggested means and ways to implement the programme successfully.

The most pressing problem in India today is that of improving the economic and social conditions of the vast number of people in rural areas who live below the poverty line. They include landless labourers, small farmers, artisans and other weaker sections of the society like scheduled castes & scheduled tribes. These rural people have been subjected to economic discrimination, degradation, exploitation, inequality and oppression of all types. The theory of percolation of economic benefits to the lowest level in the rural areas seems to have failed with the result that the vast majority of rural population is still living in squalor poverty and disarrayed civic conditions. Rural development including rural sanitation tends to constitute an important priority area in the strategies for nation building in the post-independent India in the background of what has emerged in the post-independence India.

The concept of sanitation connotes a comprehensive package of facilities including liquid and solid waste disposal, food hygiene and personal, domestic and environmental hygiene. There is a direct relationship between water, sanitation and health. Sanitation is not only the problem of keeping clean, it is a development issue without which a healthy society is not possible. It is an economic problem of raising production and productivity. The surest way to get the best out of a worker is to provide him or her with modern sanitation, hygiene and other preventive public health services. Due to lack of

proper sanitation, about 105 million children below 5 years of age die each year. As many as 50 diseases are caused for lack of proper sanitation and 80 percent of population are affected by them. The most widespread diseases like intestinal parasitic infections diarrhoea, typhoid and cholera are transmitted by human faeces. Thus it is extremely essential that in the rural environments in order to improve the health of working population, greater care and attention will have to be given as a programme like improvement of environmental sanitation.

The Minimum Needs Programme (MNP) evolved to improve the quality of life in the rural areas envisages the following :-

(i) Provision of facilities for elementary education,

(ii) Provision of minimum uniform public health facility,

(iii) Supply of safe drinking water by rural water supply scheme,

(iv) Provision of sites for landless labourers in the rural areas,

(v) Provision of all weather roads to the villages, &

(vi) Carrying out environmental improvements.

Rural sanitation programme has been largely neglected in our country. Not even 1% of the rural population has been provided sanitation facilities under official programmes till now against the lofty target of 25 percent coverage by the end of seventh Five Year Plan. However, private initiatives have helped cover an additional 7.2 per cent of the rural population. In other words, almost the entire rural population is resorting to open air defecation. Lack of proper sanitary facilities is one of the factors affecting the quality of life in the rural areas. Women in general, are the worst sufferers because in the absence of latrines in their houses, they have to defecate in the open either before sunrise or have to wait till after sunset to defecate unseen by the males on account of prevailing social customs. With the consolidation of holdings, expenation of villages and cultivated area and cutting of trees, people in general and women in particular are experiencing great difficulty in finding lonely places for defecation and even urination. Sometimes during nights, they are even subjected & exposed to unsocial elements, of the society. While discussing the problem of scavenging our Late Prime Minister, Smt. Indira Gandhi

once said in Parliament "Everybody is conscious of this fact and we have discussed it many times and there is no doubt that this is a disgrace and it should be eradicated as early as possible. You cannot ban a thing unless you provide an alternative thing for them". Showing concern over situation, she wrote to the State Chief Ministers requesting to take up constructing latrines in the villages.

Alongwith rural water supply, much greater attention should be given to the programme of rural sanitation especially to the sanitary disposal of the excreta in the villages. The problems relating to proper design and construction of village latrines and the education & organisational aspects of the programme have been studied in depth. Although in the beginning, the progress may not be very fast, it is important that the community health worker or village extension worker or Gram Sewaks or representatives of voluntary agencies should create greater awareness of rural sanitation problems amongst the people and introduce the use of sanitary latrines in schools and camps for groups of houses and where possible in individual houses. It has been experienced that with the participation of local people clean, odourless and cheap latrines can become popular, once efforts are made to involve the community & beneficiaries in this environmental improvement programme.

CENTRAL RURAL SANITATION PROGRAMME (CRSP) :

This programme although started in October 1986 suffered from so many basic and practical problems with the result that the programme suffered very adversely and desired goals & objectives could not be achieved, CRSP as approved by Govt. of India in 1986 aimed at :

(a) To provide sanitation facilities to 25 per cent of the rural population by 1991 through construction of rural sanitary latrines for individual households, so as to improve the quality of life in rural areas.

(b) To utilize the local resources and materials to the extent possible optimally.

(c) To involve the community in the programme at all stages starting from the formulation of the schemes to the execution and also maintenance of sanitary latrines.

In order to improve the situation, a few suggestions are given below :

(i) Conceivement of plan, its formulation and also expected target-all of them suffered from lack of proper understanding of the gigantic problem in such a vast and diverse country. Formerly a lofty target of 25 per cent was fixed which even after a lapse of 6 years, could not be achieved. In fact, the selection of areas should be in phased manner on need basis. It is further suggested that there should be sanitation districts, pilot sanitation villages where the programme should be launched in clusters instead of scattered & diluted programme.

(ii) One straight 'Jacket Plan' for the entire country without taking into consideration the local prevalent customs & systems, market prices of materials, availability of specific local construction materials, harnessing appropriate need based technology, availability of water, weather conditions, topography etc. cannot succeed at all.

(iii) Procedural delay and contractual obligations etc. have further complicated the problem. It has to be simplified at all levels in case the programme is really meant to be executed successfully.

(iv) A very important component i.e. training for maintaining the toilets was conspicuously absent. Ignorance and lack of maintenance techniques have virtually nullified the desired objectives. In order to assure acceptability, correct usage and longer life of the facilities provided, provision for involvement of women at all satges starting from formulation of scheme to the execution and maintenance of the sanitary latrines has to be made and apart from this their proper training, education, innovation, awareness & consciousness is extremely essential.

(v) Provision of maintenance funds for already created assets in subsequent years out of 'Plan Funds' is extremely essential. This is especially important because non-plan fund for maintenance is very meagre & negligible.

(vi) There should not be any discrimination in Urban & Rural Schemes so far as subsidy, loan Grants etc. components are concerned. In fact, there should be an uniform funding pattern for rural and urban areas. The loans should be granted to needy persons on differential rate of interest.

(vii) It is felt that enforcement of law, such as, banning the use of dry latrines in rural areas is meaningless unless suitable alternatives are offered for adoption according to need & requirement. And, therefore, social engineering will have to play a vital & predominant role. The beneficiaries themselves will have to be made conscious, cooperative and contributor to the successful implementation and execution the programme.

(viii) The rural sanitation & latrine programme should normally form part of one signle scheme instead of so many different schemes or programmes operating in the rural areas like RLEGP, NREP, CRSP, JRY MNP etc.

(ix) Community latrines may be considered in a very limited way in rural areas such as Panchayat Bhawans, Schools, Primary Health Centres, Anganwari centres market-places etc. only.

(x) Cost escalation is a very great bottle neck in the successful and timely implementation of the programme. In order to avoid this, sanction, allotment, execution & disbursement should be very quick & rapid.

(xi) The Central & State Governments should normally limit their activities to Planning, Programming, Financing, Monitoring, Evaluation & Research, aspects only. The NGOS should concentrate more on training, extension, education, execution and implementation aspect of the programme. Cooperatives & Gram Panchayats may also be involved wherever possible.

(xii) There should be single window clearance system of the programme. The benefit should reach the beneficiaries without much harassment. Different types of alternative flexible package should be available to beneficiaries to suit their pockets.

It is gratifying to note that an ambitious Rs. 10,610 crores outlay in the State and Central sectors has been envisaged in the Eighth Plan to improve rural & urban sanitation in the country, out of which Rs. 5026 crores are earmarked for rural and Rs. 5584 crores for urban sanitation.

The total population of Bihar is 8,63,38,853 as per census of 1991. Out of this, the male population is 4,51,47,280 and the female is 4,11,91,573. So far urban population is concerned, it is 1,13,68,889 only and rest

7,49,69,964 are rural people. Bihar State is predominantly rural and urbanization has so far been only to the extent of 13.17 percent as against 12.47 percent in 1981. The degree of urbanization in Bihar is also much lower compared to all India average (25.72%).

Bihar has 52 districts, 592 blocks 11,750 Gram Panchayats and 67,000 villages. Though to our knowledge, no reliable survey has been conducted still on the basis of practical experiences in the villages, it can be narrated that the 'Halkhors' normally clean the small numbers of service latrines in the villages once or twice a week. The process is normally based on 'Jajmani' system wherein a 'Halkhor' cleans the toilets throughout the year and in turn he gets foodgrains at the time of harvest of crops. Roughly assuming that even only two persons per Panchayat are employed for the purpose, their number comes to 25,000 approximately. Even if on a very modest estimate they clean only 4 (four) toilets, the number of existing service or dry latrines in rural areas comes to 1 (one) lakh only which is definitely a lower side figure. However, if we are required to convert these 1 (one) lakh service latrines in sanitary latrines, the amount required will be about 25 crores only.

So far provision of sanitary facilities to rural masses in Bihar is concerned, there are 7,49,69,964 rural people as per 1991 census. Even if we plan to cover 10% of rural population, it will come to roughly 75 lakh people and for catering to the needs of these 75 lakh people, we will need at least 15 lakh latrines @ 5 persons per latrine. In case we decide to subsidize construction of these latrines, we need at least Rs. 150 crores @ Rs. 1000/- per latrine as subsidy. In case, the whole cost or cent percent cost will be borne, the amount required will be Rs. 375.75 Crores @ Rs. 2505/- only up to plinth level and Rs. 879 crores @ Rs. 5860/- upto superstructure.

The latrine conversion programme may prove beneficial to the scavenger community as follows :-

1. The scavengers may be saved from carrying or handling the night soil in the rural areas.
2. Liberated scavengers may not be affected economically due to alternative & better means of livelihood.

3. Change of pollutable occupation may prove to be an inevitable avenue for raising social status of the scavengers.
4. Change of occupation may not result in any geographical mobility in many cases since they will be otherwise fruitfully employed.
5. Change of occupation may affect the life-style & living standard of scavengers.
6. It may favourably raise the self-respect, temperament and habits of most scavengers.
7. It will prevent diseases which is an effective method to control and raise the public health standards of the rural society.

In the background of what has been discussed, a well defined Rural Sanitation Programme of Government with sufficient fund backup and increasing association of NGOs in implementation has to be defined and directions issued. In a democratic welfare setup of ours we legitimately owe as a Nation to the teaming millions of the rural area who don't have safe drinking water or a toilet or civic amenities. This is why the rising rural penury and poor sanitary environment in our rural area which constitutes the true Indian picture.

☆☆☆

There are few ways in which a man can be more innocently employed than in getting money.

Samuel Johnson

PRELIMINARY INVESTIGATIONS ON UTILIZATION OF ANIMAL POWER FOR OPERATING A CHAFF CUTTER

R. C. Singh
Central Institute of Agricultural Engineering Nabibagh,
Berasia Road, Bhopal - 462 018 (M.P.)

An animal powered complex has been proposed to operate various agro-processing machines such as oil expeller, flour mill, feed grinder, paddy thresher and other similar machines. The heart of the complex is mecahnical gear reduction unit (bull gear) driven by a pair of animals. Preliminary tests of unit while operating a chaff cutter has given encouraging results. The cost of chaff cutting was found Rs. 1.66 per quintal as compared to Rs. 3.75 per quintal green fodder manually. The economic analysis of data revealed that the employment generated by the animal powered agro-processing complex was 200 man days and the utilization of animal power was increased about 600 hours per animal per year if the complex is used for 100 days.

The use of draught animal power is presently confined to farm operation, such as tillage, sowing, intergriculture and haulage. These operations are seasonals and limit the usefulness of animals to an average of about 100 days per year. The idling animals are causing financial strain to the farmers in terms of feed fodder and care. However, Sahu and Srivastava has reported even a lower figure in the order of only 400 hours in a year.

Chandra Sekharan et al reported that the small farmers holding less than 1 ha. of area used the bullocks only 75 days and cost of energy for a bullock pair per day of 6 h of actual work is Rs. 55.73. On the basis of the total cost of maintenance of a pair should be used at least for 142.16 days in a year to reach break even point.

Therefore it is obvious that at present draught animal power in India remains unutilized or under utilized. So it has become essential to utilize the draft animal power to a greater extent and efficiency for various farm operations.

To increase the utilization of animal energy with enhanced man-animal-machine efficiency, the draught animal can be used in rotary mode for operating agro-processing equipments and allied activities, during idle period. Keeping this in view development of an animal powered agro processing complex may be an appropriate alternative. The animal powered complex, infact will be developed to convert the animal power to the mechanical power for operating of flour mill, oil expeller feed grinder, chaff cutter, thresher and even to produce electricity. To make the complete unit economically viable a pair of animals would be utilized not less than 100 days. With these points an animal powered, agro-processing complex was developed at CIAE, Singh and Yadav, which was technically feasible for operation of duplex water lifting pump, flour mill, soyflaking machine and grain cleaner. Also preliminary investigations were conducted for operation of chaff cutter with animal power conversion unit, has been reported in this paper.

MATERIAL AND METHOD

Commercial bull gear procured from M/s. Watton Singh and Sons, Goraya, Punjab was installed at CIAE Bhopal. The input shaft was collared to a 4.2 m long wooden beam for operation, the beam was hitched to a pair of bullocks. The pair of bullocks travelled around bull gear for giving rotary power to input draft. The output shaft of bull gear was supported by a bush in middle and a bearing at the end. A 700 mm, pulley was mounted at the end of output shaft. The intermediate shaft was supported by ball bearings as shown in Figure 1.

74 rpm availed in 700 mm pulley was transmitted to the 350 mm pulley of intermediate shaft. From intermediate shaft required rpm to operation of various agro-processing machine was given through various sizes of pullies. The commercially available chaff cutter with two knives was coupled with intermediate shaft of bull gear. The bull gear was operated for 20 hours without load. Draft requirement was recorded after 15 minutes of intervals and operational speed of bullock was noted (Table 1). Power cut off

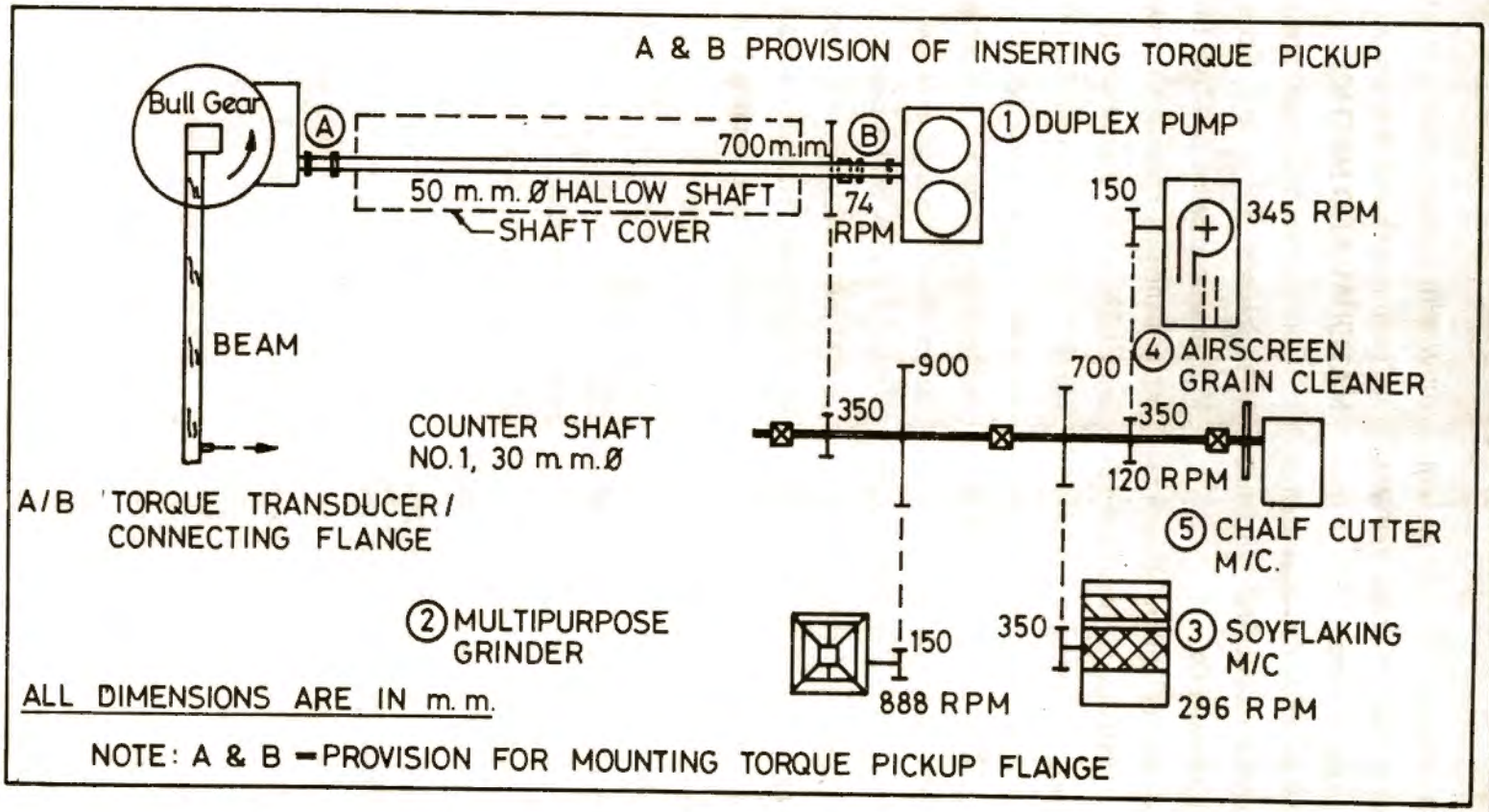


Fig. SCHEMATIC DIAGRAM OF THE DRAUGHT ANIMAL POWERED AGRO PROCESSING COMPLEX

from bull gear was cut of by disengaging the coupling device from intermediate shaft. After no load testing machine was tested with maize stalks and was operated by a pair of bullocks continuously for 4 hrs in morning and 3 hrs. in evening providing 1 hrs rest in between. The pull was measured by using a load cell and load cell indicator between the yoke and bull gear beam. The operational speed was recorded at suitable intervals to monitor the fluctuation in the output. The machine was fed with dry maize stalk in batches of 15 minutes and data were recorded (Table 2). The output with green maize stalk was also recorded. The power requirement was calculated by using the formula :

$P = FS / 3$

Where

P = Power kW

F = Force kN

S = Forward speed Km/h

The modification were also undertaken to fix a wooden handle to test the machine performance by human power. While testing the machine with human power the power was cutoff from bull gear unit by removing the coupling device. The maize stalk was fed in batches of 15 minutes by a man and data were recorded (Table 3). The machine was operated for 4 hrs. continuously with 2 men rotating the wheel of chaff cutter and one man was used for feeding, providing 5 minutes rest after every 15 minutes of work.

Table 1 : Performance of chaff cutter under no load condition

Material - Maize stalk

Moisture content - 14.73%

S. No.	Pull (Newton)	θ (Degree)	Ø (Degree)	Draught Force (Newton)	Power requirement (Watt)
1.	29.430	17.5	60.5	24.548	17.047
2.	22.072	18.0	64.6	18.961	13.172
3.	24.524	18.0	64.1	20.980	14.219
4.	22.072	18.0	64.8	18.993	13.189
5.	21.582	17.8	67.2	18.841	13.153

Speed of operation : 2.50, 2.75, 2.44, 2.50, 2.50 Km/h

Table 2 : Performance of Chaff cutter on load (Animal operated)

S. No.	Pull (Newton)	θ (Degree)	Ø (Degree)	Draught Force (Newton)	Power requirement (Watt)
1.	735.750	20.8	60.5	598.590	367.467
2.	613.125	20.0	61.2	504.879	317.232
3.	627.840	20.2	61.8	519.282	334.364
4.	667.080	20.4	60.2	542.522	345.104
5.	696.510	20.6	60.2	565.718	364.259
6.	668.010	20.3	60.0	543.192	334.960
7.	696.400	20.5	60.1	565.542	353.125
8.	628.000	20.0	61.0	516.361	331.332
9.	626.925	19.8	61.6	518.488	329.816
10.	614.015	20.21	61.4	508.183	327.495
Av.	657.365	20.21	60.8	532.275	340.515

Speed of operation : 2.21, 2.26, 2.32, 2.29, 2.32, 2.22, 2.25, 2.31, 2.79, 2.32 Kmph.

Average output : 79.88 kg/h dry and 400 kg/h green maize stalk.

θ Angle of line of pull

Ø Angle of line of pull with beam

Table 3 : Performance parameters of chaff cutter (Human powered)

S. No.	Machine (rpm)	Output (kg/h)	Power requirement (Watt estimated)
1.	54.0	45.60	120
2.	60.5	44.40	120
3.	66.0	44.80	120
4.	62.5	42.40	120
5.	57.5	45.60	120

Note 1. Two persons were used for rotating the fly wheel of the chaff cutter and one person for feeding the chaff, maize stalk.

2. Average output of green fodder (Maize) was 200 kg/h.

RESULT AND DISCUSSIONS

1. No load performance :

   No load characteristic of chaff cutter (animal powered) are presented in Table 1. At no load machine consumed power in the range of 13.15-17.04 Watt at 120 rpm. No breakage in the system was found during no load test.

2. Performance of chaff cutter on load :

   The chaff cutter was fed with batches of dry maize stalks of 14.73% m.c. (dry basis). The testing was done on whole day basis. The pull required to operate the machine and output of the machine were recorded after an interval of 15 minutes. The power requirement of machine varied from 317.232 to 367.467 Watt with an average output of 79.88 kg/h (Table 2). The output of green maize stalk was 400 to 420 Kg/h.

3. Manual operation of chaff cutter :

   The power requirement was 180 Watt approximately and output varied from 40.40 to 46.92 kg/h when the machine was fed with maize stalk of 14.73% m.c. (dry basis). The rpm of machine varied from 54 to 66.0 The output of green maize stalk varied from 190 to 208 kg/h.

4. Economic analysis of chaff cutting :

   (i) Animal powered :

   (a) Working capital requirement :

   Labour charge for 6 days + power charge for 30 days + rent/housing charge for days = 1 x 20 x 6 + 55.73 x 30 + 0 = Rs. 1791.90.

   (b) Annual fixed cost :

   Depreciation + interest + maintenance + rent/housing + interest on working capital for the period of operation

   Rs. (8000 - 800)/10 + 0.12 x 8000 + 0.05 x 8000 + 0 + 0 + 0.12 x (1791 x 100/365) = Rs. 2138.91

   (c) Capital investment :

   Initial cost of equipment + installation cost + 30% working capital

   Rs. (8000 + 1000 + 0.30 x 1791.90 = Rs. 9537.57

   (d) Hourly variable cost :

   Labour cost + material cost + power cost + lubricant etc.

   Rs. 1 x 20/8 + 0 + 0 + 0.62 = Rs. 3.12

   (e) Annual variable cost

   3.12 x (100 x 6) = 1872.00

   (f) Total annual cost

   Rs. 2138.91 + Rs. 1872.00 = Rs. 4003.91

   (g) Cost of operation Rs./h

- Rs. 4003.91/600 = Rs. 6.67

(h) Cost of operation of chaff cutting (green fodder)

Rs. 6.67/400 = Rs. 0.0166/kg or Rs. 1.66/quintal

(i) Employment generated

(i) 2 x 100 = 200 man days per year

(ii) 2 x 100 = 200 animal pair working days per year.

(ii) Human powered :

3 persons are required for operating the machine @ Rs. 20/- per day per labour. Cost of operation/hour = 20 x 3 / 8 = Rs. 7.5/h

The output of machine is 200 kg green fodder per hour Cost of chaff cutting Rs./quintal = Rs. 7.5/2 = Rs. 3.75/quintal

CONCLUSION

The study has established that animal powered chaff cutter is technically and economically feasible for rotary mode operation. Use of animal power for agro-processing during idle period will increase annual utilization of animal and farm workers which could be otherwise idle.

This in term will save expenditure Rs. 55.73 per day of feeding, care and management cost during idle period and will bring additional employment for processing of the agro products at rural level. However animal powered agro processing complex as an employment to farmers who will hire bullocks for processing would not be economical.

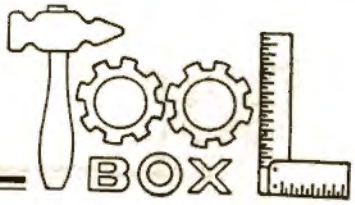
REFERENCES

Sahu, S.D. 1982. Draught animal power potential of NEH Region, Proc. Nat. Seminar on draught animal power system in India held at IIM Bangalore Vol. 1.

Srivastavata, N.S.L., Rajput, D.S. and Bhandarkar, D.M. (1982) Draught animal power and agricultural machinery used in crop production system. Proc. Nat. Seminar on draught animal power system in India held at IIM Bangalore. Vo. 1.

Chandrasekharan, M. and Varadharajan, S. 1989. Cost of maintenance of bullocks on farm. Agricultural Situation in India Jan.

Singh, R.C. and Yadav, G.C. (1993). Utilisation of animal energy in rotary mode of operation. Journal of Rural Energy Vol (2) No. 2-4.



'TIPPY TAP' SAVES WATER

Studies of behaviour and beliefs in a highland village in Guatemala found that water shortage was a major reason why handwashing was not commonly practised.

An intervention was designed based on the use of the tippy tap - a water-saving device made from a plastic bottle. Originally designed in Zimbabwe based on the use of a gourd, the tippy tap was adapted in Canada to use a plastic bottle. It requires about a tenth of the water normally used to wash hands.

In a trial project, selected mothers were given tippy taps and encouraged to install them in 'pretty corners' of their homes, together with hanging soap and clean cloths for hand drying. Mothers were given messages about using the tippy tap for handwashing.

A week later, these mothers were interviewed about handwashing. The trial showed that families were enthusiastic about using the tippy tap. They believed it used less water, and also less soap because the hanging soap did not become soggy.

A number of potential problems were highlighted. Older children were tempted to play with the tippy tap, wasting water or breaking it. The tippy tap required extra time and work to use and maintain it, and it was not easy to wash young children's hands using it. As a result of users' suggestions, the tippy tap was redesigned so that it had a hanging string to be pulled to tip out water when required. Also, the plastic bottle was hung from a stick so it could be moved to other places in the house if necessary.

The co-operation of fathers was recognised as vital to the whole family's use, so men were trained in making and installing the tippy tap. One child from each family was taught how to maintain the tippy tap. Their duties included filling it with water, letting their parents know when the soap ran out or the cloth needed changing, stopping other children from playing with it, and helping to wash young children's hands.

Communication support materials such as a flip chart and radio messages were designed and tested. Home visits to supervise tippy tap installation and encourage correct handwashing were carried out. Stories, songs, drawings and contests were used to put

across messages to school children.

RESULTS OF INTERVENTION

Ten months after the start of the intervention, more than half the intervention mothers (54 percent) were still using the tippy tap to wash their hands.

To evaluate handwashing behaviour four 'correct' steps were scored :

1. running water over hands
2. using soap
3. rinsing with clean water run over hands
4. drying with a clean cloth.

Ten months after the intervention, the average incidence of diarrhoea among children in families belonging to the intervention group was lower than in a control group.

A possible explanation for this is that during the intervention period a cholera outbreak occurred in Guatemala. The Ministry of Health (MOH) initiated community clean-up campaigns and distributed hygiene information pamphlets house-to-house. There were 19 cases of cholera in a population of 10,000, compared with a MOH prediction of 250 cases. There were no cholera cases in housholds using tippy taps.

By reducing the total incidence of diarrhoea, the cholera information campaign may have obscured the impact of the tippy tap intervention.

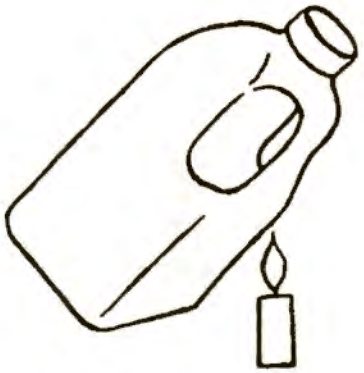
HOW TO MAKE A 'TIPPY TAP'

MATERIALS REQUIRED :

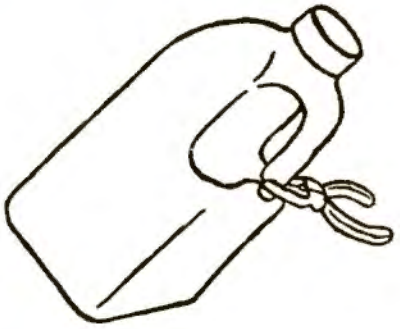
1. A plastic bottle
2. A nail
3. A small empty tin can
4. String
5. A stick
6. A pair of pliers
7. A candle
8. Matches
9. A bar of soap

PROCEDURE :

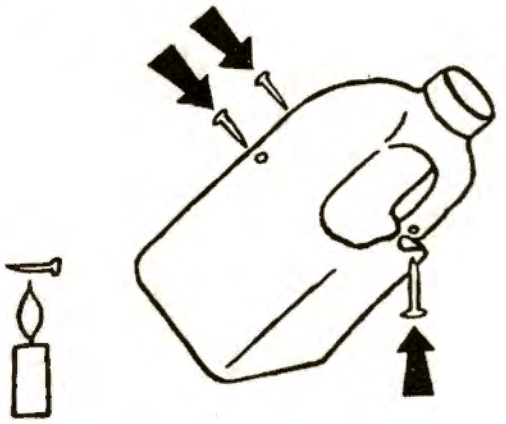
1. Take a plastic container with a hollow handle. Gently warm the base of the handle over a candle, turning the handle around until the base of the handle is shiny and soft all the way around.



2. Remove the candle and quickly 'pinch' the soft base of the handle with pliers so that the base is sealed tight to prevent water flowing through it. Hold the pliers there until the plastic cools, ensuring that the seal is completely closed.

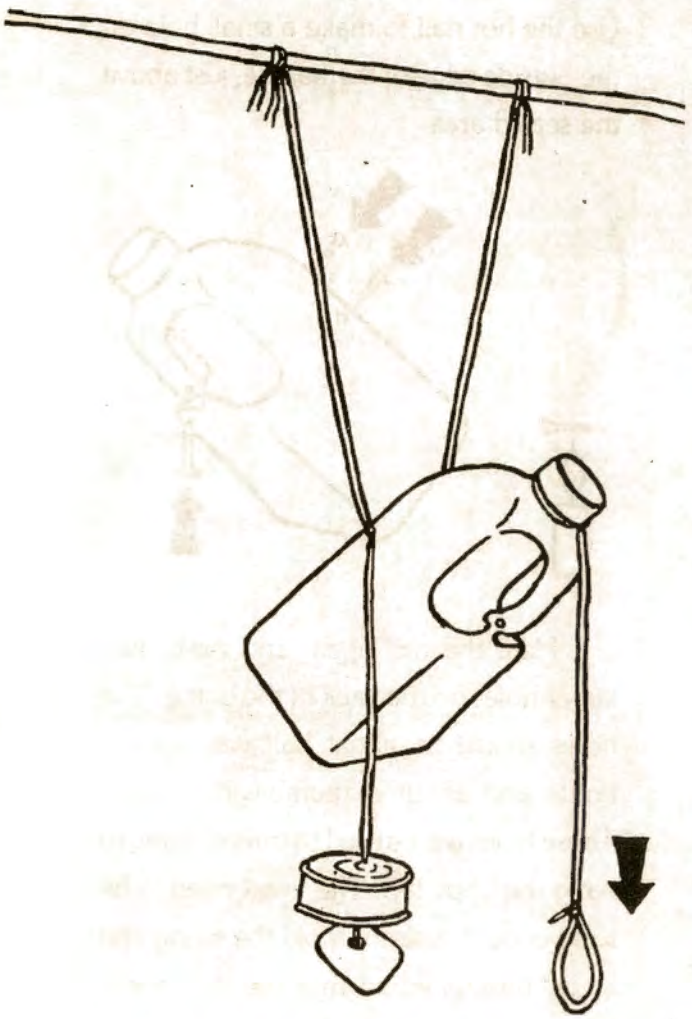


3. Heat the point of a small nail over a candle. Use the hot nail to make a small hole on the outside edge of the handle, just above the sealed area.



Heat the nail again and make two larger holes on the back of the bottle. The holes should be about half way up the bottle and about a thumb-width apart. These holes will be used to thread string to hang the tippy tap. The holes need to be wide enough apart to hold the string and to be positioned so that the 'full' bottle hangs at a 45^0 angle.

4. Thread the string through the two holes and tie the ends of the string to a stick. Thread a bar of soap and an empty tin can (the lid facing upwards) through another piece of string. The tin will protect the soap from rain and sun. Attach the 'soap and tin' string to one of the top supporting strings.



Tie a separate piece of string to the bottle cap and leave the string hanging. This string can be pulled to tip the tippy tap over for water to come out the hole in the handle.

5. Pour water into the tippy tap until the water is almost level with the holes in the back of the bottle. Use the stick to hang the tippy tap in the bathroom or outside in a tree. The tippy tap is now ready for use.

Courtsey : Dialogue on Diarrhoea AHRTAG, London

☆☆☆

A SCIENTIFIC STUDY OF ROAD HUMP

INTRODUCTION

Road hump is one which is used to control the speed of vehicle. Road hump sometimes called sleeping police, which spans the entire pavement and is the segment of a circle in cross section.

In fact, there would be no need of road hump if drivers themselves adjust their speed according to prevailing road and traffic condition, but large number of drivers in India cannot be relied upon.

NECESSITY OF ROAD HUMP

Road humps are commonly used on private access road and near schools, colleges in urban situation.

But they serve no purpose during the large term vacation in school and college and during non working hours. Hence it necessiates a type of road hump which can be deactivated when not required. Keeping this in view we tried to evolved out the same.

NEW TYPE OF ROAD HUMP

It is a hump which can be deactivated when not required. The hump is fabricated using 3 mm mild steel with sufficient stiffner to withstand the load of heavy duty vehicle. The hump consist one end hinged and other provided on roller, for easy movement along the road. The weight of hump came to 15 kg/mt length. The detailed of the hump is shown in figure (1).

The main advantage of this hump is it provides free flow of traffic when it is not in use and can be operated manually.

EXPERIMENTAL STUDY

The hump was fixed inside the N.A.L. campus, Bangalore in Bituminous Road and then jerk level was measured using accelerometer, amplified and recorded in recorder. Later it was analysed using frequency analyser. The vehicle used for the test was Hero Honda Two Wheeler. Accelerometer were fixed on front and rear axle.

RESULT

1. The hump is mechanically fit for easy movement can be moved by a single person easily.
2. From the study, it is seen that the maximum jerk level in front axle is about 1500 m/sec^3 and in rear axle 2200m/sec^3 at speed of 20 to 25 km/hr.
3. Though the jerk level is high the present

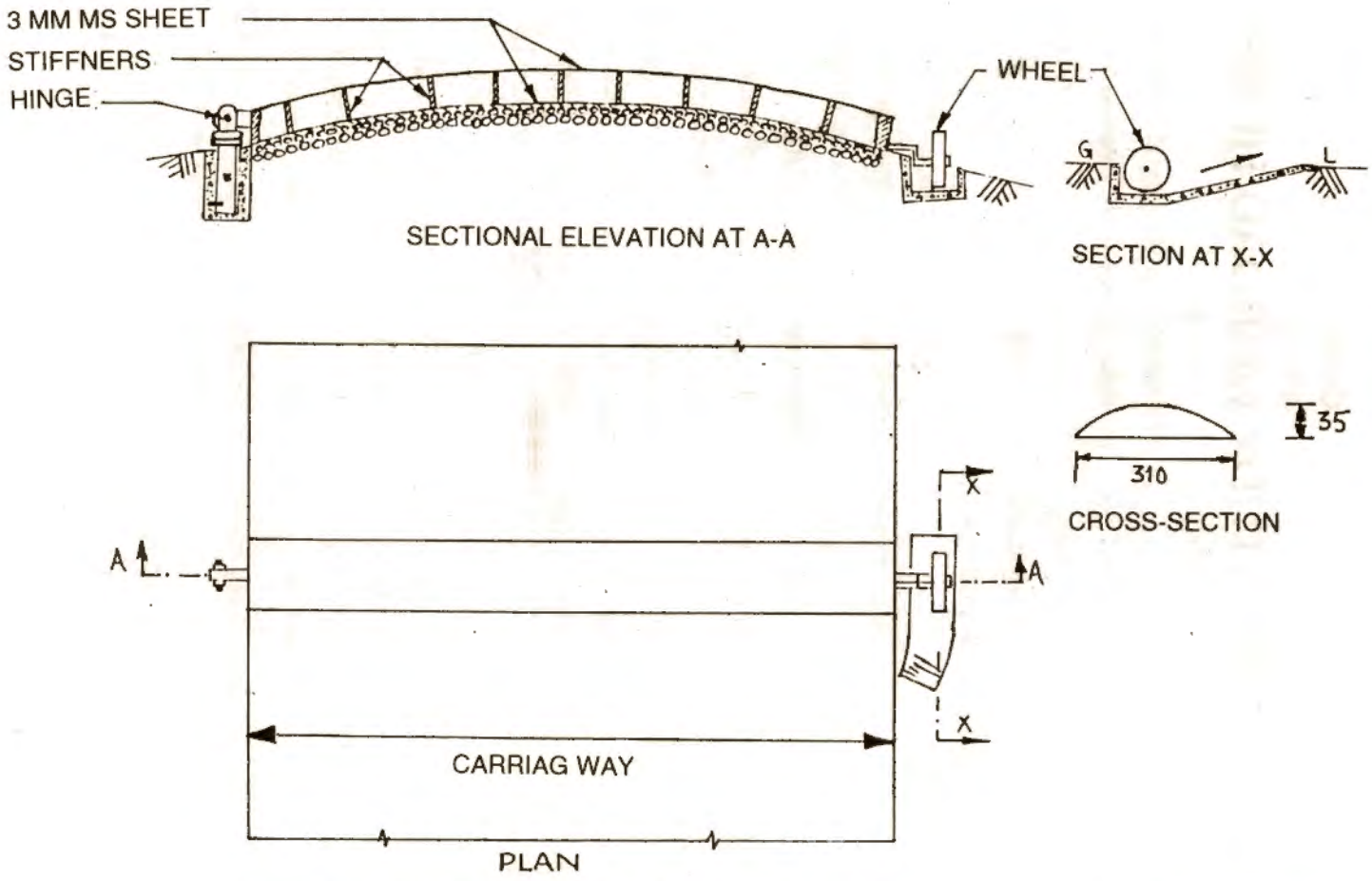


Fig. DETAILS OF MOVABLE METALLIC HUMP
DIMENSIONS ARE IN MM

NOT TO SCALE

dimension of hump is found not to give good breaking effect.

CONCLUSION

The present dimension of hump has to be modified and optimized for good breaking effect and reasonable comfortness.

Courtsey :
S.S. Adhikari
C/o Sri A. Yadav
H. No. 7, Siraha Village
Dist- Siraha
Zone - Sagarmatha, Nepal

I want to change things. I want to see things happen. I don't want just to talk about them.

J.K. Galbraith

FERTILIZER FROM INDUSTRIAL EFFLUENT

Claude Camilleri of France has applied for an Indian patent for a method which can be used to convert industrial effluents into fertilizers (Patent number 173482). It is claimed that the method is suitable to treat effluents having suspended solids up to a level of one gramme per litre and a chemical oxygen demanded of 5,000 mg per litre. The process involves degradation of the effluent by anaerobic fermentation using active micro-organisms. This partly treated effluent is decanted to separate a supernatant liquid and a semi-solid sludge. This supernatant solution is further degraded, to modify its pH, and purified to give a liquid which can be used as a fertilizer. It is claimed that nearly 80-90 percent of the suspended solids and toxic substances can be removed.

CLEANING WITH COAL

Residual by-products from gas plants often cause a lot of dirt and grime. The problem in cleaning these sites is that the wastes are extremely heterogeneous and sometimes virtually impossible to handle, being a sticky mess of tar, soil, oil-water emulsion and general debris. A process has now been developed that is uniquely suited for remediating manufactured gas plant (MGP) sites. It includes separation of the various constituents and disposal of the nonhazardous residues by combustion in a utility power plant.

This new clean soil process, developed by EPRI and Canada's Alberta Research Council (ARC) is based on the principle that when fine coal contained in a hot water slurry, is mixed in a tumbler with contaminated soil containing organic compounds, the contaminants are absorbed by the coal which tends to agglomerate, leaving the soil clean. In the complete version of the process unit, coarse solids (more than 3.3 mm is diameter) including clean coarse oil (pea, gravel), coke, slag and wood chips are screened out of the slurry as it emerges from the heated tumbler for separation of the pea gravel from the carbonaceous materials.

Slurry of the solids (less than 3.3 mm in diameter), containing the contaminated agglomerated coal and fine clean soil, is routed to a floatation unit. Since the coal floats and the soil sinks, the floatation separates the contaminated coal from the fine clean soil. The coarse and fine clean soil can then be combined and made ready for disposal. The agglomerated coal can be handled easily and makes an excellent fuel providing 10000-15000 btu of heat energy per pound on a dry

basis.

A simplified version of the process is now being prepared for demonstration in a 200-t/d plant by New York State Electric & Gas Corporation. In this version the fine-soild-slurry separation circuit is eliminated, and the final product in a nonhazardous mixture of coal, tar, and fine soil particles that can be returned to the site. The simplified plant, scheduled to begin operation in late 1994, is expected to cost only about half as much as the one based on the complete process.

FLYASH BRICKS

Flyash from Tatanager Bricks Ltd. (TBL) has become one of the major sources of raw materials for the building and construction industry. TBL is to set up an environment friendly pollution control project at Adityapur industrial area for manufacturing fly ash bricks and flyash based hard ceramic tiles.

The coal fired thermal power station generates massive volumes of flyash which is a highly toxic pollutant, and the disposability of which is becoming a serious environmental hazard. The project will aid prevention of soil erosion caused by continued brick making, and will manufacture superior quality products with higher strength and corrosion resistance.

The project, estimated to cost Rs. 114 million is assisted by TISCO in the form of free supply of flyash, the main raw material, and botom ash. Extension term loan of Rs. 25 lakhs and transport credit facility is also being provided.

FUEL PRODUCTION FROM HOUSE-HOLD GARBAGE

A pilot project of the Department of Science and Technology, set up in Bombay for producing about 80 tonnes per day of refuse derived fuel pellets as a coal substitute, has been successfully completed. The pelletization technology from 100% garbage has been completely estabished as a total indigenous technolgoy. Many private sector industries have shown interest for this type of fuel pellets which could be used as a substitute of coal for burning purposes. These pellets have been found to be eco-friendly. The integrated waste management project was conceived realizing that the usual dumping of garbage causes bad smell and the sanitary land fill causes some environmental hazards to the adjoining areas. The indigenous technolgoy of pelletization has potential for adopting in other cities of India. Voluntary organizations, Municipal Corporations, and others concerned with health and hygiene are now invited to avail the experience or to obtain the technology for the utilization of city garbage for useful purposes in the country.

POTATO FLOUR FROM CFTRI

The Central Food Technological Research Institute (CFTRI), Mysore, has developed a cottage-scale process for the production of potato flour using easily available indigenous equipment.

The process involves peeling, cutting, pretreatment with salt and soaking, granulating in mixer and drying. The dried product is ground and then packed and it contains permitted preservatives.

The equipment needed for the process are potato peeler, cabinet drier, slicer, mincer, blanching tank, heat sealing machine and handling vessels.

Potato flour prepared by this process can be easily reconstituted with boiling water to get a mashed potato product which can be used for making a variety of Indian preparations such as tikkia, stuffed paronta, pakoda.

Potato flour, granules, and mashed products are also used in the preparation of instant foods, soups as binding materials and also for preparing kheer, chops, cutlets and other products.

Potato flour-based products for mass consumption can be marketed widely and units based on potato products can easily be established in potato growing areas.

SIMPLIFYING ENVIRONMENT AUDITS

To encourage industrial units to provide accurate information in their environment audits, the government may soon amend the format of the environmental statement. The submission of the environment statement in mandatory for obtaining a no objection certificate, which is issued by the State Pollution Control Board concerned.

Organisations such as the National Productivity Council (NPC) had pointed out that the present environment statement requires industrial units to provide information such as the degree of concentration of pollutants in their effluent treatment. According to the NPC, the furnishing of such details deters industrial units from providing correct data, even though information contained in the statements cannot be used to initiate legal action against polluting industries.

Under the proposed changed format, industries will specify the pollutants generated before treatement, not after.

MICRO ALGAE IN POLLUTION CONTROL

A range of clean technologies using immobilised micro algae (blue-green, and green) are being developed for producing ammonia and hydrogen, and removal of

pollutants from water and stack gases in thermal power plants.

Using immobilized micro algae in the production of ammonia without using fossil energy the process helps in reducing the use of inorganic fertilizers in farm fields. The hydrogen is released by splitting water using solar energy, and when the hydrogen is burnt, the water is regained. It does not involve the emission of carbon, carbon dioxide and sulphur.

Alternatively, one can use biological or photochemical system if one wants to directly split water using catalysts. Catalysts are enzymes in the biological system and chemicals in the photochemical pathway. The main problem in these systems is that they are unstable in nature and do not last for a long time.

ORGANIC MANURE FROM WASTE COIR PITH

Coir pith, an agricultural waste produced in lakhs of tonnes every year in India, can be converted into good-quality organic manure in just a month with a new technology.

The technolgoy, developed jointly by Scientists at the Coir Board's Central Coir Research Institute, Alleppey and Tamil Nadu Agricultural University, uses a formulation 'Pithplus' to compost the waste into manure.

To compost one tonne of coir pith, two kilograms of Pithplus and five kg of urea are needed.

The process essentially consists of repeatedly sandwiching uniform layers of Pithplus, urea and coir pith in a fixed ratio - 100 kg of coir pith, 400 gms of Pithplus and 1 kg of urea until the heap reaches a height of one meter. Water should be sprinkled if the moisture content of the pith falls below 200 per cent.

At the end of 30 days, the coir pith turns into a black mass of compost with carbon nitrogen ratio of 24:1 which is recommended as an ideal organic manure.

Field tests have shown the composted coir pith has four times higher nitrogen, six times higher phosphorous and one-and-half times higher potassium than the raw coir pith. Composting reduces the mass by 58 per cent.

The manure from coir pith was found to improve soil conditions and mositure.

The recommended dosage of coir pith manure is 12.5 tonnes per hectare.

India produces about 5 lakh tonnes of coir pith annually, which can yield 2.9 lakh tonnes of organic manure worth Rs. 2 million, according to estimates.

The Central Coir Research Institute is fully equipped to test and certify the chemical properties of manure produced from coir pith.

CONVERSION OF WASTE INTO POWER

A methane gas collection programme has begun near Melborne at a cost of US$ Hundred million. The project is located at a huge sewage treatment plant at Werribee and will have a three-fold objective : (a) make the plant self-sufficient in electrical energy at a saving of $500,000 annually; (b) significantly reduce offensive odours' and (c) limit the release of atmosphere damaging methane gas.

According to Graeme Addison, the manager of the Werribee complex, the treatment ponds, which produced methane and hydrogen sulphide (rotten egg gas) naturally, were cauldrons of bubbling gases. Initially an on-site demontration plant able to generate 200 kw of electricity, would be built. Sewage at the plant is treated in ponds in a two phase process. The first is by anaerobic bacteria which thrives without oxygen. While this is an effective way of breaking down sewage, it generates methane, carbon dioxide, and odorous gases. The second process, while less efficient, overcomes gas generation by using mechanical aerators to introduce oxygen into the sewage. An essential element of the methane collection process is covering settling ponds with polyethylene 2.5 mm thick, strong enough for a person to walk on. The first of these is in place over one of the complex's three-hectare ponds. Gas is collected from beneath the covers by a systems of plastic pipes, up to 500 mm in diameter which have been drilled with about 12000 holes. The gas is pumped into a retort where it is measured, compressed, cleaned, and dispatched for burning. Mr Addison said it cost $2 million for the first plastic cover and estimates the cost of sealing the remaining ponds at between $27 and $30 million. It is estimated the cost would rise to about $2.5 million in five years time. When the plant is full operational it would be able to meet all its energy cost and sell the excess electricity to the state authority.

DEVELOPMENT OF ECOFRIENDLY FRIDGE

An environment-friendly houshold Refrigerator and Air-Conditioner, based on LPG (liquified petroleum gas), have been experimentally developed by the Anna University, Madras. A prototype refrigeration system was fabricated and charged with LPG. In preliminary trials, the new system gave better results than Freon-12. The cooling effect was more with the added advantage of lower energy consumption. The coefficient of prformance for LPG was five, as compared to 3.5 for Freon-12, according to Prof. S. Renganarayanan, under whose guid-

ance the project was carried out. An important aspect is that no modification of the refrigeration design is needed for using LPG. The working principle is the same. Existing systems can also be replaced with LPG without any other changes. An air-conditioner, earlier run on Freon-12 as refrigerant, was also charged with LPG and preliminary trials indicated a better performance than with Freon-12.

SOLAR REFRIGERATION FOR DRUGS AND VACCINE INDIA

Solar Vaccine Saver VR 100 developed by an Indian company is unique in that there are no moving parts, motor, compressor, or working fluid for producing the refrigeration effect. The system uses a solid thermo-electronic module for pumping out heat, thereby producing a cooling effect. The electrical energy required is supplied by direct conversion of solar energy into electircal energy by (PV) photovoltaic modules provided with the system. The system comprises a 120 Wp PV module driving a thermo electric module of 600 W capacity and is backed up with electrical energy storage. Stored energy operates the systems during night and cloudy weather conditions, ensuring a stable temperature for the drugs and vaccines (maintained between 4 to 10^0 C). It can hold four kilograms of vaccine and drugs. Energy storage is handled by sealed jell type lead acid battery charged and discharged through an electronic regulator with built-in controls for prevention of over-charging, deep discharging, short-circuit protection, and protection against polarity reversal.

WAY FOUND TO MAKE CHEAP SOLAR ELECTRICITY

A break through in solar cell technology promises to cut the cost of solar electricity by 80 percent in five to 10 years, making it cheaper than coal-fueled power.

We have developed a new design strategy which should eventually meet all nation's needs for cheap and environmentally sound energy supplies.

The potential has always been there to produce an inexpensive, clean, convenient and inexhaustible supply of energy and now we know how to do it.

The new process, when used to mass-produce solar cells, could produce solar electricity for less than US$1 per watt, cheaper than the most efficient coal-fired power plants.

Until now, solar cell technology had focussed on making high-efficiency cells by using ever-more expensive, pure, high quality silicon semiconductor material.

But the metal carrying the current in solar cells has always been put on the top surface of the cell, which cuts down the sunlight

reaching the silicon in the cell.

The university researches used lasers to cut grooves in the cell, buring the conducting metal in it. This allows lower quality and therefore cheaper silicon solar cells to produce more power than the high-quality, expensive cells. They can use silicon that is 100 times poorer in quality than the top-grade material now used in the most efficient cells.

It also allows the cells to be only 20 microns thick, compared with the 400 micron thick cells now being made. A micron is one millionth of a metre a human hair has a diameter of about 40 microns.

The researchers envision their solar cells being used in houses and on power stations, producing electricity that would be fed into the existing distribution grid.

Once the solar cells are mass-produced and widely used, the scientists believe the cost of electricity production could fall to US$ 20 cents per watt.

Their technology is patented by Unisearch Ltd, the commercial research and develoopment arm of the University of New South Wales.

The Centre for Photovoltaic Devices and Systems has long been at the forefront of solar cell design and holds the world record for cell efficiency.

WASTE TO ENERGY SYSTEM

A new promising area of power generation that is fast developing in the waste-to-power generation system. Such an endeavor any where takes care of two problems simultaneously, namely, damage to precious ground water is eliminated and considerable cost in building new power generation solid waste can be used to fuel energy generation. A system handling a few thousand tons of solid waste per day and generating high grade steam to produce a few tons of megawatts of power is now feasible.

☆☆☆

ENVIRONMENT '95

Confederation of Indian Industry, will hold its "Third Industrial Eco-Efficiency Fair" under the title "Environment '95", on 12-19 Februrary'95 at New Delhi.

For further information contact :

Confederation of Indian Industry
Trade Fair Department
28-26 Institutional Area
Lodi Road,
New Delhi - 110 003.

WIND POWER '95

A Seminar on Wind Energy entitled "Windpower '95" will be held at Washington DC on March 27-3, 1995.

For further Information contact :

AWAE
122 C Street NW
4th Washington DC 20001 USA

WATER AND SANITATION

WEDC's will hold its 21st International Conference on "Sustainability of Water and Sanitation Systems" at WEDC's International Conference Centre, Kampala, Uganda, on 4th-8th September'95.

The principal objective of the conference is to enable those involved in water and sanitation schemes to meet, discuss and learn from each other. The conference is valuable for all water and sanitation professionals, development and health workers, social scientists, hydrologists and hydrogeologists, managers, bureaucrats and engineers.

For further information contact :

Prof. John Packford, WEDC,
Loughborough University,
L. E. 11 3 TU
England.

ENVIRONMENTAL EDUCATION

British Council will hold an International Seminar in Britain on "Environmental Education : From Policy to Practice" from 26th March to 6th April'95. Environmental education exists in a variety of forms and addresses a wide range of aims. Following the Earth Summit in 1992 and the Publication of Agenda 21, environmental education is, more then ever, seen as prerequisite for sustainable development. The present seminar is also with the aim to popularize the environmental education.

The seminar has three interrelated themes.

Planning
Implementation
Evaluation

For further information contact :
International Seminar Department
The British Council
10 Spring Gardens
London SWIA 2 BN

AGRICULTURAL EDUCATION

British Council will hold another seminar on "Efficient and Effective Management of Agricultural Education", at Britain from 21st June to 4th July '95.

The purpose of the seminar is to improve the efficiency of the management of agricultural education and the effective use of resources such as teaching farms for vocational training, staffing and finance.

The seminar will focus on the management of agricultural colleges and extension programmes as well as the education and training programmes they provide. The topics included in the seminar are :

- Financing of Agricultural Education
- Control of College Budgets
- Curriculum Development
- Marketting of Agricultural Education and Training programmes.
- Staff Development and Personnel Issues
- Formulating strategic plans for agricultural colleges, including performance indicators, women in development, environmental management and business management relating to agricultural college farms.

For further information contact :
International Seminars Department
The British Council
10 Spring Gardens
London SWIA 2 BN

ENERGY MANAGEMENT

A national seminar on "Energy Management" will be organised on March 2-3, 1995 at Allahabad. The seminar will be organised jointly by Motilal Nehru Regional Engineering College, Allahabad, National Thermal Power Corporation Ltd., (Northern Region) Allahabad and the Institution of Engineer's (India) Allahabad's Centre.

The seminar covers all the aspects of energy management techniques. The main theme of the seminar are :

- Energy Management as a concept
- Energy Management in Power Sectors
- Energy Efficient Transportation Systems
- Energy Management in Process and Manufacturing Industries
- Energy Management in Transmission & Distribution

- Energy Management Techniques
- Energy Conservation in Civil Construction

For further information contact :

Dr. R. Yadav
Proff. & Head
Mechanical Engineering Department
Motilal Nehru Regional Engineering College
Allahabad - 211 004

DEVELOPMENT COMMUNICATION

International Institute of Rural Reconstruction Philippines will hold a regional course on "Development Communication" at Philippines from 13 February to 10 March'95. Topics of this regional course are planning, developing and using low-cost media for development activities, with emphasis on health, agriculture and environment. The programme is designed to assist programme managers and trainers who wish to integrate communication into field programme and training activities.

For further information contact :

Rowena Hidalgo
C/o International Institute of
Rural Reconstruction
Silang, Cavite 4118
Philippines

SMALL-SCALE HYDROPOWER

HIDRORED the Latin American Small-Scale Hydro Power Network, will hold 6th Latin American Congress on small-scale hydropower focus on "Hydropower utilisation in the Economic and Political Context of the 90ies". Both technological and energy policy aspects will be covered.

For further information contact :

PROPWER-Bolivia UMSS-GTZ
Lanza N-0736
Casilla 2672
Cochabamba, Bolivia

WOMEN AND AGRICULTURAL DEVELOPMENT

University of Reading will conduct Short Course on "Women and Agricultural Development", at Reading from 27th April to 6th July'95.

This ten-week course is designed for women and men involved, at different levels, in the planning and implementation of programmes and projects relating to rural women.

For further information contact :

The Short Course Coordinator
AERDD, University of Reading
3 Earley Gate,
Whiteknights Road
Reading R G 62 AL, UK.

THE CLIMATE CHANGE AGENDA

Climate change caused due to the greenhouse effect could be considered as one of the major crisis faced collectively by mankind. The question of global climate change has, in just a few years, assumed the centre stage among multilateral policy issues. It (climate change) occurs largely because of excessive levels of emissions of greenhouse gases, among which carbon dioxide, resulting chiefly from the use of fossil fuels such as petrol and coal, are the major contributors to the process.

Tata Energy Research Institute had the foresight to envisage the issues emerging from concerns relating to the global environment. It (TERI) has been researching diverse aspects of climate change since the problem assumed policy importance about six years ago. It has done significant work in identifying relevant issues, clarifying matters of concern, evaluating options and costs, and analysing the political economy of the multilateral policy making process.

Present book is related with the subject in Indian context. It has been essentially been divided into clearly defined subjects in four major areas; (i) Emission inventories (ii) Impact assessment (iii) Response strategies and (iv) Policy issues.

In first section "Emission Inventories" greenhouse gas emissions from various sectors, including the energy sectors, industry, agriculture, and forestry have been assessed. The section on "Impact Assessment" has a chapter, which is in the nature of a preliminary assessment of impact of potential climate change on Indian rice production. The section three "Strategies" is both mitigative and adaptive. Papers included in this chapter are mainly emphasises to reduce CO_2 emissions. The last section "Policy Issues" examines the various policy issues arising from the major conventions signed at Rio in 1992. The papers included in this book clearly reveal that if the frontiers of knowledge have to advance in meeting forthcoming challenges in climate change, innovative actions from governments and other organisations are a prerequisite.

"The Climate Change Agenda - An Indian Perspective", by Amrita N Achanta (Ed.), New Delhi, Tata Energy Research Institute, 1994 Pp. 305, English.

STATE OF THE WORLD 1994

As a society, we have failed, to discriminate between technologies that meet our needs in a sustainable way and those that harm the earth. We have let the market largely dictate which technologies more for-

ward, without adjusting for its failure to take proper account of environmental damages.

The eleventh edition of the 'State of the World' provides the latest information that how our environment is doing, where we are making progress, and where progress needs to be made it recommends that how each of us as well as businesses and nations can help secure a satisfying way of life that also safeguards our enivronment and natural resources for future generations, Our prosperity, even the survival of the way we live, depends on quickly creating a global economy that is environmentally sustainable.

The book is useful for scientists, academicians and environmentalits, to analyse interdisciplinary environmental data from around the world. The book is divided into ten chapters, as carrying capacity : Earth's Bottom Line, Redesigning the Forest Economy, Safe guarding Ocean, Reshaping the Power Industry, Reinventing Transport, Using Computers for the Environment, Assessing Environmental Health Risks, Cleaning up after the Arms Race, Rebuilding the World Bank Facing Food Insecurity.

"State of the World 1994", by Lester R. Brown et. al., New Delhi, Horizon Indian Books, Pp 265, Rs. 320, English.

RURAL POVERTY TECHNOLOGY AND DEVELOPMENT

Geography of poverty is an emerging frontier in the recent past. Poverty is a complex phenomenon, in its content and scope. It is not only widespread but also intensive. Poverty is a state wherein an individual cannot satisfy his minimum wants for reasonable healthy livings in a given social environment. Poverty is a problem of low income related with productivity, whether a nation or a people and its unequal distribution in both. The present book is based on the study conducted at Varanasi, to analyse the structure, nature and causes of rural poverty in India. The poverty level has been determined by obtaining composite poverty index on the basis of twelve variables at the village level in the block. Detailed review and poverty and rural development programmes in India has been discussed in the book.

Present book is divided into six chapters-First chapter deals with the concept and approaches of poverty including empirical studies of rural poverty in India. The second chapter is devoted to the evaluation of an aggregate picture of the geographical personality and rural economy comprising physical background and socio-economic devel-

opment of the study area. The third chapter comprising two sections deals with population characteristics and identification of the rural poor. The analysis, structure, nature and causes of poverty has been studied in the fourth chapter taking into account 600 households from 14 sample villages. The fifth chapter reviews the poverty and rural development programmes in India broadly grouping them with reference to three periods-Pre-Independence, Post Independence before mid-sixties and after 'Plan Holiday' The last chapter assesses the impact of poverty alleviation programmes in the study area and finally, formulates a rural development plan by suggesting specific recommendations and proposals for alleviation of poverty in the Niyamatabad Block.

"Rural Poverty Technology and Development" by P.K. Tiwari, Allahabad, Chugh Publications, Pp 305, Rs. 400, English.

ENERGY FOR SUSTAINABLE DEVELOPMENT

Energy efficiency improvements are particularly important for developing countries. One characteristic of developing countries in the low level of energy services available. Yet energy consumption need not rise rapidly as development takes place, for technological improvement in energy efficiency can facilitate substantial economic advancement with only modest increases in energy consumption. The pursuit of energy efficiency improvement should be carried out in parallel with improvements in institutions, entrepreneurship management and human resource development.

"Energy for sustainable Development", journal on international energy initative views energy, not as an end in itself, but as an instrument of sustainable development. It is directed to energy services, rather than the magnitude of energy consumption, as the measure of development. The journal is directed towards all members involved in the planning decision making financing, establishing managing, operating and using of energy systems of developing countries.

The journal is devided in four main columns 'NEWS' covers brief reports highlighting certain happenings in the area of concern of the journal, including descriptions of meetings/short courses on energy on new products in the field of energy. "LETTERS" are short articles and most of the contribution under this column carry a single message related to specific energy projects, experiences with specific end use devices, new developments in existing designs, novel methods of financing energy activities, mar-

ket studies for different types of energy products etc. "ARTICLES" consists of reports of research or innovative projects that have produced significant results benefits or exhaustive reviews of research. Last but not least important column "OTHER DEPARTMENT" cover as the Book Review and corespondence from other organisations/ institutions and individuals.

"Energy for Sustainable Development" quarterly, published by International Energy Initiative, Bangalore, Subscription within India - Rs. 120 (Individual), Rs. 240 Institutional.

Health care costs and the ozone layer

Another source of higher future health care costs is stratospheric ozone depletion. Epidemiologists at the US Environmental Protection Agency (EPA) estimate that the upward revision in early 1991 of the rate of ozone loss could mean an additional 200,000 skin cancer fatalities in the United States over the next five decades. Worldwide, this translates into millions of deaths. The number of people with cataracts would also increase dramatically in a world where people are exposed to greater doses of ultraviolet radiation than ever recorded. Other associated health care costs include a projected higher incidence of infectious diseases associated with the suppression of immune systems, the economic costs of which are difficult to even estimate.

A Worldwatch Institue Report

Services Offered
by
Information Service Division

The main services offered by the Information Division of CDRT, IERT, Allahabad to the staff members of GOs and NGOs are as under :

Training Programmes on

1. Project formulation techniques.
2. Survey, evaluation and monitoring of the projects.
3. Information repackaging and consolidation.
4. How to publish your news letter and news items.
5. Information presentation with Desktop publication.
6. Resource generation through information marketing.
7. Basic uses of computer for information management.

Document Delivery Service

The interested organisations/individuals may receive our regular and uptodate publications by paying a nominal subscription. Organisations/individuals subscribing for all RTIS publications will be offered a special discount price. Our main regular publications are :

1. Rural Technology Journal (quarterly in English).
2. Grameen Pradyogiki (quarterly in Hindi).
3. Manuals on various Rural Technology devices.
4. Do-it-yourself series Leaflets on various rural technology and income/employment generating techniques (both in English and Hindi).
5. Proceedings of workshops and seminars.
6. Course materials of training programmes.
7. Information folders on Appropriate Technology.
8. Classified Bibliographies on Rural Technology.
9. Holding List of CDRT's R.T. Library.
10. Bibliography of Periodicals.

In Job Training

These special training programmes are designed for the personnel of GOs and NGOs working in the field. Our in job training programmes enable them to study our working methodology both in headquarter and in the rural projects. These may be of great help for them for generating resources as well as for proper implementation of their projects and programmes. In Job Training courses are organised on special request of the interested organisations.

Special Training Courses for Voluntary Agencies

Most of the Voluntary Organisations of our country are facing serious financial problems to get funds for their projects and programmes. The staffs working in those organisations are neither well equipped with the required information resources, nor they are trained enough to implement their programmes in a scientific and systematic manner.

In view of the above points, the Information Division has now designed special courses for the voluntary organisations. These training courses will focus on :

1. Formulation of project proposal.
2. Documentation and writing of reports.
3. Resource Generation.
4. Project Planning.
5. Project Monitoring and
6. Project Evaluation.

Other Services

Technical Quiry Service on Rural Technology
and Renewable Sources of Energy
Environment and Rural Technology Network.
Consultancy Service on RT & RSE.

For further information contact :

Head Information Service Division
Institute of Engineering & Rural Technology, Allahabad - 211 002

SUBSCRIPTION FORM

Editor :
RURAL TECHNOLOGY JOURNAL
Information Service Division
Centre for Development of Rural Technology
Institute of Engineering and Rural Technology
Allahabad - 211 002 (INDIA)

Enclosed a Bank draft/Money Order No..... dated.....
of Rs./US Dollars ..... for one/two/three year (s) subscription to the RURAL TECHNOLOGY JOURNAL by air mail/surface mail (please strike out as applicable).

Note : Bank/draft/Cheque may be made in favour of "I.E.R.T.— Commercial Activity A/c."

Individual/Institutional Subscription : .....
Name of Subscriber/Institution .....
Address : .....
.....
Contact person : .....
Designation : .....
Date.....Signature .....

Subscription for one year :

	Inland		**Overseas**
		Surface	Air mail
Individual :	Rs. 75.00	US Dollars 25	US Dollars 30
Institution :	Rs. 150.00	US Dollars 40	US Dollars 50

RURAL TECHNOLOGY JOURNAL

AIMS AND SCOPE :

Rural Technology Journal is published by Information Service Division, Centre for Development of Rural Technology, Institute of Engineering and Rural Technology, Allahabad (India). The purpose of Journal is to provide a forum for exchange of views, information and create awareness in the field of Rural Technology, its development and transfer to the rural areas, technological products and processes, methodologies and approaches etc. Effort is being made to ensure that this Journal become relevant not only for this country but to all those nations, groups and individuals, in any part of the Globe who have concern to contribute towards the welfare of the under privileged rural communities. The Journal is divided into following main sectons :—

1. Portfolio	—	(Articles/Papers)
2. Tool Box	—	(Information on Rural Technology/Processes)
3. Spot Light	—	(News and Views)
4. Futurama	—	(Forthcoming Events : Training Programmes, Seminars, Symposium, Workshop etc.)
5. Book Bag	—	(News on Books and Publications)

NOTE FOR THE GUIDANCE OF AUTHORS :

Papers/articles information packages, technical queries and related materials are cordially solicited. Manuscripts should be sent to :—

The Editor
Rural Technology Journal
Information Services Division
Centre for Development of Rural Technology
Institute of Engineering and Rural Technology
26, Chatham Lines, Allahabad—211002 (India)

There is no limit to the length of contribution, but it is suggested that a maximum of 6,000 words or equivalent be used as a guide (approximately 6 to 7 pages).

1. The complete manuscript should be written in English and the desired order contents of Title, Abstract, List of Symbols, Main Text, Acknowledgement, Reference and Appendices. The Standard International System of Units (SI) should be used.
2. The manuscript should be typed on one side of the paper only (preferably 8"×11" bond paper) with double spacing between lines and 1.1/2, margin on the left.
3. Two copies of the manuscript and illustrations (one set original) should be sent to the Editor.
4. The title should be brief (maximum of 150 characters including blank in between words or other non-alphabetical characters) and followed by the author's name, affiliation and address.
5. Internationally accepted standard symbols should be use. In the list of symbols Roman letter should precede lower case.
6. Graphs, charts, drawing sketches and diagrams should be black and white prints of glossy paper and preferably 3.1/2"×7" size.
7. Illustrations should be numbered consecutively, given proper legends and should be attached at the end of the manuscript.

IERT SHELTERED WORKSHOP IN SERVICE OF PHYSICALLY HANDICAPPED.

INFORMATION SERVICE DIVISION
CENTRE FOR DEVELOPMENT OF RURAL TECHNOLOGY
INSTITUTE OF ENGINEERING & RURAL TECHNOLOGY
26, CHATHAM LINES,
ALLAHABAD - 211 002, INDIA.

GRAM : APOLY Phone : 601402
Telex : 540-260 IERT-IN
Fax : (0532) 600615