



## Taxonomic Notes on a Rare Parasitic Plant *Striga gesnerioides* (Willd.) Vatke var. *minor* Santapau and its Comparative Taxonomy with Type var. *gesnerioides*

Dheeren Panwar

Department of Botany, S.B.K. Govt. P.G. College Jaisalmer– 345001, Rajasthan, India

**ABSTRACT:** *Striga gesnerioides* (Willd.) Vatke is a common root parasite found in wild on roots of *Euphorbia caducifolia* in Indian Thar Desert. Santapau reported its new variety i.e. *minor* from the Khandala Maharashtra. Later on Bhandari M.M. reported this rare var. from N.W. Rajasthan however there are little information is available on it and not much taxonomic description and herbarium sheet as well as digital photographs are available on online platform. Hence the present investigation was done to hunt this rare variety for its proper description and documentation for easy identification. By the current investigation I have successfully re-reported this variety from Indian Thar Desert after three decades from a new site. The newly collected site has been geo tagged for future researchers. Efforts were made to give a proper description and digital photographs of each part in detail, with the comparative taxonomy of its type variety *gesnerioides* and new keys has also been given for easy identification.

**KEY WORDS:** *Striga gesnerioides* var. *gesnerioides*, var. *minor*, Indian Thar Desert

### INTRODUCTION

The genus *Striga* Lour. is a common root hemi-parasite at worldwide and distributed naturally from Tropical & sub tropical old world to Australia.<sup>[1]</sup> The name *Striga* comes from Latin derivative<sup>[2]</sup> which means 'Hag' or 'Witch' perhaps due to the sudden ugly appearance from many crop plant at time of flowering and result in damage of crop. Hence the common name is Witchweed. Previously it was placed in Scrophulariaceae<sup>[3]</sup> but currently classified in family Orobanchaceae.<sup>[4][5]</sup> Previously there are four species of *Striga* namely *S. angustifolia*, *S. asiatica*, *S. densiflora* and *S. gesnerioides* were reported from India.<sup>[6]</sup> Recently two new species of it were discovered namely *S. indica*<sup>[7]</sup> and *S. kamalii*.<sup>[8]</sup> Among them *Striga gesnerioides* (Willd.) Vatke is a common root parasite found in wild on roots of *Euphorbia caducifolia* in Indian Thar Desert and have two varieties namely a type variety *generioides* and var. *minor* which was first reported by Santapau from Khandala Maharashtra.<sup>[9]</sup> This variety which has so far been reported only from Khandala and is not uncommonly found growing on the roots of *Lepidagathis bandraensis* Blatt. Santapau has, however reported it on the roots of *Hygrophila serpyllum* Anders. in Khandala. Blatter and Hallberg have also observed many forms of *S. gesnerioides* from Thar Desert which they thought may subsequently prove to be constant varieties.<sup>[10]</sup> Later on Bhandari, M.M. reported this rare var. from N.W. Rajasthan.<sup>[11]</sup> However there are little information is available on it and not much taxonomic description and herbarium sheet as well as digital photographs are available offline as well as on online platform which generate difficulties to identify this variety among researchers and taxonomist. Hence the present investigation was done to hunt this rare species for its proper description and proper documentation for easy identification. By the current investigation I have successfully re-reported this variety from Indian Thar Desert after three decades and effort were made to give a proper description and digital photographs of each part in detail with the comparative taxonomy of its type variety *gesnerioides*.

### MATERIAL AND METHODS

**Survey:** A cumbersome field survey was carried out in Monsoon season 2015-2020 on Hilly tracts of Thar Desert including Jodhpur, Jaisalmer and Barmer district. Since it is a root parasite on *Lepidagathis* species, hence during survey several *Lepidagathis* plants were observed for hunting it. The collection site was Geo tagged by Google Earth.

Standard procedures were followed for collection, preservation and herbarium sheet preparation. Digital photos were snapped using Samsung galaxy J 5 prime and Canon EOS 1300 D digital camera. Olympus OIC dissecting microscope was used to



observe floral characters. Photos of vestiture on stem/leaf, flower parts, and fruits/seeds were captured at 10X zoom with Sony DSC camera.

**Identification:** The species was identified with the help of authentic specimens in the Herbarium of Botanical Survey of India, Regional Center, Jodhpur, and (BSJO). Online Kew herbarium catalogue, and global biodiversity Information facility, personal collections of M.M. Bhandari in Jai Narain Vyas University, Jodhpur, floras of the Indian Desert (Bhandari, 1990) and Rajasthan (Shetty & Singh, 1991).

**Comparative study:** A detailed comparative study was done with fresh collections and specimens preserved in Botanical Survey of India regional center Jodhpur (BSJO) and personal collection of M.M. Bhandari.

## RESULTS

Three species of *Striga* namely *S. angustifolia*, *S. asiatica* & *S. gesnerioides* and two varieties of *Striga gesnerioides* namely type var. *gesnerioides* and var. *minor* were collected and recorded for Indian Thar Desert. The followings are new keys for easy identification:

### Key to the species

1a. Corolla white:

- 2a. Calyx tube 5 ribbed.....*S. densiflora*
- 2b. Calyx tube 15 ribbed.....*S. angustifolia*

1b. Corolla other than white:

- 3a. Corolla yellow, leaves normal.....*S. asiatica*
- 3b. Corolla Lilac or Purplish-White leaves reduced .....*S. gesnerioides*
  - 4a. Stem dark magenta in color, pubescent, corolla lilac, retrorse hairs on corolla tube .....*S. gesnerioides* var. *gesnerioides*
  - 4b. Stem green or magenta-green in color, glabrous, corolla purplish white, Corolla tube more or less glabrous.....*S. gesnerioides* var. *minor*

Since the paper is confined to comparative taxonomy of the two varieties of *Striga gesnerioides* hence following are the description of two varieties:

[1] *Striga gesnerioides* (Willd.) Vatke var. *gesnerioides* in Oesterr. Bot zeitschr. 25:11. 1875; Pennell in Acad. Nat. Sc. Phil. Mon. 5:97.1943; Santapau in Journ. Bomb. Nat. Hist. Soc. 49: 42.1950 & in Rec. Bot. Surv. Ind. 5:68. 1963; Bhandari M.M. in Fl. Ind. Desert 256. 1990, Shetty & Singh in Fl. Raj. 605. 1991; *Buchnera gesnerioides* Willd. Sp. pl. 3: 338. 1800; *B. orobanchioides* R. Br. In App. Salt. Voyage Abyss. 74. 1814 (*nom. Nud.*); *B. hydrabadensis* Roth, Nov. P1. Sp. 292. 1821; *Striga orobanchioides* (R. Br. Ex Endl.) Benth. Comp. bot. mag. 1: 361. T 19. 1836; Hook. f. FBI 4:299. 1884; FBI 2: 376; BH 26 (2): 550. 1919.

An annual, erect, herbaceous root parasite found on *Euphorbia caducifolia*. Stem 20- 50 cm. tall, un-branched or branched at middle, terete, hairy, soft and magenta colored all over. Leaves reduced, alternate, sessile, adjacent to mother axis, younger ones acuminate and hairy, successively passed into thick acute bract. Flowers in densely crowded terminal spike, diameter 5-5.5 mm at bilateral axis, Bracteate and bracteolate, bract 7 x 2 mm, ciliate at margin, and concave inside, thick raised mid rib on dorsal side with few hairs, magenta in color. Bracteole two, lateral, linear lanceolate and 5 mm in length, Calyx campanulate, 8 mm, teeth five with bristle hairs, prominent ribs along with the length of each teeth, magenta in color. Corolla bilabiate, (2 upper + 3 lower), lower 3 mm, upper 2.5 mm, lobes obovate, rounded or truncate with tooth at apex, tube 10 mm, curved more or less at right angle of calyx, glabrous, purple hairs at mouth and inside throat. Stamens didynamouse, epipetalous, inside the throat, anther sac black, filament translucent white, dorsifixed, longer 2 mm and shorter 1.5 mm long. Ovary oblong, glabrous, green, 2.5 mm, style 5 mm, glabrous, pale white, stigma 1 mm with minute papilla. Fruit a capsule, capsule ellipsoid oblong, flat, 5.5 mm x 3 mm, shining black, impressed midrib at both side, persistent style at tip, cleft longitudinally from lateral side. Seeds are pale brown, numerous, triangular-oblong, wavy grooves & ridges on surface, 0.4 mm in length.

*Flowering and Fruiting:* In rainy season

*Field Note:* Always found on the roots of *Euphorbia caducifolia*, common on hilly tract.

Specimen examined: Jodhpur, BSJO, G.L. Tiwari 860, 16/11/1973; B.V. Shetty 1818, 20/08/1975.



[2] *Striga gesnerioides* (Willd.) Vatke var. **minor** Santapau in Kew Bull. 1948: 491. 1949 & in Journ. Bomb. Nat. Hist. Soc. 49: 42. 1950 & in Rec. Bot. Surv. Ind. 16: 206. 1953; Bhandari M.M. in Fl. Ind. Desert 287. 1978 & 256. 1990; Shetty & Singh in Fl. Raj. 606. 1991

Type: Santapau 3072 in the Blatter Herbarium, St. Xavier's College, Bombay.

An annual, erect, herbaceous root parasite found on *Lepidagathis trinervis*. Stem 06 -15 cm tall, un-branched or branched at middle, teret, glabrous, soft, and green or green with reddish tinged. Leaves reduced, alternate, sessile, adjacent to mother axis, scaly, thick, ovate-lanceolate, acute, lower ones acuminate, margin ciliate, concave inside, 08-10x2-2.5 mm, and magenta-green, upper ones passing into floral bract. Flowers in terminal spike, 3.5-4 mm in diameter at bilateral axis, bracteate and bracteolate, bracts 4x 1.5mm or slightly shorter than calyx tube, similar to leaves; bracteole two, lateral, linear-lanceolate, length 2-3x1 mm or half to the calyx tube. Calyx campanulate, 6 mm, lower part green, upper part reddish, teeth 4, acute, sparsely pubescent outside, glabrous inside, a longitudinal rib along with each teeth. Corolla bilabiate (2 upper + 3 lower), lower 2.5 mm and upper 2 mm long, tube 7-8 mm, curved more or less at right angle of calyx, long retrorse hair at distal end, glabrous at proximal, hairy at mouth and inside throat, lobes 2-2.5 mm, obovate, rounded or truncate, toothed, white or purplish-white, glabrous both side. Anthers 4, didynamous, longer 1.5 mm shorter 1 mm long, epipetalous and inside the tube, anther sac black, filament translucent white, dorsifixed. Ovary oblong, glabrous, pale green, 2 mm, style long, slender, cylindrical, 4 mm, stigma leafy with minute glutinous papilla. Fruit a capsule, capsule oblong, ellipsoid, flat, 3-4 x 1.5 mm, tipped with persistent style, longitudinal grooves at middle on both side, blackish brown when dried. Seeds numerous, very minute, wavy grooves & ridges all over, light brown or pale brown 0.2 mm long, more or less triangular.

*Flowering and Fruiting*: In rainy season

*Field Note*: Although the Santapau has reported it from *Lepidagathis bandraensis* and *Hygrophila serpyllum* I have found it on the roots of *Lepidagathis trinervis* another sp. of *Lepidagathis* commonly found in the area. This is a new report of another host. The corolla becomes purple after wilt or falls or plucking.

*Collection Site*: Plant was collected from Andolai (A Small Rain Water Pond) Hill, located at Kabootaro ka Chauk Osian-Jodhpur, Rajasthan. The new site was geo tagged by Google earth (Fig. 1).

Specimen examined: Jodhpur, J.N.V. University, Bhandari 1135.

## DISCUSSION

It has been experienced that the habit and plant characters viz. height, color, vestiture, and floral characters are important to distinguish the var. *minor* from its type var. *gesnerioides*. Hence the following are the discussion on the herbarium specimen, habit and morphology of different plant organs:

**Herbarium specimen**: Herbarium specimen in both varieties become black after preservation and looks same which superficially not beneficial to differentiate both varieties until unless simultaneous comparing of size of all the floral parts and vestiture on them (Fig. 4 & 5).





**Fig. 1.** New collection site of *Striga gesnerioides* var. *minor*: Andolai Hill (A small rain water pond) near Kabootaro ka Chauk Osian-Jodhpur, Rajasthan. Latitude and Longitude are 26°43'28" N and 72°55'09" E.

**Habit** (Fig.2): Both the varieties are clearly distinguishable from one another on the basis of height, color of plant and host specificity. The type var. *gesnerioides* has dark magenta color all over and 20-50 cm tall and characteristically found on roots of *Euphorbia caducifolia* Haines, although according to Saldanha (1963)<sup>[12]</sup> it's also reported on *Lepidagathis* & *Dysophylla* sp. but I have always found type var. on *Euphorbia caducifolia* while var. *minor* has green or reddish-green all over and 6-15 cm tall and found on roots of *Lepidagathis trinervis* Nees (first report on new host) or *Lepidagathis bandraensis* Blatter. The Branching pattern was used as a key character by Shetty & Singh (1991)<sup>[6]</sup> to distinguish both the varieties. According to them the type variety has much branched stem while the var. *minor* have un-branched stem, similar description was given by Bhandari M.M. (1990)<sup>[11]</sup>. In my observation I have always found branching in both the variety. Branching may occur from the base which often buried in soil due to the attachment on host root (Fig. 2 C) and not seen until unless digging out the plant, hence looks un-branched. Secondly branching may occur at the middle of stem in both varieties which can easily be seen (Fig. 2 A & B).

**Flowers:** Flowers were found smaller in var. *minor* (3.5-4 mm in diameter at bilateral axis) comparatively from type var. (5-5.5 mm in diameter at bilateral axis). Another interesting character was observed that after wilt or falls, flowers in var. *minor* become purple while in type var. they become pale brown or purplish-brown.

**Leaves:** leaves are reduced in both varieties only the size and color were different. Leaves in var. *minor* were green or magenta-green with sparsely puberulent or glabrous comparing to dark magenta in type var. with long hairs, also shorter in size from type var. The lower leaves are acuminate in both varieties and successively pass into acute bract.

**Bract:** Bracts were similar accept in color and size, in var. *minor* bracts were reddish green, shorter and less wide compare to dark magenta with prominent dorsal midrib and larger size in type variety (Fig. 3 B & L).

**Calyx:** Vestiture on calyx teeth was used as key to distinguish both the varieties by Bhandari M.M. (1990). According to Bhandari calyx teeth have few hairs in var. *minor* compare to long bristle hairs in type. In my observation I have obtain similar finding (Fig. 3 C & M) but also assume that in type variety hairs looks long due to the large size of calyx compare to smaller size of var. *minor* otherwise in both varieties bristle hairs were observed on teeth.

**Corolla:** Corolla color was mentioned as a key character to distinguish both varieties by all the author viz. Santapau (1949), Bhandari (1990), and Shetty & Singh (1991). The similar observation was found in present investigation for distinguishing both varieties. In var. *minor* flowers were white with purple shadow compare to lilac

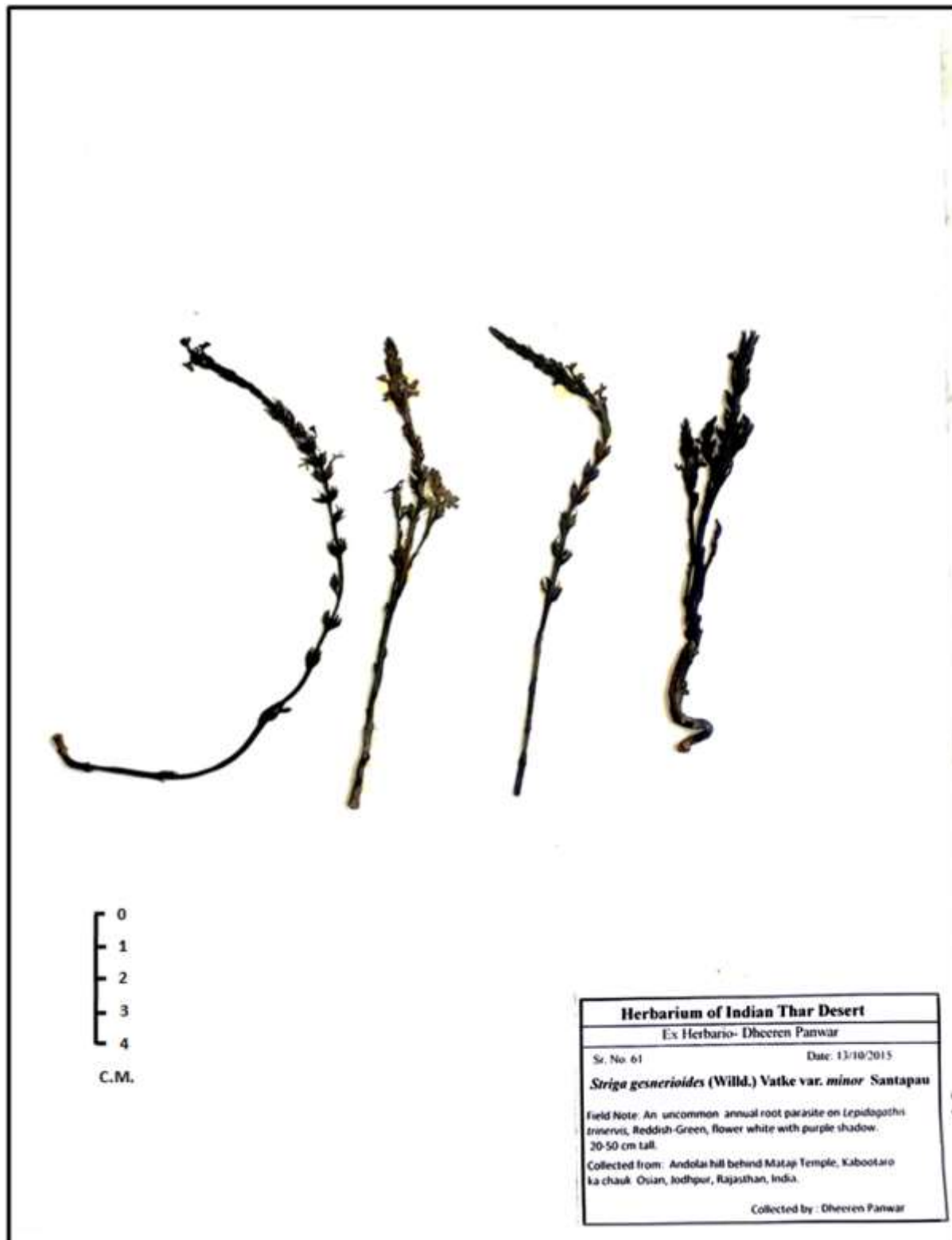


**Fig. 2. Habit and Morphology:** (A) *Striga gesnerioides* (Willd.) Vatke var. *minor* Santapau arise on *Lepidagathis trinervis* Nees; (B) *Striga gesnerioides* (Willd.) Vatke var. *gesnerioides* arise on *Euphorbia caducifolia* Haines; [Note- branching in both A & B]; (C) Attachment of var. *minor* on root of *Lepidagathis trinervis* Nees [Often attached to lateral roots which are spread in cracks of rocks hence looks separate from host]





**Fig. 3. Floral Characters (A-J) *Striga gesnerioides* (Willd.) Vatke var. *minor* & (K-T) *Striga gesnerioides* (Willd.) Vatke var. *gesnerioides*:** A & K Open flower front view-Note difference in color; B & L Separated Bracts; C & M Calyx; D & N Corolla, E & O Enlarged view of distal end of corolla tube-Note presence and absence of retrorse hairs; F & P Gynoecium; G & Q Androecium; H & R Dried capsule-Note presence of persistent style; I & S seeds, J & T Seeds in enlarge view-Note presence of wavy grooves and ridges. All photos are at 10x magnification except A & K. [Bars = 0.5 mm in I,G,Q,S; 1 mm in E,O; 1.5 mm in B,C; 2 mm in A,F,H,P,R; 3 mm in D,L,M,N; 4 mm in K]



**Fig. 4.** Herbarium sheet of *Striga gesnerioides* (Willd.) Vatke var. *minor*-Freshly collected from new site Andolai Hill behind Mataji Temple kabootaro ka chauk Osian, Jodhpur, Rajasthan, India dated 13/10/2015.

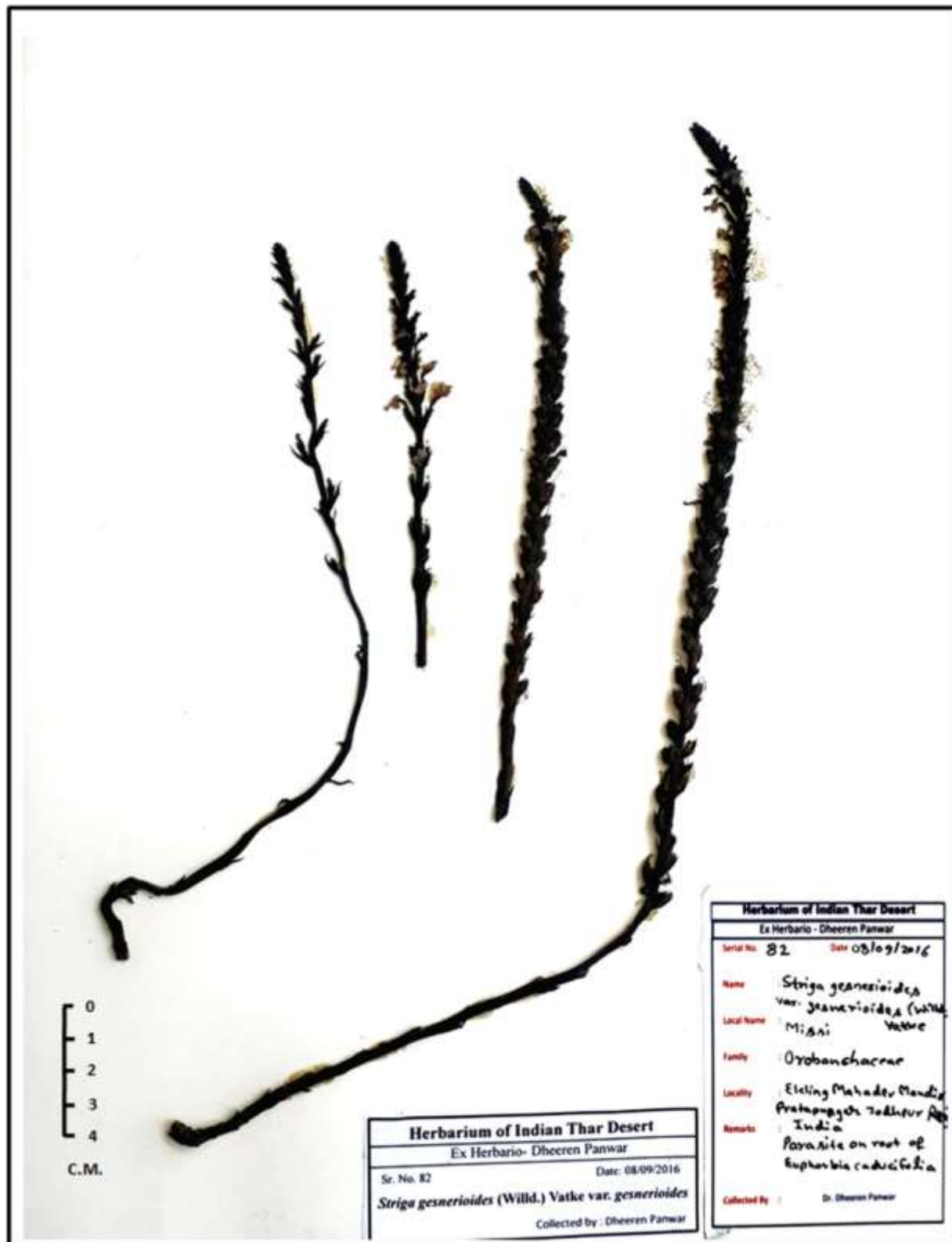


Fig. 5. Herbarium sheet of *Striga gesnerioides* (Willd.) Vatke var. *gesnerioides*- Collected from Ekling Mahadev Mandir Pratapnagar, Jodhpur, Rajasthan, India dated 08/09/2016.





Color in type variety (Fig. 3 A & K). A new distinguishing character was observed that in var. *minor* long retrorse hairs were found on distal end of corolla tube compare to almost glabrous in type variety hence used as key to distinguish both varieties (Fig. 3 D-E & N-O).

**Gynoecium & Androecium:** Not much difference was observed in gynoecium and androecium accepts the size which was larger in type variety. (Fig. 3 F-G & P-Q).

**Fruit and Seed:** Not much difference was observed in both varieties accept the size. In Type variety the size of capsules were almost double compare to var. *minor* (Fig 3 H & R). In both the persistent style was seen. Similarly the seeds were also smaller in var. *minor* compare to type variety. The wavy grooves and ridges were noted in both varieties but comparatively less in var. *minor* (Fig. 3 I-J & S-T).

## CONCLUSION

By the present investigation I have successfully recollect the var. *minor* after three decades from Indian Thar Desert at new site and the site was geo tagged for future researchers. Also new keys are provided for easy identification and differentiation from type variety. The digital photos were also provided first time for variety *minor* with fresh herbarium sheet for future reference.

## ACKNOWLEDGEMENT

I am very thankful to College Education of Rajasthan for providing me a facility for doing my research work. I am very much thankful to BSI regional center Jodhpur for granting me permission to access and explore the herbarium for identification of plants. I am equally thankful to Dr. S.L. Meena senior scientist BSI for giving me valuable suggestions to improve this article. I am also thankful to Department of Botany JNV University Jodhpur to access and explore the personal collection of Prof. M.M. Bhandari for reference purpose.

## REFERENCES

1. Plant of the world online, accessed May 2022. <https://powo.science.kew.org>
2. *Oxford Latin Dictionary* (1968). Oxford University Press, Britain.
3. Wettstein, Richard (1924). *Handbuch der Systematischen Botanik 2* (3<sup>rd</sup>Ed.) Leipzig und Wien Franze Deuticke.
4. Young, Nelson D., Steiner, Kim E., & de Pamphilis, Claude W. (1999). The Evolution of Parasitism in Scrophulariaceae/Orobanchaceae: Plastid Gene Sequences Refute an Evolutionary Transition Series. *Annals of the Missouri Botanical Garden*. 86 (4): 876–93. <https://doi.org/10.2307/2666173>. JSTOR 2666173
5. Olmstead, R. G., de Pamphilis, C. W., Wolfe, A. D., Young, N. D., Elisons, W. J. & Reeves P. A. (2001). Disintegration of the Scrophulariaceae. *American Journal of Botany*. 88 (2): 348–361. <https://doi.org/10.2307/2657024>. JSTOR 2657024
6. Shetty B.V. & Singh. V. (1991). *Flora of Rajasthan* (Vol.2). Botanical Survey of India.
7. P. Jayanthi, K. M. Prabhu Kumar, A. Rajendran, Binu Thomas, M. Sabu, A. K. Pradeep (2014). *Striga indica* (Orobanchaceae) – A new parasitic species from Southern Western Ghats of India. *Feddes Repertorium*. 123 (4): 283-290.
8. Omalsree, M. et al (2015). A new species of *Striga* section *Polypleurae* (Orobanchaceae) from Southern Western Ghats of India. *Phytotaxa* 212 (2): 163–168.
9. Santapau, H. (1949). Novitates Bombayenses. *Kew Bull.* 1948: 485-492.
10. Blatter, E.J. & Hallberg, F. (1984). The flora of the Indian Desert (Jodhpur and Jaisalmer) .*Journal of Bombay Natural History Society*, 26-27(3).
11. Bhandari M.M. (1990). *Flora of The Indian Desert*. MPS Repros, 39, BGKT Extension, New Pali Road, Jodhpur.
12. Saldanha, C.J., & S.J. (1963). The genus *Striga* Lour. in Western India. *Bull. Bot. Surv. India*. 5 (1): 67-70.

*Cite this Article: Dheeren Panwar (2023). Taxonomic Notes on a Rare Parasitic Plant Striga Gesnerioides (Willd.) Vatke Var. Minor Santapau and its Comparative Taxonomy with Type Var. Gesnerioides. International Journal of Current Science Research and Review, 6(5), 2891-2899*