PUCCINIA ALLII ON GARLIC, AN INTERCEPTION

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Abstract

Puccinia allii on garlic (Allium sativum) is recorded for the first time in Canada from intercepted plant material arriving from Europe in personal baggage. The rust is described and illustrated and observations on its taxonomy, distribution and importance are presented.

In late 1971, inspection of baggage arriving from Italy at Dorval Airport, Montreal, Quebec, revealed 1.25 lb of garlic bulbs and leaves with obvious disease symptoms (Figure 1). Examination of the material proved the organism was Puccinia allii (DC.) Rud., a European rust not known to occur in Canada.

Some years ago garlic was grown commercially on a small scale near Winnipeg, Manitoba, but today most of our supply is imported from Spain, California, and Italy. There may be odd plantings in private gardens in and around any large center but garlic production is not of economic importance in Canada today. Why then do we bother reporting an incidence of disease on this plant?

Garlic (Allium sativum L.) is in the onion family, with chives (A. schoenoprasum L.), leeks (A. porrum L.), and of course onion (A. cepa L.) and numerous wild species of Allium. Onions are of commercial significance in Canada and we should ever be alert to the dangers of introducing foreign plant parasites which, on finding new stocks of susceptible hosts, may spread rapidly and may cause considerable loss. Also, Savile (1961) points out that P. mixta on chives may spread to onion when the two plants are grown together. Accordingly it is possible that the same sort of spread may occur wfth other rusts of cultivated Allium species. This occurrence is worthy of reporting if only to make a description readily available in North American literature. The following description is from this intercepted material.

Uredinia yellowish, amphigenous, telia dull black, amphigenous, long-covered. Urediniospores ellipsoid, slightly flattened 25-31 X 19-23 µm; wall pale yellow 1.0-2.1 µm thick, evenly and finely echinulate, pores 6-8 scattered, indistinct. Teliospores 2-celled, more or less clavate and slightly angular, slightly constricted at septum, 45-77 X 19-32 µm; wall dark red-brown, smooth, occasionally faintly ridged, 3.5-7.5 µm at apex and 0.7-1.0 (-1.4) µm at side: pores not definitely seen, probably absent: pedicel pale yellow, persistent, 7-20 µm long. Teliospores are subepidermal and borne in discrete locules formed by fused brown paraphyses. (Figures 2, 3, 4).

HOST: Allium sativum L. (garlic)

OTHER SPECIMENS EXAMINED: on A. sativum - DAOM 77006, Barcelona, Spain: DAOM 10524 Mista, Malta: DAOM 116473 (=Thuem., Myc. Univ. 1434) Athens, Greece: Sacc., Myc. Ital. 1442. Avellino, Italy.

DISTRIBUTION: P. allii on garlic has a natural range in midsouthern Europe and Asia minor (Savulescu 1953, Fragoso 1924, Sydow P. & H. 1904). In Chile Oehrens (1969) first found the rust on onions, leeks, and garlic in 1968 noting that garlic was the most susceptible host. He noted also that rusted leeks had been reported in Uruguay in 1959. In North America, the only rust on garlic is reported as P. porri (Sow.) Wint. from California (U.S.D.A. Plant Disease Handbook, 1961), but this name has been revised by Cummins (1961) to P. allii.

In Europe, Wilson and Henderson (1966) recognize two autoecious species viz. Puccinia allii Rud. and Uromyces ambiguus (DC.) Lev. Synonomyous with P. allii, they list P. mixta Fckl. and P. porri (Sow.) Wint. as intermediate between It and U. ambiguus, Gaumann (1959) recognizes P. porri because It lacks teliai paraphyses and because teliospores are mainly one-celled: however, Wilson and Henderson (1966) claim that P. mixta is the valid name for P. porri if this intermediate is to be recognized. In a study of Corsican fungi, Mayor and Viennot-Bourgin (1951) report P. blasdalei Diet. & Holw. on garlic. They distinguish this rust with numerous one-celled teiiospores from P. allii which has a few one-celled teliospores. P. & H. Sydow (1904) recognize these same species by teliospore size, P. allii having slightly larger spores than P. blasdalei (35-80 X 17-30 µm vs. 30-60 X 18-27 µm). In North America, Arthur (1934) treats' 3 autoecious species of Puccinia on Allium: P. porri (Sow.) Wint. [=P. mixta Fckl. fide Hylander Jorstad & Nannfeldt (1953), =P. allii Rud. fide Cummins], P. blasdalei Diet. & Holw. [very much like P. allii Rud. according to

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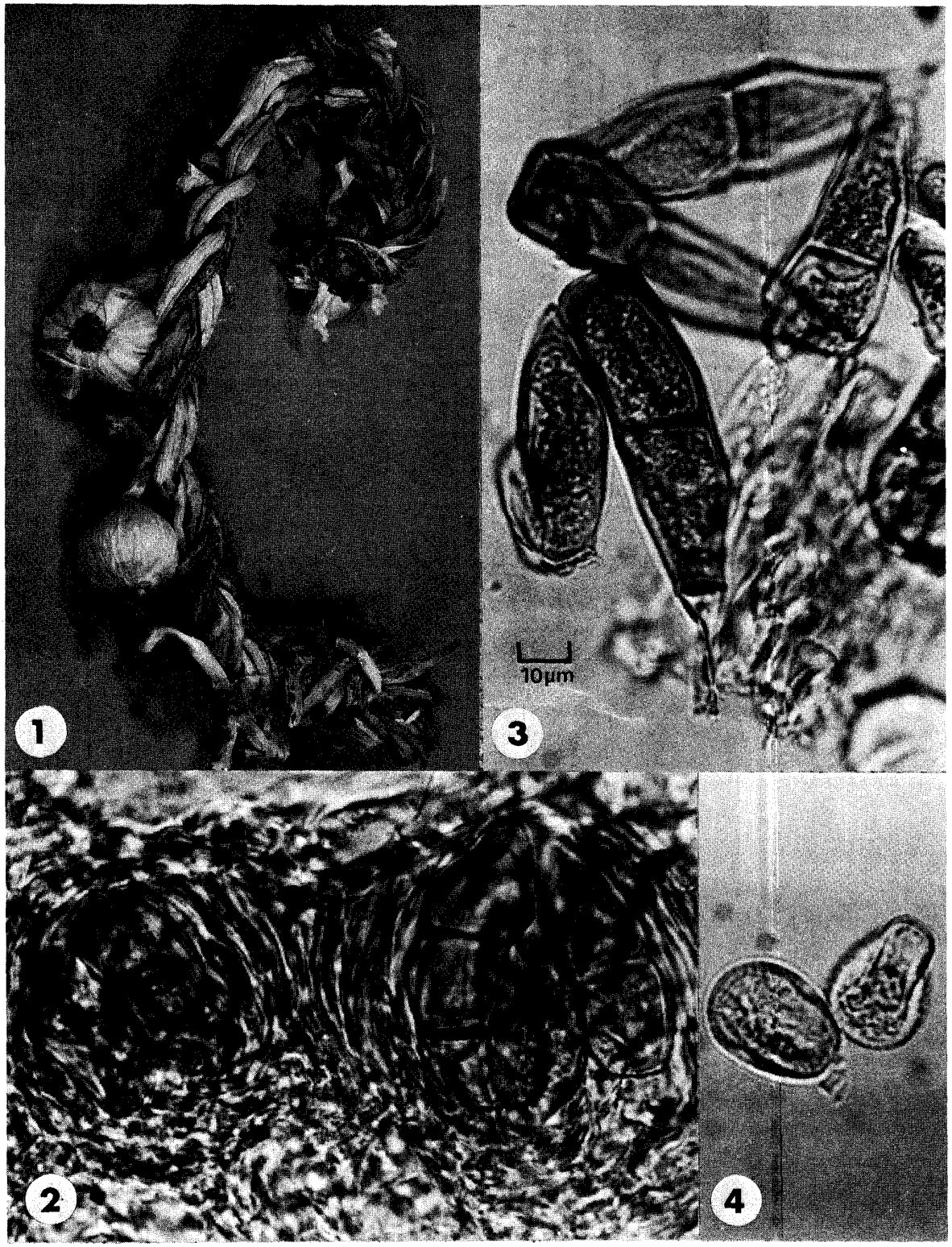

Figures 1-4. *Puccinia allii* on garlic (*Allium sativum*). 1) A twist of garlic, showing small black telia on leaves, X 0.5; 2) Cross-section of a leaf, showing loculate telia bordered by fused paraphyses; 3) Teliospores; 4) Urediniospores. Magnification of Figures 2-4 as shown by scale in Figure 3.

Arthur], and P. granulispora Ellis & Gall. P. porri is the only rust that Arthur records on cultivated Allium. As P. mixta, it is the only one that [illegible]rs (1967) has reported on the cultivated Allium cepa L. and A. schoenoprasum L. (chives) in Canada. Savile (1969) also records P. mixta on chives and suggests that at least three biotypes exist in North America. In an earlier paper he (Savile 1961) recognizes P. mixta, P. porri, P. blasdalei, and P. granulispora on small but constant morphological differences and on limited material finds P. allii and P. blasdalei very similar but separable on teliospores characters. He observed P. allii to have smaller spores with hyaline deciduous pedicels compared to colored firm pedicels in P. blasdalei. The latter he records west of the Rocky Mountains and only on native Allium. The characters of the rust reported herein are those of P. allii sensu most European authors but it is apparent from the foregoing that the taxonomy of the rusts on Eurasian Allium requires additional investigation.

In Chile, Oehrens (1969) compared the yield of garlic bulbs by weight (based on 50 bulbs) of a severely infected and lightly infected crop. He reports that rust reduced yield by 83% and noted that the severely infected plants failed to produce flowers and that bulbs were up to 50% smaller in size. In contrast to his own findings, Oehrens states that others do not report significant losses due to this rust.

The European and South American ranges of this rust indicate it to be adapted to Mediterranean climates. Thus the main threat in Canada would be in southwest Alberta, and the Okanagan Valley and southeast Vancouver Island, British Columbia.

Acknowledgment

I have had the benefit of Dr. D. B. O. Savile's observations on Allium rusts and am grateful for his comments about them.

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