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NEW REPORT OF GARLIC RUST FROM PUNJAB STATE

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GARLIC (*Allium sativum* L.), an important bulb crop, was found to be severely attacked by a rust at several places in Gurdaspur city during February 1987. A rust disease, possibly due to a species different from the one being reported, was found on garlic in 1973 from Himachal Pradesh[1].

The rust-infected plants did not support the pycnial and aecial stages. However, uredinia and telia were formed in abundance, the description of which follows: **Uredinia** amphigenous (mostly hypophyllous), usually scattered, yellowish to orange, more or less roundish, often surrounded by nearly a diamond-shaped discoloured zone; urediniospores obovate to broadly elliptical (figure 1b), yellowish, 17.27–28.79 × 11.51–23.03 (av. 22.84 × 19.32) μm in diameter; wall 1.21–4.02 (av. 2.42) μm thick, hyaline, finely echinulate, with 5–10 (commonly 6–8) scattered germ pores (figure 1a). **Teleutosori** on the leaves amphigenous, mostly scattered, on the leaf sheaths sometimes confluent, long, covered by grey epidermis, tardily naked; teleutospores ellipsoid, clavate-oblong or obliquely angular in shape, rounded, truncate or pointed above (figure 2), narrowed or rounded below, 29.94–62.18 × 18.42–32.24 (av. 49.81 × 23.47) μm in size, somewhat constricted at the septum, mostly 2-celled, not borne in loculi formed by fused paraphyses. Mesospores (av. size 25.97 × 24.04 μm), 3-celled teleutospores (av. size 56.81 × 28.21 μm) (figure 2) and 4-celled teleutos-

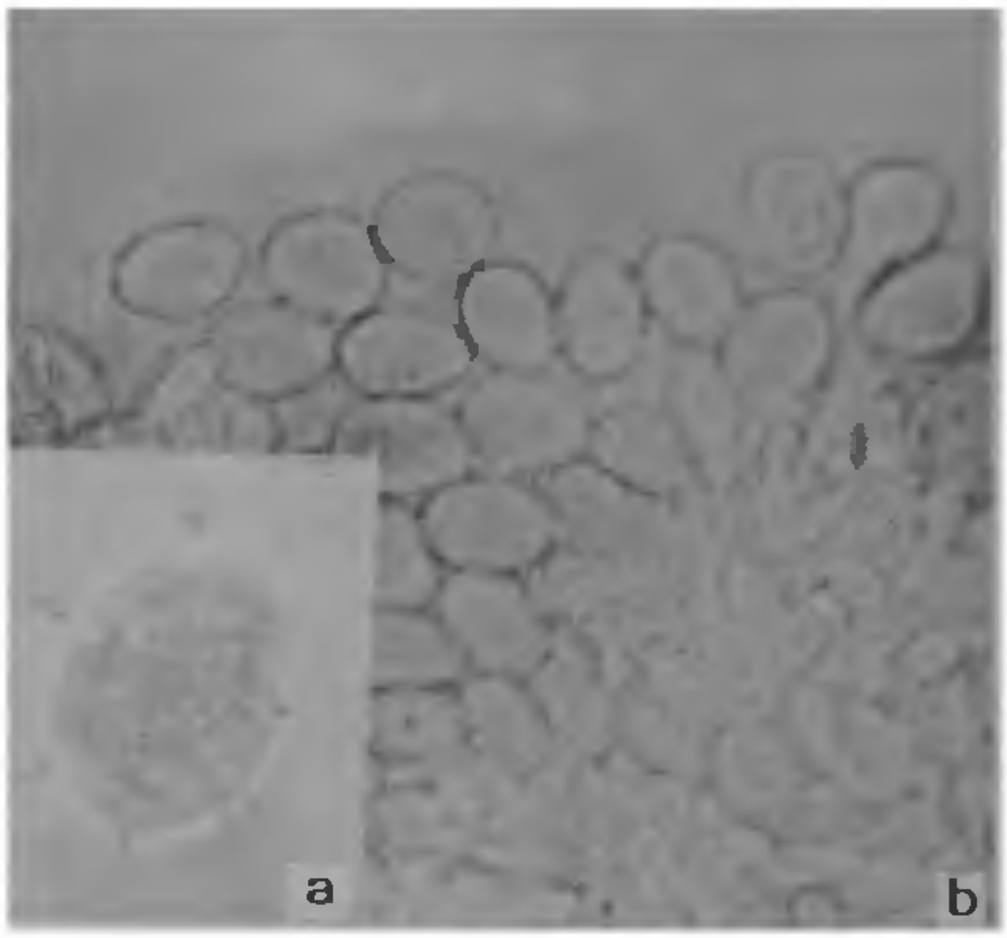

Figure 1a, b. a. Urediospore germ pores in a scattered fashion (after treatment for 48 h in 6% H_2O_2 solution). **b.** Urediospores in a section of uredinum.

pores (av. size 62.75 × 34.54 μm) rare; wall chestnut brown, 1.41–3.62 (av. 2.26) μm thick at sides, darker and 1.91–6.83 (av. 4.70) μm above, upper cell usually more densely pigmented than the lower; pedicels nearly colourless, fragile, up to 34.5 μm long.

This rust differs from the one already described undet the binomials *P. porri* (Sow.) Wint[2]. and *P. allii* (DC.) Rud.[1,3,4]. Its teleutospores are nearly one and half times longer and teleutospores wall at the apex almost twice thicker than that for the rusts reported earlier[2,4]. It departs from the rust reported

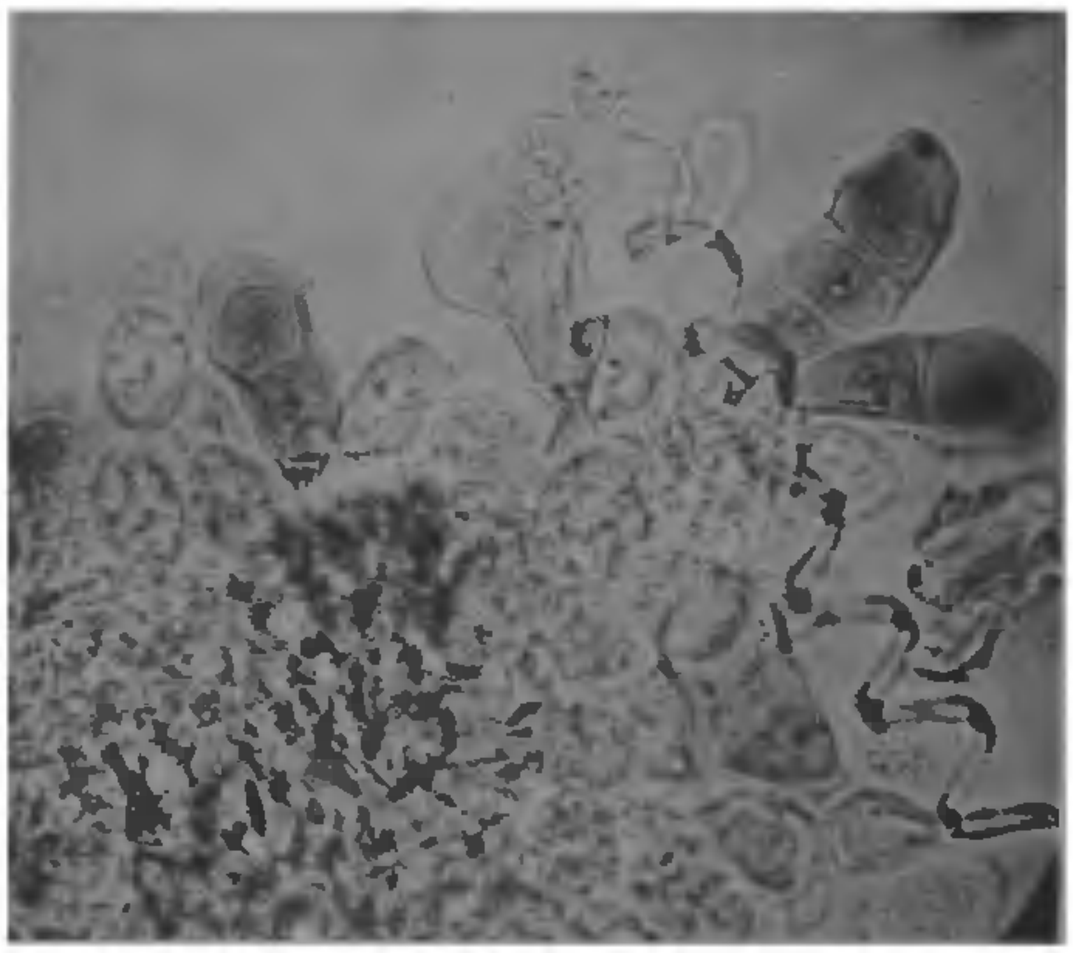

Figure 2. Two- and three-celled teleutospores among urediospores (for wall clarity treated overnight with NaOCl solution).

by Parmelee[3] in the absence of loculi formed by fused paraphyses. It does not match the rust reported by Singh and Sharma[1] in which the teleutospores are slightly larger but much thinner, and the telia form "often around the uredia". In the present rust species it was found that telia may form independently of the uredinia, but they commonly form in the middle of the uredinia as the host approaches maturity.

The mesospores were found to be rarely formed. However, some workers[1-3] did not record their formation. Three- and four-celled teleutospores are reported for the first time.

The rust did not infect onion growing in vicinity of severely rusted garlic plants, however, *P. allii* (Syn. *P. porri*) is known to infect onion[2,4].

The species *P. blasdalei* Diet. & Holw. and *P. granulispora* Ellis & Gall., which bear close resemblance to *P. porri*[2], are distinct from the present rust in several characteristics.

From the foregoing account, it is apparent that the present rust species may be distinct from the one(s) already described[1-4]. Different workers placed the rust(s) infecting garlic in *P. allii*, although their descriptions on morphology varied significantly in some respects. If such differences can be ignored, the present rust species too would certainly belong to *P. allii* (DC.) Rud.

Although there are some taxonomic problems yet to be solved, this paper is certainly a first record of rust fungus on garlic in Punjab State.

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CYTOMIXIS IN MICROSPOROCYTES OF *RAUWOLFIA SERPENTINA* BENTH

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TRANSFER of nuclear materials into the cytoplasm of an adjacent cell has been termed cytomixis. Cytomixis was first reported to occur in *Galtonia candicans*[1]. Gates[2] studying the pollen development in *Oenothera gigas* and *O. biennis* recorded chromosome extrusions from the nucleus of one pollen mother cell, through the plasma strands into the cytoplasm of a contiguous cell. Since then it has been recorded in a wide range of taxa both in microsporocytes as well as in somatic cells[3-6]. Salesses[7] established cytomixis in both natural and artificial triploid hybrids of *Prunus spinosa* ($2n = 32$) × *P. ceracifera* ($2n = 16$), but not in diploid, tetraploid and hexaploid forms of *Prunus*.

During the present investigation, cytomixis was recorded in microsporocytes of *Rauwolfia serpentina* Benth. This particular population was collected from Sukna, West Bengal, situated at the base of Eastern Himalayas. Flower buds of suitable size were fixed first in chilled Newcomer's fluid for 72 h and then transferred to a mixture of glacial acetic acid:ethyl alcohol (1:3). The buds were then kept for 10 min in 45% acetic acid. Anthers were smeared in 2% acetic carmine solution, slightly heated, the excess stain was blotted off and finally the slides were sealed.

The cytomictic connections between microsporocytes were distinct (figure 1) and the transfer of chromatin materials through those connections could be detected (figure 2). The frequency of cytomixis showed significant increase during monsoon months (9.62%). It was predominant in prophase to early metaphase.

Although cytomixis is recorded in many genera and species as a natural phenomenon, the underlying cause is not very clear. Several explanations have been put forward. Marechal[8] proposed that nuclear fragments and entire nuclei pass from one cell to the other *via* plasmodesmata. Heslop-Harrison[9] suggested the existence of 'communicating channels'. Salesses[7] suggested that cytomixis occurs in plants showing irregular physiological and cytological behaviour. However, cytomixis in meiotic normal species e.g. *Clitoria ternatea*, indicates that meiotic irregularities may not be the sole