



STATIC PILE INOCULATED COMPOST EXTENSION (SPICE)

Making quality compost using a no-turn method

“ SPICE Composting, also known as Fermentative Composting, is a low cost and easy method for effectively composting at a large or small scale. It can offer a number of advantages over aerated composting methods for both farmers and Councils. ”



What is Composting

Composting is an important way to manage organic materials including manures, hay, green waste, pack shed waste, animal carcasses and food scraps. The process involves mixing organic materials together, pushing the mixture into a pile or windrow, adding moisture and then allowing the pile to decompose in a controlled manner. Composting allows you to turn waste materials into a valuable soil conditioner for agriculture and gardens.



Covered compost windrows; Armidale Regional Council, NSW

There are a number of methods to making compost. The most common is through the use of a compost turner to add air to the compost pile. This helps control the decomposition process.

What is SPICE Composting

The SPICE Composting method uses a simple no-turn technique to achieve an effective composting process. Instead of turning the compost regularly to add air (aeration), the compost pile is inoculated with specialised microbes, then covered and left to decompose without the need of turning. This is why it is also known as Fermentative Composting.

The method is based on the “Indore” process of Sir Albert Howard, a leading British agricultural scientist in the early 20th century. The method is a two-stage process; initially it goes through an aerobic phase and then the process changes to a low oxygen, “fermentative” stage, where biological processes are intense and complex.

The end result is a quality compost product. When done correctly it will be a homogeneous stable product with a dark brown colour indicating a high level of humus with no weed seeds or pathogens.



Finished Compost at Armidale Regional Council

The SPICE method is very simple and as the compost pile or windrow does not need to be turned regularly it results in significant savings in time, machinery, water and labour when compared to standard aerated methods that require a turner. Overall it can save up to 80% in labour and water use.

Because it is a covered process it requires much less water to achieve a final compost product. Using aerated composting methods moisture is lost during the compost process as microbes respire while decomposing. Usually additional water is needed when turning aerobic composts. However in the SPICE method the compost is covered. This means that the moisture given off during composting is trapped by the cover and returns into the compost. Therefore, the method uses much less water than a windrowed compost process.

In areas of high rainfall the cover allows excess water to be kept out of the compost. So in high rainfall zones compost can be made outside using the SPICE method without the need for a shed to keep excess rain off compost windrows.

The SPICE method often results in more carbon being kept in the compost. This means more final product. Also odour is greatly reduced or eliminated. In general it has been found that there is no issue with odour at any stage of the composting process. Finally, the requirement to cover piles with tarps significantly increases the thermal and moisture efficiency in the piles and reduces the risk of contaminated run-off from the composting site.

How to Make SPICE Compost

Only basic equipment is needed to make compost using the SPICE Method. Generally it only requires:

- inoculant
- hand spray unit or pump with fire hose
- front-end loader or tractor with bucket
- water tank/truck or direct access to water
- waterproof covers
- tyres or lengths of timber

The key steps to making compost using the SPICE Method are:

1 - Make the Compost inoculant.

This is detailed in a separate SPICE Compost Inoculant Fact-sheet. The inoculant contains mainly fermentation bacteria that help regulate the composting process. Commercial products are also available.



Adding inoculant to water tank: for application

They need to be *Lactobacillus* based products. Sometimes they are sold as “EM” products. Quality products will have the active strains on the label. However it is very cheap and easy to make your own inoculant.

2 - Source materials for composting.

Similar to other composting methods you need to source a balance of materials so that effective composting occurs. This means getting a mixture of brown and green materials so you have the correct Carbon to Nitrogen ratio in the compost recipe. Aim for around 25-50 to 1 (Carbon to Nitrogen). You also need to ensure that the materials are not contaminated with plastics, metals or toxic substances.

3 - Mix, Wet and Inoculate the materials.

The materials for composting need to be well mixed and wetted up if they are dry. Aim for around 50-60% moisture content in the compost mixture prior to starting the process. You generally know you have reached adequate moisture when a handful of squeezed material produces a few drops of water. It is important not to use chlorinated water.



The inoculant can be diluted in water and added to the materials as they are wetted up. It is important to ensure inoculant covers all materials. Apply at about 1 litre of inoculant to every 10 cubic metres of material to be composted regardless of how much water you need to reach 50 -60% moisture content.

4 - Windrow and Cover.

The mixture is then piled into windrows and covered with tarpaulins or polytarps (grain covers) which are weighed down with tyres or timber to keep the cover in place. Covering the windrows helps to create the conditions for the bacteria to flourish and controls the composting process.

It is very important to put a small indentation lengthways along the top of the covered windrow. This ensures that moisture inside the pile cycles back into the pile as the composting occurs.





5 -Monitor the composting process.

The covered piles are then left for four to six weeks as a minimum. If you are on a farm and are confident that the moisture level is correct you can leave the pile to process until such time as it is finished. A thermometer, a pH meter/kit and a spade can be used to monitor the compost's progress.

During the first day or two the temperature can climb to around 65 - 70 degrees as a flush of aerobic activity take place. Toward the end of the aerobic phase, the temperature will fall back to around 50 - 55 degrees. This early aerobic flush of activity provides the first opportunity for pasteurisation. According to most standards, compost must reach and hold a temperature of 55 degrees for three days to achieve pasteurisation requirements, or be put through an alternate process. SPICE is an alternate process.



Monitoring SPICE compost on farm at Glen Innes NSW

In association with the stabilisation of temperature around 55 degrees, the pH level can drop to around 3.5 - 4.5, and the families of microbes in the compost will change as the fermentation bacteria take over. The pile colour changes to a uniform black. Additionally, a white bacteria called ray fungi (actinomyces) can colonise the piles and can be observed as grey filaments or powdery flakes. If these grey powdery flakes and filaments are predominating, it can be an indication that the pile is too dry, so check moisture levels and apply non-chlorinated water as required.

6 - Turn. (Optional).

If the composting is being done on-farm then there should be no need to turn the compost. The pile can be left until composting is complete.

However if this process is being used on collected green waste or with materials that may have physical contaminants, then after 4 – 6 weeks, the piles can be uncovered, and can be re-examined to remove any physical contamination that might have been missed at the beginning of the process.

By this stage the piles should have slumped by about a third and any compostable biobags, if used for food scraps, will have disappeared. Smaller contaminants become easier to see as the compost takes on a uniform texture and dark colour.

If needed the compost is then re-mixed, sprayed once again, re-covered and left for another 4 to 6 week period. A similar early spike in temperature (around 65 – 70 degrees C) followed by a longer period at around 50- 55 degrees C and an associated pH level of 3.5 – 4.5 may be expected during the second composting stage.

For councils and commercial composters this optional step of turning provides the second opportunity for pasteurisation if necessary and ensures material that was previously on the outside of the pile has been reincorporated and processed.

7 - Curing.

After the composting process is complete the compost can be allowed to cure or stabilise further for a few weeks. However if done properly it should be ready to use after removing the covers.



Compost Quality

A finished compost should be dark brown/black in colour, homogeneous and any large particles should be broken down to a fine size. The temperature of the pile will drop below 40 degrees C. This indicates that the composting process has been completed. Samples can also be sent away for testing to verify compost quality.

It is important to note that if you are selling compost commercially then you need to demonstrate that the product has met the Australian Standard. Seek professional advice if you are not sure about these requirements.

Monitoring the temperature of the compost is the easiest way to determine if the process has worked. If the temperature does not rise above 55 degrees C for some period of days then you will need to check as to why the process has not worked. Again, seek professional advice if you are not sure.



Success with no-turn composting on farm in the Wet Tropics Queensland

Dereck and Stacey Devaney farm bananas at Mirriwinni in Far Nth Queensland. When packing bananas a lot of organic waste materials are generated in the pack shed. Often this material is seen as a problem. The Devaneys saw an opportunity to turn this into compost but were reluctant to purchase a compost turner and saw the additional costs and time required to make aerated compost as a challenge. Also as they receive 4 meters of rain a year, aerobic compost making is a real challenge in their region as water-logging is an issue.

In 2014 they attended a workshop on using the SPICE method to make compost without too much time and costs. They immediately trialled a batch blending pack shed waste with spent mushroom compost, inoculating it and covering with low cost tarps and letting it compost. 2 years later they are now making compost on the farm annually and applying it to the bananas where they are seeing great results with both soils and plants responding positively. Lab tests have confirmed the quality of the compost.



Armidale's City to Soil composting project is a winner

New South Wales

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Armidale Regional Council in northern NSW was part of the successful "City to Soil" project that aimed to transform food scraps and green waste from the city's residents into a high grade compost that could then be returned to farmers and gardeners. The aim of the project was to minimise landfill as well as reconnect city residents with the farmers who grow their food. A key part of the project has been using the SPICE Composting method.

Running over a number of years the project has been a great success. With the potential of contamination in the compost from glass and plastics a problem with many Council composting systems, the residents of the city have supported the project and council staff have developed innovative ways to eliminate contamination risks. The result has been a high quality compost made on a large scale. Importantly the method has approval from the EPA NSW. By using this method Council has also reduced water usage and odours at the composting site.



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For more information:

David Hardwick

Gerry Gillespie

www.soilandfood.com.au

gerry.b.gillespie@gmail.com



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