

## To compost or not to compost?

That question seems to challenge the very being of organic farming. The aerobic fermentation of organic matter by thermophilic bacteria is a practice that some organic farmers hold sacrosanct. Organic farming is incomplete without it. Yet others deny the need!

In South Africa composting is an art, literally a culture. Selection of green material and animal manures, inoculation with appropriate micro organisms, creation of aerobic wind rows, maintenance of correct moisture, turning with specialist turners to control temperature, covering to retain heat and shed rain and rapid production of a very high quality material are common features of many organic farms in the country. Unfortunately it is all too often material from conventional livestock and organic farmers there appear to have lost the plot! The fertility-building component of the rotation is minimal and application rates excessively high, up to 50 tons of compost per hectare! Nonetheless the composting process itself would put the average British organic farmer to shame.

By contrast, Bob Crowder, that guru of organic diversity, ran the Biological Husbandry Unit at Lincoln University, New Zealand for twenty years without the use of so much as a forkful of compost in some sections of the Unit. The mix of shelterbelts and fruit trees, vegetable crops, green manures and predator habitats created such an abundance of vegetation that mulching and stimulation of above and below ground organisms was adequate to create the fertility for the substantial levels of productivity.

On a 150 hectare farm in the North Island of New Zealand John Pearce has created a truly impressive livestock system on degraded sand land with cattle and sheep grazing throughout the year, and no production of farm-yard manure for composting there. However, the system does revolve around the stimulation of soil biological activity by spraying a soil inoculant. This inoculant is fermented by the use of their own starter, using two and a half tons a year of fresh fish waste as a substrate, together with the dirty water from the dairy parlour washings. Judging by the quality of the grassland and the health of the animals there is something special going on here.

At Dos Hermanas, a 3,500 hectare beef, sheep and arable farm in Argentina we again have the situation of an organic farm running well with no use of farm-yard manure or any attempt at composting. Cattle and sheep graze lucerne leys and indigenous pampas throughout the year and succeed in achieving very respectable stocking rates and crop yields close to conventional.

So what is it about this mythological process called composting which so many consider central to organic farming? Composting of course is an entirely artificial process, it mixes organic materials, often manures, bedding and green waste in proportions to ensure correct C:N ratios, it requires adequate moisture and needs good oxygen supply achieved through turning. The aerobic bacteria, normally naturally present but sometimes introduced, thrive. Their respiration creates heat in the confined environment and thermophilic bacteria invade, taking temperatures over 70degrees centigrade if not controlled by re aerating. Subsequently fungi and actinomycetes move in and as temperatures drop the material is colonized by insects,

worms and other organisms. The result is an organic material that has been digested, redigested, mixed and processed. It has been transformed and if carefully managed it is alive. But it is not a process that normally happens in nature. So why do it? Why risk the loss of nutrients from leaching and volatilization? Why go to the expense of turning? Why spend all that money on a compost turner and a drained concrete pad – both pre requisites of doing a thorough job?

The adviser's answer is of course - 'it all depends'! That eminent research and advisory organization in Switzerland – Research Institute of Organic Farming (FiBL) has a long history in compost and manure management. They have helped identify the conditions under which composting is appropriate. The following outlines these:

1. **Low organic matter soil.** Composting helps to stabilize and increase the organic matter by converting readily decomposed carbon and nitrogen into stable humus through the process of assimilation by bacteria and other organisms and incorporation into the soil in the remains of their dead bodies.
2. **Slow nutrient release.** Composting creates more stable compounds of carbon and nitrogen that are released much more slowly – often over many years – than the readily available nutrients from fresh manure. Poultry manure for example has high levels of ammonium, which may result in excessive nitrate levels in crops and is very susceptible to leaching out of reach of the plant roots.
3. **Raw materials.** Green waste, including municipal waste and excessively strawey materials need to be composted in order to break down the high carbon fraction and to produce something more homogenous that can be assimilated by the plant and which avoids localized nitrogen lock up.
4. **Conventional manure.** Organic standards require that conventional manure is composted or stored in order to break down some of the 'nasties', which may be contaminants. Bacteria do have the ability to digest many complex agrochemicals and render them innocuous.
5. **Enhance disease suppression.** High bacterial and beneficial fungi populations in well made compost have the ability to suppress diseases in crops. This is partly a consequence of strong plant growth – avoiding the lush growth typical of fresh manures. It may also be a consequence of inoculation of the soil with beneficial organisms, which in various ways protect the plant from disease. Amongst the theories which have been put forward to explain this effect are: predation on undesirable organisms by beneficial nematodes, occupation of root surface sites which might otherwise be points of infection, the effect of naturally produced antibiotics on pests and camouflaging the plant roots from the disease organisms. What-ever the mechanism it has been clearly demonstrated that compost reduces certain diseases such as pithium in seedlings. Composting may well be justified for these reasons alone, when growing specific crops and at certain stages of growth.
6. **Reduction of contamination.** Composting farmyard manure produces a much more friable product which may be essential to speed up assimilation in the soil or to avoid contamination of grassland prior to grazing or silage making.
7. **Reduction of weeds.** The high temperatures and decomposition process involved in composting, substantially reduces weed seed viability provided that thorough composting throughout the windrow is achieved. A purpose built turner is particularly important here.

Composting is therefore not a pre-requisite of organic farming. If none of these conditions apply then composting is not necessary. Soil life is quite capable of dealing with fresh manure but the effects and timescale will be different. Indeed under some circumstances fresh manure is more desirable, such as in a soil where primary decomposers including earthworms need to be stimulated. These are creatures used to dealing with undecomposed, high carbon materials. In very diverse cropping situations and in no-till systems where often high levels of crop residues or leaf fall are left on the surface, rather than incorporated into the soil, not only are some of the objectives of composting unnecessary e.g. weed seed reduction, but some of the benefits of composting such as disease suppression can be achieved by simply doing nothing.

Recent research and farm experience has indicated that there may be benefits to crop quality by using compost. Improved nutrient balance and better keeping quality are becoming increasingly good reasons for composting.

A final word! If you are going to compost do it properly. Erratic and uncared for heaps of farm yard manure, or worse still poultry manure, abandoned for 6 months over winter are a disaster all round. The criteria for good composting are; correct C:N ratio, adequate moisture and good aeration usually achieved through turning. Covering with Toptex ensures more uniform heating and sheds water. Remember avoid any prolonged storage of manure unless it is properly covered.

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