RUSTS THAT PASS IMPORT INSPECTION[1]

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The problem of invisibly infected or contaminated plant materials passing even meticulous import inspections is widely recognized for, e.g., virus diseases of bulbous plants. Recent experiences suggest that more attention should be directed to some rusts which are not visible in shipments of dormant material.

A familiar example of seed contamination is the repeated introduction into North America of Puccinia carthami with seeds of safflower, Carthamus tinctorius. The occurrence of several morphologically distinguishable biotypes, both in Canada and in United States, shows that the pathogen was introduced repeatedly from various sources (5). Examination of seed from infected crops under the dissecting microscope reveals many teliospores adhering to the oily seed coat; and such seeds planted in an isolated garden produced seedlings with pycnia (3). In poorly cleaned seed lots infection probably also results from the presence of rusted leaf fragments; but the spores on the seed coat defy detection by the most careful naked-eye inspection. The recent occurrence of Puccinia helianthi in New Zealand (specimen received from Miss J. M. Dingley) may have originated from either included rusted fragments or from spores on the seed coats. Some biotypes of P. helianthi have moderately firm teliospore pedicels, but in others the pedicels are fragile and irregularly deciduous. Surface sterilization should clearly be practised when seed of such crops is imported into disease-free areas.

Chrysomyxa spp. overwinter as dormant mycelium in evergreen leaves, especially of various Ericaceae, without any symptoms. The mycelia give rise to uredinia and /or telia in the spring. Only by growing imported stock under quarantine can such infections be detected. The introduction of Chrysomyxa ledi var. rhododendri on Rhododendron in coastal Oregon or Washington about 20 years ago presumably resulted from the importation of such invisibly infected planting stock.

Various species of Melampsora that attack willows and poplars have the ability to persist on these plants in the absence of the aecial host. Urediniospores enter the young winter buds before they are sealed by the hard and resinous scales. Mycelium penetrates the embryonic leaves, grows with them when the buds break in spring, and the leaves open bearing "instant uredinia", which allow a rapid build-up of the rust. Melampsora populnea (M. aecidioides) has long been recognized to winter in this manner, and it was presumably introduced into North America (1) (Rhode Island, Colorado and the Pacific states) in planting stock of Populus alba L. with such dormant infections. It is also recognized (4) that most of the arctic and subarctic willow rusts of the Melampsora epitea complex winter chiefly or solely by this means, which has occasionally been seen also in related temperate rusts.

It is now painfully clear that this ability to overwinter in dormant buds is shared by other Melampsora spp. on poplars. In February 1972 Dr. John Walker sent me specimens of Melampsora medusae, which had suddenly appeared on Populus deltoides Bartr. in New South Wales. In March 1973 Mr. D. T. Hartigan sent me specimens, also from New South Wales, of a rust on Lombardy poplar, P. nigra var. italica Muenchh., which proves to be the European M. larici-populina.

Melampsora medusae is endemic to North America, but has recently been reported in Europe, perhaps first in 1943 (2, p. 132). M. larici-populina is endemic to Europe, but we have Japanese specimens on P. nigra var. italica. These movements of both rusts, and their recent introduction into New South Wales, almost certainly result from the practice of shipping cuttings of many clonal selections to many countries for experimental planting, a practice that I understand to be widespread.

The only practical means of curtailing these dangerous introductions seems to be to limit shipments to small quantities that can be grown in post-entry quarantine with rigid inspection of every leaf.

As I write this note, word comes from Dr. Walker that Melampsora medusa and M. larici-populina have just been discovered in New Zealand. It is conceivable, as Dr. Walker suggests, that inoculum was blown across the Tasman sea; but this is a minimum distance of 1100 miles to South Island, with the coast guarded by mountains, and ca. 1300 miles to North Island. I suspect that both rusts were introduced with planting stock, as in New South Wales. Possibly reports of the rusts in Australia speeded their discovery in New Zealand.

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