



REPORT
OF
THE COMMITTEE
SET UP
TO STUDY THE SCOPE AND
POSSIBILITIES
OF
INTENSIFYING COMPOST
PROGRAMME
IN
THE COUNTRY

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ANNING COMMISSION NEW DELHI

**REPORT OF THE COMMITTEE
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Introduction

In pursuance of the decision taken at a meeting held in the Planning Commission on 3rd October 1966 to consider the note of the Ministry of Food, Agriculture, Community Development and Co-operation on 'Compost Programme in India', the Planning Commission set up a Committee under the Chairmanship of Shri K.A.P. Stevenson, Joint Secretary, Planning Commission to study the scope and possibilities of intensifying compost programme in the country.

2. The constitution of the Committee is given at the end. The Committee had the benefit of the advice of Shri B.S. Seth, Joint Secretary (Agriculture), Planning Commission.

3. The Committee was asked to study the following problems and recommend measures that should be taken for intensifying the compost programme:

- (a) Mechanical composting in bigger towns.
- (b) Utilisation of waste and by-products of agriculture including forestry, animal husbandry, fisheries and industrial wastes for the preparation of manure.
- (c) Conservation of cow-dung through
 - (i) Popularisation of cow dung gas plants.
 - (ii) Plantation of quick-growing fuel trees.
 - (iii) Use of soft coke in rural areas and small towns.

4. The Committee held a number of meetings and formed sub-groups to study the above problems. The draft reports of the sub-groups were discussed by the Committee and the report finalised in the light of the suggestions/modifications made by the various members of the Committee. The report of the Committee is divided into the following parts:—

- (i) Mechanical composting in bigger cities.
- (ii) Conservation of cow dung through plantation of quick-growing fuel trees.
- (iii) Conservation of cow-dung through use of soft coke in rural areas and small towns.
- (iv) Conservation of cow-dung through popularisation of cow-dung gas plants.
- (v) Utilisation of wastes and by-products of agriculture including forestry, animal husbandry, fisheries and industrial wastes for the preparation of manure.

5. Since each part of the report is fairly brief and concise and the main recommendations are mentioned therein, no separate summary of the recommendations is enclosed.

6. The Committee desires to acknowledge the cooperation extended and valuable suggestions given to the Committee by Shri A. Oswald, Assistant Inspector General of Forests, Shri Ibne Ali, Director (Agriculture), Department of Community Development, Shri Jashbhai J. Patel, Khadi & Village Industries Commission and Shri K.G. Bhatia, Research Officer, Resources Division, Planning Commission. The Committee also wishes to place on record its appreciation of the excellent work done by Shri L.L. Sarin, Senior Research Officer, Agriculture Division, Planning Commission who worked as Secretary of the Committee and helped greatly in the preparation of the Committee's report.

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PART I—MECHANISED COMPOSTING IN BIGGER CITIES

The new strategy for agricultural development in India lays considerable emphasis on the use of fertilisers in increasing agricultural yields. The intensive use of soil nutrients such as chemical fertilisers will lead to a deterioration in soil conditions unless it is counter-balanced by the use of organic materials such as compost. Any scheme, therefore, which increases the availability of compost assumes priority in the context of the urgent need for increasing agricultural production in the country.

2. The composting of urban waste has been recognised all over the world as a sound system for its disposal both from the point of view of sanitation as well as the supply of rich organic matter for agriculture. The conventional method (Bangalore Method) of composting urban waste in vogue in the country involves a combination of aerobic and anaerobic processes which require four to six months for decomposition. The various operations associated with it are performed through manual labour. While towns and medium-sized cities have generally adopted this system with success, it is in the big cities that the conventional method of composting has faced several problems due to the non-availability of land for composting grounds, inadequate and reluctant labour for composting operations which involve human contact with filthy and obnoxious materials, and lastly the low grade quality of compost produced. The result is that municipal corporations resort to means of disposal of their urban waste other than composting and a great deal of urban garbage which can be usefully converted into organic manure through composting is completely wasted.

3. If composting has to be encouraged in the larger cities, the traditional method will not be suitable and mechanical composting which will eliminate some of the problems mentioned above may prove effective not only in serving as a means of disposal of part of the urban waste but also for providing the country with large quantities of organic manure to supplement the fertiliser programme. Apart from such problems as finding suitable land for disposing refuse through land-fill or dumping, lack of covering material etc., mechanical composting, apart from providing some income to the local body provides a good quality hygienic manure eminently suitable for agriculture. The obvious advantages of mechanical composting are:— (a) sanitary control with odour proof devices, (b) working both in dry and wet seasons, (c) recovery of discarded materials like metal, glass, rags, etc., and (d) high grade compost quality in a short-time.

4. The Committee has taken note of the limitations of mechanised composting as a means of disposal of the entire urban waste, of the city; at the most only 50% of the refuse would be compostable and the city will still have to dispose of the other 50% which is not compostable, by traditional methods. So far as the night soil and sewage is concerned, only a very limited quantity of raw sewage or sludges from the sewage treatment plants can be utilised in the compost plant for moistening the city refuse and the bulk of sewage or sludge will have to be continued to be disposed of through normal methods. Thus, mechanised composting can at best, solve disposal of city wastes (including sewage-sludge) only partially. Its importance is, therefore, in the main for agriculture.

5. Compost plants are now arousing particular interest in the countries whose economy is based on agriculture. Israel has built what is known to be the largest compost plant in the world. The plant is to cater to the manurial needs of horticulture. It is designed to cope with all the domestic refuse from Tel-Avi (500 tons in one shift of 8 hours). The second largest plant has been built in Bangkok (Thailand). The plant is planned to play an important part in increasing substantially the yield of rice in that country. *The Committee is of the view that there is also good scope for setting up compost plants in this country.*

6. No cost data on the actual working of a compost plant in the country are available. The capital cost of composting plants of a number of European installations have been reported to be £3,400 to £9,230 per ton capacity and £2.50 to £4.00 per ton for operating costs. This data cannot be taken as applicable to Indian condition as there are many factors such as the foreign wage scale, fuel and lighting rates etc., which do not permit of direct comparison. Questions concerning the type of compost plants (degree of mechanisation), the size of the plant and operational efficiency are also involved and these make accurate assessment of operation costs rather difficult. Comparative cost estimates for establishing compost plants as given by various manufacturing firms are given in *Appendix I*. The cost per ton of the finished compost as estimated is also given. According to this data, the capital cost of a 100 ton capacity plant varies from Rs. 18.21 lakhs to Rs. 35 lakhs depending upon the degree of mechanization. Operation cost has been estimated to vary from Rs. 10.00 to Rs. 28.00 per ton of compost produced. A scrutiny of the data, however, shows that in estimating the cost per ton of finished compost, the expenditure on different components vary considerably from firm to firm. For example, the cost of electricity and fuel varies from Rs. 14,600 in the case of estimates given by Messrs Dorr Oliver to Rs. 1.22 lakhs estimated for the Dano-Plant. The data furnished is so varying that it is difficult to assess accurately the operational cost of a mechanized compost plant.

7. Ordinary compost fetches as high as Rs. 8.00 to Rs. 12.00 or even more per ton in areas of intensive farming. It would be safe to assume that finished compost of good quality can be sold at a price of about Rs. 18.00 per ton ex-plant. In addition, compost also provides valuable organic matter and micro-nutrients to the soil. The delivered cost of one tonne of this compost to a distance of upto 30 miles from the plant has been worked to about Rs. 33.00. The potential return from the sale of compost can be much more, if side by side with production, an adequate business organisation, packaging, advertising, selling and distribution are also pressed into service. While bulk disposal is obviously easier, better financial returns can be obtained by selling compost in small quantities, for example, in bags to cater to the needs of sub-urban vegetables growers and city gardeners. This would require production of compost in varying grades, one for agriculture, a finer quality for gardening and nursery and a super grade for lawns, parks and play-grounds and public places.

8. *In the light of the limited data available on the capital costs, operational costs and production costs of compost by the mechanical composting process, the Committee is of the view that a full scale programme of installing mechanical composting plant in the cities in the country should await a critical study of these plants from the point of view of both the economic angle and operating efficiency under Indian conditions.* The Committee had the bene-

fit of the views of Mr. John L. Beckett, Colombo Plan Adviser on Composting in India. A copy of the interim report submitted by him is enclosed, as Appendix II. He felt that any one plant of a particular type may not give a true impression of the problem involved.

9. *The Committee recommends that pilot plants of more than one type should be set up in 3-4 selected cities to evaluate the most suitable plant for Indian conditions and economy.* On the basis of such a study, a plant can be properly designed to meet the local requirements in terms of capacity, processing etc., so as to ensure over-all economic operation and production of compost best suited to the local agricultural requirements. Taking note of the work that has already been done on the subject of mechanical composting by the Central Public Health Engineering Research Institute (CPHERI), Nagpur, *the Committee recommends that CIPHERI should be associated both during the erection stage as well as the operational stage of the pilot plants.*

10. According to the investigations conducted by the CIPHERI and the comparative data collected from the interested firms by the Food and Agriculture Ministry, the Committee estimates that the capital cost of a pilot compost plant will be of the order of Rs. 30 lakhs. However, the exact estimate of the capital cost will become available only after the tenders are invited for the plant.

11. The Committee had the benefit of *discussions with the Secretary (Agriculture), Government of Maharashtra* who informed the Committee that the compost plant could be constructed in the country entirely with indigenous material. One of the manufacturer also has stated that the plant could be fully fabricated in India while a few other manufacturers have mentioned that foreign exchange of Rs. 3 to 5 lakhs would be required to import essential components of a compost plant. It is possible that this foreign exchange component can be substantially reduced subsequently by resorting to indigenous manufacture. The representative from the Central Mechanical Engineering Research Institute has suggested that these components for the pilot plant, which would normally require foreign exchange, could be manufactured in this country by them and such of the successful tenderers who need some foreign exchange for their plant could get in touch with the CMERI for local production. Any foreign exchange which is still needed may be allocated on the recommendation of the CMERI. Mr. Beckett felt that some portions of these plants which have been evolved over a number of years by the particular manufactures, with consequent improvement in their performance, might require to be imported so that advantage may be taken of the improvements recently introduced. This would, however, not be a high proportion of the total cost of any plant. The Committee sees force in this argument.

12. In the initial stages of development of this programme, it may be necessary to give incentives to the Corporations which volunteer to set up mechanical composting plants. The Corporations would have to provide the necessary land and services such as water supply, electric power, drainage etc. and other facilities to run the plants. Moreover, they will have to bear the entire operation and maintenance cost of the plant. They would also undertake the responsibility for systematic collection of refuse to make mechanical composting plant run to its full capacity. *The Committee*

would, therefore, recommend that, for the pilot projects, the Municipal Corporations should be provided financial assistance on the basis of 50% loan and 50% grant from the Centre for capital equipment only.

13. *The Committee also suggests that the help and guidance of the Central Public Health Engineering Research Institute in this programme would be useful in the initial stages. They would provide full consultative assistance in the plants during the pilot project stage and would be responsible for the collection of data on all aspects of the operation of the plant and on the preparation of a comprehensive report, which would guide future policy.*

14. The Government of Maharashtra are of the view that in the initial stages of development, it might be necessary to subsidise the cost of the transport by the State Government and/or by the railways beyond a certain distance so that the compost produced is fully utilized.

15. *To watch the progress of the pilot project from agricultural, health, and engineering aspects, an Advisory Committee might be set up by the Ministry of food and Agriculture. To assist this Advisory Committee in the pilot project stage and to implement the future expansion on the basis of results obtained from the pilot project, it would be necessary to strengthen the present staff in the Ministry of Food and Agriculture by appointing a Special Officer having experience in mechanical composting.*

16. The Working Group, which discussed the Draft Fourth Five-Year Plan of various State Governments, recommended the establishment of 25 mechanical composting plants to be installed in the Fourth Plan period. In the light of these recommendations, State Governments have already been asked to make financial provision for these plants in their respective State Plans. As some of the State Governments have provided funds for the establishment of such plants, the pilot projects programme can be taken up immediately. *The Committee, however, recommends that the installation of mechanical composters on a general scale should only be taken up when adequate data from the pilot projects, become available and every effort should be made to get the mechanical composting programme underway during the last two years of the Fourth Plan period.*

17. The scope of work of the Committee was to recommend measures for intensifying the compost programme, the actual terms of reference were however mainly confined to mechanical composting in bigger towns. Measures for intensifying the composting programme have, however, to take note of not only the big towns, but also the medium size and small towns where substantial quantities of compost manure can be produced. The success of the composting programmes in medium size and small towns is very much dependent upon the efficient collection and removal of solid and liquid wastes by the local bodies to the composting sites. Thus, operationally drainage and sanitation programmes of urban local bodies which come under the purview of the Health Ministry are closely linked with the composting programmes handled by the Agriculture Ministry. The Committee feels that there is need to examine how best the programme of the two ministries in these areas can be fully co-ordinated and improved operationally and urges that appropriate steps be taken towards that end by the two Ministries.

COMPARATIVE COST ESTIMATES OF COMPOST PLANTS*

	<i>Mechanised</i>		<i>High Mechanised</i>	
	Buhler plant cap 150 tons/ day (M/s.Lar- son & Tou- bro Bombay)	M/s. Dorr Oliver Bom- bay Cap. 100 tons/ day	Deptt. of Agri. Con- ventional type Cap. 100 ton/ day.	Dano plant (100 tons capacity) (Reported by the Minis- try of Health)
1. Capital Cost (Machinery Bldg.)	Rs.18.21lakhs	Rs.25.08lakhs	Rs.24.00lakhs	Rs.35.00lakhs
2. Depreciation costs and interest	Rs.1.82 lakhs	Rs.1.92 lakhs	Rs.2.77 lakhs	Rs.3.05 lakhs
3. Expenses on personnel	Rs.0.86 lakh	Rs.0.23 lakh	Rs.0.30 lakh	Rs.0.32 lakh
4. Electricity&Fuel	Rs.0.36lakh	Rs.0.146lakh	Rs.0.30lakh	Rs.1.22lakhs
5. Maintenance	Rs.0.10 lakh	Rs.0.15 lakh	Rs.0.325 lakh	NA
6. Cost per ton of finished compost	Rs. 10.00	Rs. 10.60	Rs.18.00	Rs.26.00
7. Estimated recovery	60%	65%	60%	50%
8. No. of working days	300 days	365 days	286 days	340 days
9. Rate of depre- ciation on machinery	10.0%	3.3%	10.0%	NA
10. Revenue by sale of scrap iron & other rejections	Rs.0.45 lakh	NA	Rs.0.30 lakh	Rs.0.18 lakh

*NOTE: The data given is as furnished by the various Firms. For comments please see paragraph 6 page 2.

Interim Report of Mr. John L. Beckett, K.I.C.E.M.I. Mach. E.M.I. MUN—E.M.T.P.I., Engineer and Planning Consultant, on investigations relating to Mechanical Composting.

In connection with my assignment under the Colombo Plan on Mechanised Composting, I understand that the Government of India would like to have an interim report on the investigation carried out during my brief visit to India. In the first place, I should like to say that I have received every assistance from the various officers of the Central Administration, State Departments and Municipal authorities wherever I have had the occasion to meet them, particularly Mr. L.S. Yadava, Technical Officer (Compost & Sewage) and Mr. Khanapurkar of the C.P.H.E.R.I. who have been a most closely associated with me in these investigations.

2. The advent of national elections, unfortunately, caused some period prior to those elections, to be useless in respect of meeting Municipal officials in some areas as originally planned, but I have nevertheless obtained a representative knowledge by studies of the problem in Nagpur, Delhi, Hyderabad, Chandigarh, Amritsar, Poona, Bombay, Rourkela and Calcutta.

My investigations have already revealed differences in the disposal of refuse and sewage both from the point of view of the method employed and the control given to this operation and also the means adopted to make compost. These factors amongst others create a marked difference between the prices at which compost and sewage sludge is sold at present.

3. The use of mechanical methods for composting will require the following points to be considered:—

- (a) The economics of the proposal.
- (b) The question of better Health and hygiene in disposal systems.
- (c) Difficulties in finding suitable sites for disposal which may entail considerable haulage of refuse.
- (d) The availability or otherwise of labour for the less attractive operations inherent in this type of work.
- (e) The extent of the demand within a reasonable distance for the disposal of any compost or sludge.
- (f) To what extent the sale price takes into account assistance to agriculture.

These conditions I find vary according to the location and will probably suggest the use of two or three different types of plants varying in extent of their mechanization and method of working.

4. When mechanised composting is being considered a material factor (from the purely financial aspect) may be the extent to which any of the machinery required can be manufactured in this country. From information I have already received in discussions with manufacturers or suppliers, it

would appear that it should be practical for at least a major portion of most plants to be manufactured in India, but I will be able to finalise ideas on this aspect of the work on my return to the United Kingdom after further discussions with the parent producers of different plants.

I rather anticipate that some portion of these plants which have of course, been evolved over a number of years by the particular manufacturers, with consequent improvement in their performance, may require to be imported in order that it may work to its best advantage but I do not think that this should be a high proportion of the total cost of any plant.

5. It would, therefore, I consider be inadvisable to insist on pilot plants being completely manufactured in this country if the manufacturers would prefer some portion to be imported, as it would not be to the advantage of the Government of India to assess the capability and advantages of mechanical composting from a complete pilot plant indigenously manufactured and lacking the tried experience of some vital part of the plant which the present manufacturers would rather import. To this extent foreign exchange may be required but I shall consider the point more fully after discussions on my return to the United Kingdom.

6. In view of these factors still to be considered on return my final report will probably be not available for a few months and as very few persons in India have seen plants in operation, it would be advantageous if the technical officers who have been so closely associated with me during my investigations were allowed to visit countries in Europe such as Denmark, Holland, and Britain where various types of plants are operating as they would then have a clearer understanding of any of my final recommendations and would also obtain valuable information in respect of the methods of distribution and marketing of the compost produced.

Sd/- John L. Beckett

20-3-67

Colombo Plan Adviser on Composting

PART II—CONSERVATION OF COW-DUNG THROUGH THE SUPPLY OF FUELWOOD

The Problem

The Energy Survey of India Committee has estimated that about 102 million tonnes of firewood are consumed annually (1965) in this country. This accounts for about 40% of the total energy consumed in India. The demand is expected to rise to 128 million tonnes by 1970-71 and 163 million tonnes by 1980-81.

2. In addition to fuelwood, cow-dung is another important traditional and non-commercial source of energy in the rural sector. While there is no doubt whatsoever that the best use of cow-dung is as a fertilizer in agriculture, about 25% (55 million tonnes) of the available cow-dung is consumed as a fuel. The replacement of this cow-dung as a fuel is only possible if some alternative but cheap source of fuel is made available to the consumers. Present indications are that commercial fuels cannot replace the non-commercial ones in the rural sector in the near future and therefore, reliance has to be placed on the substitution of cow-dung by fuelwood. To replace the 55 million tonnes of cow-dung now consumed as fuel, it would require the availability of an additional quantity of about 23 million tonnes of fuelwood per annum at the present level of cow-dung consumption.

3. Against the estimates of existing and perspective demands, the position of supplies of fuelwood presents indeed a serious problem. Official statistics indicate that of the 102 million tonnes of fuelwood consumed in 1965 about 10% only is recorded as having come from areas classified as forests and 90% from unrecorded sources. The figures of recorded removals from forests appear to be low as they do not include fuelwood removed in head-loads either from or on nominal payment, from forests adjoining villages or cultivation, by right holders and concessionaires. But there is no doubt that a major part of the fuelwood consumed comes from outside the forest areas and it is feared that this source is being rapidly depleted because there have been no systematic attempts to replenish the fuelwood cut annually in such areas.

4. The fuel problem is generally most acute in densely populated rural areas where supplies within easy reach have been exhausted by over exploitation in the past, and commercial fuels are less easily introduced than in urban areas.

5. As the demand for land for agriculture increases, the forests recede and are relegated to the less fertile areas such as all hilly, undulating or those which have not been encroached upon due to the legal protection accorded to them. As a result of this the forests are now mal-distributed. In agriculture-intensive areas where the demand for fuelwood is greatest, the cost of transportation from forest areas makes its use prohibitive, and recourse is taken to burning cow-dung. There is, therefore, a particular need in such areas for fuelwood to be grown within easy reach of the people who use it. It has to be made available at a nominal cost failing which cow-dung which is more readily available (though scientifically uneconomic) in such areas, is utilised.

6. The Forest Departments are engaged in raising large scale plantations which are primarily oriented to meet the requirements of rapidly expanding wood-based industries. Such plantations would also add to the supplies of fuelwood both from the forests being cleared for the plantations as well as from the loops, tops and branchwood which would be available from some of these plantations when they are harvested. But the effect of these plantations on the fuelwood problem would be negligible since they are not likely to be within economical distance of the fuelwood consuming centres. The possibility of converting the wood into charcoal exists, but the quantity of fuel which would become available from this source would not materially affect the problem.

7. The activities of the State Forest Departments are also restricted to the areas under their control since they can better protect the plantations. But such areas are not always favourably situated with respect to the consuming centres in the rural sector. What is, therefore, necessary is an agency to raise fuelwood plantations on village waste lands, canal banks, roadsides, railway embankments, bunds of fields etc. In many States the Forest Departments have already taken over the work of planting trees along major roads, canals and railway tracks. Though these plantations may help in increasing the availability of fuelwood, the object behind them is not primarily the supply of fuelwood, and the age at which the trees are harvested is, therefore, much greater than would be warranted for fuelwood. The species chosen for such plantations are also not always suitable for fuel, viz., shade trees are preferred for road avenues, and industrial wood is grown along canal banks. It is, therefore, evident that if the fuelwood problem is to be mitigated, the emphasis would have to be on raising fuelwood plantations of suitable quick-growing species (which can be harvested after 15-20 years) on village waste lands, village roads, bunds of fields etc. The fuelwood from these plantations would be cheap in that little or no transportation would be involved. The availability of suitable land for this purpose, would however, constitute a serious problem as such lands are already in use for the grazing of livestock, exercise of cattle etc. and are generally so degraded that it would necessitate a much higher outlay per unit area for planting. Further, the ownership of such lands being with the community, watch and ward becomes a problem. The plantations would have to be specially protected against livestock, necessitating expensive protective measures. Such areas are also scattered and small in size which further increases the cost per unit area.

8. The agency for raising these plantations would have to be one which has the technical know-how and can, at the same time, enthuse the villagers in not only planting up these areas but also in protecting the plantations.

Action taken:

9. The problem of supplying fuelwood to the villages has long been recognised. As far back as 1883, it was felt that land should be acquired for the purpose, but little constructive action was taken on this. In 1928, the Royal Commission on Agriculture recommended specific measures to meet the problem but except for sporadic efforts by a few individual States, nothing tangible was done.

10. It was with the introduction of the Five Year development plans that the problem came to be viewed with the seriousness that it deserved.

The Planning Committee set up for the Five Year Plans recommended the extension of tree lands and establishment of village plantations to meet the fuelwood problem. It was during this period (1951) that the festival of *Vanamahotsava* was also introduced to encourage growing of trees by individuals and institutions, both public and private. The emphasis was on the systematic growing of trees in rural areas. Again, in the Second Five Year Plan, proposals were mooted to plant up village lands. These efforts also did not meet with any success.

11. In the Third Five Year Plan, a separate scheme on 'Farm Forestry' was formulated with the object of raising fuelwood plantations especially near consuming centres. The scheme was included in the State sector and as an incentive, a grant of 50% was approved by Government of India as financial assistance for the scheme, to the States implementing it. This assistance was based on the cost of raising the planting material which was estimated to be about Rs. 25 per acre. The assistance was, therefore, limited to Rs. 12.50P. per acre. The target for the Third Plan, under the scheme was 12.5 lakh acres. The scheme, however, did not make any appreciable headway and it is reported that by the end of the Third Plan about 50,000 acres only (chiefly in Madras State), were planted.

12. The principal reasons for the poor progress made in the scheme was the paucity of resources for it and the low rate of subsidy mentioned above. The agency for implementing the scheme was not well organised and no survey was carried out to indicate the areas available for planting.

13. Since the economic returns from fuelwood plantations are limited to what the consumer can bear (which in this case is negligible), the scheme was not given the importance it deserved in the State development programmes. The Forest Departments have a tendency to divert funds allocated for Farm Forestry to other more remunerative schemes. Or, in the event of any financial stringencies, the funds for this scheme are the first to be reduced.

14. The subsidy sanctioned for the scheme was so poor that it did not serve as an incentive either to the State or to the panchayats and individuals implementing it.

15. The agency for implementing the scheme was originally the State Forest Departments. When it was realised that the emphasis was to be on planting up of village waste lands, bunds, irrigation tanks etc., the scheme was transferred to the State Agriculture Departments and was to be implemented through the agency of the Community Development organisation. However, it was generally left to the State Governments to decide on the agency they felt most appropriate for the purpose. It was subsequently decided (1964) that the responsibility for implementing the scheme should be that of the State Forest Departments. These changes further inhibited progress.

16. As mentioned earlier, no proper survey to identify the areas to be planted up was undertaken, with the result that sporadic and dispersed plantations which were attempted in some States did not give any practical results. It was necessary to identify large compact blocks of waste lands and to plant these systematically, leaving the smaller blocks, village road avenues, plantations on bunds etc. to the panchayats and individuals.

17. The scheme being implemented in the Third Five Year Plan was discussed at the 3rd meeting of the Committee of Secretaries of the Agricultural Production Board held on 13-2-1964 where it was decided that the State forest departments should be made responsible for the overall implementation of the programmes. The rate of financial assistance for the scheme was also considered inadequate. The recommendations of the Committee were accepted by the Agriculture Production Board.

18. Subsequently, at a meeting in the Ministry of Food and Agriculture on the 17-7-1964 which was also attended by representatives of the erstwhile Ministry of Community Development and Panchayati Raj, the following decisions in regard to implementing the scheme were taken:—

- (i) Forest Departments should rear the seedlings and supply them for the plantations;
- (ii) Suitable chunks of land which are adjacent to reserved forest areas should be handed over to the Forest Department for this purpose;
- (iii) Where there are large areas of land (50 acres or more) which are lying waste but which can be used for afforestation, the panchayats, if these lands are in their possession, or the Revenue Department, should hand them over to the Forest Department for purposes of plantations. Forest Department will endeavour to create interest amongst the panchayats or blocks situated in their jurisdiction and to obtain their cooperation in the work.
- (iv) Where, however, any panchayat is capable of undertaking the job, seedlings and technical guidance should be provided to it by the Forest Department and the raising of plantations may be left to be done by them. Similarly, individual farmers who are interested in Farm Forestry should be encouraged and helped.

19. The scheme was again discussed by the Sub-Committee of the Central Board of Forestry on Afforestation of Waste lands, etc. at their meeting in September, 1964. It was recommended *inter alia*, that the plantation programme of the Forest Department including that of fuelwood plantations should be extended to include also, areas not under the management of that Department, as a Centrally sponsored scheme. Under this scheme, the Government of India should meet the cost upto Rs. 200 per acre. Where the areas are placed by the Gram Sabhas and panchayats at the disposal of the Forest Department for raising such plantations, the ownership will remain with the panchayats concerned and the benefits will accrue to them. Where the panchayats want to undertake the work themselves, the Department will be required to provide the planting and fencing materials and know-how upto Rs. 80 per acre. Similar facilities or benefits will also be given to individuals who may undertake to plant fuel wood trees on their holdings.

Proposals

20. In pursuance of the above decisions, while drawing up the proposals for the Fourth Five Year Plan, the Working Group on Forestry in the Ministry of Food and Agriculture originally included under the scheme "Farm Forestry-cum-Fuelwood Plantations" a provision of Rs. 22 crores to plant up an area of 12.5 lakh acres (5 lakh hectares) during the Fourth Plan period. (Another 12.5 lakh acres was to be afforested under the soil

conservation programme). Because of paucity of funds, this allocation was reduced to Rs. 11 crores. The Working Group recommended that the scheme should be a Centrally sponsored one to be operated by the Forest Department through the agency of Community Development Organisation, where necessary; the pattern of assistance would be 100% grant limited to Rs. 200 per acre where the Forest Department would raise the plantations and Rs. 80 per acre where the panchayats or individuals would raise the plantations themselves. The scheme would be operated on the lines decided at the meeting held in the Ministry of Food and Agriculture on 17-7-1964.

21. Eventually, because of lack of funds, the Fourth Plan allocation for this scheme was reduced to Rs. 4 crores with a physical target of nearly 2.4 lakh acres (1.8 lakh acres to be planted up by the Forest Departments and about 0.625 lakh acres by the panchayats etc.). The scheme was to be included as a Centrally sponsored one in the Fourth Plan to ensure that adequate funds would be available to the States for its implementation but it has now been decided by the Planning Commission in consultation with the Ministries of Food & Agri. and Finance at the instance of the States that the scheme should be transferred to the State sector. Unless funds over and above the State plan resources are made available for the scheme, it is unlikely that many States would implement it on an adequate scale.

22. It is understood that in Punjab, a beginning has been made to survey the available land for farm forestry in three districts and the State Forest Department have appointed special extension staff to implement the scheme with the cooperation of the farmers. This example could be emulated in other States provided funds are made available for the appointment of special staff for extension work. This could best be ensured by if Central assistance is specifically earmarked for the programme.

23. Even if this revised scheme with an allocation of Rs. 4 crores in the Fourth Plan is fully implemented, the yield of fuelwood raised in the plantations (which is estimated at about 15 lakh tons annually), would hardly meet the problem, but the implementation of even this small programme is necessary to ensure that should adequate funds become available subsequently, there would be an organisation to implement a larger programme.

24. It has also to be borne in mind that as the land which would be available for these plantations would invariably be poor and degraded, the yield per acre of fuelwood would be low in the initial rotation but would increase in subsequent rotations. The initial investment in the scheme would be comparatively high and the financial returns low since the farmers would not be in a position to bear the prices of fuelwood based on the amortisation of the investment. Where necessary, the supply of fuelwood would have to be subsidised.

25. While efforts would be made to increase the coverage of the scheme, its actual impact on the fuelwood problem in the rural areas would be limited and it would not be possible to substitute cow-dung by fuelwood to an appreciable extent in the near future. But in the absence of any other source of fuel, in the rural areas during the next two to three decades, a serious attempt to extend fuelwood plantations would have to be made. The recommendations of the Energy Survey of India Committee on the subject are pertinent

“We fear that if there are no immediate steps taken, shortage of firewood will cause grave hardship and lead to much larger demands for kerosene than Indian potential imports are likely to be able to provide. We recommend that immediate and active measures be taken jointly by the Government of India and the State Governments to formulate and implement a policy for expanding the growth of quick-growing timber suitable for use as firewood.”

26. In para 184 of its report, the Committee has further stated “There are various measures open to the Government of India to discourage the use of firewood, particularly in the towns, and to encourage the substitution of commercial fuels. Such measures include the possible uses of taxes or octroi duties on the one hand, and the stimulation and even the temporary subsidisation of alternative commercial sources of energy on the other.”

Recommendations

27. The recommendations of this Committee, in brief are as follows:

1. Fuelwood plantations are an urgent need in rural areas, particularly in or near agriculture intensive areas where the demand for fuelwood is greatest and supplies negligible.
2. Suitable waste-lands around villages, bunds of fields and tanks, compounds of schools and community buildings, village road-sides etc. should be earmarked for raising trees for Farm Forestry. This would minimise transportation costs.
3. The scheme ‘Farm Forestry-cum-Fuelwood Plantations’ formulated for the Fourth Five Year Plan by the Department of Agriculture, Ministry of Food and Agriculture, should be a Centrally sponsored scheme with 100% grant from the Centre. The allocation for the scheme in the Fourth Five Year Plan namely Rs. 400 lakhs should be maintained as a minimum outlay required for the scheme.
4. The scheme should be implemented by the State Forest Departments with the cooperation of Community Development Organisation, and the Revenue Department.
5. A systematic survey, of waste-lands should be undertaken in all States to identify the areas which can be planted up with fuelwood species, at a reasonable cost.
6. After this survey suitable large chunks of waste-land which are adjacent to forest areas should be handed over to the State’s Forest Deptt. for raising fuelwood plantations of suitable quick-growing species, under this scheme.
7. Where there are large areas of land, 50 acres or more, which are lying waste and not adjoining forest areas but which can be afforested, the panchayats if these lands are in their possession or the Revenue Deptts. should hand them over to the Forest Department for purposes of fuelwood plantations. The Forest Departments will endeavour to create interest among the panchayats or blocks situated in their jurisdiction and obtain their cooperation.

8. Where, however, any panchayat is capable of undertaking the plantation work, seedlings and technical guidance should be provided to it by the Forest Department and the raising of plantations and their subsequent protection may be left to be done by them. Similarly, individual farmers who are interested in farm forestry should be encouraged and helped.
9. The Forest Departments should build up a suitable extension wing to advise on and supervise the plantations raised on village lands, whether belonging to the panchayats or individuals.
10. Where plantations are raised by the Forest Deptt. the Central Grant should be at least Rs. 200 per acre; where panchayats and individuals raise the plantations, they should be given assistance upto Rs. 80 per acre.
11. In rural areas where there is no possibility of raising fuelwood plantation because of the unavailability of suitable plantable land, the supply of fuelwood from nearby forest area should be subsidised to discourage cow-dung being used as a fuel.
12. The use of fuelwood in the urban areas should be discouraged by such methods as imposition of taxation and where possible even subsidisation of alternative commercial fuels.
13. Industrial units should also be dissuaded from using firewood as a fuel.

PART III—CONSERVATION OF COW-DUNG THROUGH THE USE OF SOFT COKE IN RURAL AREAS AND SMALL TOWNS

It is universally recognised that the use of cow dung as domestic fuel is wasteful as compared to its use as manure. In the context of the urgent need to increase agricultural production the desirability and need to conserve cow dung for use as manure has assumed added importance.

2. The Energy Survey of India Committee have estimated that about 25% of the total production of cow dung was consumed as domestic fuel in 1962-63 and this is likely to rise to 33% in 1970-71; the Committee have estimated that nearly 1160 million tons of wet-dung or 230 million tons of dry dung were produced in 1962-63 out of which nearly 55 million tons were consumed as dung-cake. With a view to preventing a steeper rise and to contain it to the extent possible, it is necessary to plan for adequate supplies of alternative fuels. A possible solution is to encourage the consumption of soft coke in towns, as also in the rural sector. The additional consumption of soft coke would not only save the cow-dung, which is at present being used as fuel, but would also save fuelwood and also protect the countryside from the ravages of soil erosion. The Energy Survey of India Committee have estimated that, of the total energy consumed in the domestic sector in India, as much as 50% was derived from burning wood. India consumes about 105 million tons of firewood annually and the demand is expected to rise

to 121 million tons and 130 million tons by 1970-71 and 1975-76 respectively. At present about 90% of the firewood consumed comes from the felling of trees in the country-side or areas not technically classed as forest which are fast becoming denuded.

3. From the point of view of checking soil erosion and encouraging the composting of manurial matter, steps taken to minimise the loss of forest resources and cattle dung, due to their extensive use as domestic fuel, should form an important adjunct of the compost programme. As mentioned above, the use of firewood has reached an alarming level—it was about 115 million tons last year. The rate of deforestation is many-times the rate of fresh plantations. The impact of fresh plantations on the scale now planned is not commensurate with the loss and will not halt or reduce the pace at which the forest resources are being consumed. The plan scheme for the conservation of cow dung through fuelwood plantations has, as already explained, limited scope of development. A programme for new plantations would have, therefore, to be supplemented by a more vigorous programme of checking indiscriminate felling of trees. A double-pronged drive for diverting dung from cooking to farmers' fields as well as checking the felling of trees is therefore most necessary.

4. According to the Energy Survey of India Committee, out of total consumption of 21.96 mtce. of dung cake in 1962, the cities of Delhi, Bombay and Calcutta consumed 0.04 mtce., the urban areas 3.42 mtce., and the rural area 18.50 mtce. On the whole, the rural areas depended to the extent of 91% on non-commercial fuels, the big cities to the extent of 33% and the smaller to the tune of 80%. 150 million tonnes of coal or 100 million tonnes of soft coke would be needed if the entire consumption of non-commercial fuels is required to be replaced.

5. It is not possible to replace the entire consumption of dung-cake and firewood by soft coke. In our vast country, certain amount of non-commercial fuels at hand and free of cost would continue finding their way to hearths. *It is, therefore, recommended that a well coordinated programme may be drawn up for the supply of soft coke to all bigger towns and semi-urban areas.* Even today the so-called non-commercial fuels like fuelwood and dung cakes are marketable commodities in these towns fetching varying prices dependent on the size of the town and distance from the supplying villages. In the towns of eastern and northern parts of India, the prices of wood and dung cake are between Rs. 5 to Rs. 6 and Rs. 2 per maund respectively. The price of coke could be Rs. 3 to Rs. 4 per maund. In terms of heating value the price of wood and dung cakes would come to Rs. 8 to Rs. 10 per maund. Thus the bottleneck in the way of supply of soft coke to the urban areas is not the price.

6. Though at present the production of soft coke is about 3 million tons, the reserve of lower grades of coal which go into production of soft coke are abundant and indigenous production of soft coke in adequate quantities to meet the demands should not present any difficulty.

7. *The Committee feels that the use of soft-coke in urban and semi-urban areas should be popularised by augmenting existing transport facilities which are inadequate and by publicizing the many advantages of soft-coke over other domestic fuels.*

8. For facilitating the transport of soft coke from concentrated sources of production to distant sources of consumption, the Committee recommends that the railways should be persuaded to accord a higher priority to the movement of soft coke and to make available more wagons of the type needed for the purpose. The lean period of the railways could also be utilised for stepping up the movement of soft coke since it is a non-perishable commodity and can be safely stored.

9. The publicity programme should high-light both the harm done to the soil and its fertility by deforestation and the non-utilization of organic manures such as cow dung as well as the economics of soft coke as a substitute fuel. Whereas all publicity media may be used, documentary films can play a particular role in this programme. It is suggested that separate documentaries may be made on each theme. Firstly, the harmful and inefficient use of fire wood and cow dung as fuel and the economics of soft-coke as a substitute. This film would primarily be addressed to the urban and semi-urban population. It should be made in association with the Central Fuel Research Institute and the manufacturers of soft-coke should be called upon to cooperate with the Institute and to share the cost of production. The other set of documentaries should be addressed to rural audiences and deal with the beneficial effects of tree plantation and the use of cow-dung as compost in cultivators' fields.

10. *In addition to the above, there are a few subsidiary suggestions which might be considered on merits.*

These are:

(i) Restrictions should be placed on the movements of firewood and cow-dung from villages to towns on a selective basis; the restrictions should be directly linked with the position of supplies of soft-coke being made available in areas. The recommendations made by the Energy Survey of India Committee, in this regard, should be implemented.

(ii) The licences for trade in soft-coke should be expeditiously and liberally issued.

Use of soft coke in rural areas

11. Although it would take sometime before the use of soft coke is popularised in rural areas, it might be worthwhile taking up a few pilot projects for its popularisation even at this stage. In March 1966, a meeting was held in New Delhi to discuss this subject in detail and was attended among others by the Ministers of Food & Agriculture, Railways, Mines & Metals, representatives of the Ministry of Finance and the Director, Central Fuel Research Institute. It was agreed, in this meeting, to start an experiment in a few pilot areas in the States of Madhya Pradesh, Uttar Pradesh and Bihar. It was further decided that in the first instance, Director, C.F.R.I. would prepare project reports for conducting an experiment in selected villages for popularisation of soft coke/low volatile coal as domestic fuel. The C.F.R.I. has already prepared a pilot project. This aims at collecting first-hand information on the various aspects of domestic fuel utilization in rural areas—the proportion of dung and the non-fossil fuels which actually find their way to the domestic hearth etc. It is also expected to be helpful in developing appropriate field procedure, the optimum sampling unit and the most economic method of supply suited to a particular area. The experience gathered during the course of experimentation would be helpful in extending and improving the scope of similar studies in future in other regions of the country.

12. For taking up the above project, three villages in each of the States of Madhya Pradesh, Uttar Pradesh and Bihar are proposed to be selected in the first instances. The Project Report prepared by C.F.R.I. gives the type of the fuel considered for the period of experiment, type of domestic 'chullah' considered, estimated requirements of coal and coke, sources of supply for the experimental villages and method of distribution. In the project, various methods for reducing the 'delivered' price of coal and coke have been suggested. The estimated cost during the three years of experimentation is estimated at Rs. 1.65 lakhs during the first year, Rs. 2.9 lakhs during the second and Rs. 4.5 lakhs during the third year.

13. The ultimate objective is to achieve a target of replacing at least 25 per cent of non-fossil fuels by supplying 15-16 million tonnes of soft coke-coal in rural areas in about 10—15 years time so that the cow-dung and farm waste thus rendered free may be profitably utilised as manure for raising production.

14. The above scheme prepared by the Central Fuel Research Institute was discussed in a meeting held on 22nd June, 1967 by the Ministry of Steel, Mines and Metals. The proposal contained in the scheme was carefully considered. The doubt was expressed whether in view of the fact that the rural sector was getting cow-dung and fuelwood almost free, any scheme for introduction of softcoke in the rural sector, at any cost, would be successful. The Committee understands that neither the Ministry of Food and Agriculture nor the Ministry of Steel, Mines & Metals are ready to bear the cost of the scheme. The Ministry of Community Development is also not ready to implement the scheme through its block development organisation. It was, therefore, decided in the meeting that the scheme might be referred to the three concerned State Governments with a view to finding out if they would be agreeable to implement the scheme and also to meet its cost. *The Committee feels that the matter should be processed further by the Ministry of steel, Mines and Metals with the State Governments.*

PART IV—CONSERVATION OF COW-DUNG THROUGH POPULARISATION OF COW-DUNG GAS PLANTS

The scheme for the popularisation of Cow Dung Gas Plants is implemented both by the Directorate of Extension and the Khadi & Village Industries Commission. Under a scheme prepared by the Directorate of Extension in 1964, it was proposed to give Rs. 600 as loan to the farmers for the installation of gas plant of 100 cft capacity. This plant has been designed at the Indian Agricultural Research Institute. These gas plants were to be established around the Workshop Wings attached to Training Centres so that the technical staff of the Workshop Wings could look not only to the installation of the gas plants but also to their repair and maintenance as well as train the farmers in its use. Accordingly, about 300 gas plants have so far been installed in different parts of the country.

2. Work in this regard has also been done by the Khadi and Village Industries Commission. It is stated that about 1000 cow-dung gas plants have so far been set up in various parts of the country through the Commission. Attempts have been made to standardise the model of the gas plant

and its accessories. The Commission issues a questionnaire to cultivators intending to install such gas plants to elicit information on the facilities available with a view to recommending the most economical size of plant.

3. There are certain limitations which have been brought out during these installations. Some State Governments have expressed the opinion that, in their States, due to certain environmental difficulties the establishment of gas plants is not feasible.

4. These are:—

- (i) In areas where the temperatures are low, particularly during winter, the production of gas is reduced. The reverse is also the case, where the temperatures are high, production of gas increases. This mitigates against the spread of the programme as farmers would like to have more gas in winter and less in summer for cooking as well as for heating water.
- (ii) In areas where the water-level is high and nearer to the surface of the ground, it is not possible to introduce gas plants, since the wells dug are filled with water.
- (iii) In high rainfall areas such as near the Coastal area, Kerala, Konkan, Assam etc. these types of gas plants cannot be used conveniently since too much of water spoils the slurry.
- (iv) These gas plants also require a considerable amount of water for making slurry every day. Therefore, in some areas where water is not easily available it becomes difficult for the farmers to use the gas plants.
- (v) Even in areas where such plants can be taken up, they are limited to farmers who own 5 or more heads of cattle.

5. The above limitations considerably narrow down the areas where such gas-plants can be usefully constructed. Considering all these aspects it has been thought that the gas plants of these types would be mostly useful in the States like Gujarat, Madhya Pradesh, Andhra Pradesh and Maharashtra, where the climate is suitable and where, in certain places at least, water is available. The State Governments have already been requested by the Ministry of Food, Agriculture, CD&C to include this programme in their Plans and intensify it wherever possible.

6. The Directorate of Extension, Ministry of Food, Agriculture C.D. & C have arrangements to assist the State Governments in getting the drums and accessories manufactured on decentralized basis. *Now that a number of rural artisans have been trained in the Agricultural Workshop Wings attached to the Extension Training Centres, in the manufacture and maintenance of these gas plants, the State Governments may consider employing them wherever feasible.*

7. The Committee had detailed discussions, on the subject with the Khadi & Village Industries Commission. *It is recommended that, in the initial stages, a subsidy @Rs. 300 per plant may be made available towards the construction of these gas plants in selected areas. The Committee also suggests that the Khadi & Village Industries Commission should be given necessary facilities and incentives for taking up this programme in selected areas during the Fourth Five-Year Plan.*

8. *The Committee also feels that research on the improvement of the efficiency of these plants needs to be intensified.*

PART V—UTILISATION OF WASTE AND BY-PRODUCTS OF AGRICULTURE INCLUDING FORESTRY, ANIMAL HUSBANDRY, FISHERIES AND INDUSTRIAL WASTE FOR THE PREPARATION OF MANURE

In a vast country like India with a large population and varied types of industry it is evident that there will be many waste products which when suitably conserved and processed can be returned to the soil as useful manurial constituents towards improving the impoverished productivity of the land. During the past years a considerable progress has been made in conserving habitation and farm wastes (mainly human and animal excreta, vegetable trash, rural and urban refuse) and making valuable composts out of these for use in Agriculture. There can be no two opinions on India's valuable contribution in the fields of compost making. However, besides these, there are large quantities of such wastes and by-products which are either left completely unutilised or are used in rather uneconomic manner. Various reasons such as lack of technical guidance and a ready market, difficulty of collection and conservation, economic problems etc. come in their proper exploitation. Modern developments in science and technology offer a valuable scope in profitably utilising such products thus adding to the national wealth.

2. In the past, several scientists, administrators and planners in the country have at times tried to attract the country's attention towards some of the neglected materials and have put forth concrete evidences of their usefulness but somehow or other most of them have failed to get a practical shape. Further, not much efforts have been made to survey the resources of these wastes and in the absence of adequate statistics about their extent, costs etc. organised efforts for utilising the wastes have not been very successful.

3. The Expert Committee on Manures and Fertilizers, Government of India and later on the Standing Committee on Manures and Fertilisers made obvious references about harnessing some of these waste materials and made valuable suggestions in these respects. The National Council of Applied Economic Research in their series of Techno-economic Surveys of the Union Territories have also given the facts and figures for some of the more important waste or by-products in the country.

4. An important study undertaken by the Committee on Natural Resources concerns the utilisation of industrial wastes and wastes and by-products of agriculture, including forestry, animal husbandry, and fisheries. At present large quantities of such wastes either remain unutilised or are used in an uneconomic manner. Modern advances in science and technology would make it possible to utilise many of these wastes effectively. The study which was undertaken with the help of a large number of specialists from different organisations included, among agricultural and animal wastes and by-products, rice bran, non-edible minor oilseeds, tobacco wastes and tobacco seeds, bagasse, marine algae, by-products of fruit and vegetable processing, lac wastes, wastes and by-products from slaughter houses and dead animals and fishery wastes. Among industrial wastes and by-products, the study included blast furnaces slag, basic slag, salt bitters, coal ash, mica waste and the by-products of coal carbonisation. The study has thrown up a number of specific recommendations concerning each of the waste and

by-product materials. It is important that, as part of the development programmes for the Fourth Plan undertaken by States and Central Ministries, these recommendations should receive a detailed attention.

5. It would thus be seen that the importance of utilisation of such waste materials has been studied and useful recommendations have been made. The utility of the waste materials as manures has also been experimentally demonstrated. What has often been lacking is the concerted effort in following them up from all angles such as their availability and resources, method of collection and conservation and the critical study of the economics involved and so on.

6. *The Committee would, therefore, suggest that in the first instance, a survey to assess critically the quantity of these subsidiary manurial resources and their cost should be undertaken. Work on the survey and development of these might be undertaken in the order of the following priorities.*

- (i) Existing potential resources required to be utilised and further developed.
- (ii) Existing potential resources which can be developed largely provided economical and technical problems are resolved.
- (iii) Existing potential resources available in sizeable quantity but involving problems of economic collection, handling, development etc.

7. *Thereafter pilot projects and campaign should be arranged in the States for such items as would suit their conditions.*

Constitution of the Committee to study the scope and possibilities of intensifying the Compost Programme in the country.

1. Shri K.A.P. Stevenson, *Chairman*
Joint Secretary,
Planning Commission.
2. Shri R.S. Singh**
Chief (Agriculture)
Planning Commission.
3. Dr. T.S. Gill**,
Director (Agriculture),
Planning Commission.
4. Shri C.S. Chandrasekhara,
Chief (Construction Division),
Planning Commission.
5. Shri M.M. Suri,
Director,
National Mechanical Research Institute,
Durgapur.
6. Prof. Madhav, V. Bopardikar,
Central Public Health Engineering
Research Institute, Nagpur.
7. Shri T. Durairaj,
A.D.G. (PHE), D.G.H.S.
Ministry of Health & Family Planning.
8. Shri P. Jayantha Rao,
Development Officer (A & F)
D.G.T.D.
9. Shri L.S. Yadav,
Technical Officer (Sewage & Compost),
Department of Agriculture.
10. Shri. F.C. Pahwa,
Secretary, Indian Collieries
Owners' Association.
11. Shri S.K. Sen Gupta,
Joint Director (Natural Resources),
Planning Commission.
12. Shri O.P. Gugnani,
Senior Research Officer,
E.F.&R. Division,
Planning Commission.
13. Shri D.N. Kherdekar,
Director (Implements),
Directorate of Extension.
14. Shri L.L. Sarin, *Secretary.*
Senior Research Officer,
Agriculture Division,
Planning Commission.

* upto 10th March 1967.

** from 24th April 1967 onwards.

No. 2-1(18)/65-Agri.

**GOVERNMENT OF INDIA
PLANNING COMMISSION**

New Delhi -1.

Dated the 29th October, 1966.

OFFICE MEMORANDUM

*Subject:—*Constitution of a Committee to study the scope and possibilities of intensifying the Compost Programme in the country.

In pursuance of the decision taken at a meeting held in the Planning Commission on 3rd October, 1966 to consider the note of the Ministry of Food and Agriculture on 'Compost Programme in India', it has been decided to set up a Committee to study the scope and possibilities of intensifying Compost Programme in the country.

2. The constitution of the Committee is as follows :—

- | | |
|---|-----------|
| 1. Shri K.A.P. Stevenson,
Joint Secretary,
Planning Commission. | Chairman. |
| 2. Shri R.S. Singh,
Chief (Agriculture),
Planning Commission. | Member. |
| 3. Shri C.S. Chandrasekhara,
Chief, (Construction Division),
Planning Commission. | ” |
| 4. Director, National Mechanical
Research Institute, Durgapur. | ” |
| 5. Shri D.N. Kherdekar,
Director (Implements),
Directorate of Extension,
Ministry of Food & Agriculture. | ” |
| 6. A representative of the Directorate
General of Technical Development. | ” |
| 7. Shri M.V. Bopardikar,
Central Public Health Engineering
Institute, Nagpur. | ” |
| 8. Shri T. Durairaj, A.D.G. (PHE)
Directorate General of Health Services,
Ministry of Health. | ” |
| 9. Shri L.S. Yadav,
Technical Officer, (Compost & Sewage)
Department of Agriculture,
Ministry of Food & Agriculture. | |

10. Shri S.K. Sen Gupta, Member
 Joint Director, Resources Division,
 Planning Commission.
11. Shri O.P. Gugnani, ”
 Senior Research Officer,
 Economic Division,
 Planning Commission.

3. The Committee will study the following problems and recommend measures that should be taken for intensifying the compost programmes:

- (a) Mechanical composting in bigger towns.
- (b) Utilisation of waste and by-products of agriculture including forestry, animal husbandry, fisheries and industrial wastes for the preparation of manure.
- (c) Conservation of cow-dung through—
- (i) Popularisation of cow dung gas plants.
- (ii) Plantation of quick-growing fuel trees.
- (iii) Use of soft coke in rural areas and small towns.

4. The Committee will submit its recommendations by 30th November, 1966.

Sd/- G.R. Kamat
Secretary to the Government of India

To

All Members of the Committee.

Copy for information to:

- (i) Extension Commissioner, Directorate of Extension, Ministry of Food and Agriculture, New Delhi.
- (ii) Directorate General of Tech. Development, New Delhi.
- (iii) Director, Central Public Health Engineering Institute, Nagpur.
- (iv) Ministry of Health and Family Planning.
- (v) Ministry of Food and Agriculture, Department of Agriculture, New Delhi.

Planning Commission

Deputy Chairman.
 Member (AE & IT)
 Advisers (PA)
 Economic Adviser.
 Adviser (Resources)/(SP)
 Chief (Construction Division)/Chief (Food)
 DS(C)/Director (Cooperation).

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