GUIDE FOR INDEXING COMPOST MATURITY

SOLVITA®

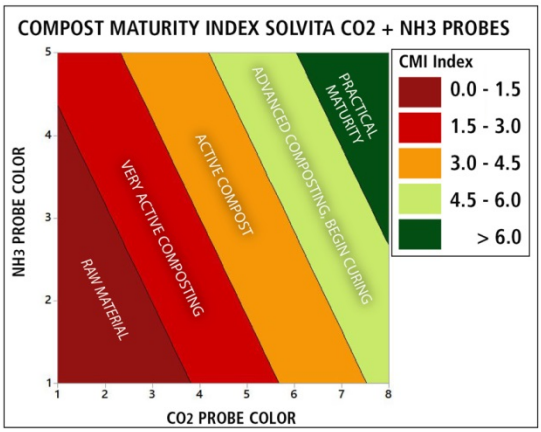
TECH MEMO 0317-6

SOLVITA CO_2 AND NH_3 CO-VARIATES TO DETERMINE MATURITY

Carbon dioxide (CO_2) and ammonia (NH_3) emissions from active composts jointly provide critical clues to the status of the composting process. especially as it goes from "active" to what is commonly called "curing" or "mature". Measuring CO_2 and NH_3 rates together is intended to garner information which either test alone cannot do, since composting is both a carbon and nitrogen stabilization process[1]. CO_2 release represents the raw energy of organic matter decomposition and also indicates probable oxygen demand. Ammonia escape may indicate an initial imbalance of decaying protein and urea in the intermediary amino-N forms, often generating high pH's and free NH_3, and certainly not yet stable. While these factors are normal in early stages of composting, they must both eventually subside before compost may be considered ready-to-use. At this point CO_2 release should be close to a "basal" background level and ammonia sequestered by microbes or converted by "nitrification" to non-volatile, plant-available nitrate (NO_3).

Solvita® provides a unique and reliable approach to gauge maturity by simultaneously indicating the CO_2 rate and the presence of free ammonia. The test employs a Solvita "Hi-CO_2" probe, calibrated for a wide range of 0 – 20% CO_2, since compost can replace all oxygen with CO_2 during composting, presenting an aeration challenge. Additionally, the NH_3 Solvita probe is calibrated for a wide range of ammonia which can climb to high levels in early stages. As a note, Solvita color numbers relate to concentration of CO_2 and NH_3 on an *exponential* scale, each color step doubling the quantity present.

The **Maturity Index** is calculated by reading both probes and determining the interrelation of the two indicators (see figure). This indexing serves two purposes: it factors the interference of high NH_3 in CO_2 determination and the real advancement to maturity[2]. Since compost never fully subsides in release of CO_2, the concept of "practical maturity" is applied whereby a status of satisfactory maturity is attained when compost is unlikely have odor or be phytotoxic to plants [3]. This is an Index (CMI) > 6.



Statistical analysis of the interaction of CO_2 and ammonia has resulted in a highly significant equation (r2=89%) relating maturity level to the ratios of the two Solvita indicators, as shown in the figure. Laboratories performing Solvita maturity tests can have access to a statistical **CMI calculator** which determines the precise location on the grid after reading Solvita probes with the DCR photometer. This should help reporting maturity in regions and states that require Solvita index documentation. tests should always be performed in conjunction with other lab analyses, particularly moisture and bulk density to properly represent the near end-status of compost.

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[1] Changa et al. (2003) Assessment of the Reliability of a Commercial Maturity Test Kit for Composted Manures. Compost Science & Utilization, (2003), Vol. 11, No. 2, 125-143

[2] Wang et al. (2004) Maturity indices for composted dairy and pig manures. Soil Biology & Biochemistry 36 (2004) 767–776

[3] Brinton & Evans (2001) How compost maturity affects container grown plants. Biocycle Vol 1 56:60