

FOOT-ROT OF LILIUM CANDIDUM AND LILIUM PYRENAICUM CAUSED BY PHYTOPHTHORA CACTORUM

CHARLES DRECHSLER

On May 2, 1925, a diseased Madonna lily plant, *Lilium candidum* L., from an experimental plot maintained by H. E. Allanson at Tacoma Park, Md., in the immediate vicinity of the District of Columbia, was presented to the writer for examination. The specimen was submitted as illustrative of a trouble responsible for the loss of individuals of this species that had occurred from time to time during the preceding weeks. Absence of any pronounced premonitory symptoms in the foliage or in the aerial portion of the stem was reported to be a characteristic feature, the disease generally becoming apparent rather suddenly in a falling over of the entire structure above the ground. Once felled in this way, the affected individuals soon withered and died.

On examination of the specimen, the seat of the malady was readily located in the subterranean part of the stem, which, beginning somewhat abruptly at a level approximately with the ground line, was shrunken to a part of its normal diameter. The parenchyma external to the strands of conducting elements was completely collapsed. Both in this tissue and in the central pith, the microscope revealed an abundance of non-septate intercellular mycelium provided with diverticulate protuberances. Pieces of affected tissue from the shrunken region as well as from the marginal zone bordering on the healthy aerial part of the stem were placed on corn-meal agar plates. From each of the pieces the same fungus was thus isolated in pure culture—a species of *Phytophthora* producing little aerial mycelium, but an abundance of sporangia and oospores.

On May 28, 1925, a specimen of *Lilium pyrenaicum* Gouan was submitted, which had been obtained from the same plot as the Madonna lily, and which had succumbed evidently to the same disease. Except that the healthy portion of the stem extended somewhat below the ground line, the macroscopic as well as the microscopic findings were entirely similar. And from all platings of diseased tissue the same species of *Phytophthora* was again isolated.

The parasite from the two species of lily was grown in Petri dishes on various culture media, parallel with species of *Phytophthora* with which its morphology suggested a possible relationship. A high degree of similarity

with respect to rate of growth and general appearance of thallus to the species most commonly known under the binomial *Phytophthora cactorum* (Lebert & Cohn) Schroeter at once became obvious. This similarity was equally pronounced with reference to microscopical features. Measurements of the diameters of 25 oospores gave an average of $26.4\ \mu$ for the fungus isolated from *Lilium candidum*, and $27.1\ \mu$ for the form from *Lilium pyrenaicum*; while an equal number of measurements of length and breadth of conidia gave as averages for the two strains $35.7 \times 27.3\ \mu$ and $34.9 \times 27.9\ \mu$ respectively. These figures show a satisfactory agreement with the averages obtained from comparable measurements of the several strains of *P. cactorum*, including one obtained from the Centralbureau voor Schimmelculturen at Baarn, Holland, another isolated from rhubarb affected with foot-rot by W. S. Beach, and four strains isolated from diseased apples originating in different localities in the United States. The lily fungus is therefore referred to *Phytophthora cactorum*, thus adding two additional hosts to the list of plants attacked by this parasite.

In this connection, mention may be made of a serious disease of the Easter lily, *Lilium longiflorum* Thunb., reported by H. H. Whetzel¹ as prevalent in Bermuda in 1921, which was designated as "stump rot" and attributed to an unnamed species of *Phytophthora*. According to the account of the Bermuda disease:

"The pathogene is harbored in the soil. Spores produced at the surface of the soil are splashed by falling rain into the crowns of the plants. Here a rot is rapidly set up which may destroy the entire stalk down through the bulb. Or only the growing tip may be killed leaving a stump with a rosette of leaves. . . . Attacks shortly before flowering are common. In these cases the tip of the stalk alone is usually killed."

The symptoms described evidently differ widely from those distinctive of the trouble that prevailed at Tacoma Park in the spring of 1925, the latter being perhaps most similar to those associated with foot-rot of tomatoes, attributable to *P. cryptogea* Peth. & Laff.² Future observations may determine the extent to which the relatively dry season during which the American disease developed may have affected its severity or modified its character. It is scarcely likely that the difference in specific identity of the congeneric hosts could have provided a factor of much importance, since the relationship between the Easter lily and the Madonna lily is usually

¹ Whetzel, H. H. Report of the pathologist for the period June 10 to December 31, 1921. Bermuda Repts. Bd. & Dept. Agric. 1921: 30-64. 1922.

² Pethybridge, G. H. and H. A. Lafferty. A disease of tomato and other plants caused by a new species of *Phytophthora*. Sci. Proc. Royal Dublin Soc. 15: 487-505. 1919.

regarded as a close one—considerably closer than that between the Madonna lily and *Lilium pyrenaicum*. It is not impossible that lilies, like certain other hosts, may ultimately be found subject to attack by more than one species of *Phytophthora*, each responsible for symptoms revealing a measure of correspondence to, or of distinctiveness from, those induced by the others.

BUREAU OF PLANT INDUSTRY,
U. S. DEPT. OF AGRICULTURE,
WASHINGTON, D. C.