

MANAGING COARSE REJECTS FROM COMPOST PLANTS and ORGANICS FROM BIOMINING

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1 Reclaiming Saline-Alkaline (Sodic) Soils with City Compost

In 2001 -2002, 25 farmers each saw one hectare of their totally unproductive soils in the Sangli-Kolhapur belt in Maharashtra restored to 80% fertility in 18 months with the help of city compost.¹

In a State-sponsored trial in the June 2001 kharif (monsoon) season, the degraded land was deep-ploughed by tractor and broadcast with 4 tons/hectare of Celrich² brand city compost plus 1 t/ha of gypsum. Sesbania (dhaincha) sown as a green manure crop was ploughed in after 55 days of growth. For the 2001 winter crop, fields were enriched with 3 t/ha of Celrich and sown with mustard, wheat or table beet, all of which gave about 60% of normal good growth. In 2002 kharif, the 4 t/ha city compost plus 1 t/ha gypsum was repeated and soybean was sown, giving 80% of normal growth.

This dramatic and rapid soil improvement suggests that the same could be successfully done using stabilised coarse organic wastes which are now rejects that incur costs for disposal but can probably be usefully used instead of fine compost.

2 The Problem of Compost Rejects

Composting is the organic waste processing method of choice in India. But half of all the biodegradable waste is rejected even after processing for compost, though it is a valuable agricultural resource. Why? Every 100 tons of raw organic waste yields around 15% fine compost meeting FCO standards, which require it to be finer than 4mm before enrichment and sale, so as to keep out broken glass and plastic fragments and make it easy for spreading. Fresh organic waste has over 50% moisture, necessary for biological decomposition. After it is stabilised by four weekly turnings in wind-rows which generate their own heat, then spread for drying before sieving, the moisture content comes down to below 20%, with about 30% lost as water vapour. Another 10% is lost as carbon dioxide. So the stabilised heap volume and weight goes down to 60% of intake.

The finest fraction cannot be obtained from this in just one sieving. The first screening is usually done through 100 mesh (either before windrow formation or after four windrow turnings). The next sievings are generally through 35 mesh and 14 mesh screens before the final 4 mm screen.

The coarser bits of twigs etc with high lignin content take longer to break down, so they remain as coarser fractions: plus-100 mesh (which may also contain plastics and cloth etc), and then 35 to 100 mesh and 14 to 35 mesh fractions which are largely organic. The 4 to 14 mesh fraction is usually used to cover fresh waste to control smell and flies and add composting microbes to it. It is also spread as a leachate-absorbing bed around fresh windrows, and then added to the heap. This gives the 4-14 fraction an extra month of 4 turnings to change into humus (ligno-proteins), break down to below 4 mm size and thus increase compost yield.

These 100+, 35-100 and 14-35 fractions are considered problem rejects, to be compacted into RDF (Refuse-Derived Fuel) for industry or brick kilns, or sent to faraway cement plants for

co-processing. But cement plants demand very low moisture content to prevent cooling of their cement kilns, and it is not cost-effective to dry these high-moisture 14-35 and 35-100 fractions, so they are simply discarded into landfills where leachate and methane formation can continue.

3 Potential Solution

This landfilling is a great pity, because these coarser organic fractions can easily break down over time in the soil and add good humus and porosity as well as essential microbes to improve soils and plant growth. They can be mixed with soil and usefully added into tree pits for horticulture (mango, guava, grape etc) or for agro-forestry or forestry. When ploughed into crop fields, coarse organic matter can make the soil porous and water-holding and promotes strong root systems for healthy and productive plants.

But as described above for fine city compost, such coarse fractions of stabilised waste should also have a wonderful, though perhaps slower, healing effect on saline or alkaline soils, especially fields which have become less fertile over time or have developed a full white crust of salt on the ground, where nothing grows. In Karnataka alone, 42 lakh hectares or 22% of arable (cultivable) land suffered from alkalinity or nutrient imbalance in 1990 and recent surveys report an alarming increase in such infertile acreage.

Thus every town generating 100 tons of waste a day will potentially produce 45 tons a day of coarse organics (in addition to the 15 tons of fines sold as compost). If one ploughs in say 3 tons of this coarse humus per hectare of saline/alkaline soil, one can restore 15 hectares every day to fertility over time. It may take 18 months to three years to recover full fertility as vegetation slowly comes back, with a first sowing of green manure to be ploughed back into the soil.

The cost of transporting coarse rejects from compost plant to barren fields cannot be borne by farmers who cannot grow crops on these lands. But the benefit to the nation of adding so

much cultivable land is enormous, especially when so much good land is lost to growing cities. So such application will need to be subsidized just as gypsum application on them is subsidized.

4 Proposed Trials

As a beginning, Karnataka's Director CADA, the Command Area Development Authority under the Dept of Water Resources, Karnataka, has just agreed in principle to conduct demonstration field trials in the Cauvery irrigation basin soils suffering salinity. Rejects from the Mysore or Bangalore compost plants will be tried in Maddur Taluk. For this, both existing and new compost plants will have to organize the transport of their coarse rejects to trial field plots identified by CADA. This will greatly benefit the compost plants by creating fresh working space. Funding the transport cost is the major challenge. Creative use of the budgets of existing schemes for waste management and agriculture can provide answers. For example, payment for landfilling in existing contracts can be beneficially used to avoid landfilling and extend landfill life and space by paying the same amount for transport to degraded lands instead. Similar opportunities can be sought in schemes for farmer relief and soil reclamation projects.

5 Biomining of Old Waste Dumps

Biomining of old open dumps of waste is a method of reclaiming both materials and space. Old mixed waste is unmixed, by sieving and sorting, into plastics, cloth, stones and sand, plus a fine mixture of organics and soil called bioearth, being purchased as is by nearby farmers.

Bio-mining for land reclamation and cleanup has been done at a dozen locations around India since 1998. Now it is becoming increasingly attractive to growing towns whose habitation is beginning to go beyond the location of formerly distant dumping grounds. Raichur in Karnataka is planning to convert 29 acres of its 39 acre dumping ground into a large park,

while 10 acres will be retained for scientific waste processing. At Raichur, 40% of its 10 acres buried under 7 meters of old dumped waste has been sieved within three months since July 2015. The bio-earth fraction is being sold at Rs 2.50 per kg and is eagerly taken by local farmers for crops like paddy, sunflower, jowar and onion. It is virtually free of all heavy metals.³ The University of Agricultural Sciences Raichur is conducting comparative trials on maize using fly ash or bio-earth or vermi-compost. First results will be out by end 2015.

Bio-mining is also under way since June 2015 at Kumbakonam in Tamil nadu, where one acre out of a 4.5 acre dump has been cleared and levelled in 3 months. 15% of the input waste is recovered as 4mm bio-earth, which is being lifted at Rs 1000/ton by the party removing the 55% of 4-25 mesh inert gravelly soil offsite for use elsewhere.⁴ The bio-earth is being supplied to banana farmers, and here too results will be out only in 2016. But the site clearance is such a success that two more towns nearby, Namakkal and Myladurai, have also floated tenders for biomining, and many more are likely to follow. The soil enrichment benefits of bio-earth will be worth watching.

6 Conclusion

In a country starved of organic manures with livestock populations declining, there is a tremendous opportunity to make up the shortage not just with compost but with other organic fractions arising from old and new city waste.

1, Ref Dr S R Maley, pers comm

2, Celrich was supplied from the city compost plant of Excel Industries Ltd at Chincholi in Mumbai/Bombay.

3 Author's personal visit, with personal inputs from the District Collector, CASHUTEC and Navkar Agro Pipes P ltd, Malegaon.

4 Zigma Global Environ Solutions P ltd, pers comm