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CONTENTS

EDITORIAL

Rural Technology, perse, is not a panecea in itself even in these situations were there is a clear cut and direct need for technological intervention. It has to be provided the cutting edge in the form of policy support, clean and committed administration, with people's welfare at heart, and suitable resource allocation. Without these inputs we will continue to scratch the surface and be happy within a small and closed community of innovators and extension workers. The galloping march of the 'top-down' development approach now being pursued even more vigorously in the guise of 'bottom-up' approach is a melodrama which even the rustic understands. Technology missions too perse won't provide few hundred million depraved Indians even a skeleton of liveable quality of life in the foreseeable future. There can be no debate on these issues. The country is expected once again, hopefully within this year, to get a chance to decide by whom it wishes to be ruled in the next years. The point is that all those millions below the accepted poverty line, will not disappear in the next six months nor they will weild a power clout, of an intelligent quality, to get a real good self-governence. It is this one single question which needs immediate answer from champions of 'democracy' - of all denominations, hues and species.

C.D.R.T. NEWS

C.D.R.T., I.E.R.T., Allahabad

* Prof. H. C. Srivastava, Dean R&D/Head C.D.R.T. had been invited by the Government of West Germany as a Visiting Professor in the University of Flensburg for their M. Sc course on Appropriate Technology for a period of two months. Prof. Srivastava has also met Senior West German and Danish Government officials to finalise a number of projects of collaboration in the field of appropriate technology research and extension.

* A Summer School on "Technology of Solar Driers" sponsored by Indian Society of Technical Education, was organised from 15th May' 1989 to 27th May' 1989. The teachers from various Polytechnics and other Institutions have participated in it. Beside internal faculty experts, some external experts from other organisations also delevered their talks.

* On the request of Non-Conventional Energy Development Agency, U.P., one Improved Watermill has been fabricated and supplied with a 5 H.P. rice huller.

* Information Services Division of C.D.R.T., I.E.R.T., Allahabad is going to computerise its rural technology library and information services to improve the dissemination of information to users. The overall objective is to strengthen the information capabilities of the Centre for Development of Rural Technology to improve and expand its services to users in India. Beside computerisation, it has also been planned to develop a Technical Enquiry Service; to establish a systematic exchange of information by networking with other CDRTs, Community Development Cells and Rural Technology Development Agencies; setting up two Rural Technology Parks and Mobile Exhibitions in rural areas; to popularise rural technology and disseminate rural technology informations to rural population by publishing manuals, do-it-yourself series, publicity materials and technology information folders. This work will be carried out with the aid of a grant from the International Development Research Centre, Ottawa, Canada.

Time is the greatest innovator.

— Francis Bacon

Management of the Non-Organised Sector : Models and Strategies for Development of the Mixed Economy Countries

*N. S. Ramaswamy**

It is well recognised that science and technology exert an increasing influence on growth and development-material, industrial, economic and social. For any activity of organised or non-organised sector management is essential to define goals and tasks in operational terms : To build linkages and decide on deployment and utilisation of material and human resources, in order to achieve the agreed tasks. The country today is in a crisis in which everybody has to give up something. According to the author the management professional should move toward modernisation of the non-organised sectors with the help of their major instrument, namely formal organisations.

Science, Technology & Management

Since the beginning of industrialisation, an ever-increasing efficiency attained in the production of goods and services has been the major contributory factor for progress of mankind-though perhaps in the conventional sense. During the last fifty years particularly, productivity in all fields of human endeavours went up by several times, primarily due to spectacular developments in, and application of, science and technology (S&T) on the one hand, and organisation and management (O&M) for utilisation of these for human welfare, on the other. Phenomenal discoveries made in natural and physical sciences, engineering and technology, social sciences and humanities etc., made it possible for man to attain miraculous achievements in most areas of economic and social endeavour.

* President, CARTMAN, 87, 17th, Main Koramangala-6, Bangalore-560 034.

S & T and O & M Wasted

Unfortunately, bulk of the fruits of these developments has not so far reached the majority of the poor since social organisations considerably lagging behind S&T have failed to channelise the tremendous potential of S&T, to the poorer half of people in the developing countries (DCs). Benefits are either wasted in accumulating armaments or in conspicuous consumption by elities. It is a tragedy-a sad commentary of human wisdom as well-that value created by S&T and O&M is deployed for destruction of human beings. This had armament race in getting momentum at a time when more than a billion people live under abnormal conditions of squalour and privation in the DCs.

Strangely, S&T is being blamed for the endemic ills of modern industrial societies not realising that it is the folly of leaders and organisations that they are unable to use S&T and O&M as instruments for promoting equitable human welfare. But scientists and

technologists are allowing themselves to be used as tools for destruction. It is high time that they assert and participate in the decision making process so that a significant part of S&T is directed towards lifting the world's poor from privation.

Non-Organised Sector Deprived

The segment of society in all nations, particularly in the DCs, which has suffered most-economically and socially-due to distorted values and inappropriate models of social organisations, is the vast non-organised, un-organised, decentralised and informal sector (hereafter referred to as 'non-organised sector'/non-OS). Though a clear-cut definition for the non-organised sector may be difficult, it seems adequate for our purposes if we consider all non-organised activities, which are not formally organised. Development of this sector has been the main concern of the UN System and all national governments for the last two decades.

Organised and non-Organised Sector

Organised sector (OS) consists of such of those activities controlled within formal organisations, which are constituted with specific objectives, as per the laws and conventions of the land, and in which there exists an employer-employee relationship and wage labour. This category would encompass all formal organisations in sectors such as public administration and systems. Government and quasi-Government agencies, mining and manufacturing, business and industry, banking and insurance, transportation and communication, irrigation and power, education and health services, printing and electronic media, etc. The rest of the work-force can be deemed to be in the non-OS. In the DCs, non-OS largely consists of those engaged in agriculture and related operations, animal husbandry and fisheries, peasants and landless labour, tiny and miniscale industries, cottage and small scale operations, petty traders and craftsmen, co-operatives, voluntary agencies, construction workers, casual labour, self-employed etc.

Market and Planned Economies

We are concerned with the development of the non-OS, because non-OS embraces, in some sense or other, the poorer half of the world's four billion people. The advanced countries under the market economy system-Europe, North America, Australia and Japan-developed rapidly by using the OS to deliver modernisation to the non-OS, thus upgrading the latter by way of improved instruments of production, access to development, strength to prevent exploitation, etc. Countries with the planned economy system-Soviet Union, China, East European nations, Cuba and so on-used variations of the Collectives and Communes as the model organisational devices for developing the non-OS.

DCs-mixed economies

But the main problem with the DCs is that most of them have mixed economy models with a large private sector-contributing anywhere between 60 and 80 per cent of the GNP-and an increasing State sector involving itself in economic and social development projects an entrepreneur, manager, promoter, regulator and controller. The degree of State intervention and controls varies from country to country. But the essential characteristics of a mixed economy prevail in most DCs. This is irrespective of the kind of Governments they have-military, authoritarian regimes, pseudo or regulated democracies and free democracies.

Within the DCs, we have a few middle income countries, which have somehow managed to eradicate object poverty and privation, though most of them have a dualistic economy with a high degree of inequality amongst different segments of the population. This still leaves about 1 5 billion people-in the middle and low income countries-whose problems of development have been causing serious concern to the UN development agencies and the national governments of those countries.

This paper largely concerns itself with Low Income Countries (LICs), where about one billion people eke out their livelihood from activities which are essentially in the non-OS Though accurate figures are not available, it is estimated that 60 to 80 per cent of the work force in these LICs would be in the non-OS. It may be noted that concerted efforts of the UN system

and national Governments to develop this sector have not helped them significantly. This is evident, from the statistical data on employment and under-employment, poverty and privation, illiteracy and ignorance, insanitation and malnutrition etc., which are still plaguing the lower half of the population in these LICs. Even programmes of controlling population have not been successful. China has been able to achieve good results in the last two decades, using her Commune system to administer the family planning programmes.

South Asia-consisting of Pakistan, India Bangladesh, Burma, Sri Lanka, Nepal-represents the typical problems of the non-OS. Though illustrations in this paper have been drawn from India, the situation and solutions are equally relevant to other countries in Asia, Africa and Latin America, Afghanisthan, Indonesia, Philippines, Thailand, Nigeria, Somalia, Ethiopia, Tanzania, Ghana, Sudan, Sub-Saharan countries etc. as well as a few LICs in Latin-America.

Development of the non-Organised Sector

Development of the non-OS is not only economic but social as well. In all cases, the key issue is how to deliver modernisation to, and manage, projects and activities, which are being carried on in the non-OS. The instruments of production and activities in the non-OS are crude and near primitive, as inputs normally given by formal organisations and management are not available to them. In this large non-OS, millions of people are eking a subsistence level of existence. Development will have meaning only if they are lifted out of the sub-human conditions they are in Therefore, in the context of the mixed economy concept adopted by these countries, this paper attempts to find feasible means of developing the non-OS, adopting appropriate economic models in suitable ways and societal ideas from both market and planned economies.

For purposes of this paper, the following major points may be noted :

(a) Most of the poor people who do not have still access to, and who have not benefited from development inputs are in the non-OS;

(b) Most of the DCs, with mixed economy models, do not yet have satisfactory models of delivery agents to upgrade and modernise the non-OS.

(c) Most of the DCs, outside the planned economy, are still imitating many of the models tried out by the advanced countries which, unfortunately, are not always appropriate to the situation in the DCs.

(d) DCs are largely concentrating on developing the OS, for which models for development are well known ; but they are totally neglecting the non-OS,

(e) In the mixed economy models, DCs are trying to adopt certain component parts from the market and planned economies ; but the mix has not produced the desired results. In fact, they are suffering from the ills of both.

(f) Most of the DCs outside the planned economy, are using the bureaucratised Government systems and agencies to deliver modernisation; but with marginal success only. Often, the efforts have been counter-productive.

(g) Most of the DCs do not appreciate the important role of-nor do they care for the-managerial concepts as applicable to the non-OS.

(h) Though 50 per cent or more of the GNP of the DCs comes from the non-OS-including agriculture-education, R&D, resource endowments etc., to the non-OS are negligible compared to the needs.

(i) The ever increasing public administration empire is consuming bulk of the input efforts, leaving little for output.

(j) Planning and consultation have become respectable substituter for action.

Although developmental effort to deliver modernisation to the non-OS has not been satisfactory, it may be noted that the failure is not due to any lack of interest on the part of leaders, governments and UN

Systems. In fact, all of them put in a tremendous amount of effort to find solutions to the complex problems of the non-OS, using largely traditional models and channels for modernisation. The search for better methods still continues. Also, there have been success stories in every country, the latest being the 'Train ng and Visit' scheme, introduced by the World Bank to educate and train millions in the non-OS on Science and Technology, better management, etc. But, these success stories have not been replicated elsewhere.

There are also situations, where the solution is known and the models evolved experimented snccessfully in one location/country or the other. But it has not been possible to extend these concepts to all DCs or to other regions in the same countries.

Therefore, the aim of this paper is to propose and illustrate various possibilities, hoping that, in this development decade, renewed efforts could be made to disseminate and implement ideas and programmes already tried out successfully somewhere, and also to try out new ideas contained in this paper.

India-a typical mixed economy

Illustrations have been drawn from India, as she represents typical problems of development. India is a classic example of a dualistic economy with a high degree of success in certain spheres and miserable failure to upgrade the wretched living conditions of 40 per cent of her population. India has vast natural resources, talented people and reasonable infrastructure and all of which ought to have facilitated extension of modernisation to 80 per cent of her population living in rural areas. But the concepts and systems adopted by Indian Parliamentary democracy, State intervention as entrepreneur, manager and controller of economic activities, high degree centralisation, non-relevance of her education system to the needs of the people, over-investment in industry and underinvestment in utilities etc., have been a big handicap for her to help the poorer half of her population. To varying degrees, this is equally true to other LICs, irrespective of the political regimes under which they are functioning.

The organised sector in India has been able to take advantage of S&T, O&M and collective bargaining by trade unions. The non-OS has been unable to obtain (it has been denied) the benefits of any of these three major inputs. Therefore, the instruments of production are in a low state of efficiency and the output fetches very low prices only in the market-sometimes even below cost of production. The casual labour and bonded labour in the non-OS are unable to form unions for lack of trade union leadership. They are helpless, vulnerable and are exploi ed. It is understandable that the urban-based trade union leaders are not interested in the vast rural labour. In fact, even in urban areas, trade union leaders help only the organised sector labour.

Disparity between OS and non-OS

The disparity between the earnings of labour in OS and non-OS may vary anywhere from five to ten times. For instance, an unskilled worker in a company may get as much as $ 150 a month, while for the same work the casual labour in non-OS may get only $ 15. None of the perquisites, facilities, amenities and benefits-readily given now to labour in the OS-are extended to non-OS labour even on compassionate grounds. Most of them live under sub-human conditions in urban slums and suffer from malnutrition, ignorance and destitution. Though political leaders including trade union leaders, become ministers in Government in the name of vast millions, welfare of non-OS labour gets articulated only in press and platforms In practice, all segments of society exploit them. In the rural areas their plight is even worse. Government laws regarding minimum wages, amenities, security etc., for non-OS remain in books, not enforced.

It is not as if the wretched condition of the non-OS is not recognised by the leaders and bureaucracy. They do want to help the work-force in the non-OS and their families depending on them. But their main problem is one of delivering modernisation through an appropriate organisation. It is here that governments in DCs with mixed economy models have miserably failed.

Condition of non-OS

The conditions of non-OS in the relatively backward areas of some African countries, such as Ethiopia, Somalia, Nigeria, Ghana and Sub-Saharan states are worse than that of South Asia. Whatever little infrastructure has been developed in these countries has been largely in the cities and urban areas, leaving the vast countryside without any facilities or amenities. Women have to walk miles and miles to fetch a pail of water. Manual labour is still the predominant source of energy for cultivation. There is no protected water supply or public hygiene.

Some countries such as Nigeria and Ghana have sophisticated infrastructure in their capitals, while primitive working conditions prevail in the hinterland, i. e., non-OS development is lop-sided. Such inequality in physical and human terms gives rise to social tensions, which ultimately lead to dictatorial regimes over-taking democratic forms and processes.

South Asian countries come under the LIC category as per UN norms. Even here, a high degree of S&T achievements and sophisticated infrastructure have not enabled them to improve the lot of non-OS in the rural areas. There is no public hygiene and protected water supply. These two inputs alone would reduce half the diseases and high infant mortality affecting the non-OS in these countries. Strangely, huge investments are made in urban areas-10 times the average for the rural areas. Production in the non-OS-foodgrains, vegetables, edible oil seeds, nuts, fruits, milk etc., supplied by the non-OS in the rural areas-do not fetch a reasonable price in the urban markets. Thus, urban areas, with heavy concentration of money, media and organisational power, are taking away the life-blood of the vast non-OS, impoverishing the latter.

These are the main reasons why development of the non-OS has to be the concern of all development agencies, governments and intellectuals. Though there has been a great deal of articulation in analysis and postulating solutions, the problem is one of implementation, which is the function of O&M. Leaders and bureaucrats have not appreciated the role of O&M, while management specialists have been so preoccupied with improving the efficiency of the OS that they neither have the time nor the aptitude-nor perhaps the know-how-to get involved in the problems of the non-OS. Therefore, this paper appeals to all S&T and O&M personnel to reallocate their talents and time to the problem of development of the non-OS. Any amount of advancement of upper segment of DCs will not be a substitute or a source of comfort when vast millions in the non-OS remain in the present state of poverty and privation.

The present situation of economic and social conditions of as well as proposals to improve and upgrade, the non-organised sector, can be illustrated with examples from India. As mentioned earlier, these will be representative of other countries as well, particularly South Asia. In India, out of about 250 million people in the work force, about 50 million (20%) could be said to be in the organised sector; the rest 200 million (80%) workers are in the non-organised sector. The proportion of non-OS in those developing countries with per capita income below $ 500 would be roughly the same, particularly in the low income countries

One typical characteristic of non-OS in DCs is that its instruments of production are inefficient; so much so, productivity is low. Bulk of population lives under subsistence level conditions. Fruits of developments are appropriated, as it were, by the organised sector, with concentration of wealth and income in the upper segments of the OS. In fact, the disparity between the OS and non-OS is increasing every year. It appears as if there is a transfer of resources from the non-OS to the OS, not by the greedy actions of the decision makers in OS, but by the very logic of the system adopted by these countries.

India as an example

During the last three decades, the GNP of India has been going up at the rate of about four per cent and per capita income by about two per cent. However, it has been estimated that the number of people below poverty line has also been increasing every year

now around 40 per cent of population i.e., roughly 280 millions.

Such a slow growth rate is inspite of the fact that India has highly developed sophisticated sectors comparable to advanced countries-third largest scientific and technical manpower with prestigious R&D institutions, fourth largest army and railway system, tenth largest industrial population, member of the exclusive small group of countries which have made substantial progress in spaces, electronics and nuclear energy. India is producing all her requirements of consumer goods and bulk of producer machinery. It will be interesting to compare India with South Korea and China-representing planned and market economies.

India vs South Korea

India's per capita income in 1960 was about the same as that of South Korea. Compared to India. South Korea has very little of natural resources and she has to import practically all raw materials and energy. In a short span of two decades, South Korea has gone far ahead of India, and is now said to have a per capita income of $ 2,000, compared to $ 200 of India i.e., ten times. South Korea has a mixed economy, similar to that of India.

India vs China

India can also be compared with China a planned economy. India started her development process in 1950, with the First Five Year Plan. China, after the success of the revolution in 1949, also started her development in 1950. At that time, China's condition in every sphere-political, economic, social and administrative-was far worse than that of India. She had no central authority ; currency had no value; high rate of inflation ; economy was shattered by internal strife and wars with other countries; social conditions were appalling. On the other hand, India inherited a well-knit public administration and defence apparatus, a huge foreign exchange reserve, well-run educational systems, etc.

It will be interesting to note the progress of China' during the last three decades, as compared to India In the economic front, China produces two to six times India's output. For instance, China produces 6 times oil, coal and steel. On 100 million hectares of land, she raises over 300 million tonnes of food, while India is able to produce only 135 million tonnes of food in as many hectares.

In the social front, China has been able to make remarkable strides. Poverty, inequality, illiteracy, disease, sanitation, malnutrition, unemployment, corruption, inflation, violence and crime-so glaring and increasing every year in India-are no longer significant problems in China. It may be argued that China's success is due to her political system with total planning, while most of the DCs under discussion have a mixed economy. The important point to note here is that China has organised her non-OS remarkably well through her system of communes; and that is the main reason for the development of the non-OS.

DCs have various kinds of governments-Military rule, authoritarian regimes, limited democracy of full-fledged democracy as in India. In spite of these wide differences in the political front, most of the DCs have what is commonly termed as 'mixed economy'. How far such countries, particularly LICs, can adopt component parts of models of market and planned economies in appropriate ways is the central theme of this paper.

Advanced countries and OS

Advanced countries of Europe, North America, Australia, Japan etc., developed industrially under the market economy conditions, and have achieved a high per capita income and affluence. In these countries, the point of note is that activities, typically in the non-OS, have been well organised to a very high degree, comparable even to the traditional OS. In fact, the OS is as much as 80 per cent. Thus, the United States is able to produce 400 million tonnes of food-grains with five per cent of the population, while India, with 80 per cent of people in rural areas, is producing only 135 million tonnes. The productivity differential is indeed striking. This is mainly because the instruments of production of the farm sector in North

America are highly developed, while those in India are still primitive, as food production is in the non-OS which is not upgraded.

Mixed economy-ills

The idea behind DCs adopting a mixed economy models was perhaps that they would be able to borrow the more desirable and feasible parts of both i e., market and the planned economy systems. However, in practice, it has been found that, instead of a judicious assembly of the better features of both the systems, not only they do not enjoy the advantages of either, but they suffer from the ills of both.

This is inevitable to some extent, since component parts of any system derive their values and methods from that of the whole. Thus, while mixing the two, policies and values of one system are not appropriate to the other, nor do they reinforce the needs of the other system. In fact, they oppose and cancel each other. A classic case is that of public enterprises established by the Government in the DCs. Instead of permitting them to run with full autonomy as commercial enterprises, these undertakings are plauded with all the problems inherent in public administration (PA). Civil servants run public enterprises with systems, values and processes of PA. which are totally in-appropriate to business and industrial undertakings. Bureaucratisation of commercial ventures is paralysing the system. Strangely, France and Italy have given full autonomy to their public enterprises.

Government is using the PA machinery to deliver modernisation to the non-OS. Since PA is impersonal and insensitive to the dynamic and complex situations in the non-OS, PAs are unable to function for task which are essentially project oriented. Administrators trained to observe procedures, rules and regulations do not have the managerial capability to improvise and innovate in the field to meet the changing requiremets of innumerable objectives and tasks. PA believes in uniform policies and procedures, while economic and social management needs differential policies and practices to suit the variety of requirements and constraints in the non-OS situations.

Thus, on the whole, the mixed economy models have not succeeded in developing the non-OS particularly in the low income countries.

Problems of mixed economies

Developing countries with mixed economy models are also unable to effectively adopt some of the desirable and feasible features of the advanced market economies. Obviously, they cannot adopt the Commune system. But, it is possible to use some of the ideas of China ; say, educating and mobilising people for development through media, making education and training more relevant to development needs, etc. Countries such as Taiwan and South Korea were able to modernise the non-OS by a judicious deployment of inputs from public systems and private enterprises. Other countries, particularly those in South Asia, are supposed to be socialist in orientation (whatever that may mean). Their belief is that public sector, in its larger sense, is the key instrument for ushering in a socialistic pattern of society. But they have organised the public sector along the lines of public administration with all its disadvantages-rules and regulations, controls and immobile bureaucracy. A pro-public sector stand need not take an anti-private sector posture. Government and business behave as if they are adversaries. Media-owned by the private sector-portray private sector as exploiters and profiteers. The vast entrepreneurial energy of talented men are frittered away in observing Government regulations and pleasing the establishment.

DC model for non-OS

Some of the typical models and programmes tried out by the DCs in Asia with mixed economy model are : Co-operatives, governmental projects, subsidies, grants, concessional credits, agencies, developmental authorities, etc , to implement development programmes. Most of them have largely failed to deliver goods to the non-OS, as is clear from the fact that inequality has been increasing in most DCs, with the lower one-third population earning less than subsistence wages. There have been success stories here and there, such as in Haryana and Punjab in India ; It

has not been possible to replicate them in different locals or countries.

Co-operatives

The nearest organisational model to the Commune System of China is the co-operative. Thousands of co-operatives have established in South Asia for innumerable purposes-production, marketing, credit, etc. These co-operatives have largely failed because of weak professional management content. An institutional concept, ideally suited to the non-OS, is being discredited as the management component is being neglected. Instead of turning out thousands of graduates with neither knowledge of environment nor skill to any work except clerking, the education system should turn out skilled and socially aware co-operators. Cooperatives are being manned by personnel with clerical level capacity and with low pay, and that too headed by deputationist cadres from Government who have no skill or motivation for the kinds of assignments given. Further, political intervention has paralysed the system. Local politicians use them for distribution of favours in order to gain influence. The casuality is the co-operative. Here again, there are success stories to prove the point that co-operatives can function effectively.

Co-operatives-Success stories

Co-operatives can cover small areas-a cluster of villages, or this can cover a range of products-produced and marketed all over a country, or a large region. Two highly successful experiments in India, covering thousands of farmers in the non-OS, are worth studying, which can be replicated in developing countries. They relate to production and distribution of milk and fertilizers, which have been carried out in India by large-scale co-operatives. In a slightly different way, co-operatives have also been successful in raising of sugarcane and manufacture of sugar.

Dairy Corporation

The main problem of production in the non-OS is that quantities produced are small, and that in literally millions of locations. Production efficiency is low due to lack of S&T and O&M. There are no marketing channels and so farmers get an uneconomic price as well. More often, middle men control the destiny of producers.

The model tried out in the case of milk production and distribution consists of the following :—

(a) Co-operatives are formed, in which thousands of farmers become members;

(b) A Dairy Corporation supplies credit and advises these farmers' co-operatives on purchase, raising, breeding, etc., of high milk yielding varieties of buffaloes and cows;

(c) The Corporation collects milk produced, gets it processed in a few well equipped centres, where value is added through application of S&T and O&M;

(d) Milk is packed and marketed with sophisticated scientific know-how, which fetches higher prices;

(e) By-products are produced such as, cheese, milk powder, chocolates, etc., and marketed in the same manner;

(f) Benefits of higher price realized are passed on to farmers;

(g) The Corporation is run on modern management lines with highly trained personnel in S&T and O&M.

The Dairy Corporation in India embraces over a million farmers; and through an Operation Flood scheme, the idea is being extended througout the country. Each State is setting up similar Corporations and Co-operatives, and all the Co-operatives together are forming Confederation of milk Co-operatives.

The net result is that high yielding breed animals are being reared in thousands and farmers' earnings have gone up considerably. The women folk are able to look after animals, thereby, giving them side income. Farmers get some productive work in their homes during off-season, earning incremental income for a reasonable livelihood. In districts where this experi-

ment has been tried out, per capita income is three times that of other districts.

In this model, production takes place in thousands of scattered centres spread over large areas extending over a million square miles, since the level of operation is not conducive for application of S&T or O&M. But processing and marketing are centralised-adding value-which, in turn, fetches a higher price. Quality is also improved and in the process farmers get modernised in all aspects of dairying.

Fertilizer Co-operative

The second illustration, which is of the opposite type, is where fertilizer is produced centrally by a Farmers' Co-operative. But distribution is decentralised to millions of farmers. Since farmers participate in production, by being members of the Co-operatives, they directly take interest in the use of fertilizers and all adjunct modernisation associated with fertilizer input. Here, production is centralised. In the process of distribution to thousands of farmers-members as well as non-members-the Co-operative is able to educate and train farmers on modern S&T and O&M. This experiment has also increased agricultural production and has upgraded the outlook of farmers.

Similar co-operatives can be introduced for all agricultural products-vegetables, food products, edible oil seeds, cotton, slaughter by-products, animal rearing, DAP implements and vehicles, biogas plants, etc. The key point to be noted is that experiments have succeeded only where management component is given the highest of importance , and training and development are carried out intensively to increase professional management content and introduction of high S&T, wherever necessary. Thus, benefits of S&T and O&M become available, retaining the people in their own locations and upgrading them. These are clear examples of how the non-OS can be upgraded through Co-operatives. With the difference that Co-operatives should be professionally managed. Millions of co-operatives in developing countries are weak because the essential management component is missing. The same model has been tried out in Philippines for handicrafts and cottage industry products.

Non-OS in Advanced Countries

Modernisation of non-OS in advanced countries was facilitated by a combination of factors. Above all, the business and industry sector took active interest in the modernisation process-partly out of self-interest to increase sales of their products and services to the non-OS in rural as well as urban areas and partly out of social responsibility. Thus, companies engaged in the manufacture and marketing of fertilizers, seeds, pumps, tractors and agricultural machinery, pesticides, etc., created awareness amongst farmers about the economic advantages of using S&T and modern equipments and management concepts. They also established demonstration plots and extension centres for convincing and training farmers. In certain cases, they also arranged credit and insurance transport and marketing, etc., in order to ensure that the inputs are optimally deployed and output sold at good prices. A certain amount of managerial and maintenance know-how was also transferred to the customers.

These commercially operating companies could afford to give these services free, as adjunct to their products, since farms were large which could raise enough income to create a felt demand. The good profit margin in sales enabled the companies to afford the cost of technical and other services rendered as a free package, as part of pre and after sales service. Since there was no pressure on land or land cellings, farms were large enough (of critical size) facilitating application of modern management concepts and science and technology.

Non-OS in DCs

This is not the situation in the non-OS in DCs, because land is hopelessly fragmented into millions of uneconomic tiny plots, where helpless farmers scratch a livelihood. India has 600 million small holdings of less than 4 hectares. These farms, working at subsistence level, do not create a felt demand nor enough profit margin for companies to afford free technical

services for modernisation of the farm system. 90 per cent of ploughs and other agricultural implements in South Asia and parts of Africa are of crude designs with low productivity. Experiments have shown that better designs would increase production and reduce burden on work animals-the main source of energy for cultivation.

Even where improved designs are available, most farmers do not go far the same due to high cost. Where-ever modern implements have been used, such as in Punjab and Haryana in India-along with other inputs-productivity has been as high as in China.

Also, marketing is nil or extremely weak. Due to this factor, farmers do not get a fair return for their products. In many parts of South Asia, growers of vegetables and fruits, as there is no transport, cold storage or marketing. Even in the case of cattle-200 million in India alone-owners get only a small portion of the value realized in the market (particularly animals sent for slaughter). Food grains have to be subsidized by Government.

Land Grant Colleges

The second facilitating agent was the Land Grant Colleges in the US, which provided technical know-how and trained personnel for modern farming. LICs do not have facilities comparable to services rendered by Land Grant Colleges. Most DCs are going on with general curricula and programmes. Knowledge and skill acquired in those Colleges do not have much of relevance to the vast non-OS. Graduates do not take to farming. Non-OS has no access to the expertise in these Colleges, as they are located far away. Colossal losses are incurred by farmers since veterinary services are totally inadequate. Milch and draught animals are important instruments of production of farmers : their maintenance can be assured only through services to established by Government.

Extension

The third facilitating factor was the Extension agent, who brought farmers, business houses and colleges together. The extension Officers in India, working under the Government, as a cadre, have neither skill nor motivation comparable to Extension workers in the US. Also, number of extension and development officers is inadequate.

Company-Farmer partnership

Companies, which followed the US model, did succeed in India to a great extent. A company, engaged in food processing and marketing, supplied technological know-how, seeds and credit to farmers, who owned land and provided labour. Transport and marketing were also undertaken by the company. Hundreds of acres were brought under this scheme to produce peas. Productivity index went up three times increasing earnings of farmers and making available canned peas to urban markets. The same model has been adopted by tobacco companies, which provide all inputs to farmers growing tobacco, the farmers owning land and providing labour only. Output was purchased by the company at pre-determined prices.

The idea is not at all new. It has to be extended to all agricultural crops. Companies should go into partnership with them - as backward or forward linkage-thereby assuring themselves of abundant raw meterials or vast markets for their agro-based products.

China's Communes

We may also note how China was able to modernise her non-OS, applying all modern principles of organisation and management through the system of Communes. Non-OS in China is organised and managed by 53,000 Communes, under which function about 4,00, 000 Brigades which, in turn, supervise the work of about five million teams.

It is not realised in DCs that Communes are in every sense business organisations. The professional management content is high. Antipathy to communism has blinded DCs to study and adopt some of the interesting features. Ownership of land is considered sacred ; but ever retaining this system, managerial services rendered by Communes can be provided by suitable organisations,

Thus, 600–700 million people in the non-OS are covered by these Communes - each Commune responsible for managing all the affairs of 12-20 thousand people, Commune manages all economic and social activities-production and marketing of goods and services, credit, transport and communication, irrigation and power, education, and health services, culture and entertainment, etc. Projects beyond Commune's capability. i.e , which have inter-Commune linkage, are managed by higher level organisations. Depending on the size of project or operations, Central Government or Provincial Government or equivalant of Districts of India, create and manage projects or institutions. Members of Communes are not formal employees of Communes ; but a kind of informal arrangement entitles them to typical benefits of formal employment. Thus, the Commune is able to develop ideas and trained manpower to cater to all requirements of people living in areas controlled by Communes. The tremendous capability of Organisation and Management for implementing programmes and projects thus become available to the non-OS organised by communes.

Even in LICs, companies are able to introduce programmes and implement projects effectively-such as for sanitation, family planning, health, education, etc.-amongst their own employees. They are able to do so because of inherent competence of formal organisations to run efficiently, with methods to reward and punish, plan and implement, measure and control etc. Therefore, it is not as if the managerial capability of Chinese Commune system or Soviet Collective is new to the world of management. The difference is only that they have extended O&M principles to the vast non-OS. This is unique to the planned economics. DCs are yet to recognise the O&M component of the Communes.

Plantations in DCs

Plantation sector is a clear example of managerial performance through formal organisations to bring modernisation and improve productivity in an activity which would have been otherwise unorganised. The plantation sector in South Asia produces tea, coffee, rubber, cardamom and such other cash crops. Plantations are of viable size and are managed like any other business enterprise with all the paraphernalia of organisation, S&T, planning, information systems, control devices, etc. India, Bangladesh and Sri Lanka not only produce enough tea and coffee for the requirements of their large population, but are also able to export, earning precious foreign exchanges. Normally, these crops would also have been in non-OS, but for historical reasons where foreign companies started plantations. Actually, these plantations are run exactly like farms in North America.

The interesting point to note is that cash crop plantation is the only sub-sector of agricultural sector, where modern organisation and management principles have been applied. This has been possible because there is no land ceiling and plantation holding size is large enough for applying management. This model can be easily extended to many other sub-sectors and crops, such as cashewnut, coconut, sugarcane, cotton, edible oil seeds, etc. India is importing all these commodities, since production is far below. These subsectors are in non-OS, with little of modernisation. Price of coconut has gone up by fifty times in twenty years. Therefore, it is proposed that Governments of DCs should permit extension of the plantation sector to many crops in areas where it is feasible to introduce. Even where small private ownership cannot be abolished, there are other ways of organisation as was done by tobacco and food processing industries.

Handicrafts and Cottage Industries

In DCs, millions are employed in handicrafts, handlooms and tiny, mini and cottage industries- making a variety of products sold to urban requirements. This is an important and large scale activity in the non-OS, suffering due to poor production and marketing.

Quality, finish, durability, etc. are below acceptable levels, largely due to lack of right raw-materials, standardisation, technology and quality control. Products do not fetch a good price, as marketing and distribution are week. It is almost distress sale or, middle men take away bulk of the sales revenue.

Handicrafts

A model successfully tried out in Philippines, also being adopted in some DCs with various modifications, can be replicated for all such products. The model consists of delivering goods raw-materials to artisans and cottage units located in thousands of villages ; bringing their output in a semi-finished form to well equipped procsssing centres; adding value by way of S&T input and finish; and finally packaging and marketing same, as per modern marketing concepts, through sophisticated outlets in urban areas. It has been observed that finish and durability are improved considerably by this method of centralised processing which, together with marketing, fetches three to four times the earlier price. Earnings of manufacturers in non-OS can be considerably improved and customers satisfied.

Though Government sponsored Development Corporations for agricultural implements, handlooms, handicrafts, village industry products, etc., have been established in some countries (hundreds in India), their performance is not satisfactory largely due to lack of managerial content. Modelled and structured as they are on public administration concepts and values, they function as typical Government Departments, with low efficiency and morals and in addition, cynical and negative attitudes. By increasing their professional management contant and making them autonomous, it should be possible to utilise these Corporations effectively. Such Corporations are to be started for all products made in the non-OS.

Role of Business

A major breakthrough in developing the non-OS can be achieved with active help of business-industry sector, both private and public. Because of their management capability and organisational morale, companies can be made to deliver modernisation through their technical personnel and sales outlets. A classic example, as illustration, is that of a private large scale type company in India, which pioneered modernisation of the bullock-cart. Their prime interest, of course, was sale of tyres for animal drawn vehicles in rural and urban areas. But they soon discovered that if they could modernise the 15 million bullock-carts in India, they would be able to sell million pairs of tyres. Therefore, the company designed improved versions of bullock-carts and gave technical know-how and all assistance to manufacturers throughout the country, which enabled them to produce improved carts. The company and a million cart operators benefited, road damage was reduced, and animal's effort reduced, thereby increasing its efficiency. Here is an outstanding example of enlightened self-interest being integrated with social responsibility to promote non-OS.

The same concept can be extended to hundreds of products, now being manufactured in rural areas. Companies marketing tea, coffee, kerosene, matches, cloth, cigarettes, vegatable oil, soaps and detergents, agricultural implements, plastic goods, pharmaceutical products, household wares, etc., have millions of outlets and thousands of technical and sales personnel. They can take responsibility for some area of modernisation by getting involved in development, adjunct to their products and services. This would enable them to increase sales and also derive public esteem, which itself will be a sales promotion device. In the process, without any additional cost, they could function as modernising agents. This is not a new concept. Companies in advanced countries did the same ; but those in DCs have not taken this approach seriously.

Banking and insurance companies can play a massive and effective role in modernisation process. In fact, development banking is already assisting medium and large scale industries by way of technical assistance, project appraisal and monitoring. India has established a rural banking system with thousands of branches spread all over the country. Since credit is an essential component for development projects, banks are ideal instruments for modernising the non-OS. India has a vast network of rural banks 20,000. These rural branches can function as the nuclei for education and development. By providing library and reading room facilities, by exhibiting documentaries on development, etc., rural branches will get public esteem

which can be utilised for mobilising people for development.

DCs have problems of introducing various types of contraceptives to reduce population growth rate, campaigns to remove superstition and other ills of society, programmes for improving sanitation, project assistance to introduce biogas plants and social forestry, etc. Government departments engaged in promotion and implementation of such programmes have not been successful due to lack of managerial approach and capability. Government is now using autonomous development agencies to launch and implement such campaigns ; but success has been marginal. Here again, business and industrial establishments can function as a vahicle for such modernisation programmes in non-OS, in collaboration with Government departments and agencies.

Recently, one tea marketing company undertook, on behalf of the Government, distribution of condoms in India. They were able to achieve far more satisfactory results, when compared to the earlier efforts of Government agencies. The sales force and thousands of outlets-all planned and managed by the company-could handle this problem with remarkable success because of the inherent strength of the organisations. The same idea could be extended for programmes with economic and social objectives. The model is one of utilising the organised sector to deliver modernisation to the non-OS through formal organisations in public and private sectors.

Of course, Post and Telephone offices, railway stations, public transport depots, etc., could also be instruments for such modernisation programmes. Unfortunately these institutions have governmental kinds of organisations and attitudes with no motivation for social objectives and commitment to serve poeple.

Education and Training

Education and training systems in the DCs are far removed from reality. They seem to cater only to upper segments of their own countries, besides providing personnel for requirements and conditions for advanced countries. Therefore, we have the pathetic case of scientists, engineers, doctors and other trained technical personnel in various fields migrating to advanced countries, or getting involved in operations within the DCs, which do not require their high technical skills. Within countries, they are either under-utilised or mis-utilised. At the same time, millions in non-OS do not get benefits from the personnel trained in the existing system, which is heavily subsidised from public funds, bulk of which is collected from masses through indirect texes which affect poor as well. It seems that there is a transfer of resources from the lower one-third to the upper one-third by this process of subsidised education; and hence the young in non-OS remain illiterate or ignorant.

Engineers ireelevant to non-OS

For example, India produces the third largest scientific and techincal personnel in the world. However, their expertise and that of numerous R&D institutions do not become available to modernise the hand-cart, animal driven vehicles and implements, tools and machinary used by cottage industries, and so on. Talents of most of scientists are wasted in clerical or supervisory activity. Most engineers are doing supervisory or non-technical work-a huge waste indeed.

Doctors not available to non-OS

Similarly, thousands of medical personnel, trained at tremendous public cost, are concentrated in urban areas, leaving 80 per cent of rural population in the hands of quacks. No modern medical facilities are available for those in non-OS in rural areas.

Most countries ore spending enormous amount on money on the curative aspects rather than on preventive aspects. It has been repeatedly stressed that public health can be improved considerably if only protected water supply, public lavatories and bio-gas plants are put up in every village. It is well known that China has 10 million bio-gas plants in operation, with programmes for 10 more million during this decade. With all her expertise, India has not been able to put up hundred thousand plants so far. Programmes of other countries are still minimal.

So the concept of health services is lopsided. Though the anomalies are well known and remedies have been recommended in successive public Health Commissions in DCs, there has been no attempt in implementing the obviously right policies which only would benefit those in non-OS.

Law and non-OS

DCs have intricate law and judicial systems; but they are not available to the needs of 90 per cent of the population. The whole system is so complex, time-consuming and costly that it is beyond the reach of most poor and needy people in the non-OS.

Trade Unions and non-OS

Even trade union leaders concentrate on the problems of workers in the organised sector-usually 10% of the work in any DC-and that too in the urban areas, 80% of the work population in DCs does not get benefits of trade union activity or the minimum wage laws enacted by Government.

Irrelevance of entities

This phenomenon of irrelevance of entities, ideas, institutions, organisations, etc., to the needs of the non OS in the DCs is well known. But in the absence of models for delivering modernisation to the vast non-OS, these entitics continue in the same path. This is the main reason why all public systems and private undertakings in the formal sector should join hands with the Government in delivering modernisation to the vast non-OS.

Animal System

A classic example of negligance of a vital resource, due to ignorance and apathy, is the case of animal systems in DCs. Two billion people in the third world depend on draught animal power (DAP) for cultivation and small scale transportation. Animals provide power for cultivating 50% of area ; and haul 25 million carts. Market value of draught animals in DCs is in the region of $ 100 billion, and replacement by mechanised powered systems may cost anywhere from 200 to 400 billion dollars. 400 million draught animals make available 150 million H.P. in as many locations in DCs. Mechanisation can be encouraged wherever technically feasible and economically viable. But DAP will remain as an appropriate energy source for next three decades in many DCs. The DAP system is under-utilised and in-efficient. By improving efficiency, it would be possible to get 2-3 times the output and earnings out of the system. DAP is in the non-OS, which is not given any attention by the DCs.

India alone has 100 million draught animals, providing two-thirds of rural energy for transportation and cultivating two-thirds area under crops. The market value of cattle and buffaloes in India is $ 30 billion-almost the same as that of organised industry. About 20 million people are involved in the DAP system and 200 million depend on animals for livellhood as a means for production. Inspite of the tremendous contribution made by animal system to the country, attention given to this vital resource-so critical to millions in non-OS-is very little, compared to industry and other infrastructure facilities. It is not appreciated that half the population of South Asia depends on animals for part of their livelihood. The animal system has to be upgraded by way of : improved design of carts and implements : improved breeds of animals ; their health care and feed ; increased utilisation of animals ; better marketing of animals and their products whilst alive and after death, etc.

Loss to the economy is staggering. Work animals are used only for 100 days a year in rural areas. By using them during off-season on improved carts in urban areas, utilisation would go up. 25% of draught effort is wasted due to poor design of implements and vehicles. By improving implements and carts, animals output can be trebled. Due to bad harnessing device, animal's neck is injured, rendering them useless for work. This can be rectfiied and animal's working life span increased. Five million buffalo calves are killed off at birth, as there is no organisation to rear them until working age. By adopting an improved harnessing device, they can be put to work at the age of one. Co-operatives can rear them.

By massive planting of nitrogen fixing tress, animals can be fed well and soil fertility improved. By improving health services, animals health and production ability-milk and draught-can be improved. Donkeys can be raised (China has eight million) to draw carts and to carry loads, which will be a boon to Africa.

Slaughter is primitive, unhygenic and westeful. Millions of dollars can be saved if slaughter is modernised and by-products recovered and processed. Animals undergo needless agony with no benefit to man or animal.

All aspects of animal systems-which are in the non-OS-need urgent attention. A combination of business, banks co-operatives should review their present apathy so that the animal system can be given S&T and O&M.

The same is true of hand carts and all human-powered devices. One-fourth of energy inputs in non-OS of LICs is muscle-power of man.

Man-Animal-Nature relationship

In addition, the concept of man-animal-nature symbiotic relationship has to be recognised. The animal husbandry system has to be integrated with agricultural production, milk and meat systems, social forestry, biogas plants, rural transportation, environment, employment programmes, etc. Such an integration and co-ordination at various levels would require an organisational and managerial model which is totally absent today. It is strange, though true, that the Food and Agriculture Organisation and other UN systems, engaged in development programmes, do not have a programme for upgrading the DAP system though they contribute energy for cultivation of 50% of cropped area in the third world. This is a classic example of lopsided priorities for development. This is mainly because development planners in the third world have not yet found good models and competent organisations for upgrading and modernising non-OS.

Media and Non-Os

Development of the non-OS would require mobilisation of people and modernising their outlook and skills. Media and extension work are critical inputs required for such programmes. Nevertheless, the media in the DCs are mostly preoccupied with urban affairs and that too with heavy slant on entertainment routine or sensational news. Education and training components for development are not given necessary importance.

The print media is by and large preoccupied with political squabbles and gossip, violence and sex, social scandals of elites, etc. A study showed that hardly two per cent of space is given to development news in regional papers. The celluloid media is largely preoccupied with sex and violence as the essential ingredietns for box office success. Even TV programmes have very little of modernisation and mobilisation components.

Communist countries have used media very effectively in modernising non-OS. In DCs, lip service is given to poor people by leaders of media ; but, in practice, they are unable to do anything for non-OS because of the need for increasing circulation, box office and viewing popular ity of proportion of time for development has to be increased in order that people get educated and can participate in modernisation processes.

Political process and non-OS

Finally, political process is the key to development. Unfortunately, politics has degenerated to politicking in democracies, while military regimes have taken over most of the DCs with very little of public participation in development programmes. All the ills of partisan politics are blocking development process ; and the non-OS has suffered much more than any other sector. Since no dramatic results can be produced in non-OS politicians need the common man more for purpose of rhetoric end votes than for tangible results.

Conclusion

Ideas given above are only illustrative and not comprehensive. They are more conceptual than

empirically proved with statistics for substantating the various points postulated. This has been deliberately done, since qualification often misses fundamental issues and concepts. These views are not new either most of these concepts and models are known to scholars and leaders. Path finding, creatively and decision making are only part of the process of modernisation.

Improvisation, innovation and implementation are the crucial elements in modernisation process. Most of the DCs are preoccupied and are getting paralysed by the planning and creativity part. Non-OS is the ultimate sufferer due to lack of implementation. Management function has very little of credibility or public acceptance in DCs. Concepts of management are confined to those applicable to formal organisations. The fact that the same formal organisations can deliver modernisation to the non-OS through special programmes and strategies has not been appreciated.

Therefore, management professional have to move away from their obsession with improving the productivity of formal organisations in traditional sectors. They should move towards modernisation non-OS with the help of their major instrument, namely formal organisations. Co-operatives have to be strengthened managerially. Management education and training in DCs has to concentrate on development management, particularly geared to service and modernisation of the non-OS. Similarly, S&T should spend part of its effort on appropriate technology. Thus, S&T and O&M can still develop the non-OS which ought to be the main concern for the 1980s.

ERRATA

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Forest Area in India—Statewise

Owing to a printer's error the figures quoted under the last column of table, **Percentage Area**, were incorrect in Rural Technology Journal's March 1989 issue. The correct figures are as follows :

State/Union Territorics	% age change
Andhra Pradesh	—17.6
Assam	— 6.0
Bihar	—11.2
Gujarat	—46.5
Haryana	—47.0
Himachal Pradesh	—39.4
Jammu & Kashmir	—35.1
Karnataka	—13.0
Kerala	—14.3
Madhya Pradesh	—16.9
Maharashtra	—25.4
Manipur	—10.1
Meghalaya	—13.4
Nagaland	— 0.7
Tripura	—18.8
Orissa	—18.5
Punjab & Chandigarh	—55.4
Rajasthan	—47.1
Tamil Nadu	—20.9
Uttar Pradesh	—18.7
West Bengal	—22.3
Sikkim	+63.7
Arunachal Pradesh	+13.0
Delhi	—44.4
Goa, Daman & Diu	— 6 7
Mizoram	—13.6
Total	—16.1

Development of Suitable and Economical Housing System for Dairy Animals

*P. K. Srivastava and P. C. Bargale**

Housing facilities to animals have been ignored by Indian dairy man and farmers for want of a scientifically designed low-cost animal shelter. A technically viable and economically feasible animal shed was therefore designed and developed using locally available construction materials. The performance of this shed was evaluated in terms of maximum and minimum temperatures and Relative Humidities (RH) during the peak seasons of hot/cold stress and precipitation. The results were compared with ambient and that of a similar shed with ACC sheet roof (in place of country tiles). The paper presents a brief discussion on the design aspects, materials of construction, economics and the performance of two sheds.

Introduction

Housing of animals is one of the important requirements for better production. In India, scientific housing of animals has been practically ignored in the past except in few organised Government farms where Western type of dairy cattle housing are followed. These system of housing are mainly designed to suit the requirements of European countries and their temperate climate whereas the nature of animal house and mode of its use should be determined by the local climatic, socio economic factors and traditions and therefore the western designs prove unsuitable for most of regions in India where the protection to animals is required from both excessive cold/hot weather and the precipitation. Moreover, these adopted designs involve very high cost and materials which are generally not available in Indian villages.

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Most of the studies conducted in India (Singh et al 1977, Sastri 1980, and Sastri 1986) on animal shelter are related to the evaluation of traditional housing system and their effect on production and productivity of dairy animals. Not much attention has been paid towards design and development of a scientifically based economical animal structure which is within the reach of an average Indian farmer/dairyman. A study was, therefore undertaken to develop an economically feasible and technically viable animal housing using locally available low-cost materials of construction. The house developed was evaluated for its performance and the results are presented in this paper.

Materials and Methods

For study of present practices of animal housing prevalent in Bhopal district a survey was carried out (Srivastava et al 1985) in nearby villages namely Karond, Golekhedi, Nabi Bagh and Arvalia. The proforma prepared for this purpose included detailed

information on type of housing, its orientation, dimensions, materials of construction, management practices for feeding/watering and waste disposal, manpower requirement, production and productivity, mortality of animals, and problems faced by the dairyman. A bull mother farm situated in Bhopal and designed on European pattern and managed by the M. P. State Dairy Development Corporation, Bhopal was also surveyed. The data generated was analysed to identify the locally available materials, their suitability, cost etc. and an animal house based on survey results, recommendations of Indian Standards (IS : 11799-1986) and discussions with dairyman, was designed and developed for an average farmer with 3 milch animals, 3 calves and a pair of bullocks.

The animal shed was evaluated for its suitability by observing the temperature and relative humidity (RH) during the peak months of summer (May-June), Winter (December-January) and precipitation (July-August). The data was recorded at 8.30 A.M. and 2.30 P. M. daily. The shed was divided in two parts through a wall and the roof of one was provided with A. C. C. sheets whereas the roof of other part was made by country tiles with agricultural waste in base. This was done with a view to compare two material for making roofs and to study their effect on environment inside the sheds. The data on the maximum and minimum temperature and the relative humidities (BH) were analysed and compared. The actual cost of material and the construction of shed was recorded.

Material of Construction

Based on survey results and recommendations of Indian Standards following materials were identified to be used in the animal shed developed :

Floor	:	Local bricks (preferably little overburnt) using mud and murram
Walls	:	Local brick with mortar/lime
Trusses	:	Wooden balli (from local wood)
Roof	:	Country tile supported by agricultural waste on one half of the shed and ACC sheet on another half
Manger and water trough	:	Local bricks and cement mortar
Doors	:	Angle iron frame with G. I. sheet or local wood
Drains	:	Bricks with lime mortar
Ventilation	:	Honey-comb structure with brick masonary and simple fixing of wire mesh all along the wall near the roof.
Mortar	:	Clay/lime mortar

Design and Development

Following considerations were made for design and development of the animal shed :—

Topography and meteriological data : The topography and meteriological conditions have a direct impact on environment hence these were studied. Bhopal is situated at 23°20' north latitude and 77°25' east longitude at an altitude of 495 m above mean sea level. The climate of Bhopal is moderate and temperature ranges between 10°C in the month of January to 41°C in the month of May. The mean annual rainfall of the region is 1210 mm which is mostly concentrated in the months of July, August and September.

Site : The shed was located on dry, elevated and well drained area with provision for future expansion. There were already some suitably placed trees to serve as wind breaks and to provide shade. Although the selected site was away from Institute road but easily accessible throughout the year. Facilities for adequate water supply were existing.

Orientation : Keeping in view the availability of sunshine at Bhopal, which is located 23°20' north, the long axis of the shed was oriented north south (Fig. 1). The side walls faced north and south, one of the walls of existing threshing shed of Institute was utilized.

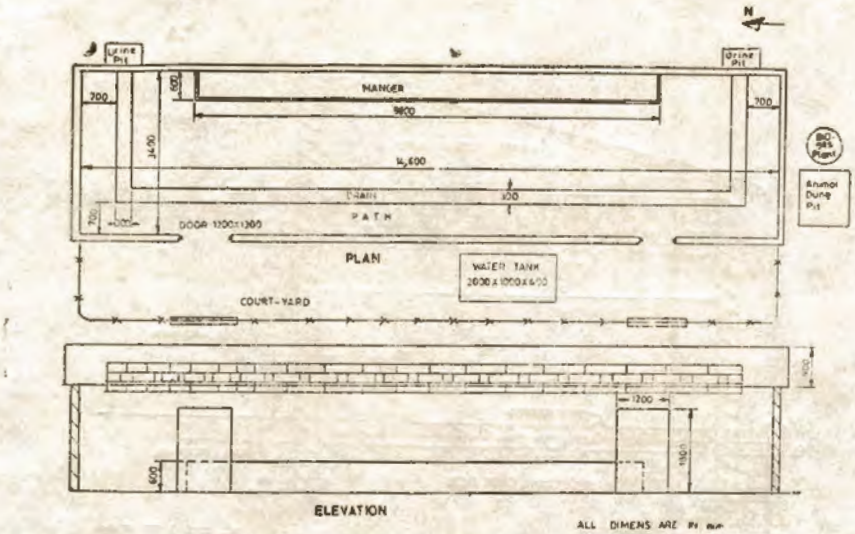

FIG. 1 DETAILS OF DEVELOPED LOW COST ANIMAL SHED

Standings : The standings were constructed in such a way that the animals faced the east wall as shown in Fig. 2. Manger was made adjacent to the east wall. A space of 6.2 m^2 per animal has been provided (total length of shed 14.6 m, width 3.4 m).

The subbase of the flooring was made of rubbles and brick aggregates which were hand-packed, watered and well rammed. A layer of 10 cm of lime concentrate was spread over the sub-base, well rammed and was allowed to set for 7 days. The top flooring was made of bricks. Good quality bricks were laid on about 18 mm thick lime mortar bed and each brick was properly laid on edge and set by gentle tapping with a wooden mallet. Its inside faces were buttered with mortar before the next brick was laid and pressed against it. On completion of portion of flooring the vertical joints were fully filled from the top with the mortar.

Manger : The manger was made of continuous type and its wall were made of cement mortar. The flooring of manger was made smooth and all the corners of the manger were rounded-off and finished smooth. The height and the width of fore curb was 0 60 m, the inner width of manger as 0.50 m and minimum depth was kept as 0.40 m. The back of manger was kept 60 cm above the floor.

Roof : As one existing wall was utilized, the roof was sloped away from the wall. The roofing material was asbestos cement sheets and earthen country tiles. The caves of the roof were projected out 50 cm away from the wall. The roof was supported by wooden trusses. The wooden caves were spaced 0.80 m apart.

Side Walls : The wall was made of bricks laid in yellow clay mortar. It was plastered with clay and dung and its width was kept 0.20 m. It was made solid upto 1.6 m height and remaining 0.50 m was constructed as honey-comb structure for ventilation in the shed. The height of rearwall was kept 3 m.

Drains : The drains were laid in the shed all along the sides and back of standing. The drain was made of brick in mud mortar and was of 'U' shaps with a depth of 7.5 cm at the bottom. The slope of the drain was 18 and its width was 30 cm. The drain was 30 cm. The drain was led to a common urine pit.

Water Supply : Provision for adequate supply of potable water was made. For this purpose a trough of reinforced cement concrete was provided with a capacity of 800 litre.

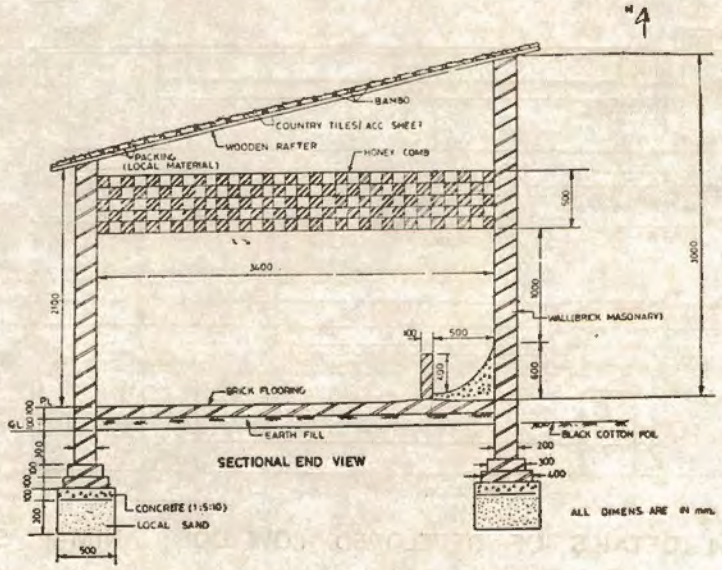

FIG. 2 : CROSS SECTIONAL VIEW OF DEVELOPED LOW COST ANIMAL SHED

Lighting : Provision of lighting was made.

Waste handling system : The animal waste would be manually collected and utilized for feeding a biogas plant.

Doors and Windows : As honey comb pattern of wall of 50 cm has been planned therefore no window was provided. The doors of size 1.2 × 1.8 m each made of MS sheet were provided.

The overall dimensions of the developed low cost animal house are given below :

Capacity	—	8 animals
Orientation	—	North-South (length of shed)
Length	—	14.6 m
Width	—	3.4 m
Height	—	2.1 m in front
	—	3 m in back
Roof slope	—	25%
Manger	—	9.8 m × 0.6 m × 0.3 to 0.6 m (Fig. 1)
Total area	—	49.64 m²
Area/animal	—	6.20 m², length/animal 1.80 m distance between 2 animals=1.40 m
Drain width	—	0.30 m
Drain depth	—	7.5 cm, in U shape
Tying arrangement	—	Simple with rings and chain

Cost of materials for shed :

(i)	With country-tile roof		Rs. 12060.00
(ii)	With ACC sheet roof	—	Rs. 13500.00
	Cost of labour	—	Rs. 4985.00
	Total cost for shed with country tile roof	—	Rs. 17045.00
	Total cost for shed with ACC sheet roof	—	Rs. 18485.00

Results and Discussion

Fig. 3 presents the observation data regarding minimum and maximum temperatures and relative humidities in animal sheds with country tile roof and animal shed with ACC sheet. The Figure also presents

the maximum and minimum temperatures and RH during peak of summer (May-June), rainy season (July-August) and Winter (December-January). It is observed that in summer the temperatures were lower in both the sheds compared to ambient. The drop in temperature was more in sheds compared to ambient. The drop in temperature was more in shed with country tile roof compared to the shed with ACC sheet cover. The maximum drop of 3.5°C was observed in country tile shed in the month of May whereas it was maximum 2.3°C in shed with ACC sheet cover. The maximum drop of 3.5°C in shed with ACC sheet roof. On an average a drop of 2.6°C and 2.1°C was observed during summer in the two sheds with country tile and ACC sheet roof respectively. The comparision of minimum temperatures during winter indicates that the temperatures were higher in both the sheds compared to ambient temperatures. On an average the temperature was higher by 2.1°C and by 3°C respectively in country-tile and ACC sheet shed during the month of January. The difference in drop and rise of temperatures during summer and winter in two sheds is mainly because of two different roofs. There was loss of heat through air from partially porous roof having country tiles while this loss was little lower in case of ACC sheets. The loss of heat was lower during winter also and thus it maintained a little higher temperature in ACC sheet shed.

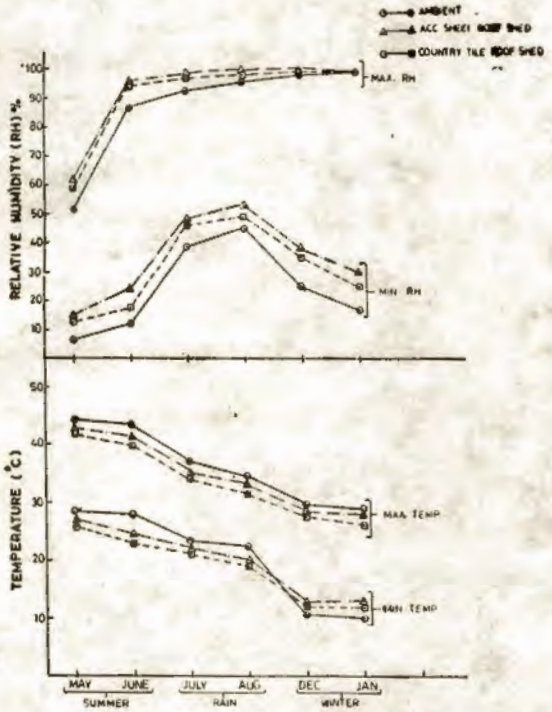

FIG. 3 VARITIONS IN MAXIMUM AND MINIMUM TEMPERATURES AND RELATIVE HUMIDITIES OF TWO SHEDS WITH COUNTRY TILE-ROOF AND ACC SHEETS ROOF CORRESPONDING TO AMBIENT DURING PEAK SUMMER, WINTER AND RAINY SEASONS.

The RH was observed on higher side in both the sheds compared to the RH of ambient. The difference was observed more in ACC sheet room. The maximum RH was high upto 7% compared to ambient in month of June while the minimum RH was higher by maximum of 13% in the month of January. The average rise over ambient RH was 4.5 and 8% respectively in country-tile and ACC sheet roof. These variations were also mainly due to movement of air through roof which allowed the outside air to be circulated through the shed. Thus the shed provided with country-tile roof appears to be more suitable for the regions where the animals are subjected to stress due to higher temperatures. Moreover the initial cost of material of construction is also little lower compared to the shed with ACC sheet roof. The shed may be provided with ACC sheet roof where the stress to animals is due to higher RH and a little higher initial cost could be afforded. On the whole both the shed serve the purpose of animal housing effectively.

Conclusions

The performance evaluation of animal using locally available low-cost materials of construction showed that the shed with country tile roof was more suitable compared to the similar shed with ACC sheet roof particularly for regions where thermal stress is more predominent. From the initial capital investment point of view also the shed made of country tile roof is found to be economical.

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Effect of Biogas Spent Slurry Applied in Combination with Chemical Fertiliser on Yield and Yield Components of Sorghum

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The effectiveness of biogas spent slurry in substituting chemical nitrogenous fertiliser was studied in sorghum crop under rainfed conditions. It was observed that the slurry could substitute nitrogenous fertiliser to the extent of 50% of the recommended dose without affecting the yield and yield components.

Introduction

The advent of green revolution has enabled us to boost our food grain production from a mere 52 million tonnes in 1951 to 151 million tonnes in 1987 (Joshi, 1988). And this has been achieved by resorting, predominantly, to an energy intensive pathway of production and through the consumption of prodigious quantities of chemical fertilisers. The concept of Integrated Plant Nutrient System has been introduced as a result of increased fertiliser prices as well as the increased deterioration of physico-bio-chemical properties of our soils associated with long term use of synthetic fertilisers. The system envisages maintenance and upgradation of soil fertility for sustaining increased crop productivity by optimising all possible organic and inorganic sources in an integrated approach. Biogas spent slurry is one such important organic source.

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Biogas spent slurry is the anaerobically stabilised material rich in plant nutrients as compared to the aerobically digested farm yard manure. The lone application of spent slurry does not meet the requirement of nutrient for the entire crop at critical stages of growth due to slow release of nutrients. However, its use in combination with chemical fertiliser can increase the availability of nutrients, especially nitrogen to crops. There are two approaches to use spent slurry along with chemical fertiliser (a) substitution or partial replacement of chemical fertiliser by the spent slurry, and (b) supplementing the spent slurry over and above the recommended dose of chemical fertilisers.

Any substitution of chemical nitrogenous fertiliser by the spent slurry could reduce the input cost and also save the precious foreign exchange involved in importing petro-chemical raw material. This study was taken up to see to what extent the biogas spent slurry could substitute chemical nitrogenous fertiliser in sorghum crop under rainfed conditions.

Material and Methods

The field was prepared by ploughing followed by secondary tillage. Plots of size 5M×5M were laid

out following the Randomised Block Design. There were 10 treatments as below, and were replicated thrice.

Treatment No.	Treatment Combination
1.	Control (no N was added)
2.	50% N as Slurry
3.	100% N as Slurry
4.	50% N as Slurry + 50% N as FYM
5.	50% N as FYM
6.	100% N as FYM
7.	50% N as Slurry + 50% N as urea
8.	50 % N as FYM + 50% N as urea
9.	50% N as urea
10.	100% N as urea

The experiment was conducted in Kharif, 1988, in experimental plot of University of Agricultural Sciences, Dharwad. The calculated quantities of the spent slurry were applied. N. P. K. and trace element were analysed in the spent slurry (Jain et al, 1989), and are given in table 1. The recommended N : P : K (per acre) for sorghum of 40 : 30 : 15 was given. Only N nutrient was supplied in two doses, as basal dose, and top dressing after 30 days of sowing. CSH-5 variety was sown in the experiment, keeping a spacing of 0.357 M × 0.1 M. Intercultural operations and plant protection measures were undertaken. During the crop growth, plant height of five plants in each plot (selected randomly) were measured and tabulated. When the grains were fully matured, the crop was harvested, threshed and weighed separately. Fodder weight, earhead weight, grain weight and 1000 grain weight were recorded. N content in fodder samples was also estimated by following Kjeldahl's method (Jackson, 1962).

Results and Discussion

Table No. 2 depicts the data of plant height of Sorghum at different periods as influenced by the slurry application. It is clear from the table that the plant heights in the treatment 50% N slurry and 50% N urea at all periods of crop growth observed, are on par with those of the treatment 100% N urea, and the differences are not statistically significant.

From the table no. 3, it is observed that the treatment 50% N slurry and 50% N urea is on par with the treatment 100% N urea with respect to earhad weight, total biomass weight, grain yield, 1000 grain weight of Jowar and even N uptake by the plant, and the differences are not statistically significant. Slurry releases nutrients slowly and because of the slower availability of nutrients, the yield is not increased over the 100% N urea treatment. Dahiya and Vasudevan (1986) obtained similar results in mustard and vegetables like ladies finger, tomato and cauliflower, and proved that half of chemical nitrogenous fertiliser be replaced by spent slurry. Asmus and Gorlitz (1985) also demonstrated that when slurry and chemical nitrogenous fertiliser were mixed at equal levels, the yields of wheat crop were on par with each other, and the differences were not statistically significant. However, in vertisols, the slurry could replace chemical nitrogenous fertiliser upto 75% without affecting the yields in wheat and Soyabean crops (Misra and Singh, 1989).

Thus, the results indicate that it is possible to substitute nitrogenous fertiliser by biogas spent slurry to the extent of 50% without affecting the yields of sorghum. The input cost on fertiliser saved would be enormous in the context of energy crisis.

Acknowledgement

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Table No. 1 : Analysis of the Biogas Spent Slurry used.

Type of analysis	Concentration
Total nitrogen	1.80%
Phosphorus	0.52%
Potassium	1.90%
Micronutrients :	
NaO	0.20%
CaO	7.28%
Mn	188 ppm
Fe	3550 ppm
Zn	144 ppm
Cu	28 ppm

Table No. 2 : Variation in Plant height at different growth stages sorghum as influenced by biogas spent slurry in combination with chemical fertiliser.

Treatment Number	Plant height (in inches) (Days after sowing		
	40 days	70 days	110 days
1.	2.09	46.77 b	50.6 b
2.	2.45	48 80 b	51.93 b
3.	2.31	48.07 b	50.03 b
4.	2.72	51.87 a	54.53 b
5.	2.21	44.00 b	47.47 b
6.	2.70	48.53 b	52.67 b
7.	2.67	53.53 a	59.07 a
8.	2.47	49.03 b	54.47 b
9.	2.53	52.87 a	56.00 b
10.	2.82	58.93 a	64.13 a
SEM	± 0.135	± 2.43	± 1.92
CD at 5%	NS	7.25	5.73

Note : Similar letters (a, a) and (b, b) indicate non significant results.

Table No. 3 : Effect of application of Biogas Spent Slurry on yield and yield components of Sorghum.

Treatment Number	Fodder wt.		Earhead wt.		Tot. biomass wt.		Grain yield		1000 grain wt.	N Content in fodder (%)
	(kg/plot)	(t/ha)	(kg/plot)	(q/ha)	(kg/plot)	(t/ha)	(kg/plot)	(q/ha)	(Grams)	
1.	30.17	12.06	7.90	31.6 b	38.07	15.22b	5.73	22.92b	20.25	1.078
2.	32.17	12.86	8.77	35.08b	40.93	16.37b	6.57	26 28a	19.32	1.038
3.	31.67	12.66	7.33	29.32b	39.00	15.60b	5.73	22.92b	20.93	0.982
4.	35.50	14.20	8.00	32.00b	43.50	17.40b	5.90	23.60b	20.61	1.040
5.	31.00	12.40	6.37	25.48b	37.37	14.94b	4.80	19.20b	19.63	1.021
6.	35.33	14.13	9.00	36.00b	44.33	17.73b	6.50	26.00b	21.67	1.040
7.	40.00	16.00	11.20	44.80a	51.00	20.48a	7.83	31.32a	20.65	1.156
8.	37.66	15.06	11.07	44.28a	48.73	19.49a	7.93	31.72a	20.56	1.077
9.	35.17	14.06	9.10	36.40b	44.27	17.70b	6.83	27.32a	20.56	1.124
10.	40.50	16.20	12.93	51.72a	53.43	21.37a	8.60	34.40a	20.22	1.232
SEM	± 3.40		± 1.05		± 2.96		± 0.70		± 6.2	
CD at 5%	NS		3.11		8.83		2.09		NS	

Note : Similar letters (a, a) and (b, b) indicate non-significant results.

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Water Pollution - The Greatest Constraints For Development Of Tommorrow

*Partho Protim Lahiry**

Water pollution is the major environmental problem associated with population explosion and urbanisation. Availibility of clean water has become the greatest constraints for development. In the present paper, author has elaborated the causes of water pollution, simultaniously he has emphasised the measures for restricting pollution.

Water the most vital resource for all-kinds of life on this planet is also the resource, adversely affected both qualitatively by all kinds of human activities on land, in air, or in water.

Though water covers almost two third area on the earth but availibility of drinkable water is quite insufficient to meet the requirements of the mankind. Only 0.80% of the total available water on the globe can be used for drinking purposes.

Eighty percent of Indian population drinks polluted water from the sources like lakes, wells, streams and logged rain water, some time contaminated even with faecal matter. Over two and half million persons die of enteric diseases every year, which are caused by drinking polluted water. Millions of people inhabit the vicinity of rivers which are the source of water to drink, to bathe, to wash dirty cloths, to clean utensils and to bathe their cows and buffaloes. Tap water is available only in large cities and towns In the absence of the suitable measures, very serious water pollution occurs frequently all over the country and especially in the rural areas where three fourth of our population live.

Our country is passing through a stage of rapid population growth. Since water pollution is caused by the activities of man, it occurs to the greatest extent where the urban population is growing rapidly.

To day about 1.25 billion people on the earth are forced to consume dirty and unhygenic water for drinking. The defilment of water as a result of human activities is a phenomenon as old as hills, the increasing industrialisation, urbanisation and developmental activities and consequent pollution of water has brought a veritable water crisis.

According to a survey report of World Health Organisation, unavailibility of adequate quality and quantity of drinking water is responsible for almost 80% of the existing diseases in the developing countries to day.

A report released by the UNICEF has highlighted the fact that infant mortality can be reduced by 50% by providing them clean and fresh drinking water.

Water Sources :

As far as India and other developing countries are concerned, there are three main resources of water for

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small water systems - ground water, surface water and rain water.

* Getting ground water from wells, springs, ponds, rivers etc.
* Building small Dams to collect surface water.
* Collecting rain water by various methods.

The specific sources of water for drinking and other purposes varies from place to place.

Rural Water Sources :

* Open wells.
* Ponds.
* Rivers.
* Lakes.
* Springs.
* Tube-wells.
* Hand pumps.
* Canals.
* From rain water logged at the lower surfaces.

Most unfortunately, beside drinking purpose, the above sources are regularly being used for bathing, washing etc.

Urban Water Sources :

In the urban areas, though the main sources are partially similar as compared to the rural sources, but the way of supply is entirely different, as stated below.

* Taps (through centralised water supply).
* Tube wells.
* Hand pumps.

Concept of Water Pollution :

Before discussing further, it is important to know, what water pollution exactly means ?

Water can be classified mainly as clean, polluted and contaminated manner.

* A clean water is one which is at all times free from all contamination and is safe for human consumption.
* Polluted water is one which has suffered impairment of physical qualities through addition of substances causing turbidity, colour, odour or taste.
* A contaminated water is one which may carry infection by reason of the addition of human or animal wastes or which has been randered unwholesome by poisonous chemical compounds.

Therefore the term water pollution is defined to mean such contamination of water or such alteration of the physical, chemical and biological properties of water or such discharge of any sewage or trade effluents of other liquid, gaseous or solid substance in to water that is likely to create a nuisence by way of physical appearence, odour taste or render such water harmful and injurious to public health for the purpose of domestic, commercial, industrial, agricultural and other legitimate uses or to health of animals and aquatic life.

Water Pollution-a review :

As already mentioned in the previousl ines, most of the drinking water is drawn from open sources in the rural areas, where almost three fourth of our population resides Same water sources are used for several other purposes, causing water polluted by germs, tape and hookworms, eggs of insects, cattle dung and urine etc. In addition to these, domestic and industrial waste waters, agricultural practices and shipping also contribute lot to pollute water. To day most of the rivers of the world receive millions of litres of sewage, domestic wastes, industrial and agricultural effluents containing substances varying in characteristics from simple nutrients to highly toxic substances.

The fate of ground water is also same in most of the areas. The industry continues to be one of the most significant cause of pollution of aquatic ecosystems due to a diverse kind of wastes produced by them. Open well water was not as pollutent and contaminated as tank or stream water, but was not free from infectious germs and insects.

A very interesting study was made in this direction which shows that (date follows), the sources of water where near from the residence of the people are suffering from various diseases. Presented date clearly reflects the fact that incidence of diseases was high on the households which fetched water from short distance than those who fetched water from long distance, because first source being in the vicinity of habited places was more exposed to pollution, than the second one.

S. No.	Diseases.	Water Availibility		
		In houses/ half Km.	Upto 2 Km.	Above 2 Km.
1.	T. B.	69%	16%	15%
2.	Chicken Pox	100%	—	—
3.	Skin Disease	80%	20%	—
4.	Diarrhoea.	50%	50%	—
5.	Aneamia.	83%	17%	—
6.	Maternity.	68%	26%	6%
7.	Small Pox.	100%	—	—
8.	Malaria.	51%	49%	—
9.	Asthma.	77%	8%	15%
10.	Jaundice.	100%	—	—

Incedence of skin diseases, was higher in the families which fetched drinking water from shorter distance, because near by sources could easily be polluted. Polluted drinking water is the main cause of Jaundice, therefore, it was not found in the families which fetched drinking water from long distances.

Unequal distribution of fresh water further complecates the situation at global level. Water supplies and sanitation facilities are comparitively adequate in most of the developed countries On the other hand, in the developing country like India, only less than 15% of the rural population has convenient access to safe water and less than 60% of the people in urban area having fresh water adequately, which means, almost 70 to 80% of our total population have neither clean nor hygenic water to use.

Pollution of water is responsible for a very large number of mortalities and incapacitations in the third world countries. Polluted state of the water resources has led to steady decline in fisheries and also affected the irrigated land.

In the present day living system therefore, water pollution is the major environmental problem associated with Unbanisation. Pollution menace has gravely affected human race by the way of pollutents generated from domestic sewage, agricultural pesticides & efflents, industrial wastes, the radioactive wastes and wastes caused by modern technological advances. Availibility of clean water is going to become the greatest constraints for development of tommorrow.

How Water Get Polluted :

Various commonly observed factors and reasons of the water pollution have already been discussed in the previous lines, following are the other important factors responsable for this evel.

1. *Pollution Through Indurtries* :

The industrialisation has played a significant role in polluting the water sources, especially the rivers of the country. Which is supposed to be the primary and important source of drinking water.

Industrialisation in one hand has strengthen the economy by increasing productivity and employment, while on the other hand it has disbalenced the ecology of the entire region by the way of disposing its waste.

The solid & liquid industrial wastes, which are generally being thrown into the rivers, contains major physico-chemical properties harmful for all living creatures. There are millions of industries including heavy industries in India discharging wholly or partially treated effluents in the rivers.

2. *Pollution Through Poor Sewage System and On Site Sanitation* :

Drinking water in cities and in semi urban areas are supplied mostly by centralised water supply systems through Taps and hand pumps. Tap water sources are rivers, lakes, ponds and tube

wells. In most of the cities and towns, water supply lines are parallel to sewer lines and often get contaminated. Likewise, where the ground water level is higher, hand pump water has to face the same music.

The extensive use of unsevered disposal system has caused severe ground water contamination. This has exposed people to the risk of diseases. Diseases related to the use of contaminated ground water may be devided into those which are caused by a biological agent (a pathogen), and those which are caused by chemical substances.

However, these latter diseases are overshadowed in India by the formar which are the greatest cause of diseases and death.

Improper and inadequate systems availibity for excreta disposal creates health hazards of contaminated ground water in India, night soil disposal is a big problem not only in the rural areas but also in the urban regions. Under conditions of poor sanitation carrier of enteric diseases can contaminates rivers, springs, wells and other sources of drinking water.

3. *Pollution Due to Modern Agricultural Practices* :

Agriculture, the predominant rural activity is increasingly using chemical fertilizers and pesticides to increase the productivity of cultivated lands. These chemical fertilizers, pesticides and insecticides have pollute ground as well as surface water.

Chemical used ultimately enter water bodies and have a fatal effect on fish, fry and eggs destroy spawring grounds and feeding areas, restricts migration of fish. Such pollution reduce resistant of fish to diseases and also harmful for humen being. These reach to water bodies from soil through rain and ground water, and accumulate in them in large in quantities.

4. *Pollution Due to Improper Use of Drinking Water Sources* :

Though the drinking water is the basic need of every living creatures, but beside drinking there exists several other purposes, for which water is required. Inadequate supply of water has induced people to use the clean drinking water sources to meet out other needs, for example :

* Taking bath in rivers, ponds, springs etc.
* Washing cloths in lakes, open wells etc.
* Cleaning utensils.
* Animal bath.
* Using ghats for burning bodies of man and animal, etc.

The above practices are responsable for water pollution to a great extent.

How the polluted water affects the human life :

Water pollution affects the human life, both in direct and indirect ways. Some negative effects are at once observable, while some effects can be observed in the long run. Ill effects of the polluted water can be elaborated as under :

1. People who have to depend mainly on tank and streams or on own open well for drinking purposes in the villages, proportionately more number of them are exposed to communicable diseases Unprotected drinking water is a major cause of communicable diseases in rural India.

2. If piped drinking water is provided it is often stored in unhygenic earthern pots, which may cause intestinal diseases.

3. *Malaria* : Most of the villages in our country have many tanks and water logging particulerly during rainy season, which aggravate mosquitos breeding due to dirty state of water. Decaying cattle urine, dugn feed waste, heaped garbage, stagnant rain water in open pits pollutes the logged water rapidly, helping mosquitos breeding which injected malaria germs into human body by biting.

4. *Skin Diseases* : Many more people, even healthy looking people in villages suffered from skin diseases, these are the results of taking bathe in dirty polluted ponds, rivers, and cannels.

5. *Diarrhoea* :

Major cause of dysentry in rural areas is contamina ted drinking water from open wells, tanks, rivers, streams etc. Many, rather most of the open and common community wells contains fungus, bacteria and amaebia, the potential source for stomach upset and diarrhoea.

6. *Anaemia* :

Clean and fresh water contains many substances useful for human body, but the polluted water is often lacking such characteristics. Deficiency of iron content in body causes anaemia, which is too common in the rural areas, where people do not have plenty amount of fresh water to drink.

7. *Gynaecological Diseases* :

Most of the females suffered from various Gynoaecological diseases due to ignorance, inadequate care and unhygenic drinking water.

8. *Jaundice*

It is generally caused by infection through water and food. Jaundice is common in the villages where drinking water is invariabily impure.

9. In general polluted and impure water creates a variety of dreaded types of diseases caused due to poor water supply, improper maintainance of wells, and sanitation. Following table reflects the root of those commonly found diseases.

A. **Water Borne**	**Diseases.**
Water which has been contaminated by poor sanitation acts as vachile for infecting agents.	* Cholera * Typhoid. * Infection Hepatitis.
B. Water Washed	**Diseases.**
Insufficient available water to allow people to wash regulerly, infection develop.	* Scabies. * Yaws. * Leprosy. * Trachoma.
C. Water Based.	**Diseases.**
Essential part of life cycle of infecting agents takes place in aquatic animal, person drinking or walks in water.	* Schistosomiasis. * Guinea Worm.
D. From water related vectors	**Diseases.**
Infection carrying insectsbreed in water and bite, near it specially when stagnant.	* Malaria. * Sleeping sickness. * Yellow fever.

10. Many water borne diseases like Trachoma, Elephantiasis, Encephalitis, Malaria etc. are spread by contaminated water or dirty hands as well as Scabies, Yaws, Laprosy and Conjunctivities diseases which are aggrivated by insufficiant water for washing purposes as elaborated in the above lines.

11. Schistosomiasis and malaria are spreading rapidly Schistosomiasis is caused by water borne parasites, i.e., snail transmitted and that infected human on contact.

Construction of major Dams and irrigation channel, lack of proper latrine facilities, pollution of tanks, ponds etc. help in accelerating the diseases.

12. Improper disposal of human faeces and urine is the principal cause for several communicable diseases including most serious EPIDEMICS.

In many rural areas poor sanitary disposal is responsable for local pollution as well as contaminate sources of drinking water.

13. Polluted water if supplied for irrigation may at times cause disastrous results, by not only killing the crops but making the land itself unfit for agricultural use.

14. Polluted water affects fisheries by killing fish fauna, the food of fishes or making the fish unfit for human consumption. The insecticides and certain pollutants remain in the flashes of the fish for a long time and is transferred to human by way of food,

cause harmful effects, and some times even causes death.

15. Water pollution through human excrete is also very much dangerous. Human excreta contains four types of pathogens (biological agent of contaminated ground water), eggs of helminths (worms), protozoa, bacteria and viruses which causes diseases and death. The extensive use of on site sanitation may lead to elevated concentrations of nitrate in the underlaying ground water.

Two major diseases have been associated with consumption of water containing high nitrate concentrations due to insanitary conditions preveling in the rural areas.

(i) *Methaemoglobinaemia* :

This is a disease primarily affecting young infants. The acute toxicity of nitrate occurs under specific conditions in the stomach and salva. The resultant methaemoglobin is incapable of revirsibly binding oxygen, and consequently anoxia or death may ensue if the condition is left untreated.

(ii) *Carcinogenesis* :

Recently there has been increasing interest in the cancer risk associated with elevated quantities of nitrates in drinking water.

Through chemical fertilizers, Nitrogen not consumed by the plant or not removed by the soil will eventually reach the ground water as either nitrate or ammoniumion, depending on the quantity of fertilizer used and amount of oxigen available. Where chemical fertilizers are not used, an increase in the nitrate concentration may indicate faecal contamination.

Measures to be taken to restrict water pollution :

1. For checking pollution of rivers, all the pollution sources in the cities should be trapped into a series of sewage pumping stations/systems by connecting them to sewage pumping centralised system. The sullage may be pumped out and be utilised for irrigation purposes after treatment.

2. Floating dead bodies and waste materials have to be trapped and taken out from the rivers and may be disposed off by burning them completely.

3. The entry of animals into the rivers, lakes, ponds, streams should be banned.

4. There should be a seperate arrengment for washerman and no washerman should be allowed to use any other water source for washing or bathe than specified for the purpose.

5. Urinals and latrines need to be constructed everywhere and no body should be allowed to fulfil his nature calls in open.

6, The people may be educated, as they have old and deeply laid belief that if bodies and ashes are immersed into holy rivers, the souls rest in heaven. The electric crematoria has to be introduced in the most of the places, so that bodies are burnt and ashes disposed off in hygenic manner.

7. The factories should be asked to pretreat the effluents before it is discharged into the river or into drains joining the river (Law exists which is to be strictly implemented).

8. In the cities drinking water is supplied by tap water and in villages it is being supplied by open wells, hand pumps and tube wells. The water supply lines are parallel to sewar lines by which they frequently get contaminated. Open well, hand pump and ground tank waters are used by the village people, but where the water lable is high, they also get contaminated with sewage water. For this, reguler checking in water supply system should be done so that source of contamination may be found out.

9. If pollution is in the ground water, it moves with it. Therefore, the wells should always be uphill and 15 to 30 meters (50 to 100 feet) away from a latrine, barnyard or other sources of pollution. If the area, where one has to dig a well, is flat, remember that the flow of ground water will be downward, like a river, toward any nearby body of surface water. Wells have to be located in the upstream direction from pollution source.

10. Maximum possible number of soakage pits are to be constructed in the rulal areas to restrict water logging on roads and near residential areas.

11. Minimum use of chemical fertilizers is advisable to restrict ground water pollution.

12. Simple methods of purifying water like use of ALUM, CAMPHOR, sand and gravel filter bed, silcagel filters, Chlorine tabs, ozonization etc. should be adapted and proper training facilities for the same should be provided in villages through Government and Non-Government agencies working in the area.

13. Voluntary organisations may come forward to avail themselves of number of Government programmes designed specifically to facilitate the activities for the primary health care in the rural areas, where adequate facilities are not available. Some of those programmes are as follows :

* Special Health Schemes for Rural Areas.
* Schemes for Improvement of Medical Services.
* Scheme for Primary Health Care and Family Welfare.
* Urban Family Welfare Centres.
* All India Hospitals Post Partum Programme at the Subdistrict level.
* Opinion Leaders Camp for Family Welfare.
* Scheme for Experimental Innovative Project in Rural Areas and Urban Slums.
* A. N. M. Training Schools for Female Health Workers.

By introducing already existing schemes and programmes facilitate by the Government in all possible areas, a sence of awareness can be generated among villagers, which will finally help themselve to restrict pollution in all respect.

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Fertilizer Injector

In late sixties plantation of hybrid cotton increased in Bharuch district of Gujarat State. Plant to plant placement is wider in hybrid cotton compared to normal variety. Therefore it was not convenient to sow hybrid seeds with seed-drill ; sowing was done by marking the distances. Fertilizing the plants with wide spacing was also difficult. Innovative farmers developed one method. They used to drill a hole near the stem of the plant with an iron poke. The hole was enlarged by rotating the poke in a circular motion. Then they put the fertilizer in the hole by hand and closed the hole by soil.

To make the above process easier, faster and precise Agricultural Tools Research Centre has designed and developed a Fertilizer Injector since 1977.

Figure : 1 Fertilizer Injector

The first design of the Fertilizer Injector had a conduit pipe and a funnel at top of the pipe. Bottom portion of the pipe was vertically cut along the centre line. A flap was pivoted to close the pipe opening. A string was tied between the flap and one handle near the funnel. By pulling the handle the flap will open and allow the fertilizer, filled in the pipe, to drop into the hole made near the plant stem But that design was found little complicated. Due to mud deposition some time the flap was not closing properly on the pipe end and the fertilizer was being wasted.

Later the Fertilizer Injector was changed into the design as shown in Fig. 1. In this design, a tapered iron poke is welded at the bottom of the conduit pipe. The upper end of the poke is forged to half round shape to provide passage to the fertilizer; and the bottom end is pointed to penetrate the soil. This design is very simple to operate.

Conventional Method of Fertilizer Application

The plant needs fertilizer in the root zone around stem of the plant. At present a ring is dug around the plant stem, fertilizer is spread and in some cases covered with soil before irrigation. This process of fertilizer application is much time and labour consuming. As the fertilizer is not applied deep near the roots, it is less effective. Moreover in this process quantity of the fertilizer required is more, as some of it remaining on top soil is wastage. The processes of digging ring, applying fertilizer, covering top soil are to be done in bending posture which is uncomfortable and tiring.

Method of operating the Fertilizer Injector

The fertilizer Injector is for applying chemical fertilizers to the individual plant in vegetables, flower or fruit crops or in cotton crop.

By holding hand grips [2] of the tool poke [5] end is positioned on the ground 2 to 3 inches away from the plant stem. Insert the foot-rest [4] with one foot. Poke should be inserted as much as depth of penetration required according to the plant age. Take away the foot from the foot-rest and rotate the tool in about one and a half feet circle by holding the hand grips. This will enlarge the hole in the ground. After

tilting the tool towards direction of the foot-rest feed correct amount of the fertilizer in the funnel [1]. It will slide into the enlarged hole upto the depth of poke end. Then pull out the tool and cover the hole with one foot. The fertilizer applied deep into the soil, near root zone of the plant is very effective. In the same fashion the tool can be used all around the plant.

Advantages of the Fertilizer Injector

1. Even a small doze of fertilizer applied with injector acts very effectively.
2. As the fertilizer is injected deep into the soil near root zone of a plant, it acts immediately.
3. As there is no waste of fertilizer, it is observed that quantity of the fertilizer needed is half only, using the Fertilizer Injector, compared to the conventional method.
4. With the Fertilizer Injector required doze of fertilizer at required interval of time can be applied.

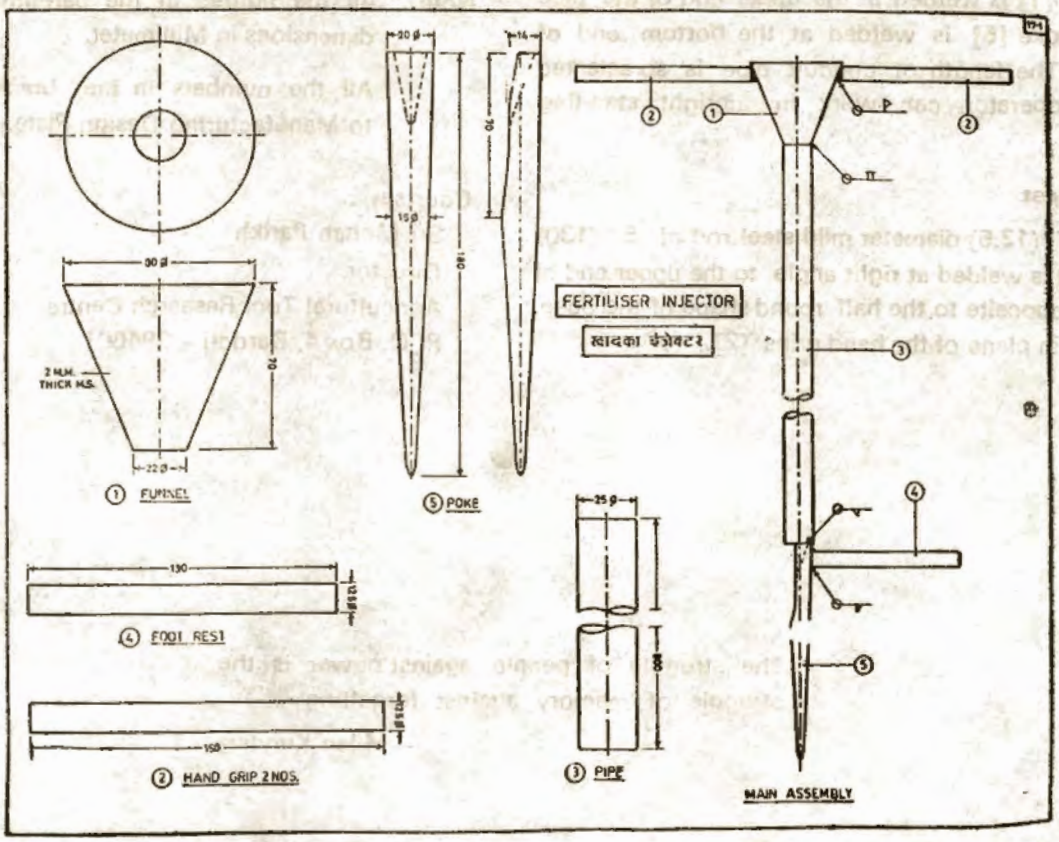
Thus the Fertilizer Injector is a tool for applying fertilizer at required distance and depth, required doze and at required time interval.

Instead of working in bending posture, the Fertilizer Injector enables the operator to work in an upright posture and hence the work becomes comfortable and enjoyable.

Manufacturing process

The Fertilizer Injector has following five components ;

[1] Funnel
[2] Hand Grips
[3] Vertical Conduit pipe
[4] Foot-rest
[5] Poke



1. Funnel

It is prepared from 14 Standard Wire Gauge (S. W. G.) thick mild steel sheet. The larger diameter is 3" (80) and height is $2\frac{3}{4}$" (70). The smaller end is placed over the end of conduit pipe [3] and welded all around.

2. Hand Grips

They are $\frac{1}{2}$" (1.25) diameter and 6" (150) long mild steel rods welded to the upper end of the funnel [1] at opposite ends.

3. Vertical Conduit Pipe

1" (25) diameter conduit pipe is 32" (800) long. The funnel [1] is welded at the upper end of the pipe and the poke [5] is welded at the bottom end of the pipe. The length of conduit pipe is so selected that the operator can work in upright standing posture.

4. Foot-rest

It is $\frac{1}{2}$" (12.5) diameter mild steel rod of 5" (130) length. It is welded at right angle to the upper end of poke just opposite to the half round shape of the poke, as well as in plane of the hand grips [2].

5. Poke

It is forged from $\frac{5}{8}$" (16) diameter mild steel rod of about 5" (130) length. One end of the rod is pointed tapered for easy penetration into the soil and the other end is forged to form a half round shape along its length, as a passage to the fertilizer.

Keeping the half round portion along the axis of the pipe [3], weld the poke to the pipe. Foot-rest [4] is welded to the upper end of the poke, at right angle to the poke.

By assembling all the components as described above the Fertilizer Injector will be ready.

Note : All the figures in the parentheses ( ) are dimensions in Millimeter.

All the numbers in the brackets [ ] refer to Manufacturing Design Plate.

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The struggle of people against power is the struggle of memory against forgetting.

—Milan Kundera

An innovative technology for water purification

The system of coagulation, settling and separation of undesirable materials forms a part of several water purification methods. The substance used for coagulation is called a 'coagulant'. There are many chemical coagulants, the most commonly used being alum or aluminium sulphate.

A research study recently carried out at the National Institute of Physics (LIPI) in Bandung, Indonesia, has shown that the seeds of Sainjna plant (Moringa Olcifera) can also be utilized for water purification.

The plant

In India, Sainjna is called by different names :

* Hindi : Mungna, Sainjna, Shajana
* Bengali : Sajina
* Marathi : Achajhada, Shevgi
* Gujarati : Midhosaragavo, Saragavo
* Telugu : Mulaga, Munaga, Tellamunaga
* Tamil : Murangai
* Kannada : Nugge
* Malayalam : Murinna, Sigru, Moringa

In Assam it is called Saijna and Sohjna ; in Orissa Sajina ; in Punjab Sainjna, Soanjna ; and in Santhal Mungra arak. It is also commonly called Drumstick tree or Horse raddish tree.

The tree is valued mainly for its tender pods which are used as vegetable. Flowers and tender leaves are eaten as pot herb. Seeds are consumed after frying. The roots of the tree used as condiment or garnish. Twigs and leaves are lopped for fodder.

Almost all parts of this plant are considered medicinal and are used in the treatment of ascites, rheumatism, venomous bites and as cardiac circulatory stimulants. The seed oil is used for edible purposes, illumination and in cosmetics.

The process

The illustration shows the process details of using Sainjna seeds for water purification. The dosage depends on the quality of water to be treated :

* for low turbidity (0-5 mg solid/litre of water) use 1/4 seed
* for medium turbidity (5-25 mg/litre) use $\frac{3}{4}$ seed
* for very turbid water (25 mg/liter) use $1\text{-}\frac{1}{2}$ seed.

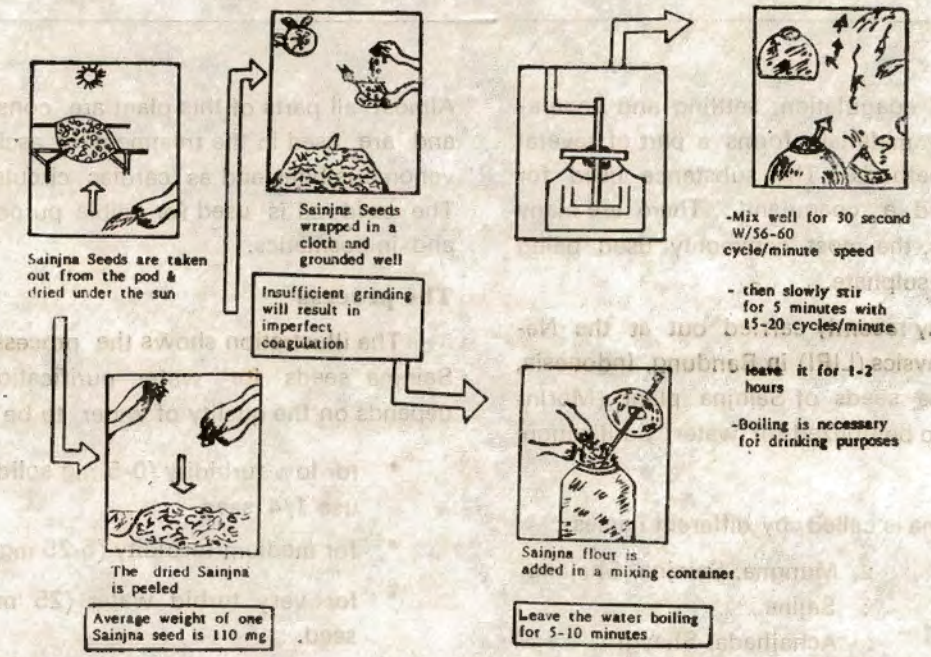
Add a little water to the grounded seed until it forms a paste, so it can be easily dissolved in water.

Excess dosage will increase turbidity because some parts of the seed will remain unsettled. Addition of 2 5-3 mg of clay soil per litre of water will accelerate the settling process and result in a better quality clear water.

The dosage will also depend on the water source condition and the season.

Suggestion

It is suggested that further studies be conducted in India by NEERI, Nagpur to work out the most appropriate dosage for purification of water by Sainjna seeds.



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Poverty is no disgrace to a man, but it is confoundedly inconvenient.

— Sydney Smith

Bullock-drawn automatic sugarcane planter

Sugarcane planting is a labour intensive operation. On an average, it requires 17 man-days and 2 pairs of bullocks to plant one hectare with the conventional *desi* plough. A semi-automatic bullock-drawn planter designed and developed by Menon could carry out all the operations automatically except dropping of the setts. It was further modified to make it a compact unit. In both the designs a labourer sitting on a seat on the machine picked up sugarcane setts from two boxes and dropped them into a seed chute one by one so as to achieve desired overlapping and continuity. However, the adoptability of the equipment was rather poor, mainly because of uneven dropping of the setts resulting in gaps in planting.

Excessive weight of the equipment was another limiting factor, considering the power available from the bullocks. It was therefore considered necessary to work out a design that permitted automatic metering of the sugarcane setts so as to eliminate the extra weight of the dropper. This would not only result in low draft but would also ensure uniform dropping of setts. The new automatic bullock drawn sugarcane planter was developed to meet these objectives.

Design description

The bullock drawn automatic planter consists of a frame-work on which are provided drive system, seed box, metering system, fertilizer box, insecticide container, furrow opening shovel and seed chute. The drive system consists of gears and chain-sprockets and separate levers for engaging and dis-engaging the drive. Arrangements are made for lowering and lifting the equipment at turns and for increasing or decreasing the depth of planting. The main components of the equipment are described below.

1. *Frame-work with auxilliary components* : The frame of the equipment measures 700×450 mm and is made of 37×6 mm MS angle iron. It is supported on 500 mm diameter wheels made of 75×6 mm MS flat. One of these wheels serves as the main drive wheel. A double-point cultivator shovel is provided for making the furrow. Arrangement has been made for lowering and lifting the furrow opening system to facilitate turning, helped by a castor wheel.

2. *Metering system* : An important feature of this equipment, the metering system consists of a seed box in which the front and rear walls are straight up to a height of 30 cm and then incline at an angle of 60°. There is a lateral gap of 140 mm between these walls. The over all dimension of the box is 500×380×450 mm.

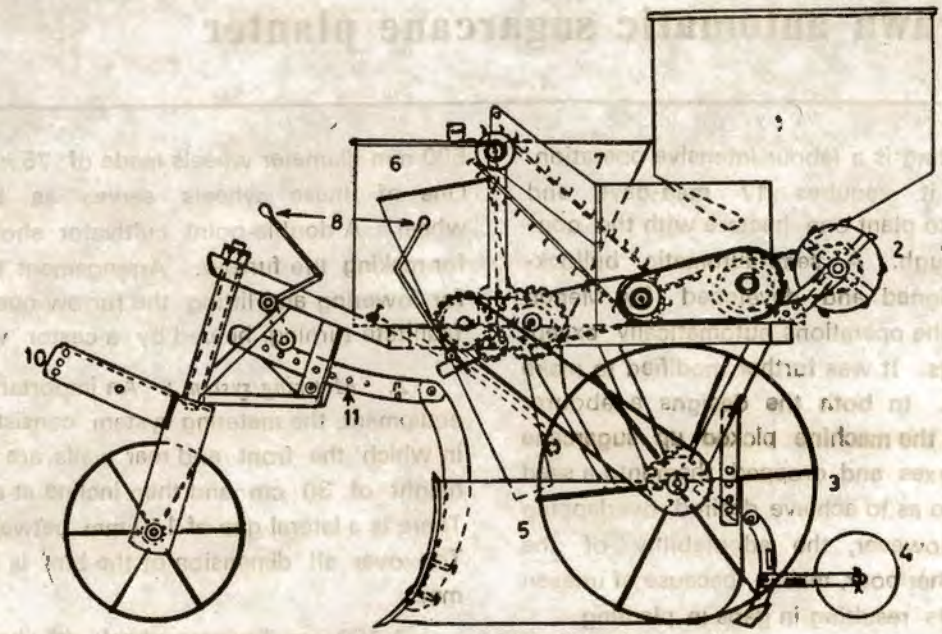
A 150 mm diameter wheel with backward inclined lugs works through a slit in the rear wall of the box and acts as pusher. At the bottom of the box there is a 125 mm dia, and 350 mm long conveying roller. There is a clear space of 750×350 mm where the cane pieces are temporarily stored before being picked up by the picker elements. The pickers, made of MS sheet, are fixed by rivets on the flat conveyer belt. In all, there are 23 pickers. Each picker normally accommodates one sett or at the most two setts, if the cane is of less than 25 mm dia. The picked up setts move on the conveyer belt to be ultimately dropped into the seed chute leading to the furrow.

The pickers are designed to accommodate even bent cane pieces.

3. *Fertilizer and insecticide dispensing system* : Fertilizer is applied in metered quantity by the side of the sett ; simultaneously, insecticide is applied over the sett through gravity flow. The sett is then immediately covered with a blanket of soil and is compacted.

Method of operation

Before the actual planting starts, two or three bud setts are cut in 30-35 cm lengths. The seed box is filled with these setts in a properly arranged manner.



(Side View)

Construction of the bullock-drawn automatic planter. 1 Seed box. 2. Pusher. 3. Drive wheel. 4. Tamping roller. 5. Furrow opener. 6. Insecticide tank. 7. Fertilizer box. 8. Seed chute. 9. Castor wheel. 10. Hitching arrangement. 11. Depth control system. Dimensions : Length 2.5 m. Width 0 85 m. Hight 1.15 m. Weight 120 kg.

The box has the capacity for 350-400 setts, depending on the thickness of the cane. One filling is sufficient to plant a row length of about 100 m. At every 100 m. distance, the seed material is kept ready for replenishment. The fertilizer box and insecticide tank are also filled.

Initially, the cane pieces are arranged on the pickers so that the setts start dropping immediately as the furrow opens. The equipment is hitched to the bullocks, the furrow opener is lowered, the depth is set, and the drive is engaged. As the device starts moving the pusher wheel pushes the cane pieces on the conveying roller up to the empty space and these are picked up one by one by the picker moving over the conveyer belt, The setts are dropped through the seed chute into the furrow. The speed of the conveyer belt is fixed so as to achieve an overlapping of 3-5 cm between two setts. The setts are immediately covered with a blanket of soil, which is compacted with a roller.

On an average, a 100 m row is covered within 2 minutes. All the planting operations are accomplished in a single pass.

Test results

1. *Technical specification of the machine* :

Overall length	2.5 m
Overall width	0.85 m
Overall height	1.15 m
Overall weight	120 kg

2. *Operational parameters* :

Depth of planting	12-15 cm
Setts dropped per 100 m length	350-400

Over-lapping between setts	2.5-3 cm
Soil cover over setts	7.5-8 cm
Soil moisture	10-11% (wet basis)
Draft	75-80 kg
Time to cover 100 m row length	2.0 min.
Time per filling of seed box, turning, etc.	1.5 min.
Total time for planting 10 m row length	3.5 min.
Rows/ha	110
Total time for planting 1 ha.	6.41 (say, 6.5) hours.
Germination	At par with normal
Average output/day	1.25 ha
Labour requirement	2+1 bullock operator.

3. *Cost economics* : The automatic planter costs about Rs. 2,500/–. The comparative costs of planting one hectare by conventional and automatic systems are as follows :

	Conventional system	*Automatic planter*
1. Labour requirement	17 man-days	2 man-days
2. Bullock-hours	16 bullock pairs	6.5 bullock pairs
3. Labour cost Rs. 12/day	Rs. 204.00	Rs. 24.00
4. Bullock pair cost @ Rs. 5/hr	Rs. 80.00	Rs. 32.50
5. Cost of planting 1 ha	Rs. 284.00	Rs. 56.50

Conclusion

The fully automatic bullock drawn sugarcane planter greatly facilitates planting of sugarcane. On an average, an output of 1.25-1.5 ha/day is achieved with reduced labour requirement and at about 1/5th the cost of the conventional system.

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News and Views

COOKING GAS FROM WATER HYACINTH

Cooking gas which can be used as a substitute for LPG has been successfully developed from water hyacinth, hitherto regarded as a nuisance acquatic weed, by the Central Institute of Fisheries Technology, Cochin.

The process for generation of bio-gas from water hyacinth (African payal), using a specially designed reaction chamber was developed by D. P. Chakraborty, a CIFT scientist with guidance from Dr. M. R. Nair, Director of the institute. The reaction is so vigorous that a gas pressure of more than 1.3 kg/square cm developed inside the reaction chamber at the initial trial itself. The gas can be easily burnt in an ordinary household LPG gas stove.

In a test trial, two litres of water were boiled within 15 minutes for the preparation of tea. The residue obtained after manufacture of the gas looks like cowdung and could be used profitably as manure for paddy or any other crop.

Ten kilogrammes of the acquatic weed can generate half a kilo of gas which will not only meet the requirements for a day's cooking for a family of five but also keep a lighted petromax burning for a few hours at night.

The process of gas generation from the African payal will serve two purposes : removal of the widespread weed which is now an impediment for fishing and water transport in backwaters and rivers in Kerala and elsewhere and the plant use for cooking and lighting purposes at fishermen's homesteads.

An inititial investment of about Rs. 8000 for fabrication of a reaction chamber and for an ordinary LPG stove would be sufficient. To start with, it will take seven days for the fresh green water hyacinth in the reaction chamber to generate the gas. Then onwards, the chamber can be filled every now and then with fresh weed, even as the residue is removed from the chamber. Residues taken out can be used as manures.

A recent study had shown that noxious aquatic weeds pose a serious problem to fisheries, navigation, agriculture and irrigation by their uncontrolled growth and rapid propagation.

SOUNDING OUT FLY ASH FROM FLUE GAS

An innovative way of removing microscopic fly ash particles from flue gas high-intensity sound waves is being tested in the USA.

The USA Department of Energy has awarded a $790 000 contract to San Diego based Solar Turbines to test a way of capturing fly ash particles. Solar Turbines will team with Manufacturing and Technology Conservation International, to build and test an acoustically enhanced cyclone collector.

The advanced cleanup device uses high-intensity sound to cause small particles to stick together in a snow ball effect. Eventually they become large enough to be caputred by a conventional particle collection device.

The device has particular application to advanced coal-burning systems that burn coal and use hot gases in gas turbines. Unless the unburned mineral particles are removed from the combustion gases, they act as sandblasters wearing away the turbine blades.

One advantage of this acoustical approach is that it works at high temperatures.

PAN MASALA IS GENOTOXIC,

Cancer researchers in Ahmedabad have confirmed that pan masala is "genotoxic" and have sounded a warning on its indiscriminate consumption.

A substance is said to be genotoxic if it damages the cell's chromosomes containing hereditary material called genes that are passed on by parents to children.

Dr. S. G. Adhvaryu and co-workers at the Cell Biology Division of the Gujarat Cancer Research Institute have found pan masala to be genotoxic even at levels much lower than average daily consumption by a pan masala addict.

The scientists said they used a popular brand of pan masala for their study.

The extract of pan masala was mixed with a test-tube culture containing the growing ovarian cells of a Chinese hamster.

Reporting their results in the Indian Journal of Medical Research, the scientists said they observed chromosomal changes in hamster cells treated with extract from as little as 1.1 milligrams (mg) of pan masala.

The small pouch of pan masala sold in the market contains about 5000 miligrams, and the average daily human consumption is 6000 mg to 8000 mg. the scientists said.

The researchers warned that the chromosomal damage was dose dependent and therefore the "end effects would be the result of cumulative effect of pan masala consumed".

They said though their report was preliminary, the results" do warrant a restriction to the indiscriminate use and sale" of pan masala until further indepth studies are completed.

While tobacco chewers spit out the juice, pan masala is consumed in full. Therefore, in addition to local effects on oral mucosa, pan masala is likely to produce systemic effects as well, the scientists cautioned.

NOISE POLLUTION AFFECTS SCHOOL KIDS IN NAGPUR

School going children in Nagpur run a greater risk of becoming deaf than their counterparts in other parts of the country.

According to a study submitted to the Nagpur University recently, the noise generated by speeding trucks drives a majority of school children in the class deaf.

While road mishaps claim the lives of about 200 chidren in the city every year, thanks to the absence of a bypass road for the national highway, the noise pollution takes a heavier toll inside the class-room. the study, says.

More than 100 light vehicles, 40 trucks and scores of other small modes of transport pass by schools every hour, causing irreparable damage to the children's hearing ability.

The study conducted for a doctoral thesis, titled "effects of noise pollution on school going children in Nagpur" reveals that for a population of 16 lakh, Nagpur has the highest number of secondary schools in the state.

The children in a majority of the school situated in the most unsuitable places like those near national highway, market places, congested commercial areas and railway tracks, are exposed to the highest level of noise pollution.

According, to international standards, school should be located where the noise range is between 20-25 decibels.

Unfortunately, only 13 per cent of the schools in the city fall within the permissible limit. Most of the schools are situated near the national highway, which cuts through the city, where the noise level is 60 to 80 decibels, the study says.

More shocking is the plight of children in 62 schools where the noise level is more than eighty per cent, the study adds.

Audiometric tests conducted on a section of students from schools located near noisy places, revealed that the children were suffering from hearing problems.

An ENT surgeon, said that the students would go completely deaf in five to six years if they were not immediately treated.

The teachers, who were tested showed signs of irritability, high blood pressure, ulcer, mental stress and a high degree of anxiety, besides suffering from symptoms of migreine the study says.

FERTILIZER FOR MUSHROOM

whey, a waste product of milk, has been made use of for producing mushroom fertilizer by a group of researchers from Sydney University in Australia. First, protein is removed from the whey and then yeast is grown from the lactose which remains. The yeast is then dried and mixed with the compost where the mushrooms are grown. The enriched compost increases the mushroom yield by 30%.

FOUR-ROW PADDY TRANSPLANTER

Paddy, a major food source is mostly grown as a transplanted crop. Transplanting, being a manual operation, is tedious and tiresome. Japan, China and Korea have developed power operated paddy transplanters and research is on to modify these to suit different field conditions. The International Rice Research Institute at the Philppines has developed manually operated paddy trsnsplanters India is also doing research on manual and power-opeated transplanters.

A transplanter which can plant paddy seedlings when pulled in puddled soils was designed, developed and tested at ICAR Coordinated Scheme for Research and Development of Farm Implements and Machinery at Andhra Pradesh Agricultural University (APAU). Hyderabad. This manually pulled machine can plant seedlings in well puddled and levelled soils maintained with 2 to 5 cm of water. The seedlings can be planted at a row spacing of 20 cm. The field capacity of the planter is 0.5 ha per day.

The biggest gain from this type of planter is its capacity to plant seedlings if it is just pulled in the puddled field in other manually operated transplanters, the pickers must be pushed with a handle for picking and planting seedlings each time after dragging the planter upto a certain distance, depending on the row specing required. This operation considerably reduces field capacity of the planter.

The machine consists of two ground wheels, transmission chain with sprockets, gears, a float, a seedling tray mounted on a frame and a handle. The seedling tray is filled with either mat type or root washed seedlings.

When the planter is pulled, the ground wheel rotates. The motion of the ground wheel shaft is transmitted through a chain and sprocket system to an intermediate shaft. From the intermediate shaft to which the four bar mechanism is attached, and it finally goes to picking fingers.

Thus, as the ground wheels more forward, the fingers pick the nursery seedlings and plant them. For every revolution of the wheel the pickers plant seedlings 12 times as the transmission ratio is 1.12. Four people should participate when the planter is in operation (Two to pull it, one to load the seedlings and another to cater to gap filling and planting at head lands).

A saving of Rs. 200 can be had in labour cost per hectare of land planted with this implement, when compared to the conventional method of planting. Since the seedlings are planted in rows, weeding with rotary weeders and fertilizer application will save on labour costs and fetilizer respectively. Crops planted in this method were found to be healthier and more uniform when compared to those planted conventionally. The cost of the machine works out to Rs. 2500.

SUNFLOWER IS CATCHING ON

Sunflower is an important oilseed crop, photo and thermo sensitive, with the advantage of growing throughout the year and even in dry areas. Sunflower at present is predominantly cultivated in Maharashtra and Karnataka and is being introduced in Andhra Pradesh, Gujarat and Tamil Nadu either as a cash crop or correction crop or inter-crop with groundnut, maize etc.

Sunflower seed is a rich of source of vegetable oil of high quality with pronouncedly anticholesterol properties. Sunflower meal is nutritious and can be fed to milch cattle, poultry and pigs. However, its cultivation is yet to gain impetus inspite of its high rate of growth and oil potential.

Recently, this crop was introduced in Punjab with great zeal. Under the Oilseeds Technology Mission, the Punjab Department of Agriculture distributed mini-kits to promote sunflower cultivation. Punjab's area under sunflower is likely to increase the two lakh hectares during next few years.

Until recently hybrid varieties were in short supply. Seed of a Russian variety, "Peredovic" was introduced in Punjab and work continues to improve the production level of this variety. Some varieties from South India are also under observation. Owing to its short duration, it can conveniently be fitted into various sequential and inter-cropping systems under irrigated condition. Farmers, however, has shown some hesitation in adopting it on a wide scale, due to a variety of reasons.

The most important factor promoting the introduction of any crop is that it fits well into the existing crop rotation and does not adversely affect the preceding or succeeding crops. The best sowing time of sunflower, namely, January-February, matches well with the harvest of potato, toria, peas etc. But when preceded by paddy, sowing is hindered because of the long standing period. Some suitable variety for this circumstance should be evolved.

Of the various crop rotations, toria-sunflower is report to be most suitable with respect to seasonality and economics. This is followed by potato-sunflower rotation.

Sample farmers in Amritsar district obtained the average yield of 3.95 quintal per area. It, however, varied from 2.75 quintal per acre to 4.75 quintal per acre. These wide variations were due to more or less thoroughness in the adoption of cultural practices and differential level in the attack of birds, insects and diseases.

Even the highest level of yield obtained is however, much less than the known potential yield. A production of 35 quintals per hectare has been reported in Ropar district. Therefore, the adoption gap in the the use of production technology is a serious factor for low yield level. This points to the need for strengthening of the extension activities to aquaint the farmers with the latest technical know-how.

Attack of birds, especially of parrots, caused severe damage to the crop. This damage was inversely related to the area under the crop. The damage caused by birds, however, is bound to decline with the wider adoption/spread of the crop.

The stem of the hybrid varieties is weak, cannot hold up the flower. The heavy rain accompanied by a storm last year caused severe damage to the crop by lodging. Attack of insects and diseases, especially of jassid, aphid, semiloopers, head rot and downy mil two to three pickings, yet the possibility of immature seeds cannot be ruled out. This lowers the outturn of the crop.

Harvesting and threshing of the crop is considered to be another major problem, its manual operation being very costly. In addition the labour hesitate to perform this operation due to the thorny structures on the flowers and stem.

According to the Department of Agriculture a power-driven paddy thresher can thrash even wet flowersheads at the rate of 35 to 40 quintals per day. Sherpur Threshers, Ludhiana, have also developed a multipurpose thresher which can run on a 5 HP motor. Punjab Tractors, Mohali, have harvested and threshed a standing crop of sunflower successfully with their combine in a single operation. These machines need to be demonstrated on a wider scale at the farmer's fields.

The support price policy of the Government of India has been implemented in Punjab Markfed has been assigned the job of making purchases in case the price fall below the support price of Rs. 450 per quintal. The market price, however, ruled much higher than

the support price. Based on the open market price of Rs. 615 per quintal (the average price received by the sample farmers) and the average yield of 3.95 quintal per acre, the gross return from sunflower crop was estimated at Rs. 2429.25 per area. The average cost of cultivation of the sample farmers were estimated at Rs. 1374.75 per acre. The crop, therefore, showed an average net return of Rs. 1054.50 per acre. Sunflower, therefore, stands favourably in comparison to other competing crops provided it does not hamper its predecessor and successor crops.

ENVIRONMENTAL COSTS OF MANGROVE DEFORESTATION

An alarming trend in cyclones has been noticed in coastal Orissa, and experts say this is due to the fast disappearance of mangrove forests.

Population growth, search for agricultural lands and prawn cultivation in brackish waters in the past three decades have brought this once beautiful mangrove vegetation to a disaster endangering the natural ecosystem of the coastal belt.

During the period, as many as ten floods and six cyclones have occurred in the belt. The worst was in 1971, when a cyclone claimed more than 10,000 lives.

Before the 1940s, the entire Mahanadi delta on the Orissa, coast was rich in Mangrove vegitation. Islands like Hukitola, Jambu, Ramnagar, Kharnasi, Batighar and Jogidhanpur were also covered with such forests.

The exploitation of mangrove vegetation was started in the forties when the then zamindar Burdwan purchased the Kujanga area under the 'Sun set law' and then disposed of nearly 12,000 hectares for cultivation to Medenapur people.

More than 2,500 hectares of mangrove were destroyed during the construction of the Paradip port.

Official sources said only 50 sq. km. of the total 200 sq km of mangrove forests now remained in the Mahanadi delta.

Over 100 sq km mangrove vegetation have almost vanished during 1970-80, following extensive coconut plantation and paddy cultivation. Prawn cultivation claimed 50 sq km in the past five years.

Remote sensing pictures taken out by Salyut-7 during the seventies revealed that nearly two sq km mangrove vegetation were being cleared every year in Orissa.

The State Government's drive to raise a belt-cum wind-break plantation along the sea coast seem to be restricted to the sandy coastal soil, leaving the swamps to be encroached for paddy and prawn cultivation, the ecologists say.

TRADITIONAL HEALTH CARE STEPS USEFUL

Developing countries like India cannot afford to abandon traditional health care measures, since several traditional practices among communities have proved scientifically useful for the prevention and treatment of illnesses. This was unanimously concluded by doctors and health-care officials at a seminar on 'Traditional Practices in Mother and Child care' in the Capital today.

Organised by the National Institute of Public Cooperation and Child Development, the two-day seminar concluded with a consensus of opinion regarding the efficacy of traditional methods of health care. It was felt that a combination of traditional healing and modern medicine was the most promising and appropriate solution for health-care problems in rural and tribal areas.

Dr. Maya Natu, Prof. B. J. Medical College, Pune, pointed out that even in medically advanced countries, the spectrum of traditional care was very large. These included mother care, child-rearing practices and treatment with native home remedies which have been handed down through the experience of generations and have proved scientifically relevant. Reviewing the practice of mother and child care practice in Maharashtra, she stressed that it was advisable to study the existing patterns, their utility and their harmfulness before condemning them and introducing modern medicine.

Prof. Jatishwar Singh from Imphal stated that traditional physicians and traditional birth attendants were still indispensable in the north-east. The need, according to him, was to modernise their service and make the old traditional practices more scientific by introducing intensive training Programmes.

Dr. Dinesh Paul, Deputy Director (health), NIPCCD, however, forewarned that there were a number of unhealthy practices in traditional indigenous systems of medicine, and people in the rural areas needed to be informed about them. Application of cow dung and horse dung on the umblical cord after the delivery could lead to tetanus in the new born, he cautioned. A combination of the wisdom contained in traditional healing with the scientific approach of moderen medicine was the most promising and appropriate solution for India, he remarked.

SWEATING MAKES SKIN PERMEABLE

It is generally believed that undamaged skin is a reliable barrier to the entry of toxins and other foreign material into the system. However, the discovery of the Soviet scientist, Dr. Pyotr Slynko, affirms that the skin, after profuse seweating, is increasingly permeable. This new finding has opened up promising avenues of R&D in health resort practices like halneology (Study of medicinal baths) and coametology.

Dr. Slynko, attached to the A. A. Bogomets Institute of Physiology, Ukraine Academy of Sciences. studying permeability of skin of men and animals, found that it is capable, under specific conditions, of not merely letting through but also virtually imbibing any kind of solutions or suspensions from the ambient medium.

For instance, immediately after sweating, sweat ducts are not completely closed and they show marvellous activity, vigorously soaking whatever is dissolved around. A person emerging from a hot bath and taking a dip in a cold pond will have his sweat glands closing up only two to three minutes after the dip. By the time, residues from previous bathers, disinfectants might have found their way into the blood and lymph.

According to Dr. Slynko. occasionally our skin works against as for which we only are to blame-for the presence of noxious substances around us. He explains the mechanism of mass poisoning. A person working in hot whether and surrounded with chemicals seems to be protected with a mask. But once slightly cooled by occasional breeze, he may show all symptoms of poisoning. This means toxins have penetrated into his system through the unprotected skin.

Similarly, Dr. Slynko points out, it can happen with people working in hotbed, greenhouse or other facilities. Hence, he calls for a revision of protective measures to numerous categories of labour. Another side to Dr. Slynko's discovery is its immense value in medicinal baths. Take for example, sauna or steam bath. One may proceed (after light showering) directly from the steam bath–when his skin will be in a position to imbibe substances from the surrounding air–to a special room where medicines he needs are sprayed in required concentration.

The new discovery is also useful in balneomudtherapy (mud-bath therapy). Covering a patient with a coat of mud may not be of any avail unless it is made sure that he is sweating under it. For research has demonstrated that in such cases sweating does not take place always and sweating is necessary to absorb the medicinal substances in the mud. According to Dr. Slynko, the patient has to sweat well. Then a light pure-water has to follow and immediately after, a shower of acquous mud solution can produce the desired effect.

REVIVE OLD METHODS TO STORE RAIN WATER

Prof. P. R. Pisharoty has called for reviving ancient Indian methods of collecting rain water in ponds, small checkdams and sub-soil dams.

"These methods, though ideal for small watershed management and highly scientific had been neglected

by us, under western influence", said the 80-year-old expert speaking on "rainfall and hydrology in India" at a function organised to felicitate him by the Physical Research Laboratory of which he is the emeritus scientist.

The revival of these methods would not only help tackle the massive problem of top soil erosion but create self-confidence and involvment of society in water management.

Prof. Pisharoty said the problem of top soil erosion and silting of dams was very acute, as the rainfall characteristic of the country was peculiar. Over 50 per cent of the annual precipitation was received by most places in just 20 to 40 hours or even less. With rain coming down at an intensity of five cm. an hour in some places, over a tonne of top soil could be washed away within minutes if the land was unforested, he said.

Neglect of time-tested methods : Although the country's mean annual rainfall averaged about 117 cm, the largest anywhere in the world for a country of 320 million hectares, the problem of water crunch continued because of the neglect of time-tested methods of rain harvesting under the water conservation culture of ancient India.

"Two decades ago, Indian domestic, industrial and irrigational uses of water totalled up to about 38 million hectares metres. By the turn of the century, it would touch 80 million hectares metres and if we do not act now, the situation would worsen fast," the expert warned.

Describing the Sardar Saravor (Narmada) project as a "well planned river valley project", he said, "even in case of such a project we will be able to harvest only 40 per cent of rainfall while the rest has to be let off".

The high intensity and seasonal nature of the rainfall permits dams in the country to store only 10 to 20 per cent of rain water. So large fraction of water can stored only by ponds, contour bunding and underground cisterns.

He regretted that no literature on soil erosion data for different parts of the country had been evolved, especially when regions experienced varying degrees of rainfall.

The country's hot summer months could be converted into a boon, if we could harness sunshine and utilise stored rain water for growing a third crop, the scientist said, adding that 30 per cent of vegetables was grown in Kerala during summer, dried and stored for use in monsoon.

Prof. Pisharoty stressed the need to evolve a quantitative estimate of area's rainfall from satellite pictures and utilise space-age technology for flood forecasting and river stage forecasting.

FERROCEMENT DOORS TO SAVE WOOD

Scientists at the Central Building Research Institute (CBRI), Roorkee, have designed a highly-resistant ferrocement door which can reduce indiscriminate use of wood.

The ferrocement doors are resistant to rooting, swelling, warping, peeling, and attacks by moths and termites.

The doors are less prone to damage by fire and weathering, are joint-free and offer better dimensional stability.

According to preliminary calculations, each square metre of the new door is estimated to cost about Rs. 250.

The doors can be made both in double and single leaf configuration.

SOLAR-POWERED LIQUID-PISTON PUMP

A prototype "liquid-piston pump", powered by the sun's energy, is being designed by researchers in Ghana, West Africa. It works on the principal that a fluid (in this case, freon) can produce useful mechanical energy when it is repeatedly vapourized and condensed.

The pump consists of a cylinder separated into an upper and lower chamber by a flexible plastic membrane. The top chamber is filled with freon, a liquid

that vapourizes at a lower temperature than water. Immersed in the freon are an evaporator coil that circulates hot water and a condenser coil for cooler water. A solar collector powers the system by heating the water in the evaporator coil. The lower chamber houses the water being pumped. It has one flap valve to let water flow in from the supply and another to let water flow out to the elevated storage container.

Here's how one cycle of the pump works : (1) The solar collector heats the water in the condenser coil, causing it to circulate naturally (2) the liquid freon warms up and begins to evaporate and expand (3) as the chamber pressure increases, the flexible plastic membrane moves downward, forcing water in the lower chamber to flow through the outlet flap valve (the intake valve remains closed) (4) when the level of liquid freon drops below the bottom of the evaporator coil, evaporation ceases (5) meanwhile, cool water flowing through the condenser coil causes the freon to begin condensing back into liquid and (6) as the chamber pressure decreases, the membrane moves upwards, drawing water from the main supply through the inlet valve (outlet valve remains closed).

The cycle repeats itself over and over, giving rise to an undulating movement of the membrane and a flow of water to the storage tank.

PUMP USES WATER-POWER TO PUMP WATER

A water-powered pump for use in streams and rivers is anchored to a pole in flowing water and uses a propeller to force water through a hose to wherever it is needed. The product is innovative in that it requires no external energy source.

The Sling pump, as it is called, requires a flow of water running at a minimum of 0.4 m/sec and a depth of 25-30 cm. It is available in three sizes, with capacities ranging from 3,000 to 9,000 litres per day in water flowing at 0.65 m/sec. Several pumps can easily be harnessed together for a larger supply of water.

The pump, which needs virtually no maintenance, is said to be suitable for a wide range of applications, drinking water supply to permanent/holiday homes, watering cattle, irrigation water sampling and (with purification equipment) for military field use.

The pump was developed by Per-Olof Karlsson, a former mining foreman who lost his job in the 1983 steel and mining slump. The layoff gave him a chance to use his engineering background and put some of his own product ideas to test. The pump is selling well in northern Sweden and is even being exported to Somalia and Guinea-Bissau, where electricity supplies are underdeveloped. It is being marketed by JTM Produkt AB Box 51, S-980 21 Jukkasijarvi, Sweden.

Forthcoming Events

AFFORDABLE HOUSING

"US/UK Conference on Affordable Housing" will be held from July 6-7 at Queen Elizabeth II Conference Centre in London. Topics focusing on affordable housing in 1990s, will include : finance for rental housing, tax incentive for rental housing, local governments and nonprofits as providers, partners, or enablers of housing, and projections for housing for sale.

For further information contact :
Kadi Kurgpold
USC Law Centre
Los Angeles
California 90089-0071

PHOTOVOLTAIC SOLAR ENERGY CONFERENCE

"Ninth European Photovoltaic Solar Energy Conference and Exhibition" will be held in September 1989, at Freiburg, Federal Republic of Germany. This conference will cover all aspects of photovoltaic activities laboratory devices, complete photovoltaic systems, materials research, economic projections and industrial production.

For further information contact :
Professor G. Wrixon/
Dr. S. McCarthy
N.M.R.C., University College
Lee Mattings
Prospect Row, Cork
Ireland

DEGREE COURSE IN RENEWABLE ENERGY

Jordan Energy Institute is now offered a four year degree course in Renewable Energy. A 1.6 KW Photovoltaic system, a heat pump, a 60' wind power, and computer programmes are among the facilities on which students work while taking courses and using the 1200 volume special library for energy studies.

For further information contact :
Jordan Energy Institute
155 7 Mile Road
Comstock Park
MI 49321
USA, (616) 784-7595

WIND ENERGY CONFERENCE

The "European Wind Energy Conference" will be held in Glasgow, Scotland, from July 10-13, 1989.

For further information contact :
Prof. N Lipman
Energy Research Unit
Rutherford-Appleton Lab
Chilton, Didcot

DESIGN OF COMMUNITY FORESTRY

International Agricultural Centre (IAC) Wageningen will be organised an "International Training Course on Design of Community Forestry," from September 18-December 22, 1989, at the Netherlands.

The course will deal with forestry in the broader frame work of rural development, ranging from sylviculture to legal and institutional aspects, extension, planning and implementation. The course is designed for policy and training staff in developing countries. The basic requirement for admission is at least BSc level in forestry, agricultural or social science and 5 years in forestry or rural development.

For further information Contact :
Mr. Peter Laban
Director of Studies
P.O. Box 88
6700 A B Wageningen
The Netherlands

WIND POWER '89

"Wind Power '89" workshop will be held at San Francisco, from September 24-27. This meeting is for designers, developers, researchers, manufacturers, utiliy planners and governmental officials, to discuss the technology and application of wind power.

For further information contact :
AWEA
1730 N. Lynn St 610
Arlington VA 22209
USA

NATURAL RESOURCE MANAGEMENT FOR SUSTAINABLE AGRICULTURE

An International symposium on "Natural Resource Management for a Sustainable Agriculture" will be held from February 6-10, 1990 at Hyderabad. An international network for sustainable agriculture and resource management is one expected output from this symposium.

For further information contact :
Mr. R. P. Singh
Central Research Institute
for Dryland Agriculture
Hyderabad-500659

ABSTRACTING AND INDEXING

National Institute of Small Industry Extension Training (NISIET) will be organised "Eighth Short-term Intensive Training Programme on Abstracting and Indexing" at NISIET from July 17-28, 1989.

For further information contact :
The Registrar
NISIET
Yousufguda
Hyderabad-500045

FORESTRY FOR RURAL DEVELOPMENT

International Agricultural Centre (IAC) offers an International Training Course on "Forestry for Rural Development : New Approaches and Survey Techniques," every year in October-May at Enschede, The Netherlands.

The course is designed for foresters, agriculturist and others, with responsibility for the execution of Community Forestry Programmes and other rural projects with important tree components. This course emphasizes new approaches for the integration of trees in predominantly agricultural landscapes by using a participatory approach. The 8 month's course includes one month fieldwork in a tropical country.

For further information contact :
Dean of Students
ITC, P. O. Box 6
7500 AA Enschede
The Netherlands

POWER GENERATION FROM BIOMASS

Renewable Energy Centre, College of Technology and Agricultural Engineering, Udaipur will be organised a "Training Course on Power Generation from Biomass" sponsored by Department of Non-Conventional Energy Sources, Ministry of Energy, Govt. of India, at Udaipur, from August 21-24, 1989.

Topics to be covered in this training course are wasteland and EPP Programmes, Nursery and Plantation techniques, Biomass production, Organic wastes, Availability, Potential and Assessment Management techniques and Integrated power systems. Conceptualization of biomass energy syn-fuel and waste based integrated energy and power generation systems and their importance in present energy context. Energy conservation, conversion and utilization systems, socio-economic analysis, etc.

For further information contact :
Prof. A. N. Mathur
Course Director
Training course on Power
Generation from Biomass
Renewable Energy Centre
College of Technology &
Agricultural Engineering
UDAIPUR - 313001

News and Notes on Books and Publications

GRAMIN VIKAS KE LIYE PROUDYOGIKI

Appropriate utilization of science and technology is a essential ingradient for progress and development of any country. Laboratories of council for scientific and Industrial Research are doing their best to make techniques widely acceptable in the masses. The present document is a part of the effort in this birth centenary year of Pt. Jawahar Lal.

This book aims to create awareness about the technologies being developed for Rural Development and economic upliftment. The book is divided in four parts according to emerging subjects as living comforts. Opportunities for self employment, technology missions and developed agricultural techniques.

This document is useful and very informative for laymen. This efforts is quite appriciable and it will play a role in bridging gap between the labs and common people. You may ask for copies from :

Dr. M. C. Upreti, Project Officer
CSIR-Polytechnology Transfer Centre
Lucknow-226020.

"Gramin Vikas Ke Liye Proudyogiki" ed. by Dr. M. C. Upreti, Published by Council for Scientific & Industrial Research Delhi-110001, 1989-pp. 154, price unknown.

SEED POTATO PRODUCTION IN PHILIPPINES

This publication presents the work undertaken within framework of Philippine Ministry of Agriculture and Food and GTZ, West Germany.

The importance of potato as a food crop is well known in developing countries as well as in India. In Potato growing seed quality is of utmost importance for high yields. Healthy seeds are required on affordable costs to small farmers.

Conventional methods of potato seed production are time taking and expensive. To manage the traditional seed growing as organized cooperative and maintenance of health standard of the crop is very difficult in an agricultural environment in which small farms dominate.

As an alternative to the traditional seed propagation of potatoes, modern bio-technology methods may be applied for rapid multiplication to make available potato seeds on appropriate cost. A detailed study of such an implementation is described with all possible details of methods and processes.

In brief this publication is helpful for agricultural administrators and technicians in tropical countries to evaluate alternative seed strategies through the biotechnology.

"Seed Potato Production in the Philippines" by Dagmar Jeerdens-Roettger, Published by GTZ, Eschborn, Federal Republic of Germany, 1987, Pp. 114.

ENERGY PLANTATION IN WASTELAND

The ever–widening gap between demand and supply of fuelwood is one of the main factors causing deforestation and degradation. Energy Plantation on Waste lands is an important programme with potential not only to provide vegetation cover and check soil erosion but also to open up employment avenues in situ in the rural sector. Keeping in view the multiple uses of this activity, DNES initiated the Energy Plantation Demonstration Programme during the Seventh Five Year Plan. This Programme is being implemented through the State Nodal Agencies, Forest Department, Forest Corporations, State Departments, Research Institutions and Voluntary agencies.

The Gujarat Energy Development Agency (GEDA) selected Moti Sindhodi in Abdasa Taluka of Kutch District as one of the sites covering an area of 1000 ha of wasteland for energy plantation with financial assistance from DNES. In the face of all odds, such as shallow, depleted, and saline soils, scanty and erratic rainfall, brackish water, incessant grazing, etc. the plantation has come up well. The project marks a significant step forward in the afforestation of wastelands. Several hundred local labourers get employment daily in kutch area which has been hit by four successive droughts.

A study carried out by ORG on various facets of this Programme in Kutch is unique on several counts. The findings of this study have a baseline character in providing sites for formulation of policies on Energy from Wastelands.

The present booklet is of value to all those interested in the maximum and efficient utilization of bioresources in general and in Energy Forestry Programme on Wastelands, in particular.

"Energy Plantation in Wastelands", The case of Kutch-ORG Report (Operations Research Group, Baroda) 1988, Pp. 75, Rs. 60.

SELF EMPLOYMENT FOR DISABLED PERSONS : EXPERIENCES FROM AFRICA AND ASIA.

The authors of this book-one a small enterprise development specialist and the other a rehabilitation professional-have joined forces to see what disabled people can achieve as entrepreneurs and to examine the potential of self-employment as an option for those who want to and are able to earn their own living.

Written in simple language, the book is outcome of a survey of 53 businesses run by disabled people in several African and Asian countries. At its core are 16 case studies, showing in fascinating detail how the disabled entrepreneurs succeeded in self-employment, and highlighting the problems they faced. At the same time, a survey of 32 rehabilitation institutions is used to examine how far they served the needs of their disabled clients who chose self employment.

The books calls into question much of the conventional wisdom about disability, provides encouragement to disabled entrepreneurs and to institutions serving them, and suggests a fresh approach to rehabilitation. It contain valuable advice forl planners and rehabilitation professionals in developing countries and presents a spectrum of new possibilities for practical and appropriate services designed to promote self-help and economic self-reliance for disabled people.

"Self-Employment for Disabled Persons : Experiences from Africa and Asia." by Malcolm Harper and Willi Momm. Geneva, ILO, 1989 ; viii+85 pp. annexes. 15 Swiss francs.

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Publications List, 1989.

1. Rural Technology : Report of National Seminar, 1981, 20 papers on Rural/Appropriate Technology,

   English pp 268 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 feature : 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. Papers and proceedings of National Workshop on Energy from Agricultural Residues, 1985 : Back ground paper, recommendations, keynote & valedictory address and 28 papers on the topic.

   English pp 208 Rs. 200/-

6. Papers and proceedings of National Workshop on Decentralised Energy Planning for Rural Development : recommendations, keynote & 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, Wind Mill, Agriculture marketing, Water lifting devices etc.

   English pp 235 Rs. 225/-

8. Course synopsis of ISTE : Manual of Training Programme on Renewable Sources of Energy for Porject Officers of Non-Conventional Energy Development Agency, Government of Uttar Pradesh, 1987, 13 papers on Biogas, Biomass, Solar energy, Cookstove, Human & Draught Animal Power, Aero-Generator, etc.

   English pp 196 Rs. 200/-

9. A case study on Smokeless Cookstove.

   English pp 32 Rs. 25/-

SEND ORDERS TO :

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RURAL TECHNOLOGY JOURNAL

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Rural Technology Journal is published by Information Services Division, Centre for Development of Rural Technology, Institute of Engineering & Rural Technology, Allahabad (India). The purpose of the Journal is to provide a forum for exchange of views, information and create awareness in the field of Rural Technology, it's 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 communites. The Journal is divided into following main sections :

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 Workshops etc.)
5. Book Bag — (News on Books and Publications).
6. Workshop — (Technical Queries)

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There is no limit to the length of contribution but it is suggested that a maximum of 6000 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 Inter-national 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 1½" 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-alph-abetical characters) and followed by the author's name, affiliation and address.
5. Internationally accepted standard symbols should be used. In the list of symbols Roman letters should precede lower case.
6. Grahps, charts, drawing sketches and diagrams should be black and white prints on glossy paper and preferably 3½"×7" size.
7. Illustrations should be numbered consecutively, given proper legends and should be attached at the end of the manuscript.

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