Distribution and symptoms of epiphyte infection in major carrageenophyte-producing farms

Abstract

High density commercial farming of carrageenophyte Kappaphycus alvarezii is often plagued with "ice-ice" disease and epiphyte infection, which eventually leads to reduced production and in some cases collapse of crop. Epiphyte outbreak has been occurring regularly in major carrageenophyte farms in the Philippines, Indonesia, Malaysia and Tanzania. Infected materials from these countries were studied to establish baseline information on the epiphyte's identity, density, symptoms and secondary infection on the host seaweed. The causative organism was identified as Neosiphonia apiculata (Hollenberg) Masuda et Kogame, based on its morphological features. Epiphyte density on host seaweed materials decreased in the following order: the Philippines (88.5 epi cm(-2)), Tanzania (69.0 epi cm(-2)), Indonesia (56.5 epi cm(-2)) and Malaysia (42.0 epi cm(-2)). Initial symptoms were the presence of tiny black spots, indicating the embedded tetrasporeling in seaweed cortex layer. Vegetative form emerged after 2 weeks measuring less than 0.5 mm in length with a density of less than 25.0 epi cm(-2). Upon maturation, infected seaweed takes on a "hairy" appearance with "goose-bumps" like cortical swellings. The epiphyte appears as a solitary plant with multiple secondary rhizoids or as multiple epiphytes appearing from a single cortical opening. At the end of infection, the epiphytes left dark pits on the cortical swelling, and the carrageenophytes are infected by opportunistic bacteria. Bacterial enumeration of healthy and infected seaweed materials showed an increase of more than 300% in total bacterial count on infected materials dominated by Alteromonas sp., Flavobacterium sp. and Vibrio sp.