

## Appendix 1

It was brought to my attention in October of 2011 that Malaysia had requested approval from the Australian government to export pineapples into Australia. The concern was the accidental importation of Bacterial Heart Rot and Fruit Collapse caused by *Dickeya* sp.

The first appearance of the disease in Hawaii coincided with importation of planting material from Costa Rica, Honduras, and Philippines. When first discovered in 2003 the disease was in its pre-epidemic stage. Thus, the disease most probably was already developing in fields prior to 2003, when the first lot of planting materials came in late 2001 from Costa Rica with subsequent shipments from Honduras and Philippines. Hawaii has a very strict quarantine law and a well trained staff of inspectors. However, with over a million seed pieces to inspect, careful individual inspections are not possible. These inspections are done visually and any microscopic organisms will go undetected unless there are tell tale signs that there is a disorder. Thus *Dickeya* sp. may easily slip past inspections when the disease is in its latent form.

Hawaii has other checks and balances to insure that unwanted pests and diseases do not enter the State. An application to import such planting material which may be potentially harmful to Hawaii is submitted to the Hawaii Department of Agriculture. The request is circulated for review by a scientific peer review panel. The panel overwhelmingly opposed importation of large quantities of plant material from a country known to have *Dickeya* sp. This concern was over ruled at the administrative level and a permit was granted.

Now that *Dickeya* sp. is well established in Hawaii's pineapple fields, we must live with it and accept high losses during rainy seasons, which favors disease spread. There is no effective chemical or biological control for *Dickeya* sp. The contaminated soil will remain contaminated for years to come. Any susceptible host or pineapple cultivars grown will be vulnerable in this contaminated soil.

The varieties Josapine and N36 are the two commercial varieties in Malaysia grown for export. The breeder, a personal friend of mine has indicated that these two varieties are susceptible to Bacterial Heart Rot and Fruit Collapse caused by *Dickeya* sp. Severely infected fruits often explode on hot afternoons and mildly infected fruits where 1-2 eyes are infected are undetectable from external examinations as well as latent infections. Thus, any fruit coming out of Malaysia cannot be deemed "Low Risk" because it can carry latent infections.

There are many unanswered questions and only continued research can produce answers for such questions as; varietal susceptibility, mode of transmission, vectors, alternate hosts, develop a bioassay method to detect latent infections, etc. Here in Hawaii studies were initiated in 2003 with a small grant but that source has since been exhausted and no new funding is available.

The nomenclature/taxonomy of *Erwinia chrysanthemi*, has changed several times over recent years. With today's genomic methods for classification, former *E. chrysanthemi* species have been reclassified into six new species of *Dickeya* with some *E. chrysanthemi* strains not corresponding to any of the described species. The closest

relative to the pineapple pathogen is *D. zea*. However, there are significant differences between the pineapple pathogen and *D. zea*, so its classification is presently uncertain. At present, the correct name for the pineapple pathogen is *Dickeya* sp.

A bacterial pathogen causing stalk rot of corn in Hawaii was recently identified as *Dickeya* sp. with a genetic identity to that of the *Dickeya* sp. isolated from pineapple in Hawaii. This finding underlines the need for additional research on the potential host range of the pineapple pathogen and its spread to other crops.

The results of the *Dickeya* sp. research done in Hawaii can be accessed in “Pine News”. Another paper is currently under review for publication. This paper discusses the world-wide genomic classification of *Dickeya* sp. The high light of this paper reveals the similarity of strains of *Dickeya* sp. from Costa Rica, Honduras, Philippines, Hawaii and Malaysia all of which are similar to the Malaysian strain.