



THE SPECIFIC OXYGEN UPTAKE RATE

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Stability and Maturity

- **Stability**
 - Relates to microbial activity
 - More relevant during the early stages of composting
- **Maturity**
 - Relates more to the beneficial effects of the compost from a plant viewpoint
- **Area of overlap**
 - 'grey' area at the end of the high rate bio-oxidative phase

Tests for stability

- No single parameter widely accepted
- Combination of tests likely to be needed
- Respirometric tests seem most useful
 - Based on well-understood principles
 - Relatively high degree of reliability and repeatability
 - Fairly simple and inexpensive

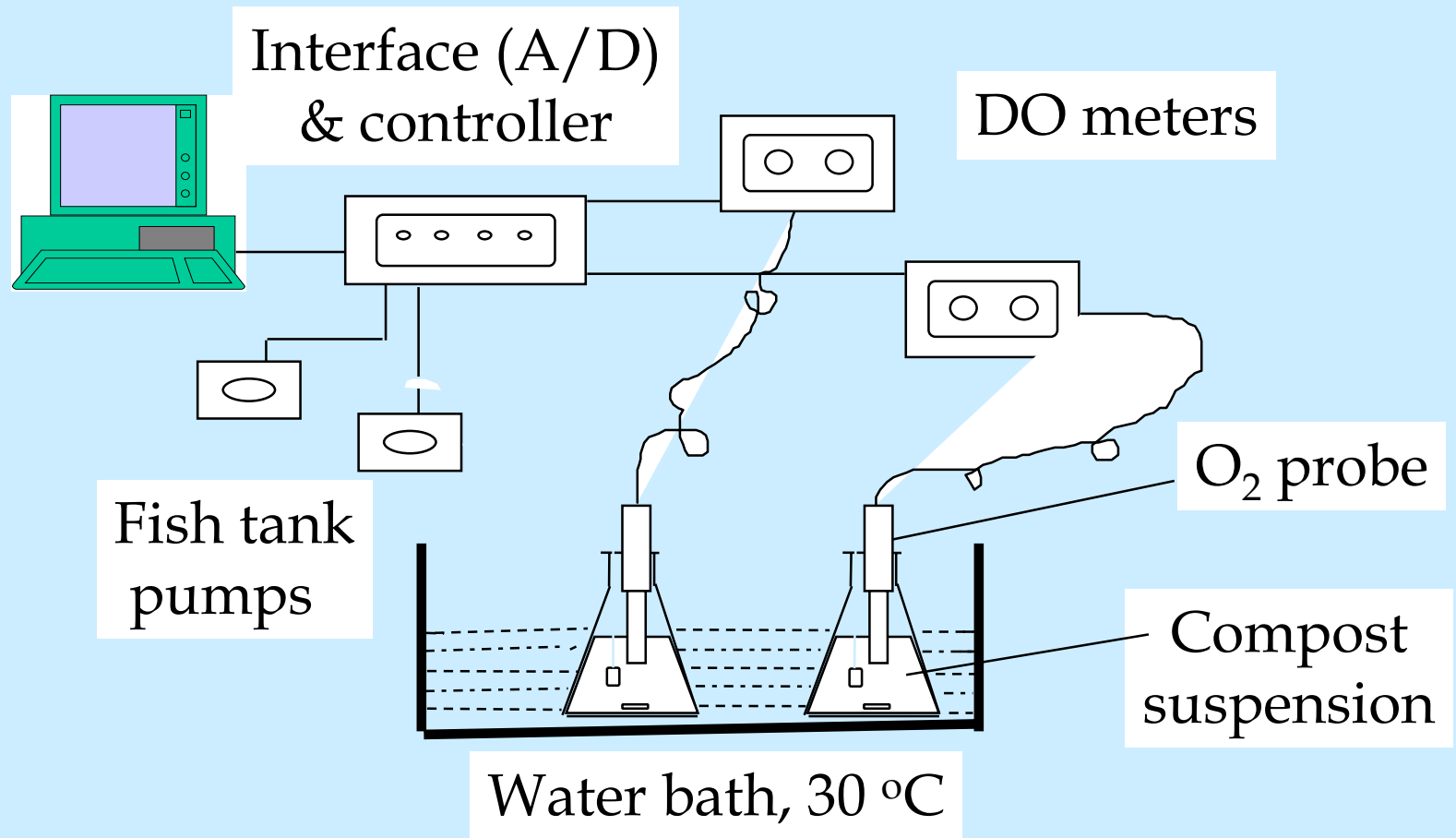
Development of SOUR

- Originally as a research tool to monitor composting progress
 - Since been used on a wide range of processes and materials
- Based on the BOD test which is
 - Used routinely in wastewater treatment
 - Has been adapted to be used as a respirometric test
- SOUR further adaptation of the BOD

Thinking behind SOUR

- Reproducibility
 - Solid state results are dependent on material structure and moisture
 - Liquid suspension removes limitations related to structure, moisture content and oxygen availability
- Ease of use
 - Uses standard pieces of laboratory equipment - requiring no specialist training
- Low cost
 - Operates at 30°C - uses DO monitors (no need for sealed respirometers)

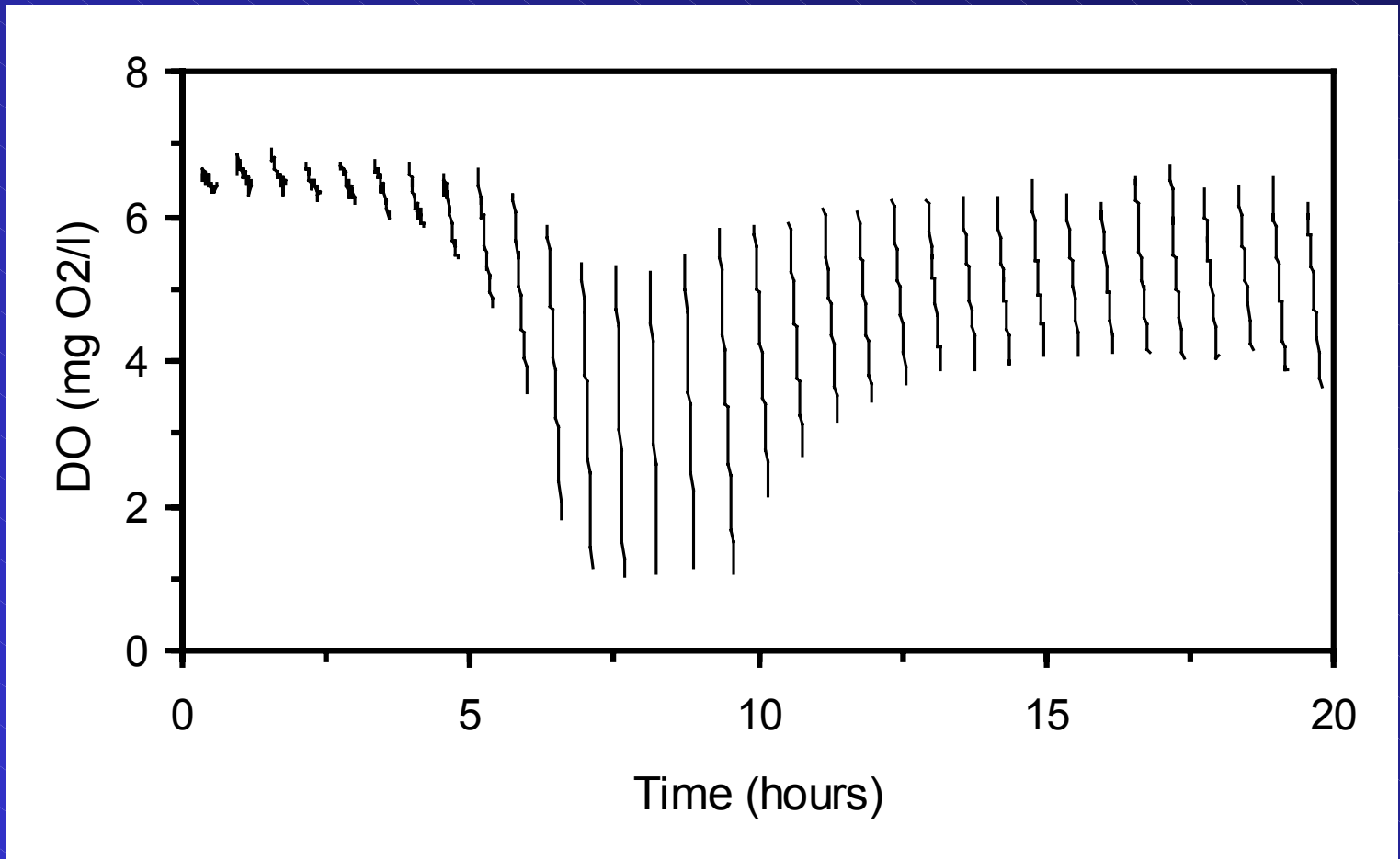
Apparatus



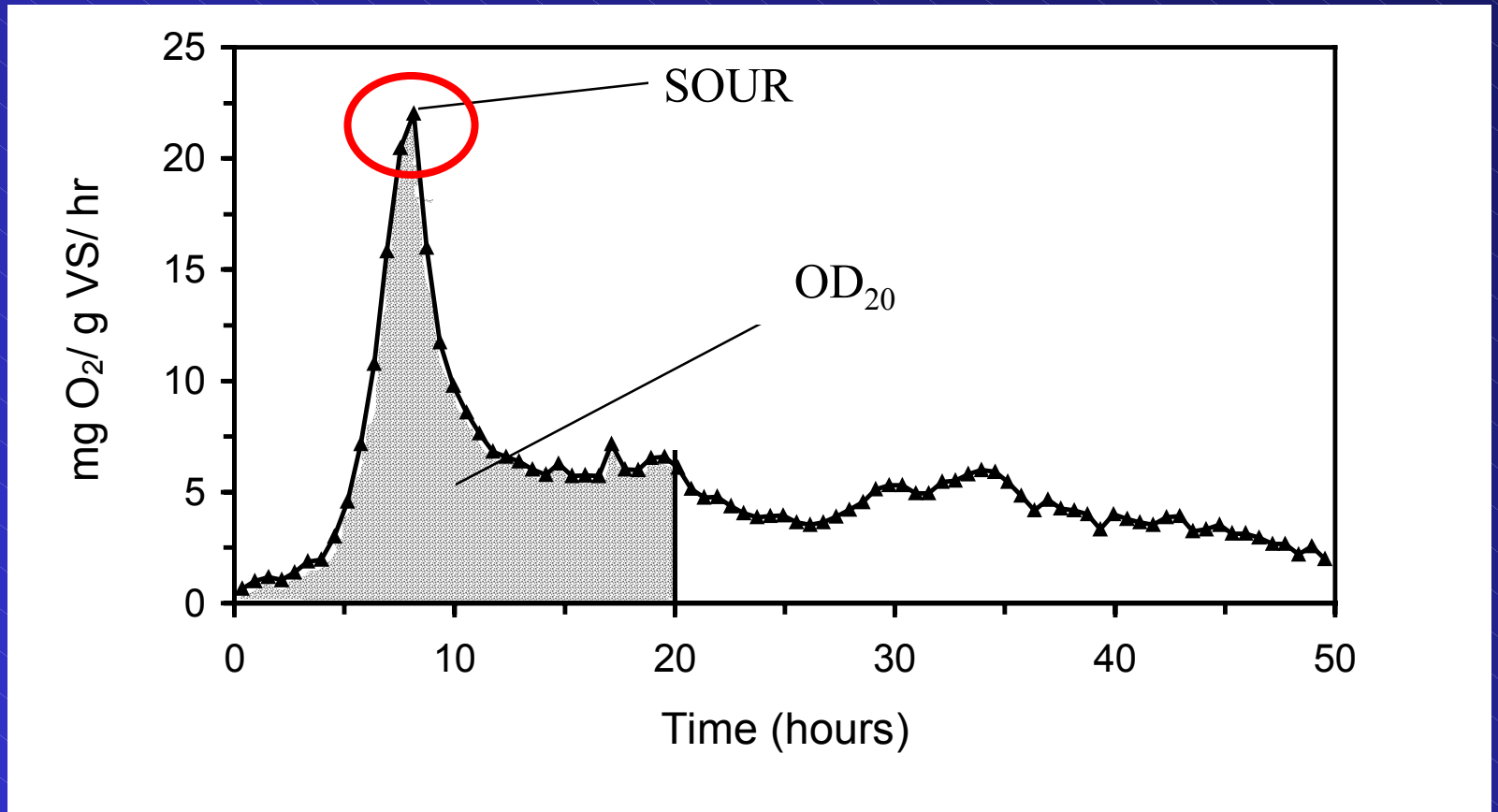
Methodology

- Screen material through 10 mm
- Break up large solids
- Use 3-8 gm of solids (or more)
- Add to 500ml of distilled water
 - The mass and liquid amount are matched according to the projected O_2 consumption rate
- Blend for 30s
- Set in water bath at 30°C
- Alternate aeration and DO measurement
- Measure the max rate of DO consumption

Typical DO rate response - Figure 2



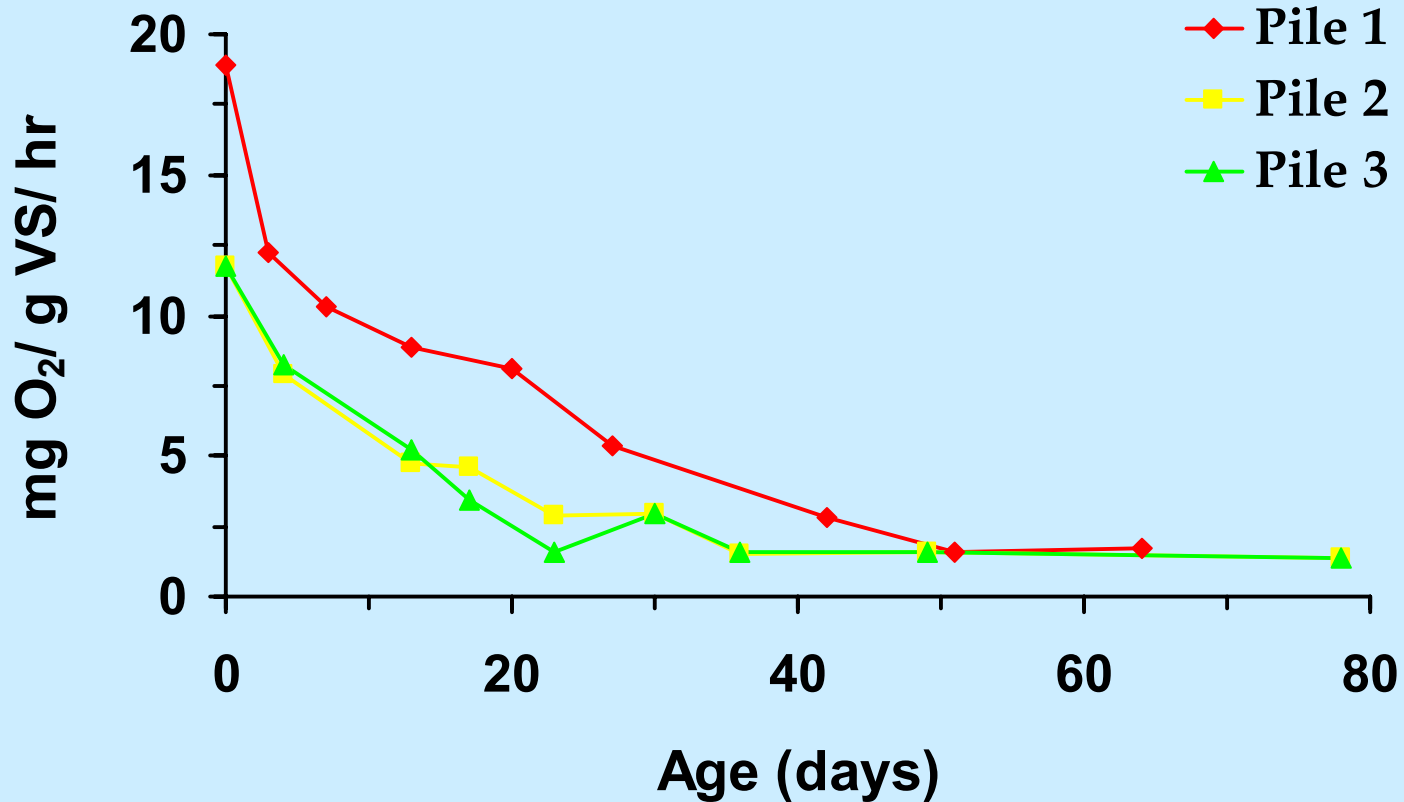
Typical SOUR profile - Figure 3



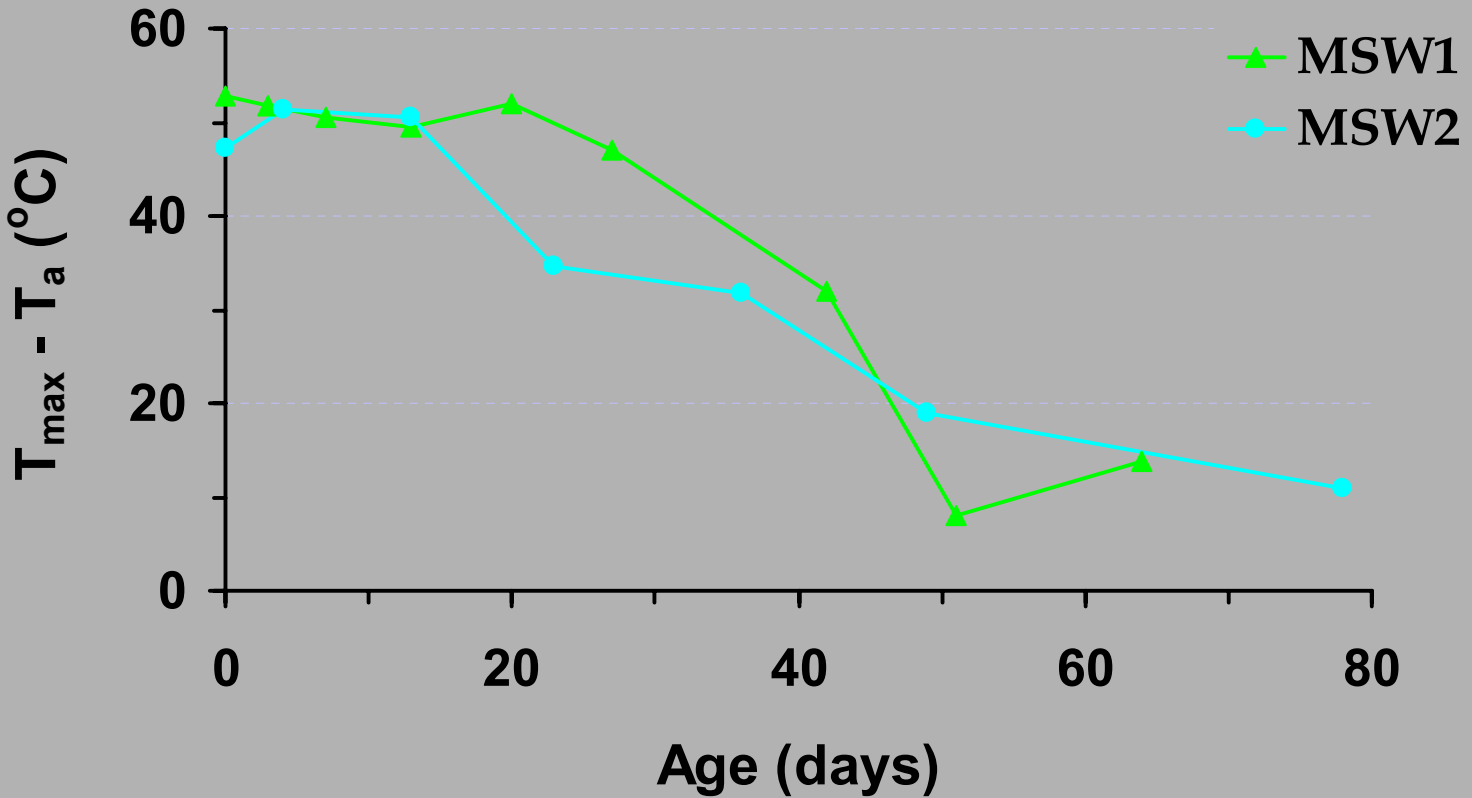
Use of SOUR

- Used in Leeds since early 90s
- SOUR v OD_{20} (Figure 3)
 - Correlation over a wide range of feedstocks has been good
 - Peak value used as it is easier
- Figure 4 (in paper) shows a typical set of results
 - Figure presented for MSW and sewage sludge mixtures being windrowed

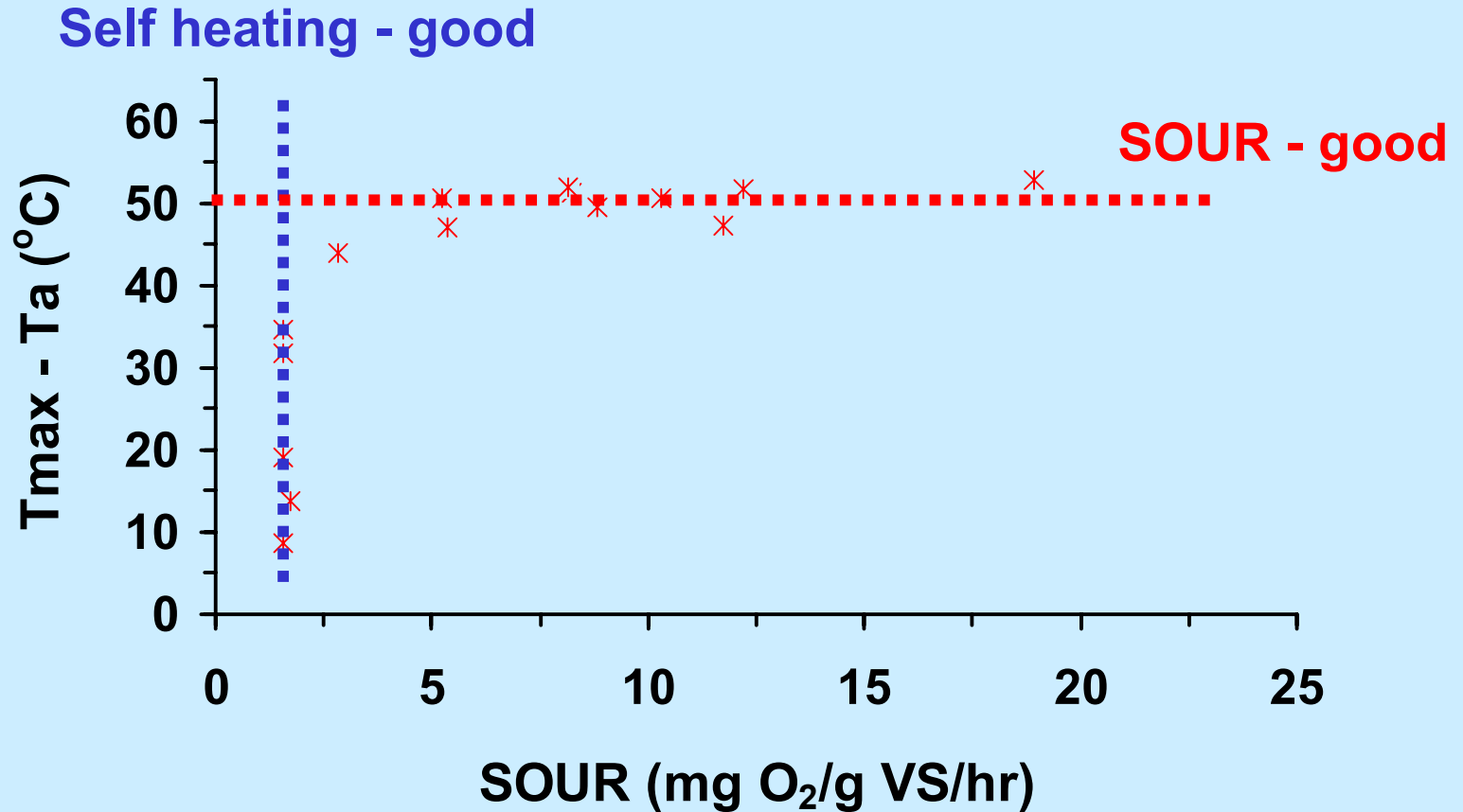
Typical SOUR results - windrow



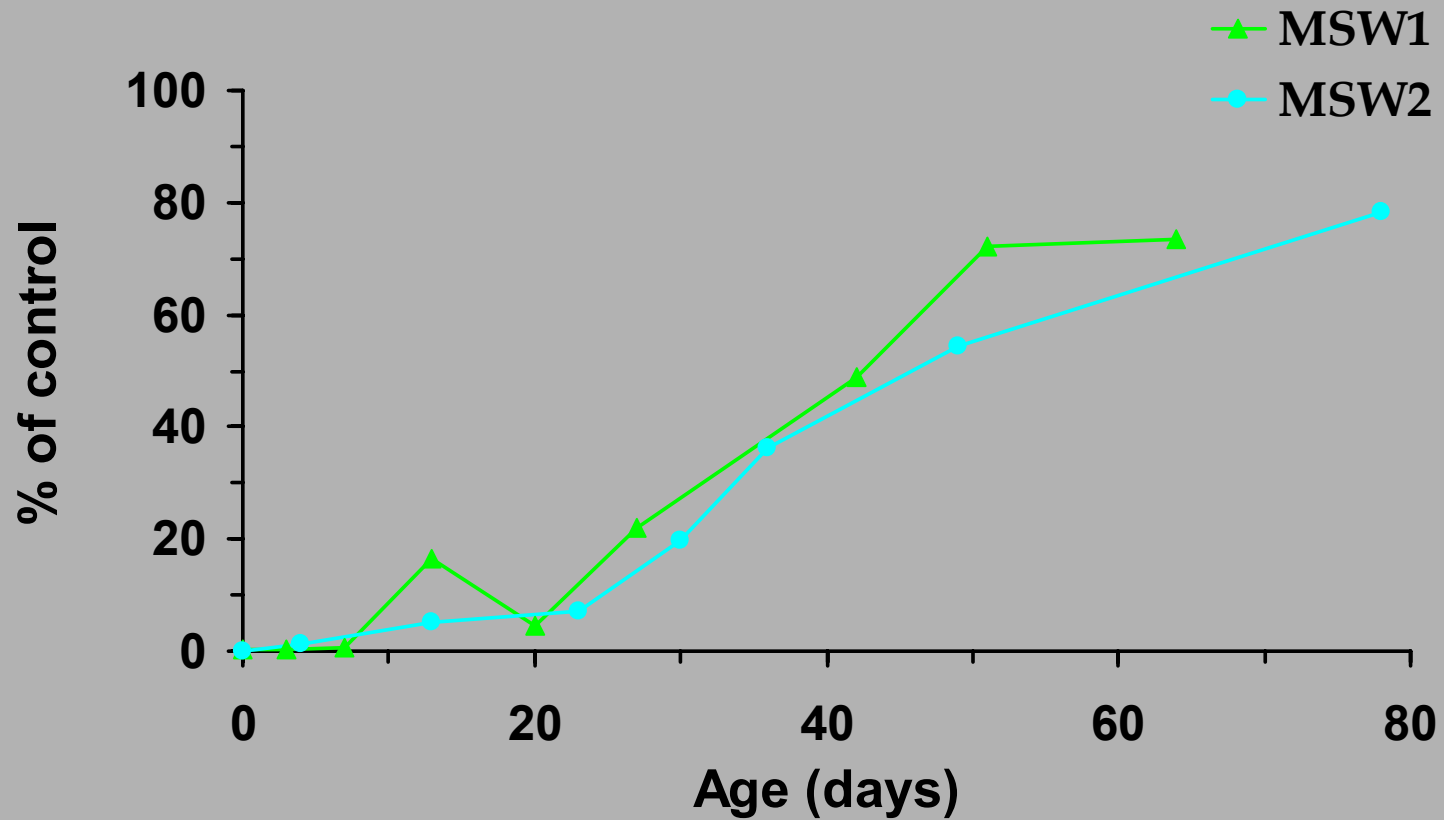
Self-heating



SOUR and self-heating



Germination index



SOUR and Solvita with green waste

Time (days)	Solvita	SOUR
0	3	5.9
7	3	3.1
10	4	-
15	4	0.8
21	4	0.9
28	5	0.5
35	5	0.4

Large change

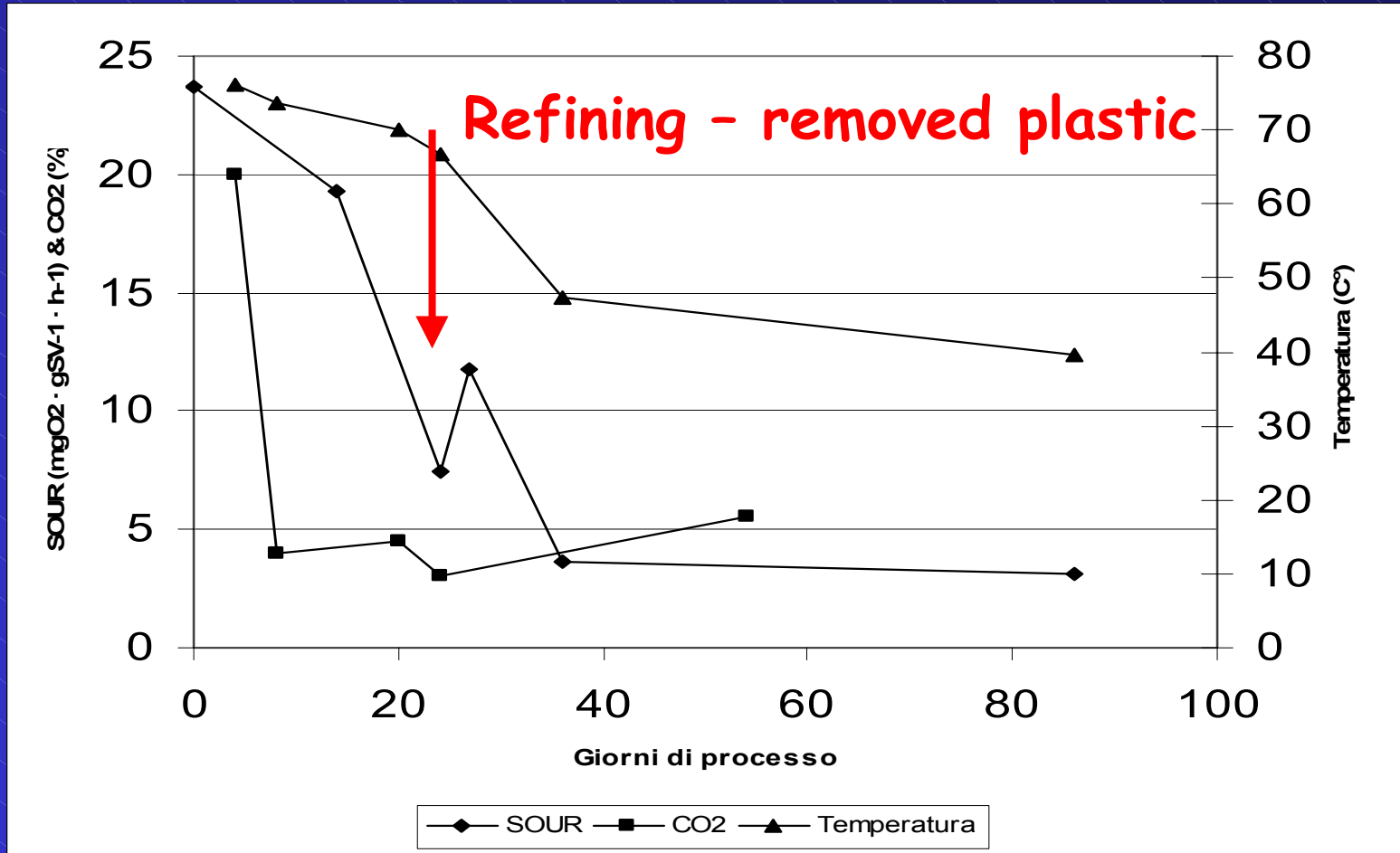
Small change

Working at different temperatures

- Temperature originally set to be above ambient (in UK) hence 30°C
- Higher temperature more rapid result
 - Italian results from work at 35°C
- If baseline is needed relationship of the form

$$SOUR_T = SOUR_{30} \Theta^{(T - 30)}$$

Results from SOUR at 35°C

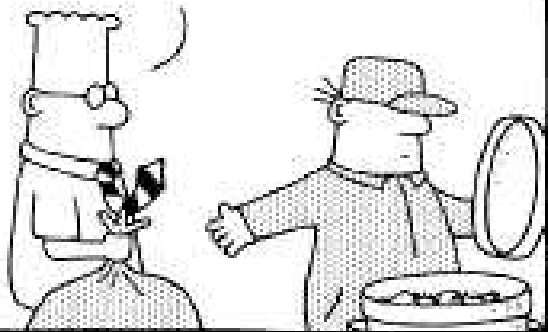


Conclusions

- Relatively inexpensive and simple to operate
- Good signal response without O_2 transfer limitations with solid matrix
- Robust indicator used successfully with a wide range of waste types
- Good indicator of stability but **NOT** for following maturity

Dilbert puts it in perspective!

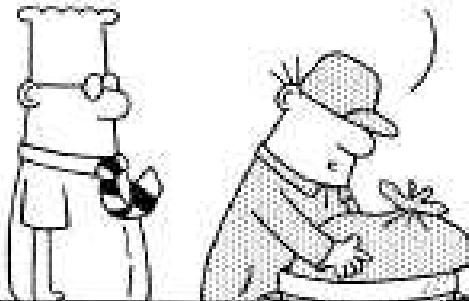
I'M DATING A BEAUTIFUL WOMAN. DO YOU HAVE ANY ADVICE?



scottadams@aol.com

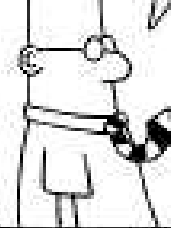
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A BEAUTIFUL WOMAN IS LIKE A HEAP OF FRESH GARBAGE: EXCITING, MYSTERIOUS AND DELIGHTFUL.



DO YOU HAVE ANY ADVICE THAT DOESN'T COMPARE MY GIRLFRIEND TO GARBAGE?

HOW ABOUT COMPOST?



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EU Biowaste Workshop - Brussels April 2002