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NEW FUNGAL RECORDS ON *BOMBAX CEIBA* LINN. FROM PAKISTAN. II.

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ABSTRACT

Triadelphia inquinans Shearer & Crane, *Fusarium semitectum* Berk. & Rav., *Lasiodiplodia theobromae* (Pat.) Griff. & Maubl and *Torula herbarum f. quaternella* Sacc. are reported first time on *Bombax ceiba* L. from Faisalabad, Pakistan.

Key-words: New fungal record, *Bombax ceiba*, Faisalabad, Pakistan.

INTRODUCTION

Bombax ceiba Linn. is native to Pakistan. It is also found in India and Nepal. Its distribution and economic importance has been highlighted by Sheikh (2003), Dabur *et al.*, (2007), Abbas *et al.* (2015).

In a project on survey and surveillance of fungal association to flora of district Faisalabad, Pakistan, a detailed survey of the area is carried out and fungi recorded from *Bombax ceiba* are reported in this paper.

Previously only nine fungi have been reported on *Bombax ceiba* from Pakistan (Ahmad *et al.*, 1997; Khan, 1989). Recently Abbas *et al*. (2015) reported three more fungi on *Bombax ceiba* from Pakistan viz.: *Dematophora necatrix* Hartig, *Stachbotrys kampalensis* Hansf, *Alternaria chlamydospora* Mouchacca, thus brings the recorded fungi twelve. In the present paper four more fungi are reported and that are the text of paper.

MATERIALS AND METHODS

Materials and methods used in present work are the same as described by Abbas *et al*. (2010a). Identification up to species level made after consulting (Wollenweber and Reinking, 1935; Booth, 1976; Toussoun and Nelson, 1976; Ellis, 1971, 1976; Carmichael *et al*., 1980; Ahmad *et al*., 1997 and Kirk, 2015)

Observations

Fungus found on *Bombax ceiba* specimen # 45 is studied and details are given below

Description of fungus under study. Fig. 1 (A-D)

Mycelium brown immersed in the bark of host plant. Conidiophores not seen. Conidiogenous cells smooth, pale brown to golden brown, 3.3 - 6.7µm long. Two types of Conidia were found.

1) Small conidia unseptate, pale brown, 2.3 – 3.0 µm.

2) Bigger conidia cylindrical to clubed shaped, 2-3 septate, yellowish brown, 7.6 - 11.4 × 11.4 - 19µm. with 1-2 broad band, one more broader and darker blackish brown at mid of conidia while other relatively less broader light brown septum at basal end, apex round and base truncate.

DISCUSSION

The examined fungus closely resembled with *Triadelphia inquinans* by having two types of conidia.1) small conidia un septate and brown 2.3 - 3µm, and 2) big conidia 2-3 septate, brown, dark banded and 7.6 -11.4×11.4-19µm. Therefore, fungus under study is identified as *Triadelphia inquinans.*

RESULTS

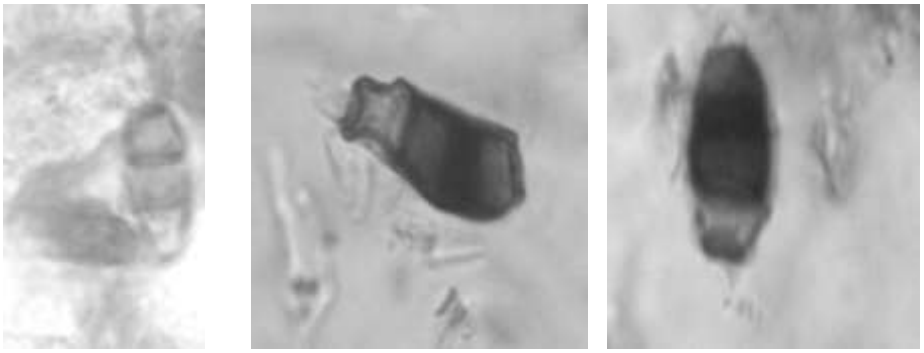
The species identified from *Bombax ceiba* specimen # 53 is *Triadelphia* inquinans (Sacc.) Hughes & Pirozynski *Can. J. Bot* **50**: 2524-2525 (1972).

=*Dicoccum inquinans* Sacc**.**

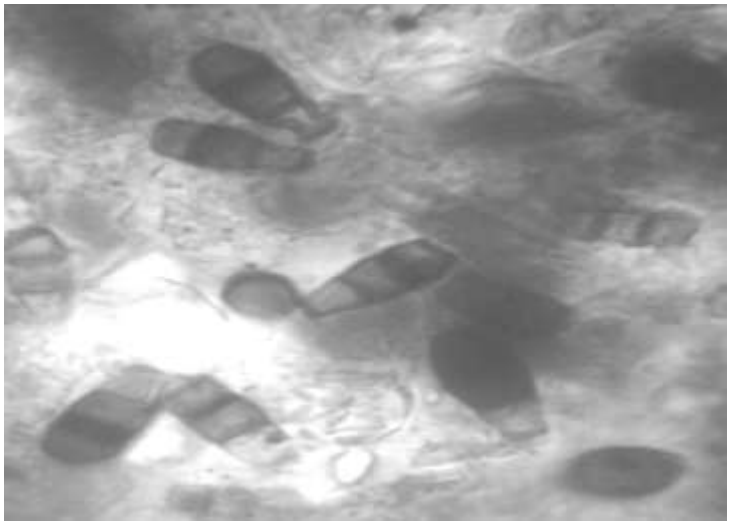
Genus *Triadelphia* is not reported from Pakistan Ahmad *et al.* (1997). *Triadelphia inquinans* is also a new addition to the fungal flora of Pakistan and *Bombax ceiba* is also a new host of *Triadelphia inquinans* from Faisalabad Pakistan.

Specimen examined:

Triadelphia inquinans; on the bark of *Bombax* ceiba; from Agriculture university Faisalabad; 4 August 07; by S.Q; Abbas & Humaira Noureen; G.C.U.F.MH. # 53.



A. B. C.



D

Fig. 1**.** (A-D). *Triadelphia inquinans*. (A-D) Immature & mature Conidia (1000x)

Observations

Fungus found on *Bombax ceiba* specimen # 51 is studied and details are given below:

Description of fungus under study. Fig. 2. (A-G).

Mycelium hyaline to pale, septate. Sporodochia absent. Chlaymydospores present, globose 5-9.3 in diameter. Conidiophore hyaline, septate, branched, 60-85 × 4-6µm. Conidiogenous cells hyaline, polyblastic, bottle shaped 10-16 × 3-5µm. Conidia 0 -5 septate, hyaline, fusiform, tapering on both side, Claw also present at basal cell, 3-septa 20-28 ×3-4µm, 5-septa 35.8-41.5 ×3-4.5µm.

DISCUSSION

Genus *Fusarium* can be differentiated by other genera in having foot shaped basal cell. By critical examination it is noted that the species under study belongs to *Fusarium* section arthrosporella and it is closely resembled with *Fusarium equiseti, F. avenacerum and F. semitectum*..

The presence of polyblastic conidiogenous cells, 0-5 septate, hyaline, fusiform, tapering on both side with foot shaped basal cell, macroconidia are the main character of this species.

It differs from *F.equiseti* by having polyblastic conidiogenous cells. The presence of chlamydospores separates it from *F. avenaceum.* This species closely resembles with *Fusarium semitectum* by sharing of chlamydospores, polyblastic conidiogenous cells, 3-5 septate 35.8 - 41.5 × 3-4.5µm conidia.

RESULT

Examined fungus from *Bombax ceiba* is identified as *Fusarium semitectum*. Berk & Rav. In Berkeley, *Grevillea* 3: 98, 1875

Fusarium semitectum has already been reported from seed of *Bombax ceiba* (as *Bombax malabaricum*) Ahmad *et al.* (1997).

In the present study *Fusarium semitectum* is reported from bark of *Bombax ceiba* from Faisalabad Pakistan.

Specimen examined

Fusarium semitectum; on bark of *Bombax ceiba*; from Agriculture University Faisalabad; 4 July 07; by S.Q; Abbas & Humaira Noureen; G.C.U.F.MH. # 51.

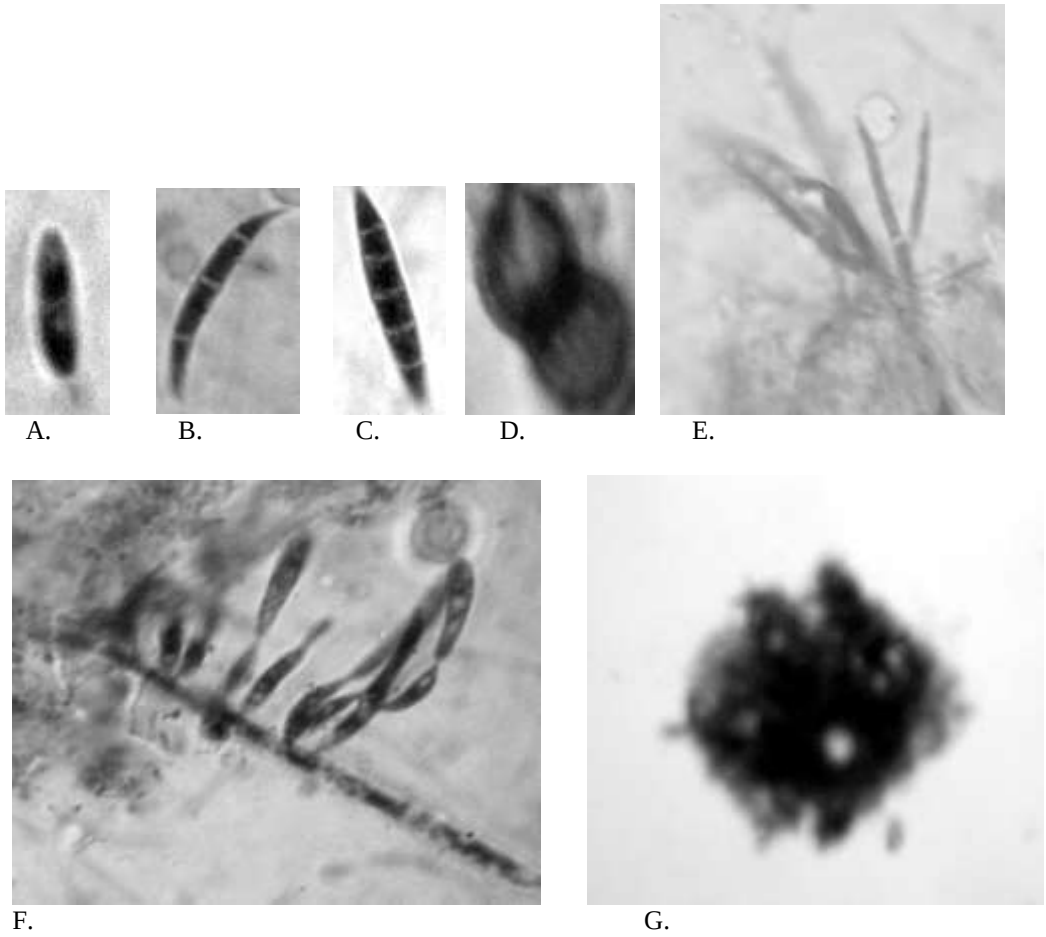


Fig.2. *Fusarium semitectum.* (A-G). (A-C)1, 3, 5 septate conidia (1000X) (D) Chlamydospores (1000X) (E-F) Conidial attachment with conidiogenous cells (1000X) (G) Sporodochia (100X)

Observations

Fungus found from *Bombax ceiba* specimen # 54 is studied and details are giving below

Description of fungus under study. Fig. 3 (A-E)

Conidiomata eustromatic, pycnidial, blakih brown, uniloculr, nonostiolate, 228×190µm. Conidiophores hyaline, thin walled, 3.2 -7.6- 11.4 x 3.9 (3.8) µm. Immature conidia hyaline and thick walled, hologenous, determinate. Mature conidia uni septate, septum in the middle of the conidium, dark brown with longitudinal striations, relatively thin walled than immature conidia 15.9 - 24.1 x 11.4 - 15.2 µm.

An overview comparative Summary of the *Lasiodiplodia* species in tabulated form

Name of species	**Conidial measurement (µm)**	**Reference**
Lasiodiplodia abnormis	25–28 x13–15	Saccardo (1913)
L. citricola	22.5–26.6 x13.6–17.2	Abdollahzadeh *et al*. (2010)
L. crassispora	27–30 X14–17 1.8 70 4	Burgess *et al*. (2006)
L. fiorii	24–26 X12–15	Saccardo (1913)
L. gilanensis	28.6–33.4 x15.6–17.6	Abdollahzadeh *et al*. (2010)
L. gonubiensis	32–36 x16–18.5	Pavlic *et al.* (2004)
L. hormozganensis	19.6–23.4 x11.7–13.3	Abdollahzadeh *et al*. (2010)
L. iraniensis	18.7–22.7 x12.1–13.9	Abdollahzadeh *et al*. (2010)
L. margaritacea	14–17 x11–12	Pavlic *et al.* (2004)
L. parva	18.3–22.1 x10.7–12.3	Alves *et al.* (2008)
L. plurivora	26.7–32.5 x14.4–16.7	Damm *et al.* (2007)
L. pseudotheobromae	25.5–30.5 x 14.8–17.2 21.7–26.3 x13.4–14.8	Alves *et al.* (2008); Abdollahzadeh *et al*. (2010)
L. ricini	16–19 x 10–11	Saccardo (1931)
L. rubropurpurea	24–33 x 13–17	Burgess *et al.* (2006)
L. theobromae	23.6–28.8 x 13–15.4 22.4–24.2 x 12.9–14.3	Alves *et al.* (2008); Abdollahzadeh *et al*. (2010)
Fungus under study	15.9-24.1 x 11.4-15.2	Present study
L. thomasiana	28–30 x11–12	Saccardo (1913)
L. undulata	20–32 x13.5–19.2	Abbas *et al.* (2004)
L. venezuelensis	26–33 x 12–15	Burgess *et al.* (2006)

DISCUSSION

Lasiodiplodia Ellis & Everh**.**, was described by Ellis & Everh, 1n 1896. *Bot. Gaz.* 21: 92. It has 37 species Kirk (2015). *Botryodiplodia theobromae* Pat was described by Pat. (1892). Griffon & Maubl**. (**1909) transfer it to *Lasiodiplodia theobromae* (Pat.) Griffon & Maubl**.**, *Bull. Soc. mycol. Fr.* 25: 57 (1909). However, Punithalingum (1980) dealt it as *Botryodiplodia theobromae* in his monograph. Sutton (1980) was of the opinion that it was more appropriate to called it *Lasiodiplodia theobromae.* Abbas *et al.* (2004) when working on *Sphaeropsis undulata* Berk & Curt. They found out that *Sphaeropsis undulata* Burk & Curt was an earlier name for it, therefore, they made a new combination *Lasiodiplodia undulata* (Berk. & Curt.) Abbas, Sutton, Ghaffar & Abbas. After 2004, work on *Lasiodiplodia* was carried out both morphological as well on DNA finger printing and sequence (Pavlic *et al*., 2004; Burgess *et al*., 2006; Damm *et al*., 2007; Alves *et al*., 2008; Abdollahzadeh *et al.,* 2010) and described 14 new species of *Lasiodiplodia*.

Abbas *et al*. (2004) considered *Botryodiplodia theobromae* as synonymy of *Lasiodiplodia undulata*. Abdollahzadeh *et al*. (2010) was of the opinion that conidial dimension of *Botryodiplodia theobromae* never exceed

30 µm in length and 16 µm in width. The conidial measurement in *Lasiodiplodia undulata* are up to 32 µm long. and up to 19.2 µm wide. Therefore both species are separate taxa, however, the type specimen of *Sphaeropsis undulata* Berk & Curt present in Kew garden herbarium will further clearify the position.

RESULT

The fungus found on *Bombax ceiba* is identified as a *Lasiodiplodia theobromae*. *Lasiodiplodia theobromae* (as *Botryodiplodia theobromae*) was already reported from thirty nine different plant belonging to different families from Pakistan, (Ahmad *et al.,* 1997). However it is not reported from *Bombax ceiba* therefore it is a new host of *Lasiodiplodia undulata* from Faisalabad Pakistan

Specimen examined

Lasiodiplodia theobromae on bark of *Bombax ceiba*; from Civil Hospital Tandlianwala, G.C.University campus Faisalabad; 18 May 2007 & 24 August 07; by S.Q; Abbas & Humaira Noureen; G.C.U.F.MH. # 54.

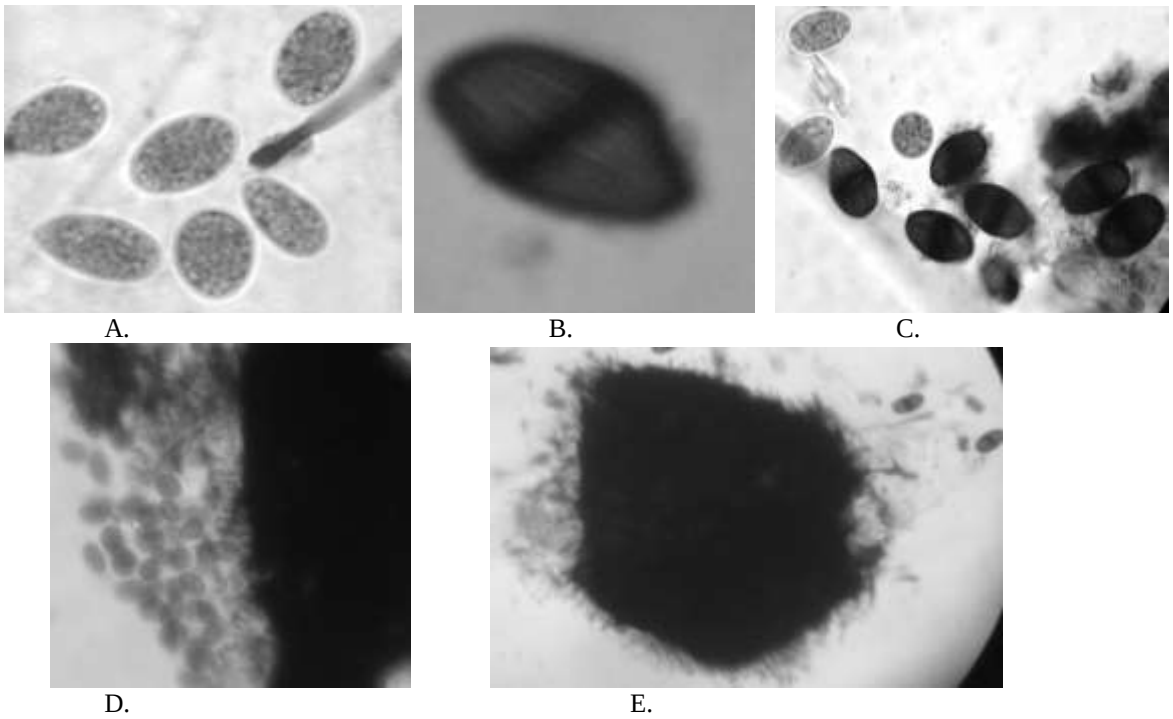


Fig. 3. *Lasiodiplodia theobromae.*(A-E). (A) Hyaline Conidia (1000x). (B-C) Mature Conidia (1000x). (D) Conidial attachment (1000x). (E) Pycnidia (400x).

Fungus found on *Bombax ceiba* specimen # 50 is studied and details are giving below

Description of fungus under study. Fig. 4 (A-D)

Mycelium well developed, branched, septate, brown turning black when old, immersed in the bark of host plant. Conidiophores septate, brown, thick walled 2-6 µm thick, conidiogenous cell more thicker and darker than the cells of conidiophores, spherical to sub spherical more darker in lower region, 7-8.8µm. diameter. Conidia in very long, pale to dark brown, thick walled, smooth, 1-3 (mostly 2) septate, 9.8-16.5 ×6.6-7.2 µm.

DISCUSSION

Key to common species of *Torula*

- Conidia 3-10(mostly 4-5) septate, 5-9(7) µm thick…… *Torula herbarum*
- Conidia 1-3(mostly 2) septate, 5-7 um thick……*T. herbarum f. quaternella*
- Conidia 3-6(mostly 4) septate, 8-13 µm thick ……*T.terrestris*
- Conidia almost all 3-septate, 7-9 µm thick……*T.caligans*

- Conidia almost all 0, 1-2 septa, 4-6 µm thick …… *Rutola graminis* (as *T.gramins*)

By comparing all the species of *Torula* it is evident that the examined species closely resembles with *Torula herbarum f . quaternella* due to the 1-3 septate and smooth walled, 9.8-16.5 ×6.6-7.2 µm conidia.

RESULT

The species identified from *Bombax ceiba* specimen # 50 is *Torula. herbarum . f. quaternella* Sacc.

This species was already been reported from Pakistan, on dead branches and leaves, on pods of *Albizzia lebbeck*, Lahore; Ahmad (1960, 1968, 1969; Ahmad *et al.* (1997) but no record from *Bombax ceiba* from Pakistan. Therefore *Bombax ceiba* is a new host of *Torula. herbarum . f. quaternella* from Faisalabad Pakistan.

Specimen examined

Torula. herbarum. f. quaternella; on bark of *Bombax ceiba*; Bilal Shaheed Park Tandlianwala; 8 August 07; by S.Q; Abbas & Humaira Noureen; G.C.U.F.MH. # 50.

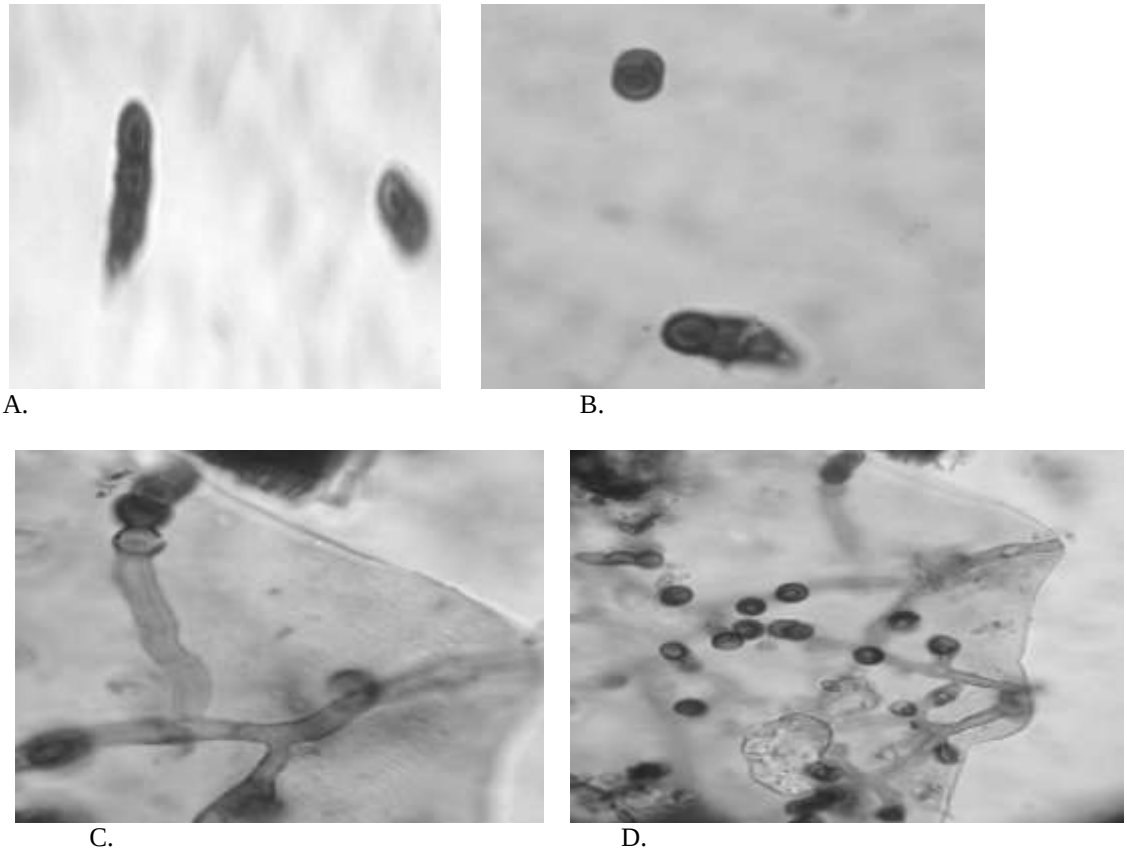


Fig. 4. *Torula. herbarum f. quaternella* (A-D).(A-B) Conidia with 2-3 septa (1000X) (C-d) Conidia with conidiogenous cells (1000X, 400X)

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