CENTER FOR TROPICAL AND SUBTROPICAL AQUACULTURE

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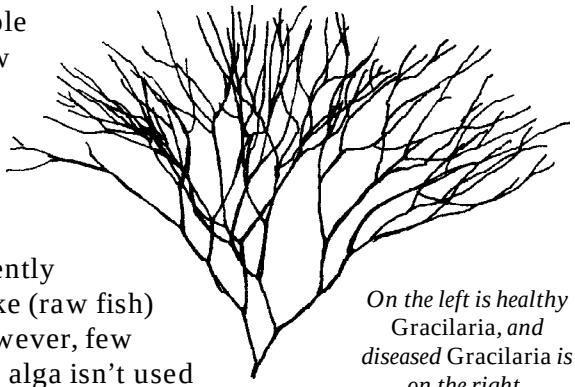
Gracilaria Gall Syndrome

Most people in Hawaii know *Gracilaria tikvahiae*, or ogo, as a long, thin, flavorful green seaweed frequently included in poke (raw fish) appetizers. However, few realize that this alga isn't used only as a tasty ingredient in popular local dishes; *G. tikvahiae* is also an important producer of phycobillins, a class of photosynthetic pigments employed in a variety of medical and biotechnology applications. Ogo can be grown by farmers in tanks or ponds or harvested after being washed up along the shoreline. But in recent years, Hawaii's commercial ogo production has been threatened by *Gracilaria* Gall Syndrome (GGS), an illness that slows or stops growth, reduces shelf-life and disfigures the seaweed, making it difficult to market.



On the left is healthy Gracilaria, *and diseased* Gracilaria *is on the right.*

In the past, the only method of combatting GGS has been to discard the entire crop, sterilize the tank hardware and plumbing, and start over. For the past year, scientists working for the University of Hawaii at Hilo, the University of California-Santa Cruz, the Brookwood Medical Center in Alabama, and the state of Hawaii Aquaculture Development Program on Oahu, have been trying to better understand the nature of the pathogen causing GGS, in order to develop cost-effective management strategies and minimize the negative impacts of the disease.

GGS—The Symptoms

Ogo afflicted with GGS typically have abnormal lesions or galls (small bump-like structures) along their stems or branches. Growth beyond the gall becomes twisted or contorted, and "witch's-broom"- like structures may also appear at the ends of the branches. The surface tissue of *G. tikvahiae* may appear scalloped and if touched, can slough off as if it were decaying. GGS develops and takes hold rapidly, with infection rates jumping from 10% to 90% of the crop in less than a week. In addition to being rendered visually unmarketable by the disease, infected *G. tikvahiae* usually display considerably reduced growth rates and diminished post-harvest shelf life.

New Research

The primary goal of GGS research has been to identify the exact nature of the agent causing the disease. Scientists have successfully isolated several abnormal varieties of bacteria found in GGS-afflicted ogo. However, researchers are still trying to ascertain which bacteria, or combination of bacteria and environmental conditions, can induce an outbreak of the disease. At the present time, the evidence linking GGS to a bacterial agent is still

anecdotal, based on the experience of scientists who have curbed the progression of the disease with the antibiotic, penicillin.

After successfully identifying the GGS-agent or agents, researchers hope to devise a management strategy that will help prevent outbreaks. Farmers have had some success with use of less sensitive strains of ogo. Researchers are also looking into manipulating environmental conditions to control rapid outbreaks of the disease.

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Where should I turn for help?

If you believe that your seaweed crop may be afflicted with GGS, or if you would like more information on this disease, please contact one of the experts listed below:

- Aquaculture Development Program
  at Anuenue Fisheries Research Center
  1039 Sand Island Parkway
  Honolulu, Hawaii 96819-4347
  (808) 845- 9561 Phone
  (808) 845- 4334 Fax

- The University of Hawaii Sea Grant
  Extension Service
  1000 Pope Road, MSB 226
  Honolulu, Hawaii 96822
  (808) 956-8191 Phone
  (808) 956- 2858 Fax

- Dr. Michael Shintaku
  The University of Hawaii-Hilo
  200 West Kawili Street
  Hilo, Hawaii 96720
  (808) 933-3373 Phone
  (808) 933-3622 Fax