

BENCH-TESTING OF BIOLOGICAL PRODUCTS

From time-to-time Syneco Biochem, is contacted by those wishing to conduct laboratory benchmark studies to determine the effectiveness of our biological products in their waste system. While there are more significant factors than can be adequately discussed in a brief overview, an understanding of some of the requirements for growth in bacteriological systems should underscore the difficulty in obtaining projectable results in laboratory bench studies.

OXYGEN: While most of the bacteria in our products are anaerobic, there are some aerobes present. The synergistic relationship of the two is critical to a healthy biomass. (Oxygen has a relatively low solubility in water, the diffusion of oxygen across a limited air-water interface may limit the density which a culture can attain.) The shift from large scale cultivation (i.e. ponds or lagoons), to a smaller scale laboratory analysis, will markedly alter the aeration dynamics and lead to striking changes in the composition of the bacteria in the fluid.

ANAEROBIOSIS: The establishment of a strictly anaerobic atmosphere for cultivation in small containers is difficult. Oxygen tensions as low as 10^{-5} atmospheres can be inhibitory. In nature, mixed cultures are the rule, and strict anaerobes depend on neighboring facultative organisms to scavenge oxygen. In a lab set-up strict anaerobic conditions would not allow for the proper growth of the facultative organisms and their much needed synergistic impact.

CARBON DIOXIDE:

All metabolizing aerobes elevate the CO_2 level in their environment. However, in a small system this contribution is minimal and may produce a long lag time before the initiation of growth. All growing bacteria cells have an absolute requirement for adequate CO_2 .

pH: In nature, the pH ranges in a large system vary greatly from area to area and from top to bottom and thus support a specific bacteria that is most comfortable within a given pH range. In a small, confined culture, minute shifts in pH affect the entire colony resulting in conditions that greatly favor the growth of one bacteria over the rest. Obviously, this sort of shift in growth can easily defeat the purpose of any study.

In the interest of brevity, a number of equally critical growth factors - vitamins, amino acids, ironchelating compounds, unsaturated fatty acids, nucleic acid bases, inorganic ions, trace elements, temperature, exoenzymes - have not been discussed. Hopefully, however, there is enough information to further an understanding of the tremendous complexities inherent in any biological system. Truly, the only process currently known for determining the effectiveness of a biological product is the full scale field test.

Limited Warranty: Our only obligation shall be to replace or pay for any material proved defective. Beyond the purchase price of materials supplied by us, we assume no liability for damages of any kind and the user accepts the product "as is" and without warranties, expressed or implied. The suitability of the product for an intended use shall be solely up to the user.