Puccinia kraussiana (Uredinales) on Heterosmilax gaudichaudiana, A New Record of Rust in Eastern Asia

ZEUI-CHIANG CHEN AND TETSUO KOYAMA

Department of Botany, National Taiwan University, Taipei 107, Taiwan; The New York Botanical Garden, Bronx, New York 10458

Puccinia kraussiana, a rust fungus of Africa, was found in Taiwan for the first time in eastern Asia. It was parasiting on leaves of Heterosmilax gaudichaudiana, on which all four stages were characteristically found. The host species, H. gaudichaudiana, newly added to the host range of P. kraussiana, constitutes also a new entry to the phanerogamic flora of Taiwan.

Key words: Heterosmilax — Puccinia — Taiwan.

During the survey of Taiwan rusts the authors have come across an autoecious, macrocyclic eu-form Puccinia parasiting on the leaves of Heterosmilax gaudichaudiana. The rust is identical with Puccinia kraussiana in most aspects, while it differs sharply from both P. citrina and P. ferruginea, the only two rusts so far recorded to attack Heterosmilax gaudichaudiana, a considerably narrowly distributed liliaceous liana (Cummins and Ling, 1950). This identity was established upon examination of the type material. Puccinia kraussiana does not appear either in the current treatment of eastern Asiatic rusts by Hiratsuka and Hasebe (1978). Both the rust species and the host plant not only make a new entry to the flora of Taiwan but also constitutes a new record in eastern Asia in this particular host-and-fungus combination.

Puccinia kraussiana was first described from South African Natal as a rust attacking Smilax kraussiana, an endemic species in eastern Africa. Then only the uredinia (II) and the telia (III) stages were known. Later, its aecia (II) stage was disclosed by Sydow and Sydow (1902) as well as by Doidge (1927). The spermogonia (0) stage was first described by Jørsted (1956) from an African collection, though uredinia (II) was not seen by him. Recently the senior author has had an opportunity to examine Nigerian specimens of Smilax kraussiana bearing this rust of 0, I, and III but II. The Opsis-form life cycle seems to be a prevailing type of P. kraussiana in Africa.

While the spermogonia hitherto reported were amphigenous, the Taiwan specimens are exclusively on the abaxial surface of the host leaf, and contain all of four stages (0, I, II, and III) on the same leaf. These slight variations in the spermogonia and the life stages, however, do not seem to suggest any taxonomic difference in Taiwan specimens from African P. kraussiana, because the two otherwise make a perfect match.


0-stage. Spermogonia surrounded byaecia forming a circular discolored spot, 2–4 mm in diameter on the adaxial surface of leaves. Spermogonia aggregated 5–10 and concentrically distributed in 1–2 layers on the center of spot (Fig. 4), subepidermal, flask-shaped or obovate, 175–210×160–180 μm, with a short ostiolate neck up to 25 μm long (Fig. 5), wall yellowish-brown 16–21 μm thick, consisting of 3–5 layers of rectangular cells 6–8.5×3–5 μm, conidiophores obclavate, 30–32×4–7 μm; spermatia subglobose to oblong, 5–6×3.5–4 μm, smooth, hyaline.

I-stage. Aecia amphigenous, usually concentrically surrounding spermogonia 1–2 layers (Fig. 4), subepidermal, deep seated, appressed globose or subglobose, 180–350 μm in diameter, yellowish-brown, without true peridium but surrounded by interlaced hyphae about 4 layers up to 27 μm thick, opening by a central pore (Fig. 5); aeciospores (Fig. 1) broadly pyriform or ovate, golden to deep lemon yellow, 35–45×23–28 μm, wall 3–5 μm thick at side, 5–10 μm thick at apex, echinulated with smooth-surfaced conical spines up to 5 μm long, spaces among spines about 3–4 μm.

II-stage. Uredinia on abaxial surface, orbicular, triangular or ellipsoid, up to 1 mm in diameter, golden brown, exposed, pulverulent; urediniospores (Fig. 2) pyriform, ellipsoid or obovate, 27–50×25–45 μm, wall 4–5 μm thick at side, 5–9 μm thick at apex, golden color, echinulated with screw-nail-like or wart-like spines (Fig. 6) up to 2.5 μm long, pore obscure, probably 2–3, equatal.

III-stage. Telia on abaxial surface, gregarious or scattered, globose to subglobose, up to 1.5 mm in diameter, exposed, compact, cinnamon brown, becoming lemon yellow from germination and pulverulent, associated with uredinia or separate; teliospores (Fig. 3) ellipsoid or elongately obovoid, 50–70×20–25 μm, apex from rounded to conically elongated, slightly constricted at septum, golden or lemon yellow, wall smooth, 2.5–3 μm thick at side, 5–6.5 μm thick at apex, pore apical or near the septum, pedicels persist, pale yellow, 13–15 μm thick, up to 150 μm long, but usually about 100 μm.

Specimens examined. Taiwan: Pingtung: Kenting, coastal forest, on _Heterosmilax gaudichaudiana_, Apr. 21, 1978, Z.-C. Chen 2871 (0, I, II, III) TAI.

Host Range: _Heterosmilax gaudichaudiana_, _H. javanica_, _Smilax aspera_, _S. goetzeana_, _S. kraussiana_, and _S. zeylanica_. _Heterosmilax gaudichaudiana_ thus becomes a new host of this rust species.

Distribution: Natal, South Africa, East Africa, India, Burma, Java, and Taiwan. Taiwan marks a northern limit of distribution of _P. kraussiana_.

Although _P. kraussiana_ comes close to _P. citrina_ and _P. smilacis-chinae_ in teliospore morphology, the former species can be distinguished from the latter two by