

## New bacteria identified to be involved with poorly understood 'Ice-Ice Disease' on cultivated seaweeds

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A case study utilizing next generation DNA sequencing to identify bacteria linked to Ice-Ice Disease in the seaweeds *Eucheuma denticulatum* and *Kappaphycus alvarezii*, both farmed in Kenya.

In the globally growing seaweed industry, diseases like 'ice-ice disease' (IID) are holding back production and threatening seaweed farmers' livelihoods. In Kenya the disease spreads during the hot-dry season from January till March causing quality and biomass loss for the farmers. To better understand the disease and to understand which bacteria are involved in the development of the IID, healthy and diseased tissue samples of *Eucheuma denticulatum* and *Kappaphycus alvarezii* were collected in two seaweed farms in Kenya. Then the DNA was extracted, and sequenced using next generation sequencing (PromethION sequencer). From 24 samples 1506 bacterial taxa were identified, mostly to species level, with many never been related to IID or seaweeds before.

Statistically significant differences of bacterial communities between the two seaweed species and for the healthy and diseased samples of each seaweed species were found. The most common bacteria species in diseased samples were *Marinomonas pontica*, *Psychrosphaera saromensis*, and *Wenyingzhuangia gracilariae*, and in healthy samples *Occidentia massiliensis* and *Thermosynechococcus elongatus*.

The results showed that claiming involvement of bacteria based on genus level, as done by most previous studies, is not sufficient, and a more detailed identification on species level is needed. Thus, these results have contradicted many findings of previous studies. Sequencing for any bacteria present in the samples provides greater and more accurate data and is therefore recommended to be used for future studies investigating the bacterial involvement in IID. Future results could then aid in establishing preventative measures and increase seaweed farmer's income security.

### Keywords

Ice-ice; Nanopore PromethION; *Eucheuma Denticulatum*; *Kappaphycus Alvarezii*