

A dried plant specimen, possibly a leaf or stem, is shown against a light, textured background. The specimen is dark brown and appears to be a single leaf or stem with a small, pointed tip. The background has a subtle, marbled pattern in shades of beige and light brown.

# **The QuikSoil® BACS Process**

## **Scientific Principals Part 2**



## **The Science of QuikSoil® BACS**

**Consider the following point:**

**After you turn your compost, the process recovers and goes happily on for days or weeks until you turn it again –**

**Even though all credible studies we have seen show the increased oxygen from the turn only lasts a few hours.**

The background of the slide features a light beige, marbled paper texture. On the left side, there is a vertical stem with a single dried, brownish leaf. On the right side, there is another stem with a single dried, brownish leaf. The text is centered in the upper half of the slide.

## **The Science of QuikSoil® BACS**

**What is the  
actual definition  
of an  
aerobic bacteria?**



## The Science of QuikSoil® BACS

“An organism that is ***CAPABLE*** of using oxygen as a terminal electron acceptor, and can ***TOLERATE*** a level of oxygen equivalent to or higher than that present in an air atmosphere.....”



## **The Science of QuikSoil® BACS**

**Definition from**

***Bergey's Manual of  
Determinative Bacteriology;  
9th Edition, 2000, page 23  
Lippincott Williams & Wilkins***

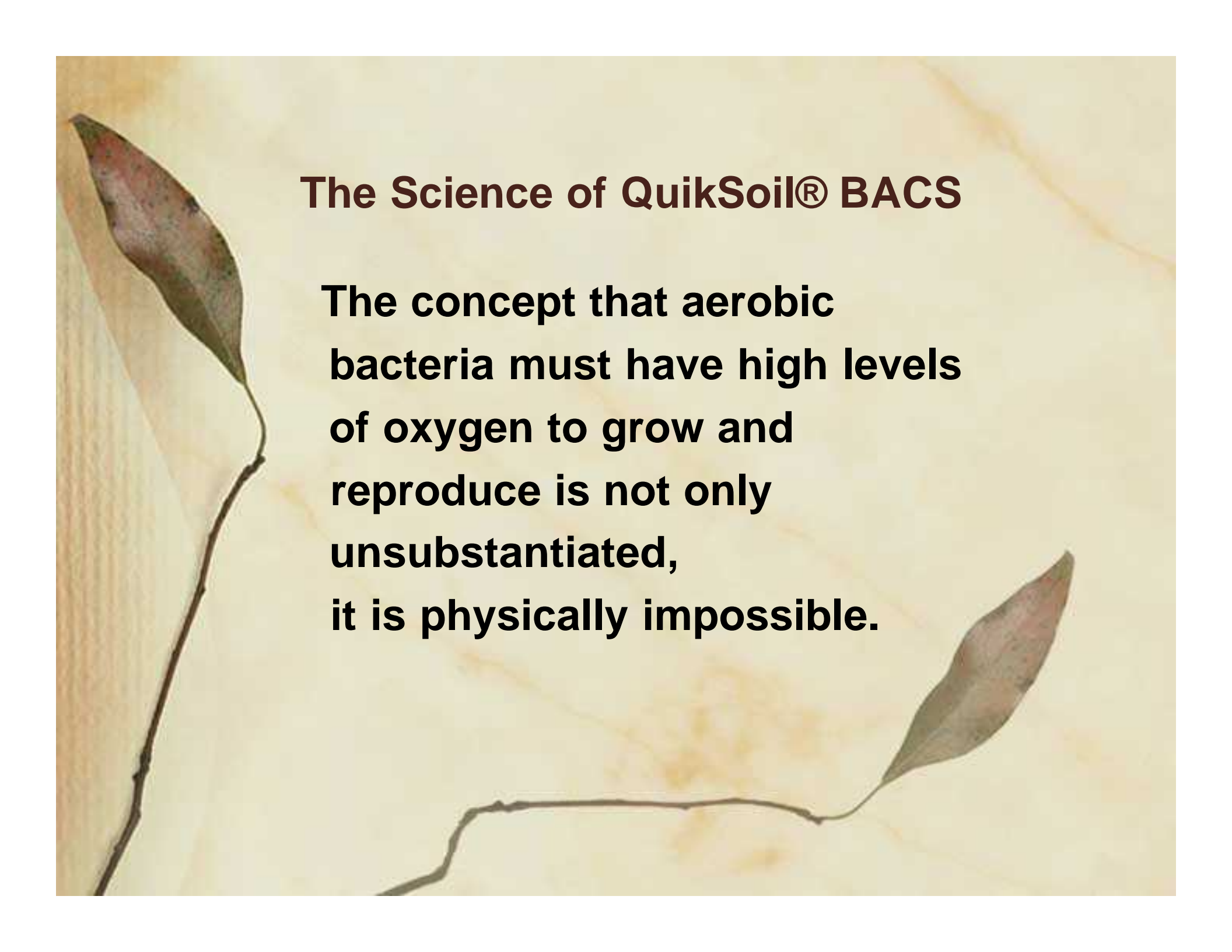


## **The Science of QuikSoil® BACS**

**Bacteria have no mouths, noses, or lungs.**

**The method by which they utilize oxygen is not equivalent to our own.**

**Oxygen is largely utilized in reactions that occur **EXTERNAL** to the cell, in moisture.**

The background features a pressed leaf on aged, yellowish paper. A faint botanical illustration of a plant stem with leaves is visible, extending from the left side towards the right. The text is overlaid on the right side of the image.

## **The Science of QuikSoil® BACS**

**The concept that aerobic bacteria must have high levels of oxygen to grow and reproduce is not only unsubstantiated, it is physically impossible.**



## **The Science of QuikSoil® BACS**

**It is physically impossible due to the nature of the world in which bacteria grow, and the way bacteria secure their food, a way dependent on moisture and temperature.**



## **The Science of QuikSoil® BACS**

**We all know subconsciously that bacteria only grow in moisture.**

**That is why we only use deodorant on those areas of our bodies that are likely to become damp.**



## **The Science of QuikSoil® BACS**

**Bacteria are on our arms, our tabletops, our clothes, our computers, telephones, and just about everywhere else.**

**BUT THEY DO NOT AND CANNOT GROW UNTIL AND UNLESS THEY ARE EXPOSED TO MOISTURE !**



## **The Science of QuikSoil® BACS**

**This is why the moisture level is so important in composting.**

**Moisture acts as the medium by which nutrients and essential compounds are transferred through the outer cell membrane and into the bacterium.**

**Temperature acts as the controlling agent, determining the permeability of the bacterial cell outer membrane.**

The background of the slide features a pressed leaf, likely a bay leaf, on a light-colored, textured surface. The leaf is dark brown and elongated, with a prominent vein running down its center. It is positioned on the left side of the slide, with its stem extending downwards and then horizontally across the bottom. The overall appearance is that of a dried botanical specimen.

## **The Science of QuikSoil® BACS**

**Decomposition occurs more rapidly at thermophilic temperatures (above 105° F) because the bacterial cell walls are more permeable, allowing more rapid access to nutrients and essential compounds, and thus, more rapid growth and reproduction.**

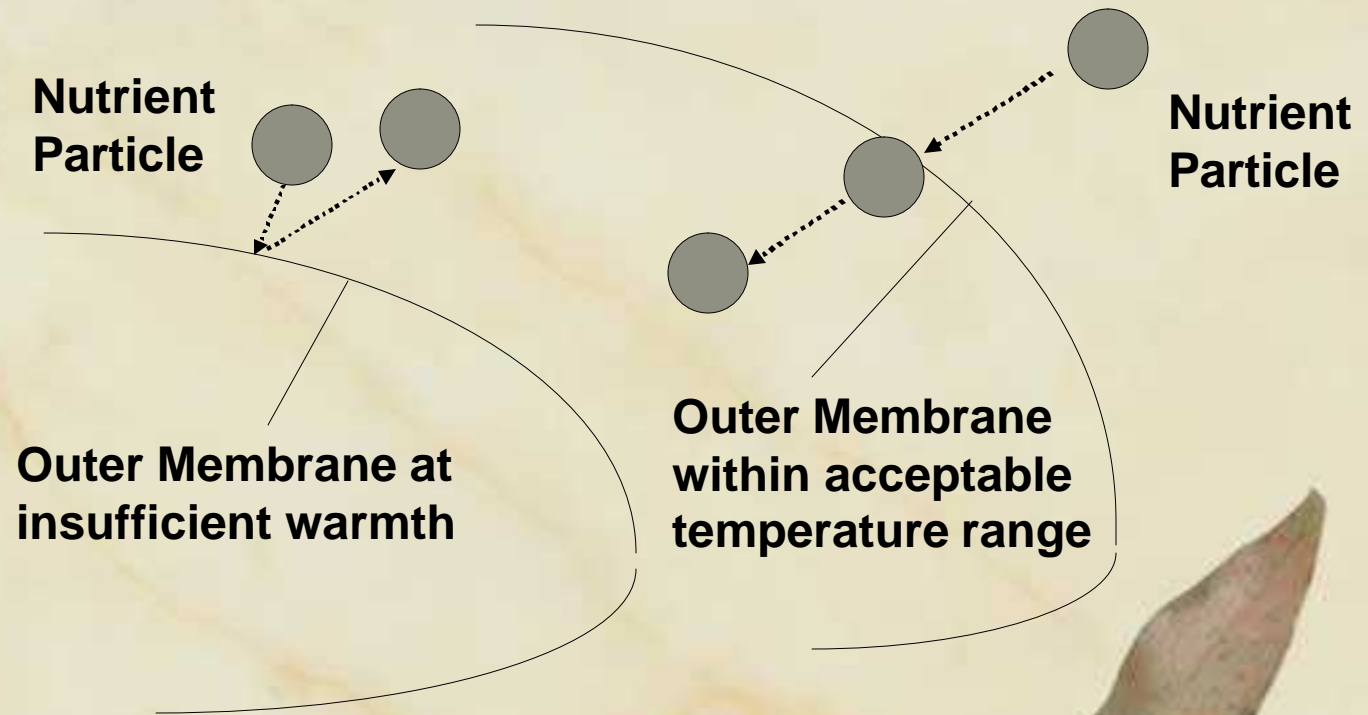


## **The Science of QuikSoil® BACS**

**At cooler temperatures the membrane becomes less permeable. Thus the digestion rate and therefore the growth and reproduction rates both decrease.**

**At temperatures that are too hot, the membrane becomes too permeable, and the cell fills with liquid until the membrane bursts. This is the basis for pathogen kill by temperature.**

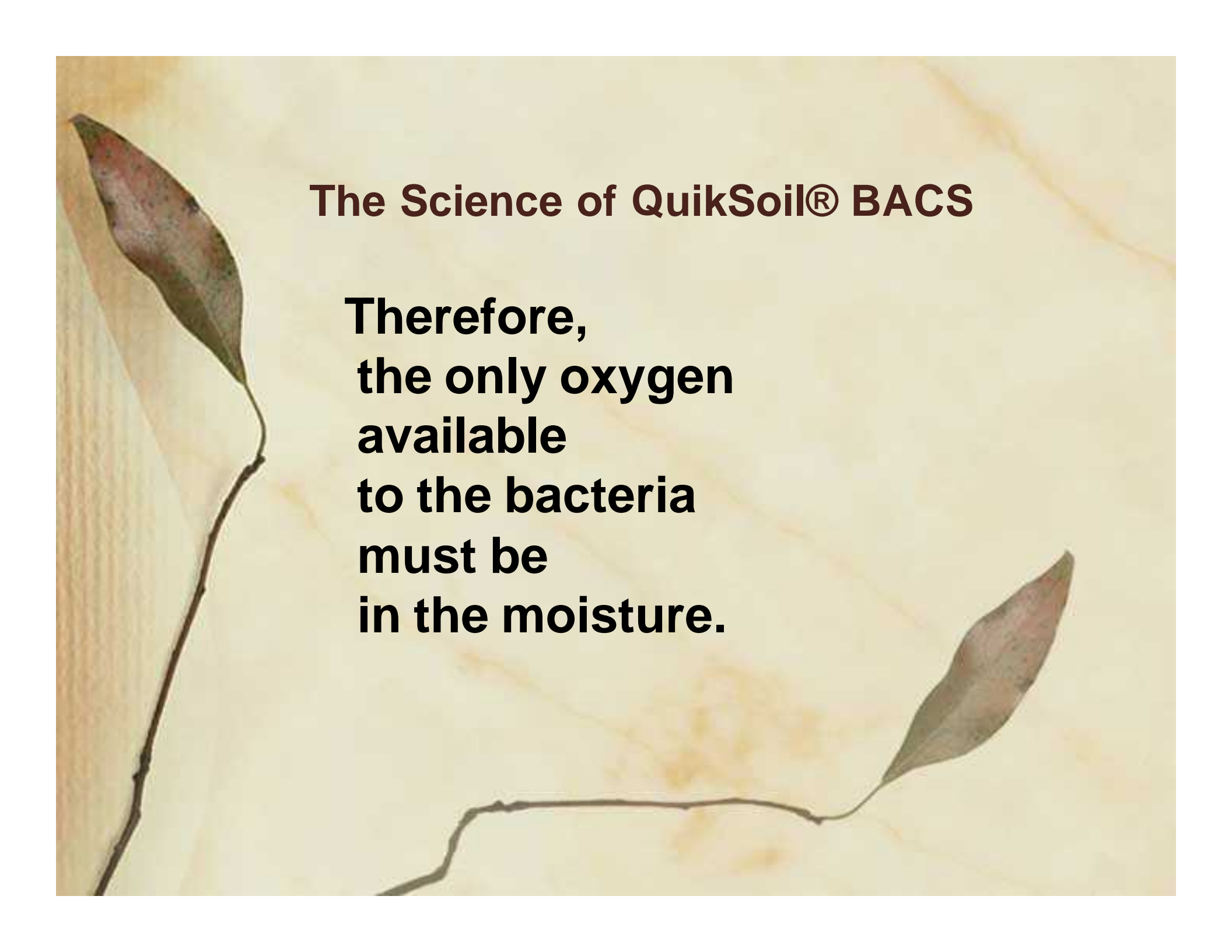
# Membrane Permeability





## **The Science of QuikSoil® BACS**

**The “digestion” occurs externally, and the required nutrient is then transported through the membrane . This method is the reason bacteria require temperature and moisture to grow and reproduce.**

The background of the slide features a pressed, dried leaf on a piece of aged, yellowish paper. The leaf is positioned vertically on the left side, with its stem extending downwards. Another smaller leaf is visible on the right side, also pressed. The overall aesthetic is natural and scientific.

## **The Science of QuikSoil® BACS**

**Therefore,  
the only oxygen  
available  
to the bacteria  
must be  
in the moisture.**



## **The Science of QuikSoil® BACS**

**Water is limited as to the amount of dissolved oxygen it can hold. This limitation varies with temperature. At thermophylic temperatures, the maximum dissolved oxygen level in the moisture, and the only available oxygen to the bacteria,**

**is 3 to 5 parts per million !**

The background of the slide is a photograph of a pressed leaf on aged, yellowish paper. The leaf is dark brown and appears to be a single leaf on a stem, positioned vertically on the left side of the frame. The paper has some faint, light brown stains or foxing. The text is overlaid on the right side of the image.

## **The Science of QuikSoil® BACS**

**This is a maximum of  
one two-thousandth of 1%  
dissolved oxygen  
available at any given moment !!**

The background of the slide is a light, textured surface, possibly parchment or paper, with a few dried, pressed leaves scattered across it. One leaf is on the left side, and another is on the right side, both showing some brown and green hues. The text is centered on the page.

## The Science of QuikSoil® BACS

**This must be sufficient oxygen for the aerobes involved in thermophylic composting, as it would have been impossible for the creatures to develop needing more oxygen than would ever be available for their use.**



## **The Science of QuikSoil® BACS**

**Remember the point we began with:**

**After you turn your compost, the process recovers and goes happily on for days or weeks until you turn it again –**

**Even though all credible studies we have seen show the increased oxygen from the turn only lasts a few hours.**



## **The Science of QuikSoil® BACS**

**It is the flow of oxygen,  
- the rate at which  
re-saturation of the  
moisture with oxygen  
occurs –  
that maintains aerobic  
requirements.**



## **The Science of QuikSoil® BACS**

**A steady convective  
flow of even 1% oxygen  
through the mass will keep  
the moisture continuously  
saturated.**

The background of the slide is a light beige or cream color with a subtle, marbled texture. On the left side, there is a vertical stem of a dried plant with a single, elongated, brownish leaf. On the right side, there is another stem with a similar leaf, extending horizontally across the lower part of the slide. The text is centered in the upper half of the slide.

## **The Science of QuikSoil® BACS**

**So long as porosity is maintained,  
heat and oxygen will move through  
the pile.**

**When decomposition causes  
densification, and porosity declines,  
then it is time to turn –  
to reallocate assets  
within the mass.**



## **The Science of QuikSoil® BACS**

**Porosity and convective flow are encouraged by proper construction of the row or pile.**

**Diversity in size and shape of particles is critical.**



## **The Science of QuikSoil® BACS**

**Turning without a justifiable reason destroys colonies and forces the restart of bacterial cycles.**

**It also encourages homogenous particle sizes that can pack tightly and discourage porosity!**



## **The Science of QuikSoil® BACS**

**For turning to be a reasonable source of aeration,**

**Turning would be required every few hours, and the bacteria would never have sufficient time to recover, and effectively grow and reproduce.**



## **The Science of QuikSoil® BACS**

**Aerobic soil maintains  
thousands of strains of  
bacteria – yet it is  
“turned” annually - if at all.**



## **The Science of QuikSoil® BACS**

**In addition to creating porosity by using diverse particle shapes and sizes, aeration can be assisted by duplicating the physical chemistry of aerobic soils in the compost row or pile.**



## **The Science of QuikSoil® BACS**

**In good aerobic soil there is a specific volume relationship between cationic (positively charged) minerals. Because they have like charges, these cellular units repel each other. When the volumes are correctly balanced, this repelling action helps create and maintain porosity.**



## **The Science of QuikSoil® BACS**

**Imagine dropping a handful of magnetized iron filings into a tray of loose soil. The iron particles would repel each other, and in the process move the soil particles.**

**Various sets of minerals found in aerobic soils accomplish this same task, and these relationships are correctly duplicated in QuikSoil® to achieve the same result in compost.**



## **The Science of QuikSoil® BACS**

**As decomposition causes materials to become more dense, ionic mineral balances are essential in maintaining aerobic conditions. The rapid loss of porosity and convection often found in conventional processes does not occur in the BACS process.**



## **The Science of QuikSoil® BACS**

**The aeration qualities of QuikSoil® are fundamental to BACS. By allowing a significant decrease in agitations and disruptions, less CO<sub>2</sub>, VOC's, and odor escape the decomposing mass. And more time is spent in bacterial growth and reproduction - in actual decomposition - yielding more finished, stable, and carbon-rich compost.**



## **The Science of QuikSoil® BACS**

**By increasing actual decomposition hours without increasing processing time, a more thorough level of decomposition is achieved - with a substantial decrease in emissions.**



## **The Science of QuikSoil® BACS**

**The second function of BACS and QuikSoil® is to maintain sufficient aeration to allow a significant decrease in mechanical aeration events, events which disrupt bacterial growth and reproduction.**



**End Part 2**