24. Puccinia leonotidis (P. Henn.) Arth A Severe threat to Leonotis nepetaefolia (L.) R. Br.: A Review

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Abstract:

During the fungal field survey the *Puccinia leonotidis* (P. Henn.) Arth. has been observed infecting the *Leonotis nepetaefolia* (L.) R. Br. Severely in many localities of Western Ghats of Maharashtra.It has been reported from many countries from world but the recent survey shows every plant heavily infected from many area of Maharashtra in December and January. Most of the times only uredial stages are common on the same host. As this disease is becoming more common in India now a days there need to concentrate on its alternative host also from India to focus on the preventive measures of the probable future crop diseases.

Key words: *Leonotidis, Puccinia*, rust fungi, Western Ghats

Introduction:

***Leonotis nepetaefolia* (L.) R. Br.** is herb or undershrubs, 50-150cm high; stems stout, slightly angled, with long internodes, pubescent. Leaves 5-12 x 3-10 cm, broadly ovate, membranus, pubescent on both sides, apex acute, base cuneate, margins coarsely serrate. Flowers in axillary, many flowered, dense whorls; calyx up to 1.9cm long, ribbed, incurved, teeth very unequal, tipped with slender spines; corolla 2.0-2.5 cm long, tube glabrous at the base, hairy in the upper half. Nutlets 0.4 cm long, ovoid, pitted at apex. Flowers and fruits in October – February. Distribution is common throughout the state.(Singhet al.2001)

Leonotis nepetifolia, (also known as klip dagga, Christmas candlestick, or lion's ear), is a species of plant in the genus *Leonotis* and the family Lamiaceae (mint). It is native to tropical Africa and southern India. It can also be found growing abundantly in much of Latin America and the West Indies. It grows to a height of 3 metres (9 ft 10 in) and has whorls of striking lipped flowers, that are most commonly orange, but can vary to red, white, and purple. It has drooping dark green, very soft serrated leaves that can grow up to 10 centimetres (4 in) wide. Sunbirds and ants are attracted to the flowers. It has been found growing on road sides,

rubbish heaps or waste land. *Leonotis nepetifolia* (klip dagga) is related to *L. leonurus* (wild dagga or lion's tail.) The most noticeable difference between the two is the leaf shape. *L. nepetifolia* leaves are cordate with serrated edges, except the top pair which are lanceolate with serrated edges, as pictured in taxonomy box. The leaves are all lanceolate with serrated edges on *L. leonurus*. *Leonotis nepetifolia* is known in Trinidad as 'Shandilay' and the leaves are brewed as a tea for fever, coughs, womb prolapse and malaria.

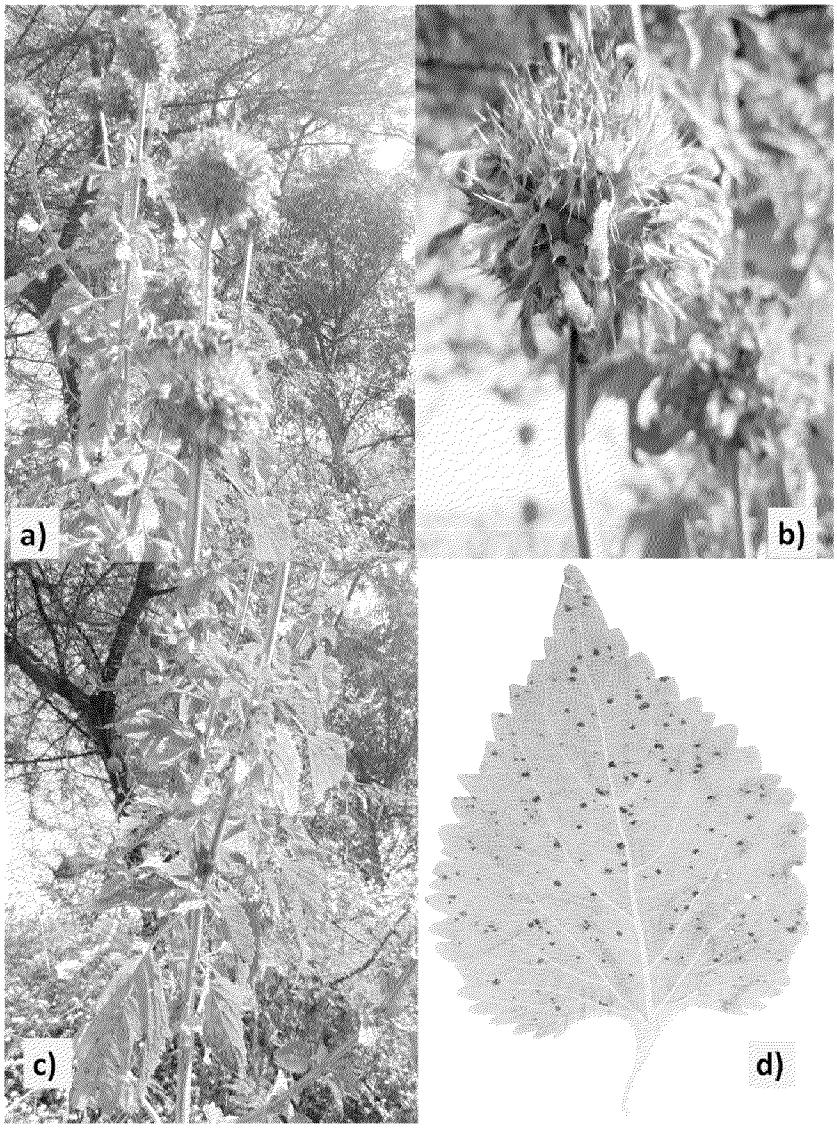

Fig. 1 –Habit of *Leonotis nepetaefolia* (L.) R. Br. b. Inflorescence c. Heavily infected plant leaves. c. Lower side of leaf showing the uredo-pustules of *Puccinia leonotidis* (P. Henn.) Arth.

Puccinia is a very common rust fungus occurs on a diverse host range. In all total there are 5441 records from *Puccinia* (Index Fungorum, 2018). This fungus *Puccinia leonotidis*(P.

Henn.) Arth. commonly occurs on *Leonotis nepetaefolia* (L.) R. Br.There are total 05 synonyms namely *Uredo leonotidis*P. Henn, *Aecidium leonotidis*P. Henn., *Uredocancerina*P. Henn., *Uredo leonoticola*P. Henn.and *Puccinia leonotidis*(P. Henn.) Arth. in different journals.**(Fig.1)**

Thaxter IOin 1913mentioned thatonly the uredinia of this common tropical rust are known in America on *Leonotis nepetaefolia*(L.) R. Br., Maraval Valley, March 1913, II, Thaxter IO. Arther in 1915 did the comb. nov.(1915) *Puccinia leonotidis* (P. Henn.) comb. nov.*Uredo leonotidis* P. Henn. inEngler, Pfl. Ost.-Afr. C:52. June, I895. *Aecidium leonotidis* P. Henn. inEngler, Pfl. Ost.-Afr. C: 52. June, I895. *Uredo cancerina* P. Henn. Hedwigia 34:330. December, I895. *Uredo leonoticola* P. Henn. Hedwigia 38:69. I899. *Puccinia leonotidicola* P. Henn. in Baum, Kun.-Samb. Exp. I903. On Lamiaceae(Labiatae) :*Leonotisnepetaefolia* (L.) R. Br., Yabucoa, May I7, I912, 4; Coamo Springs, Jan. I, I27, April 6, 845; Hormi- gueros, Jan. 14, 2i6; Bayamon, Feb. I4, 390; Lares, Nov. 22, 4836, 4916; Guayama, Dec. 4, 5336; Ponce, Dec. 4, 5394; Guayanilla, Nov. 13, 5869. The West Indian collections examined are from Ponce, P. R., Jan., I9II, E. W. D. Holway; Rio Piedras, P. R., I912, J. R. Johns- ton, 454, 498, between Aibonito and Cayey, P. R., Feb., I899, A. A. Heller 557; Kingston, Jamaica, Oct., I899, G. Lagerheim, and July, I9IO, Eug. Mayor II9; Port Antonio, Jamaica, Feb., I915, E. W. D. Holway; Havana, Cuba, March, 1903, E. W. D. Hol- way (Barth. N. Am. Ured. 78I); Nassau, Bahamas, June, I909, P. Wilson 8437.

So far no American collection has revealed other than urediniospores. These are characteristic in being somewhat flattened from above, with the wall slightly thicker in the upper part, and in having three to five, usually four, basal pores close to the hilum. A collection by Lagerheim from Jamaica bears the inscription "*Uredo basipora* Lagerh..," which indicates that the peculiar arrangement of pores was seen by Lagerheim, but I do not find that he published his proposed name. The assignment of the species to the genus *Puccinia*, is based upon observations by Hennings, who published a description otteliospores, taken from South African material. In my herbarium is a part of the same collection, made April I8, 900o, by the Kunene-Zambesi Expedition, one half of a well rusted leaf, but it shows no teliospores, although there is an abundance characteristic urediniospores. A portion of the type material of *Uredo cancerina* and *U. leonoticola* has been examined. The species as here indicated seems consistent with other species on related hosts in its morphology, and with tropical forms generally in rarelyproducing other than repeating(Arthur 1915)

Then Pipal E. J. 1916 reported the same from Florida. *Puccinialeo notidicola* P. Henn. in R. Baum Kun-Samb. Exped. J p.2. 1903. On *Leonotisnepetaefolia* (L.) R. Br.: Florida. Host

index and morphological characterization of grass rusts of the world. Arthur in 1917 published the Uredinales of Porto Rico Based on Collections by H. H. Whetzel and E. W. J. C. Arthur and J. R. Johnstonin (1918) Proceedings of the semi-central anniversary of the Botanical club reported *Puccinialeonotidis* (P. Henn.) Arth.He mentioned that this autoecious species, occurring throughout the warmer regions of the world, has been found in America only in the uredinial stage. Aecia and telia have been seen from Africa. The other West Indian islands represented are Jamaica, Porto Rico, and the Bahamas.

J. C. Arthur in 1922 mentioned that only the uredinia of this common tropical rust are known in America.Chavan and Patil in 1970, a rust was collected on the plants of *Leonotisnepetaefolia*at Satara. There is one report of *Puccinia leonotidicola* on this host. But Arthur (1915) had made interesting remarks about it. Arthur had a part of the type material collected from South Africa by Hennings but that well rusted leaf revealed no teliospores though abundant urediospores were present. Also in other type materials as of *Uredo cancerina*and *Uredo leonotidicola,* Arthur did not find teliospores. Arthur therefore concluded that "the assignment of this rust to the genus *Puccinia*was based only upon the observations of Hennings". The rust collected at Satara on *Leonotis nepetaetifolia* did show teliospores and uredospores. The teliospores were of *Puccinia*type. The measurements and morphology of these two spore forms are similar to those described by Hennings for the rust *Puccinia leonotidicola* and hence this report confirms the *Puccinioid* nature attributed to this rust by Hennings

Fred J. Seaver in 1925 Collected *Puccinia leonotidis* (P. Henn.) Arth. On *Leonotis nepetaefolia* (L.) R. Br.(Seaver 1925) and reported the same in The Fungous Flora of St. Croix.

Frank D. Kern in 1928 mentioned that this species has usually been referred by American authors to *Puccinia leonotidis* (P. Henn.) Arth., the type of which is from South Africa. While it seems probable that the American and African specimens are the same and that this is the proper name to be used, there is a confusion regarding the teliospores. Arthur in the N. Am. Fl. 7: 407 (1921) gives a description of the telial stage which is evidently from African material based on observa- tions by Hennings (see Mycologia 7: 245, 1915). The telio? spores are described as ellipsoid, 18-23 X 25-32 ll. Fragoso and Ciferri in Bol. R. Soc. Esp. Hist. Nat. 26: 248 (1926) describe a new species, *Pucciniadominicana* Frag. &Cif., on *Leonotisnepe*? taefolia, collected in Moca, Santo Domingo, Jan. 23, 1926, by J. Beccan. The urediniospores seem to be the characteristic ones found on this host. They describe teliospores as subfusoid, 18-22 by 60-90 ll, and their species is founded largely on the difference between these teliospores and those described by Hennings. He inclined to think that theywere dealing here with only one species on

Leonotis as is indicated so strongly by the urediniospores and that there is an error either in one case or the other regarding the teliospores. The Stevenson collection is reported in the N. Am. Fl (Frank D. Kern 1928)

F. D. Kern and R. Ciferri in 1930 reported the same rust in Fungi of Santo Domingo: III. Uredinales.H. S. Jackson in 1932 mentioned that the collections listed are of uredinia only as is the usual situation in this widely distributed tropical rust. The species is common throughout Central America and northern South America, and has been reported previously from Brazil and Argentina. It is also known in western Africa and eastern India in the volume The Rusts of South America Based on the Holway Collections: VI.(Jackson 1932).

In 1940 H. W. Thurston, Jr., also studied the same rust from Brazil and documented the same in The Rusts of Minas Geraes, Brazil: Based on Collections by A. S. Müller. In 1967 Sathe A.V. did the same rust collectionfrom Kolhapur, Maharashtra State, India, the writer came across a rust infecting the plants of *Leonotisnepetaefolia*Br. The microscopie examination revealed the rust in its uredial stage. The previous literature showed the report of *Puccinialeonotidicola*P. Henn. Arthur (1915) pleaded for its changed nomenclature as *Puccinia leonotidis*(P. Henn.) Arthur, regarding the previous reports as synonymous with it. According to the articles Nos. 49, 59, 60 & 73 of Botanical Nomenclature (Lanjouw et al. 1956) the former nomenclature by P. Hennings i. e. *Puccinialeonotidicola*P. Henn. appears to be valid. Hence the present collection of the writer is referred to as *Puccinialeonotidicola*P. Henn. Bot. Ergeb. Kunene-Sambesi Exp. 1902: 3.This rust is reported from Mysore State (Belgaum: former Bombay State) (Butler &Bisby Rev. Vasudeva , 1954). Here it is reported for the first time from Maharasthra State, India, where it occurs in Southern Parts of the State, and prevails mostly in uredial stage.

Conclusion:

Many researchers have done good amount of work on the same fungus. An extensive survey of different localities of the Pune District was done by Ranadive K. R. and noted that, the same disease is infecting the *Leonotisnepetaefolia* (L.) R. Br plant severely, following the defoliation of the infected leaves. All most all leaves were infected heavily. Curling of the infected leaves also noted in all leaves of every plant in the survey. Although this disease is infecting the *Leonotis nepetaefolia* (L.) R. Br.plant now, but there is no documentation of the alternative host of the same fungus. If any alternative host is there from the Poaceae family is there, then it is quite possible to get the same type of severe losses to our crop plants in near future.It's highly necessary to pay attention to this future problem of our cash crop plants.

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