

A SIMPLE NIGHTSOIL, FARM AND FACTORY BY-PRODUCTS COMPOST SCHEME

By G. C. DYMOND.

The following practical scheme for effectively disposing of nightsoil, together with stable manure, filter cake, surplus molasses or dunder, garden and household refuse, bagasse, cane tops and trash has been in successful operation at Springfield Estate, Darnall, for the past five months.

LAYOUT OF COMPOST ENCLOSURES.

The compost enclosures have been designed to provide effective aeration, simple drainage, together with easy filling and off-loading. The capital cost of the layout is low, while the design and principles can be adapted to the smallest farm or the largest factory or township.

The following plan and photographs illustrate the essential features of construction and methods of working.

(1) The enclosures are built of hollow cement blocks filled in with concrete. To ensure easy handling, the enclosures are built on sloping ground. The cement floor has sufficient slope for drainage and has three longitudinal tiers of bricks to support the loose floor of bamboos or light poles. These poles are spaced, leaving about an inch space between each pole for aeration. The low end of the enclosure is closed by a loose gate of poles, held in place by pipes embedded in concrete.

(2) For an output of 1,000 tons of compost per annum, the following capacities are necessary:—

4—6 enclosures 20 feet long by 9 feet wide by 4 feet 6 inches deep or 810 cub. feet each.

The requirements are 250 natives, 45 animals, 100 tons filter cake, together with the necessary organic matter such as bagasse, cane tops, cane trash, etc.

METHOD OF OPERATION.

A light covering of weathered cane trash is spread over the poles. Stable litter consisting of trash or bagasse after passing through the stables is then layered to a thickness of about 8 inches. The following day the nightsoil from a bucket system is distributed over the absorbing mat. It is immediately covered with stable litter and the whole enclosed in a thin layer of filter

cake. This process is repeated every day. Light dustings of finely ground agricultural lime and application of molasses diluted 50/50 are improvers.

The empty buckets should be layered with bagasse as an absorbing medium and covered with the same material on removal.

A good practice is to accumulate heaps of the coarser materials, such as cane tops interspersed with a proportion of stable litter. After lying for a month, the now partially disintegrated tops can be fed into the pits every day.

Two long planks over the top of the enclosures facilitate feeding and avoid trampling and consolidating. The compost pits should be filled about one foot above the surface, as after one month the mass contracts about 33 per cent. of its original volume.

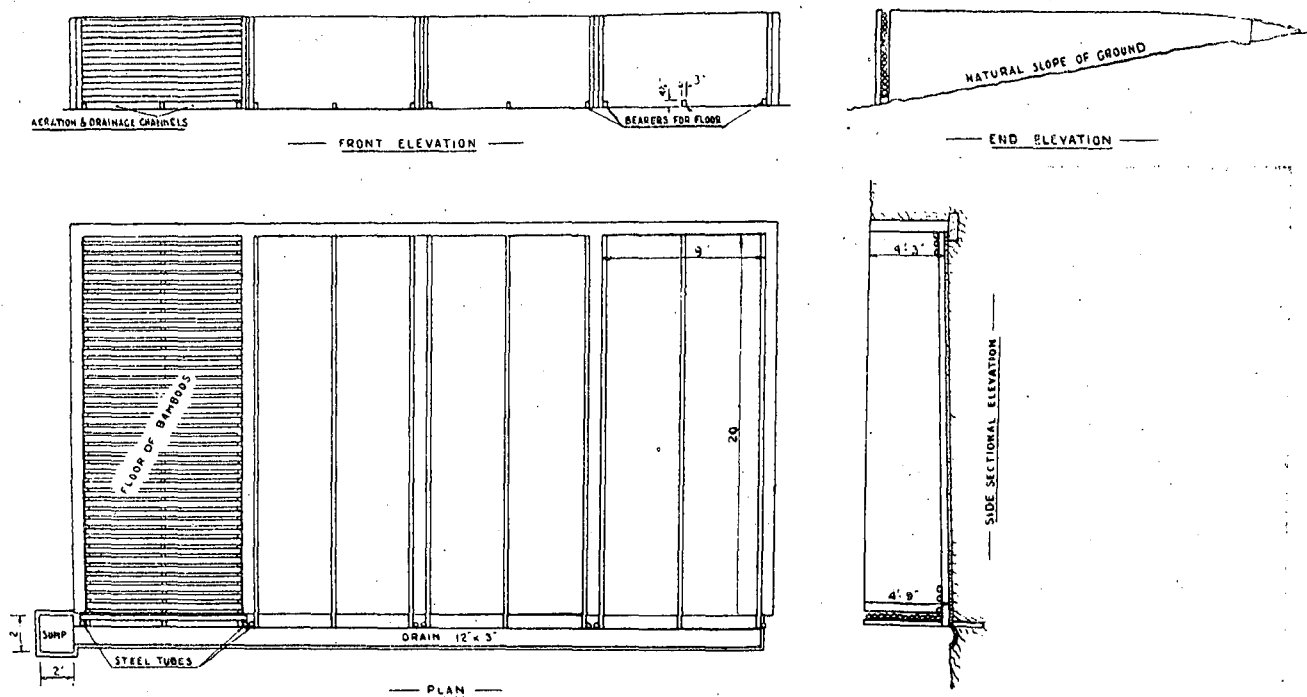
Sufficient water *must* be applied throughout the filling of each pit in order to keep the material wet throughout its mass. A slight drip through when the pits are full ensures this essential factor, for owing to the very high temperatures obtained (up to 78°C.) the pits tend to dry out.

Pits should be filled in 10 days (maximum) and with sufficient capacity (6 pits) may be allowed to remain for six weeks. The partially-rotted material is then turned out through the open end, where it is allowed to rot for a further six weeks to two months, when the process is complete.

ANALYSIS OF THE PRODUCT.

The investigation into the best method of producing the best compost is in the initial stages, but the results so far obtained are interesting.

1. Represents stable litter, with tops, filter cake, bagasse and old accumulations of manure.
2. Represents the same with the cleaning-up of the premises.
- 3 and 4. Normal practice as described above, together with diluted molasses.
- 5 and 6. Normal practice with dustings of agricultural lime; no molasses.



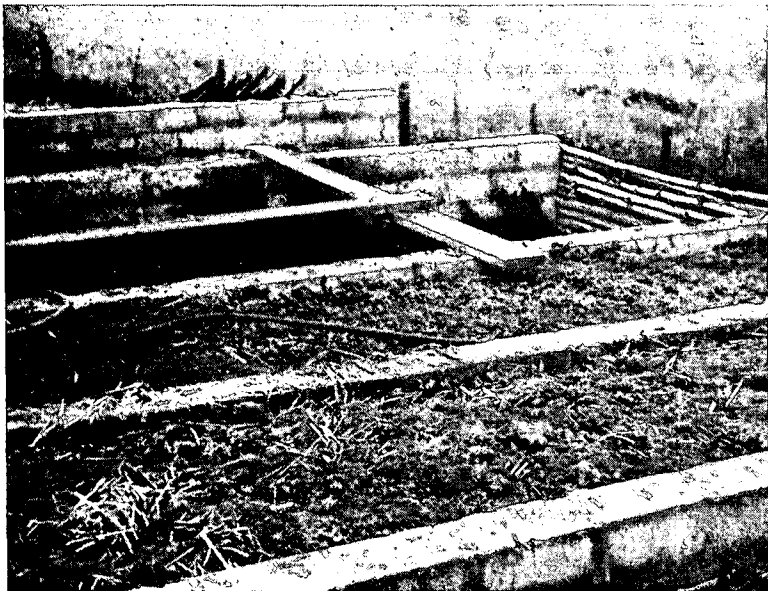
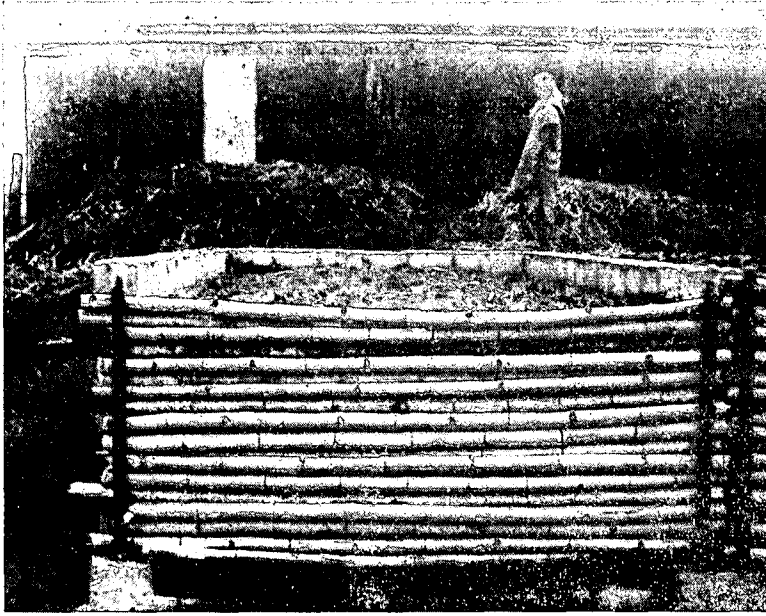
COMPOST PITS FOR ESTATES.

HULETT'S LTD., DARNALL.

18.11.43.

DRAWING Z492

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The Analysis.

	1.	2.	3.	4.	5.	6.	Karoo Manure sample.
Moisture per cent.	69.8	61.3	69.0	63.8	77.0	78.0	36.8
Loss on ignition	45.8	29.7	38.1	34.8	59.6	59.6	47.9
Nitrogen, N	1.7	1.0	1.2	1.3	2.2	2.2	1.7
Phosphoric oxide, P ₂ O ₅ , total	2.0	1.6	1.4	1.3	2.2	1.5	1.5
Phosphoric oxide, P ₂ O ₅ , available	0.7	0.6	0.6	0.8	1.7	1.2	0.6
Potash, K ₂ O, total	3.8	1.2	2.7	1.0	1.1	1.7	10.7
Potash, K ₂ O, available	1.3	0.5	0.9	0.7	0.6	1.4	3.8

If the quality of Nos. 5 and 6 can be maintained, it represents an organic manure equal to if not better than Karroo manure, and which can be produced at one-tenth of the cost. The increased availability in P₂O₅ and K₂O in No. 6 is of particular interest.

HEALTH ASPECT.

In my opinion this system of nightsoil disposal constitutes an effective health insurance. Dr. A. L. Ferguson, Assistant Medical Officer of Health, reported that he found "no flies, no smell, and no nuisance." It is obvious that no pathogenic organisms can live in the high temperatures recorded over long periods (maximum temperature 78°C.), while the final product becomes a valuable organic mixture.

GENERAL OBSERVATIONS AND APPLICATIONS.

Historical.—General Smuts has declared that the question of the soil is the greatest problem before South Africa. Dr. J. C. Ross and other authorities have told us that our country is in peril through erosion, decreasing soil fertility and the non-rotation of crops, which is resulting in the malnutrition of plants and animals and men.

G. V. Jacks, in his book "The Rape of the Earth," says: "The unprecedented economic expansion during the 19th century has been followed by a world-wide biological deterioration of the land. Probably more soil was lost from the earth between 1914 and 1934, than in all previous human history."

In "The Labouring Earth," Alma Baker states that the Mississippi deposits 400 million tons of soil into the Gulf of Mexico every year, that 9 million acres of American land have been ruined by wind erosion, that a probable 300 million tons of top soil were lost from the Great Plains in a single day; or, as Stuart Chase, the modern author of "Rich Land, Poor Land," puts it, "the people of America have been sitting on their porches watching their continent go by."

Has anyone calculated the increasing quantities of top soil—the 9 inches of earth on which we all live—that have gone down our rivers and discoloured the Atlantic and Indian Oceans during the brief number of years that the white man has cashed-in on this land? We have been paying compound dividends out of our basic capital, the soil, while the resulting and increasing malnutrition facing us is what Dr. A. L. Ferguson aptly describes as "civil disaster."

I am no medical or nutrition expert, but from the ever-increasing voices that are crying these facts to the world, it is obvious that health is basically dependent on the food we eat and therefore constitutes a problem of education. No sickness service can rank with health services, nor hope to cope with the ever-increasing results of malnutrition. This problem exists in all countries to-day. It is a problem that is at once a challenge and an opportunity—an opportunity which can be grasped, not by individual voices, writers and enthusiasts, but by authority, leadership and legislation.

If this country, or any other, is prepared to spend a fraction of the money so easily found and wasted on promoting death, in promoting instead the health of the soil and therefore the health of the people in the urgent immediate future, then only can South Africa be handed on as a worthy heritage to those who are now fighting for us.

Potentialities.—How can this be done? The weapons are known—anti-erosion methods, contour ploughing, afforestation, rotation of crops, periodic return to selected grasses, more animals per farm and compost.

I have been told that compost alone cannot save the day. There is not enough of it. It is at present true that there is

not enough to go round; that there are not enough animals in the right places; not enough use made of sewage and city wastes; not enough convenient organic matter in the towns and cities to save a reasonable percentage of the £8,500,000 unit values which have been calculated to go down our sewage pipes every year.

If this is a war of survival, as men like General Smuts and Dr. Ross warn us it is, is it not time that we calculate the compost potential required for rebuilding our fertility and face up to the cost? A rough survey of sugar potentials is imposing.

From an annual crop of, say, 6,000,000 tons of cane there are approximately—

1,200,000 tons of trash.
540,000 tons of cane tops.
1,980,000 tons of bagasse.
270,000 tons of filter cake.
180,000 tons of molasses.

From an ordinary business angle, one can imagine the futility of even attempting to organise these potential sources of compost into a practical scheme. But if it is true—and who can doubt it?—that South Africa, and indeed the whole Western world, is facing an accumulating soil poverty unknown in history, then the controlled utilization of the by-products of sugar takes on national importance.

Practical Aspect.—Let us briefly examine the possibilities of such a controlled utilization in a big way.

Cane cutting constitutes a heavy item of expenditure in sugar growing, and this item, owing to the trend of higher wages and scarcer labour, is most likely to increase.

In Louisiana to-day there are 350 mechanical harvesters in successful operation, cutting, cleaning and topping the cane. It is well known that the difficulties of mechanical cane harvesting are in that order—cutting, cleaning and topping.

To anyone who has seen the simpler windrowing machines in operation, mechanical harvesting of the cane whole, i.e. without cleaning or topping, would present no insuperable difficulties on normal slopes and levels. Such uncleaned cane would be transported to the mill, where mechanical trash strippers now perfected and in operation in Hawaii, would remove the trash, which could be composted at the mill or compressed for transport to other composting centres.

The tops would present a new but not insuperable mechanical problem. In this connection, it should be remembered that this nutritious portion of the cane could be either dehydrated for cattle food or used in the compost beds.

Always realising the national emergency, existing steam-raising plants could be partly converted to coal or so improved as to provide a surplus of bagasse, which could be composted *in situ* or compressed for distribution to towns and cities for supplying part of the necessary organic matter required in nightsoil disposal plants.

For activating media, there are at the sugar factories filter cake, effluents and dunder after converting the molasses into its valuable by-products, nightsoil from native and Indian barracks, garbage and kraal manure, all of which can be utilised for producing large quantities of compost.

The urgent immediate future, authoritatively put at fifty years, constitutes a challenge and an opportunity. In so far as the sugar industry is concerned, it constitutes a constructive opportunity for helping to replenish the diminishing soil fertility and health of South Africa.