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Two New Rust Species records from India

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Abstract

An interesting Teliomycetous two new species belonging to the genus *Aecidium* Pers. ex Pers. and *Coleosporium* Lev. viz. *Aecidium merremiae-umbellatae* sp. nov. and *Coleosporium wahlenbergiae-marginatae* sp. nov., respectively have been illustrated and described. These species have been recorded for the first time in India hitherto, on *Merremia umbellate* (L.) Hall. F. Engl. (Fam.- Convolvulaceae) and *Wahlenbergia marginata* (Thunb.) DC. (Fam.- Complanulaceae) respectively. The hosts of these species become additional host records to the Fungi of India.

Key words: Teliomycetes, Uredinales, new species, *Aecidium merremiae-umbellatae* and *Coleosporium wahlenbergiae-marginatae*.

INTRODUCTION

In continuation of taxonomical studies on rust fungi, the author came across an interesting collections on the living leaves of *Merremia umbellate* (L.) Hall. F. Engl. (Fam.- Convolvulaceae) belonging to the genus *Aecidium* Pers. ex Pers., and *Wahlenbergia marginata* (Thunb.) DC. (Fam.- Complanulaceae) belonging to the genus *Coleosporium* Lev., from Kolhapur district (Maharashtra). Rust fungi comprise, ca. 10% of all the known fungi i.e. 6930 spp. of 163 genera and 14 families (Kirk, 2001). In India, ca. 900 spp. of 75 genera of rust fungi are known (Bilgrami *et al.*, 1991; Sarbhoy *et al.*, 1996; Jamaluddin *et al.*, 2002). Rust fungi are obligate parasites of vascular plants with ecogeographical association, high host specificity and having different types of life cycle patterns from the most complex to simple as a result of reductional series by omission of spore forms, which pose a problem in their identification. In present study, the hosts of the described new rust species are the additional hosts to the fungi of India. The rust collected on the living leaves of *Merremia umbellate* (L.) Hall. F. Engl. (Fam.- Convolvulaceae) belonging to the genus *Aecidium*. At present there is no *Aecidium* species known on this host genus and thus, a new species has been proposed to accommodate the present material as *Aecidium merremiae-umbellatae* sp. nova. While the another rust collected on living leaves and stem of the host *Wahlenbergia marginata* (Thunb.) DC. (Fam.- Complanulaceae) belonging to the genus *Coleosporium*. As compared with different species of *Coleosporium* reported from different countries on same host genus or on other Complanulaceous hosts, the present material is differ in some morphological respect and nature of

infectious symptoms, therefore the new species has been proposed to accommodate as *Coleosporium wahlenbergiae-marginatae* sp. nova.

During the field survey these rusts have been observed on the respected hosts infecting very severely. The most important diagnostic feature of these rusts is that they only restricted along with the riverbanks on their respected hosts from February to April.

Herbarium specimens of these rusts were deposited in the Ajrekar Mycological Herbarium (AMH), National Fungal Culture Collection of India (NFCCI), Pune.

RESULT AND DISCUSSION:

Aecidium merremiae-umbellatae T. R. Kavale sp. nov.; Plate No. I figs. A-H, Text Plate No. I figs. 1-7.

Pycnidia, uredinia, teliis et non obseruatur; Aecia Foliicola et hypophyllis, maxime interveinal formae necrotic maculis distincta, ante dispersit folium in laminas, showing tumor vel hypertrophy, sub-epidermalibus, penitus depresso in mesophyllo, peridiata cupulatis aut cylindraceous, erumpentia, usque ad 0.5-01 mm diametro, sub-epidermoides, peridermiatus; cellularum peridii parietes exterioures rectangularis vel hemisphaericae et polygonae, striati, 25-30 x 19-23 μm ; aeciosporae catenulatae, globosae et angularis, unicellulares, 22-27 x 18-20 μm , hyalinis et colorati lutea massae.

Holotypus: In foliis vivis *Merremia umbellate* (L.) Hall. F. Engl. (Fam.- Convolvulaceae), Chitri Riverbank, Ajara, Kolhapur (M. S.), 19-02-2021, Prathamesh T. Kavale, et positus AMH-10353.

Pycnia, uredinia and telia not observed; Aecia foliicolous, hypophyllous, mostly interveinal forms distinct necrotic spots, scattered on leaf lamina showing swelling or hypertrophy, sub-epidermal, deeply sunken in mesophyll, peridiate cupulate or cylindraceous, erumpent, upto 0.5-01 mm in diameter; peridial cells thick-walled, rectangular to polygonal in shapes, hyaline with striations, 25-30 x 19-23 μm ; aeciospores catenulate, one-celled, globose to angular, thin-walled, 22-27 x 18-20 μm , minutely verrucose, hyaline but yellowish in mass.

Habit: On the leaves of *Merremia umbellate* (L.) Hall. F. Engl. (Fam.- Convolvulaceae), Chitri Riverbank, Ajara, Kolhapur (M. S.), 19-02-2021, Prathamesh T. Kavale, AMH-10353.

Coleosporium wahlenbergiae-marginatae T. R. Kavale sp. nov.; Plate No. II - figs. A-H, Text Plate No. II - figs. 1-6.

Spermogonia et aecia praeterieritis, Uredinia hypophyllous, cum gravibus facti amphigenae, et in stirpe moratus, et dispersi sunt, sub epidermalibus, erumpentibus, peridiata, ad maturitatem perducenda est plana, aureum flavo, 1-2 mm; Peridium simplicis stratum cellulis; peridii cellulae apicales elongatae, crassis, parietibus, in parte vel verrucosae striatis ornatis, 10 x 15 μm ; urediniosporae (aecioid) in catena, pigmento pallide aurantiacis ex luteo colore aut oleum, dissolvi in duritie, calore, crassis, tenuitunicatis, ellipsoidea, rectangularibus, variabilis, vel in figura globosa, intimis 1-1.5 μm , crassus externe et ornávit cumulum accedit per plana, ut virga "verrucis", denique irregularis distincte inducitur iugis, usque ad 18-26 x 26-33 μm ; Teliis amphigenis et cauliculis, intraepidermalia sub- insita, erumpentia pulvinatis plana-convexae, rubro brunneis, densissima, cerae, haud gelatinosis fiet de areolis germinis sive infectum, separamini iacentes, 2-5 mm diametro; teliosporae et una cellula compacte, soris in una cellula intraepidermalia sub vallo accumsan altum, non-catenate, sessilibus vel cylindraceae, clavatae, tenuis-muratas, penitus orti sunt,

pallide flavis usque flavo aureum, de alium senem, usque ad 14-22 x 80-115 µm; probasidia 3-septatae, cylindrico clavatae, rubro brunneis, crassis; basidiosporas nesciantur.

Holotypus: In foliis vivis *Wahlenbergia marginata* (Thunb.) DC (Fam.- Companulaceae), Hiranyakeshi Riverbank, Ramtirth, Ajara, Kolhapur, M.S., 13-03-2021, Ashish T. Kavale, et positus AMH-10354.

Spermogonia and aecia not observed; uredinia mostly hypophyllous, when severe become amphigenous, also on stem, scattered, sub-epidermal, erumpent, peridiate, matured flat, golden yellow, 1-2 mm; peridium composed of a single layer of cells; peridial cells elongated, thick-walled, partially striated or verrucose ornamented, 10 x 15 µm; urediniospores (aecioid) in chain, yellowish orange or golden colour due to pigment dissolved in oil-globules, thick-walled, ellipsoid, rectangular, spherical or variable in shape, inner wall 1-1.5 µm thick and adorned externally with flat topped, rod like “verrucae”, distinct and merged in short irregular ridges, up to 18-26 x 26-33 µm; telia amphigenous and caulicolous, sub-epidermal, innate-erumpent, pulvinate, flat-convex, dark reddish brown, thick, waxy, become gelatinous on germination or wet, separate, scattered, 2-5 mm in diam.; teliospores one-celled and compactly arranged, sub-epidermal sori into a palisade layer of one celled high, non-catenate, sessile, cylindric, clavate, thin-walled, deeply originated, pale yellow to golden yellow, of different aged, up to 14-22 x 80-115 µm; Metabasidia 3-septate, cylindric, clavate, reddish brown, thick walled; basidiospores not observed.

Habit: On the living leaves of *Wahlenbergia marginata* (Thunb.) DC (Fam.- Companulaceae), Hiranyakeshi Riverbank, Ramtirth, Ajara, Kolhapur, M.S., 13-03-2021, Ashish T. Kavale, AMH-10354.

CONCLUSION:

The rust collected on the living leaves of *Merremia umbellata* (L.) Hall. F. Engl. (Fam.- Convolvulaceae) belonging to the genus *Aecidium*. At present there is no *Aecidium* species known on this host genus and thus, a new species has been proposed to accommodate the present material as *Aecidium merremiae-umbellatae* sp. nova. The most important diagnostic features of this rust is that the Aecia on the infected leaf are mostly hypophyllous, interveinal and forming swellings or hypertrophy spots with irregular necrotic circles.

The another rust collected on living leaves and stem of the host *Wahlenbergia marginata* (Thunb.) DC. (Fam.- Companulaceae) belonging to the genus *Coleosporium*. Hiratsuka, N. *et al.* (1954, 1955, 1956, 1985), Morimota, Y. (1953), Hira, N. *et al.* (1955), Yoshinaga, T. *et al.* (1930) and Shimabukuro, S. (1961) reported *Coleosporium lycopi* P. Sydow and H. Sydow on the host genus *Adenophora triphylla* DC. (Fam.- Campaulaceae) and listed additional hosts viz. *Adenophora triphylla* DC. var. *insularis* (Kita.) Kitamura, *Adenophora triphylla* DC. var. *japonica* (Reget) Hara and *Wahlenbergia marginata* DC. from different localities of the Islands of Japan. As compared with *C. lycopi* P. Syd. and H. Syd., the present material is much differ in morphological respect viz. nature of infectious symptoms on the host, smaller sized aecioid-urediniospores, larger sized septate Metabasidia and additional host record form India, the new species has been proposed as *Coleosporium wahlenbergae-marginatae* sp. nova. The present material also differs from existing species of *Coleosporium* reported on the Companulaceous host genera form different countries viz. *Coleosporium companulae* (Pers.) Tul. on *Companula* sp. from France (1854) and on *Campanula*

rapunculoides (2017) as well as on *Campanula trachelium* (2021) from Italy. *C. campanulacearum* Fris. on *Companula sp.* from Sweden (1849), *C. campanulae-macranthae* F. Wagner on *Campanula petulae* from Germany (1898), and *C. trichelii* Kebl. on *Campanula trachelium* from Germany (1904). The most important diagnostic features of this rust is that the aeciooid-uridinospores observed in chain and are comparatively smaller in size, reddish brown waxy telia with comparatively larger sized septate metabasidia and the infection is on stem and mostly severe on leaves amphiginously.

The most important diagnostic feature of these two new rust species is that they only restricted along with the riverbanks on their respected hosts.

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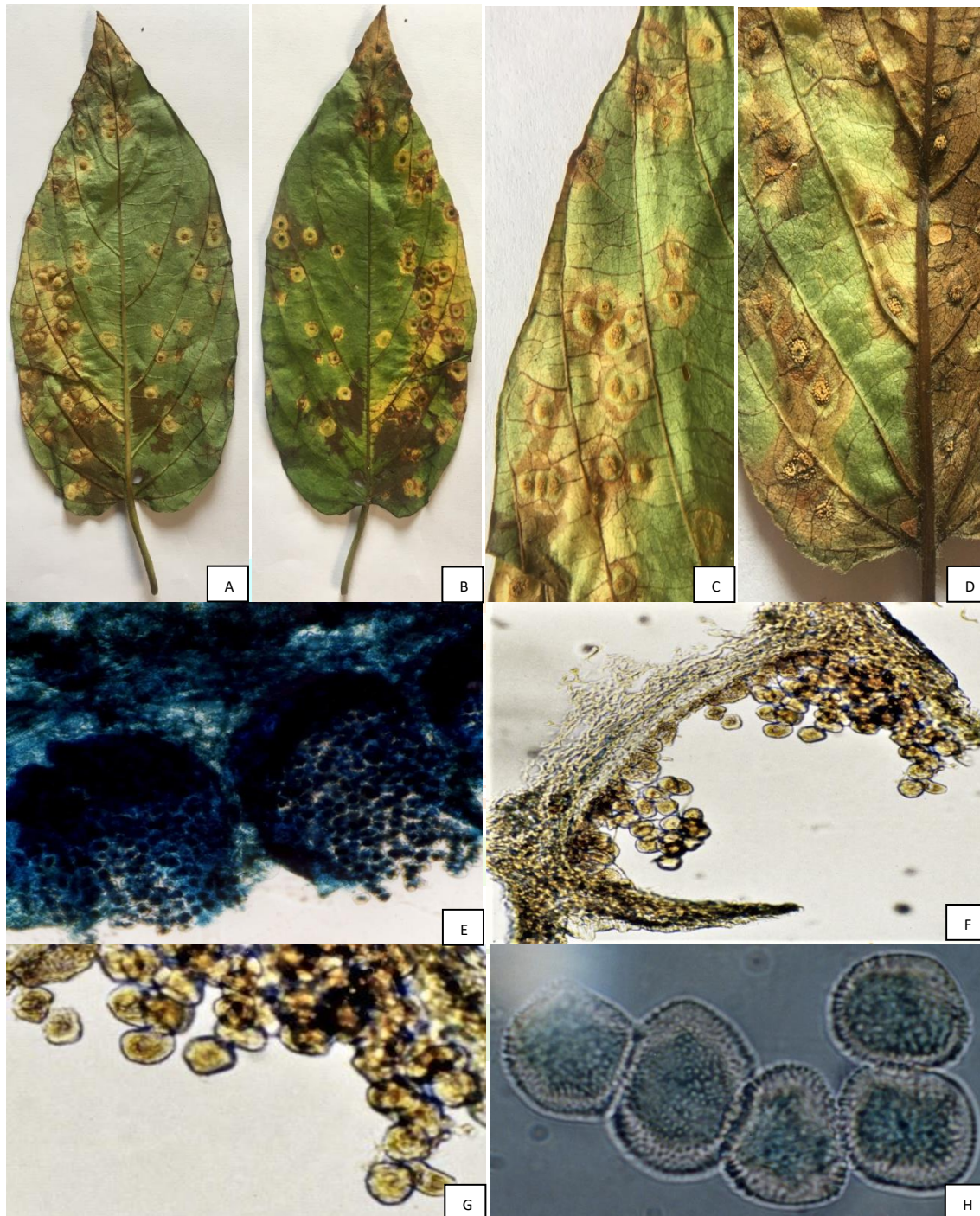
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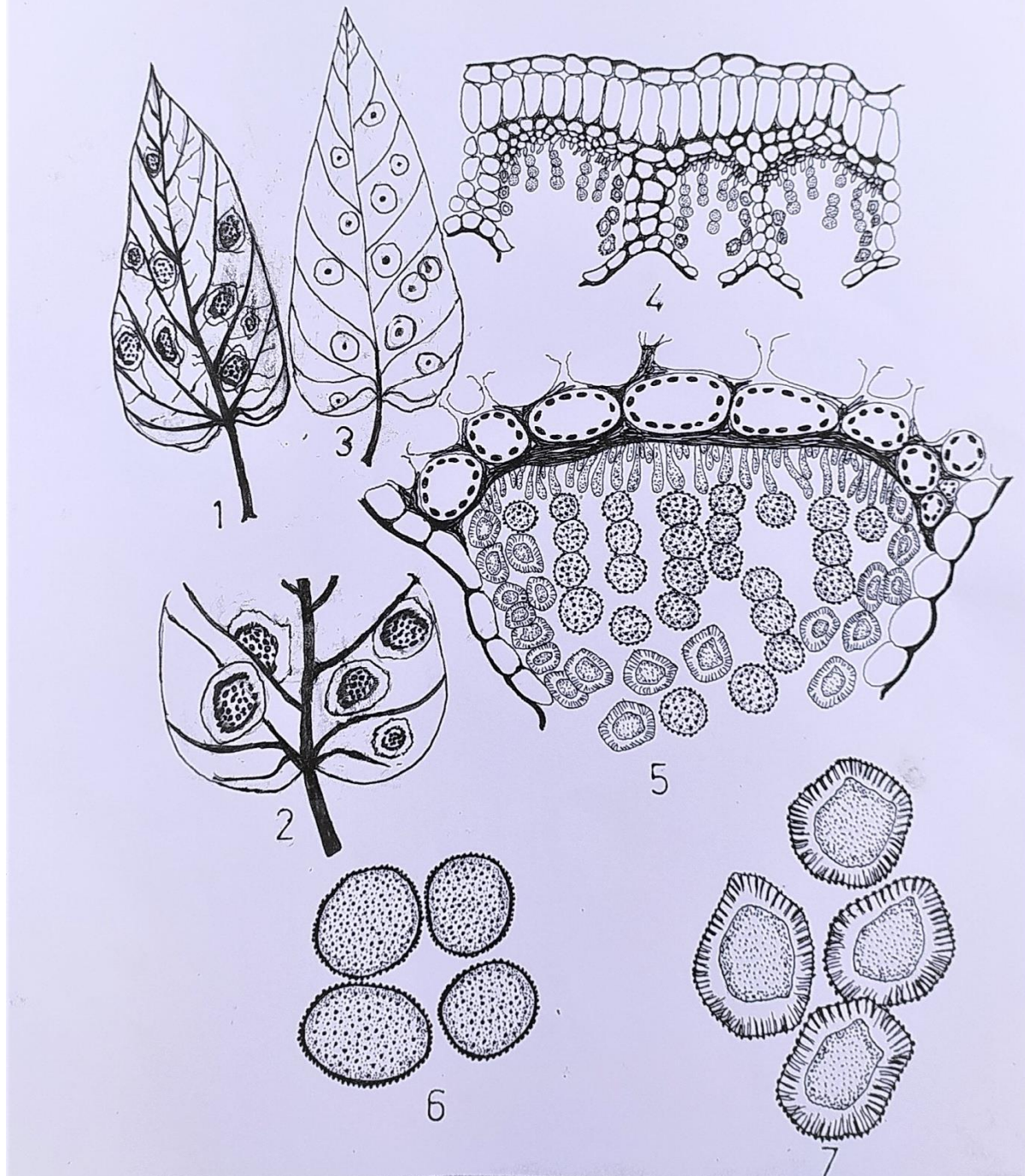


PLATE NO-I



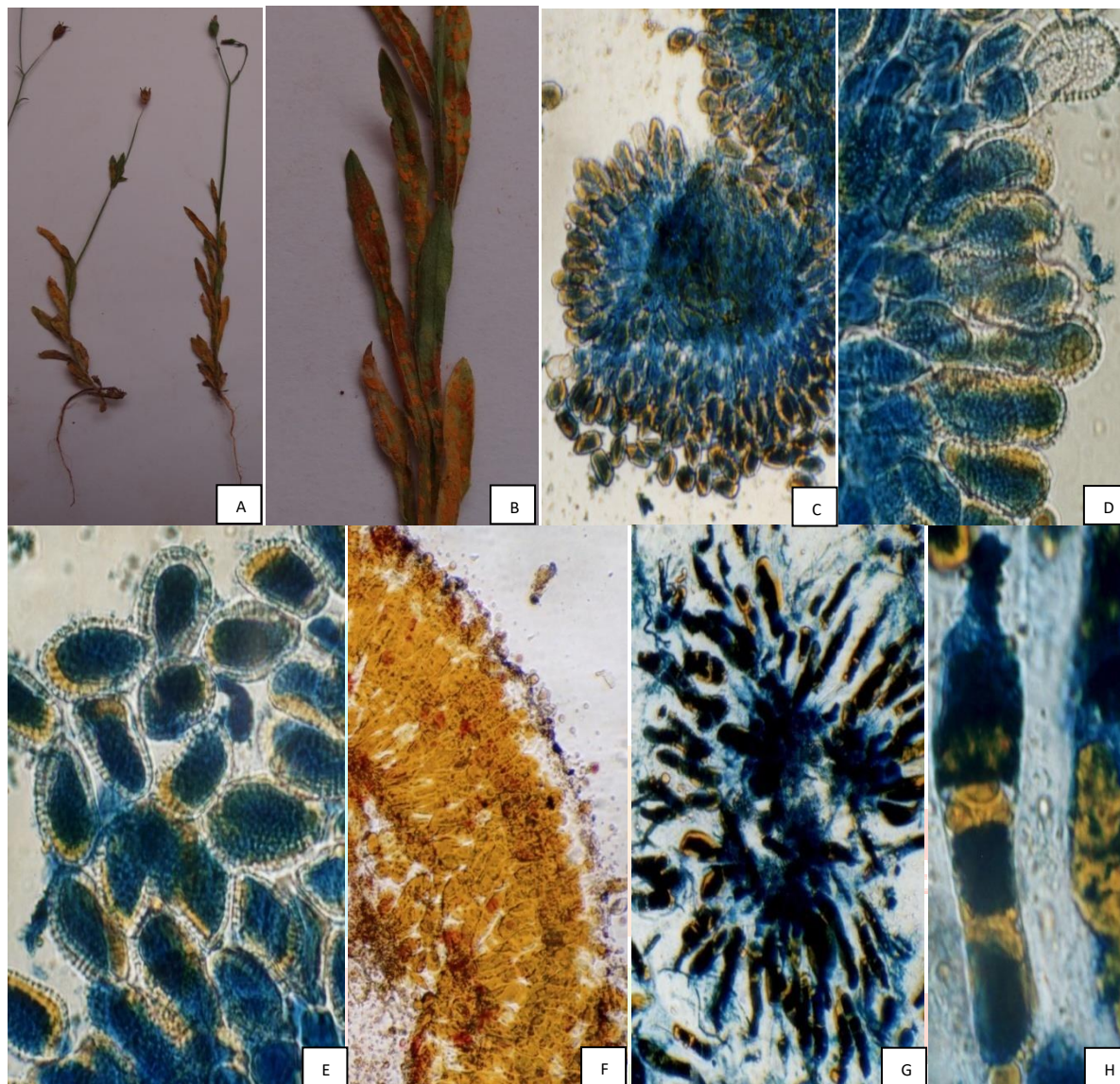
Figs. A-H *Aecidium merremiae-umbellatae* T.R. Kavale sp. nov., Fig.-A- Habit-Infected leaf showing Aecidia on lower surface with necrotic circles, x N. S.; Fig.- B- Infected leaf showing Yellow spots on upper surface x N. S.; Fig.-C & D- Magnified Aecidia on lower surface of leaf; Fig. -E- T. S. of leaf passing through Aecidia; Figs F- Magnified Aecidial cup; Fig.- G- Aeciospores; Fig. H- Peridial cells

TEXT PLATE NO. -I

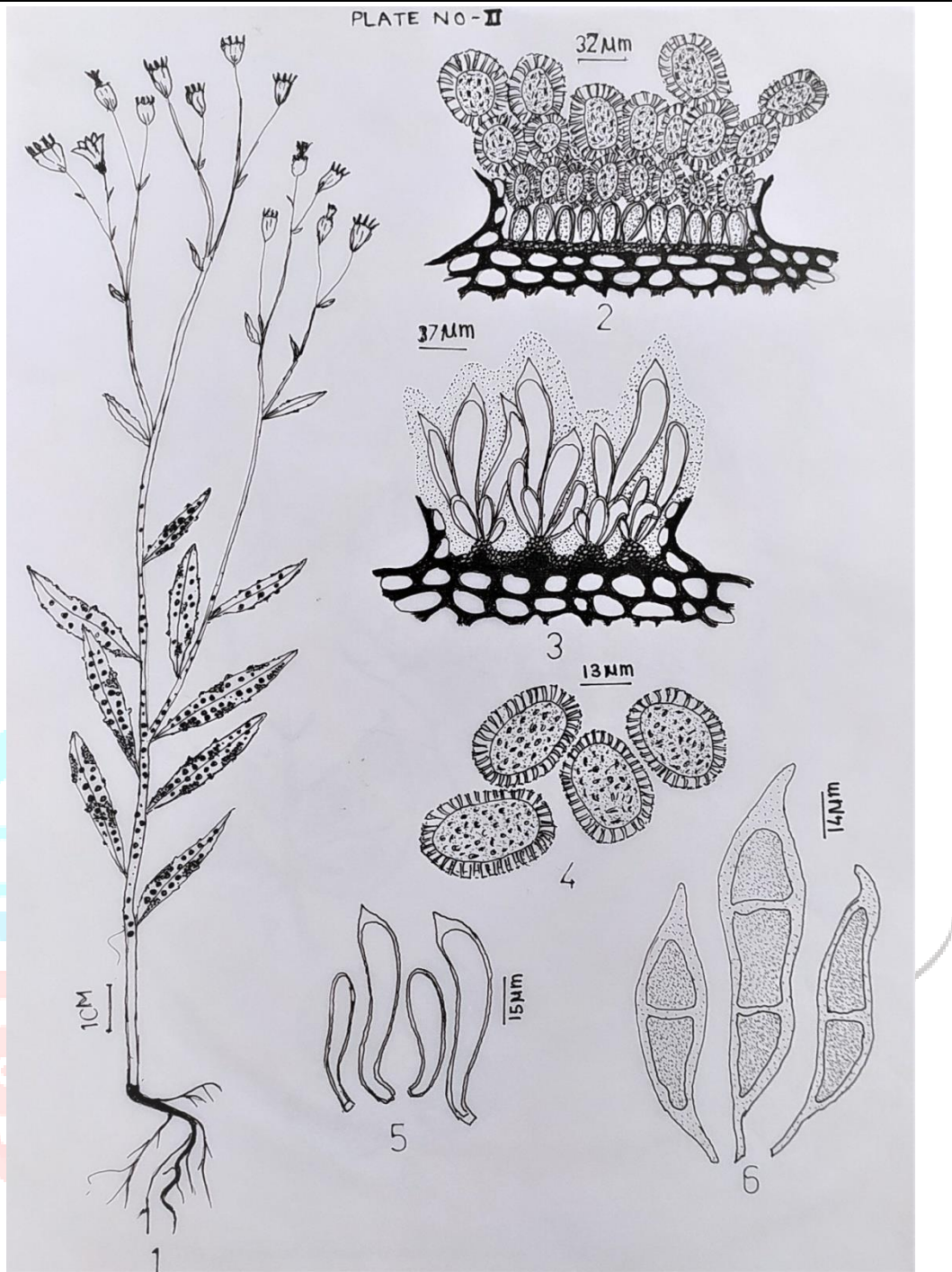


Figs. 1-6 *Aecidium merremiae-umbellatae* T.R. Kavale sp. nov., Fig.-1- Habit-Infected leaf showing Aecidia on lower surface with necrotic circles ; Fig.- 2- Magnified Aecidia with necrotic circles; Fig. 3- Habit- Infected leaf showing Yellow spots on upper surface; Fig. 4- T. S. of leaf passing through Aecidia; Figs 5- Magnified Aecidial cup with Aeciospores and Peridial cells; Fig.- 6- Aeciospores; Fig. 7- Peridial cells

PLATE NO-II



Figs. A-H *Coleosporium wahlenbergiae-marginatae* T.R. Kavale sp. nov., Fig. A- Habit-Infected plant of *Wahlenbergia marginata* (Thunb.) DC showing pustules of uredia and waxy telia ; Fig. B- Magnified infected leaves showing uredia and waxy telia on both surfaces; Fig. C- Uredinium Fig. D- T. S. of leaf showing uredium with chains of aecid-urediniospores; Fig. -E- Urediniospores ; Figs F- T. S. of leaf passing through waxy Telia showing probasidia (non-septate); Fig.- G- Metabasidia (septate); Fig. H- Magnified Metabasidium



Figs. 1-6 *Coleosporium wahlenbergiae-marginatae* T.R. Kavale sp. nov., Fig. 1- Habit-Infected plant of *Wahlenbergia marginata* (Thunb.) DC showing pustules of uredia and waxy telia; Fig. 2- T. S. of leaf showing uredium with chains of aecid-urediniospores; Figs 3- T. S. of leaf passing through waxy Telia showing probasidia (non-septate); Fig. 4- Urediniospores ; Fig. 5- Probasidia (non-septate); Fig. 6- Metabasidia (septate)