

# **Great Pacific Bioproducts Test Results Report**

November 20, 2007

I was asked to do a comparative study of two liquid fish products by Mike Renwick of Great Pacific Bioproducts. The purpose of the study was to ascertain which product best supports and enhances microbial life horticulturally beneficial to the microbial nutrient cycle found at the soil to root interface.

The method used for the examination was direct microscopy and recording by video camera the microbial life or lack of it observed. A Leitz Orthoplan phase contrast transmitted light research grade microscope interfaced with a Sony high definition video camera was employed. Images were captured to the hard drive of a computer and later rendered to DVD format. I was unaware of which sample was which until all examination and recording was complete, therefore the testing was performed blind. I received samples labeled 'A' and 'B'. The accompanying DVD makes reference to these two labels throughout.

When observing the accompanying video footage please be aware that often, movement observed on a microscope slide is not what you might assume. Sometimes flows are caused by the coverslip settling and vibration type motion of tiny bacteria and debris can be caused by Brownian motion (movement of and amongst water molecules) and does not indicate motile (mobile) bacteria.

The magnification observed in most cases is 250X applied by the microscope but also amplified by the camera lens. Generally compared to the field of view observed through the microscope tube our field of view is restricted to one third of that by the camera. When zoomed in on a subject the field of view is, of course, much less. The higher magnification employed occasionally is 500X applied by the microscope. The estimated microbial numbers provided in this report are as observed through the microscope. At 250X the actual field of view is 900 microns (0.9 mm) across.

Initial observations revealed sample 'A' to have a mild fishy odor and to be quite liquid while sample 'B' was very thick and had a strange odor which smelt to me like burnt sugar but smelt like latex paint to my colleague.

## **Methods Employed:**

- 1/ Both samples smeared undiluted on slides and observed.
- 2/ Both samples diluted with distilled water, smeared on slides and observed.
- 3/ Equal amounts of both samples mixed with approximately .33 ml of non sulfured black strap molasses and equal amounts of distilled water, shaken vigorously for 90 seconds and left at 68 to 70 degrees Fahrenheit with lids off. Observed periodically over 93 hours.
- 4/ Equal amounts of both samples mixed with approximately .33 ml of non sulfured black strap molasses, equal amounts of vermicompost (approx. 2 teaspoons) and equal amounts of distilled water (sample:water ratio = approx. 1:20), shaken

vigorously for 90 seconds and left at 68 to 70 degrees Fahrenheit with lids off. Observed periodically over 70 hours.

### **Observations:**

**Method 1&2:** These examinations revealed very little bacterial life in either sample, apparent to the observation method utilized. Please see the video footage for detail.

### **Method 3:**

**'A' Sample at 21 to 24 hours;** At 21 hours some non-motile rod shaped bacterial growth was observed and at 24 hours additionally yeast cells were observed.

**'B' Sample at 21 to 24 hours;** No increase in bacterial or yeast cells observed.

**'A' Sample at 43 to 52 hours;** During this time period there was a large increase in bacterial cells, both rod shaped and cocci (spherical) shaped. Also observed was a great increase in yeast cells. Observed one short apparent fungal hyphae growing from a spore or growing bud.

**'B' Sample at 43 to 52 hours;** During this time period there appeared to be no change in microbial life from initial observations.

**'A' Sample at 70 to 93 hours;** During this time period the bacterial count appeared to increase and the yeast cells increased enormously. Again observed one short apparent fungal hyphae growing from a spore or growing bud.

**'B' Sample at 70 to 93 hours;** Once again during this time period there appeared to be no increase in bacterial or cell life from initial observations, outside of a possible occasional bacterium.

**Interim Conclusions:** It appears that Sample 'A' has some bacterial content and readily supports bacterial and yeast growth. Because of the small fungal growths observed this product will probably be a good fungal food source. On the other hand it appears that Sample 'B' does not readily support microbial life and development and even seems to have a prohibitive effect. I would guess that some chemical agent has been introduced during processing.

### **Method 4:**

**'A' Sample at 24 hours;** At this stage enormous fungal hyphae structures have developed as well as large amounts of non-motile rod and cocci shaped bacteria. Also observed was longer strand bacillus bacteria. The fungal hyphae is wide diameter, ranging in size from 4 microns to 10 microns, which according to Elaine

Ingham of SFI Inc., is highly beneficial. There are at least two distinct species of fungal hyphae present.

**'B' Sample at 24 hours:** No development of microbial life recognizable as such to the examiner was observed. There were some rod structures observed but did not seem bacterial in nature. There were a few other scattered rod shapes which could have been bacteria but not in significant numbers.

**'A' Sample at 44 hours;** Large development of non-motile rod and cocci shaped bacteria estimated at around 100,000 per field of view (FOV) which interprets to approximately 648,000,000 cells/ml and using the SFI conversion factor for bacteria estimating a 60% volume; 186,000 micrograms/ml/ or per gram. Longer bacillus strands noted. Also observed was increased development of fungal hyphae previously noted.

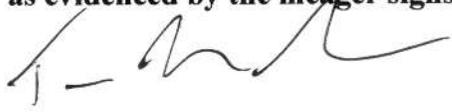
**'B' Sample at 44 hours;** Observations reveal no significant change from the previous time frame.

**'A' Sample at 70 hours;** The bacterial count has increased considerably and estimated to be approximately 117,000 per FOV or 756,152,000 cells/ml and using the SFI conversion factor and assuming 70% volume; 217,000 micrograms/ml or per gram. The development of fungal hyphae is at least double that of the last time frame. There are complex branching structures with lots of new growing tips indicating vigorous growth.

**'B' Sample at 70 hours;** At this time frame there is finally some evidence of microbial life. There was no bacterial life observed but some yeast cells and two fungal hyphae structures were observed.

**Conclusions:** It is my conclusion that Sample 'A', the Great Pacific Bioproducts liquid fish product is a tremendous food source for fungal hyphae found in compost and soil. It also promotes the growth of what appear to be beneficial non-motile bacteria predominantly rod shaped and longer bacillus. I do not know why the motile bacteria were not also promoted. Perhaps the bacteria which did multiply produced some substance which prohibited their development. This is something which calls for further investigation.

It is also my conclusion that Sample 'B' does not support microbial life very readily as evidenced by the meager signs of bacterial, fungal and yeast life forms observed.

  
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**SAMPLE 'B'.  
LEADING NORTH AMERICAN  
LIQUID FISH FERTILIZER 5-1-1  
(FISH EMULSION)**

**M.R./GPB.**