

5 New Species from Bangladesh

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ABSTRACT

Elaeocarpus zeus MRDA was described and illustrated (Fig-1) as a new species from the district of Bogura, Latitude: 24.843559, Longitude: 89.370108, Bangladesh. It belongs to the Rudraksha family *Elaeocarpaceae*. However, the Rudraksha fruit is a blue marble and rounded seed-shell/stone. This new species is deeply sculpted stone similar to Rudraksha seed. But not round shaped. It was lance-shaped with pointed tips. *Elaeocarpus obtusus* Blume has round but pointed fruits and obtuse to broadly rounded apex leaves. There is no information that *Elaeocarpus obtusus* Blume found in Bangladesh. Both species compare in Table-1. The ellipsoid fruit pointed at apex and sweet in taste. Not sour like other *Elaeocarpus* species like *E. serratus*, *E. floribundus* and others found in Bangladesh. This medium tree has buttressed roots and new shoots from bottom of tree trunk. Leaves are quite similar to *Elaeocarpus obtusus* Blume, small and round leaves.

Keywords: *Elaeocarpaceae*, *Elaeocarpus*, New species, Bangladesh.

INTRODUCTION

Elaeocarpaceae Juss. First published in Essai Propr. Méd. Pl. ed. 2: 87. 1816 [11 May 1816] (1816) nom. cons. Bricker, J. S. (1991). A revision of the genus *Crinodendron* (*Elaeocarpaceae*). Syst. Bot. 16 (1): 77–87. The native range of this genus is from W. Indian Ocean, Tropical & Subtropical Asia to Pacific Ocean. This includes 483 accepted Species and of that may be 6/7 species are present in Bangladesh. *Elaeocarpus* is a genus of flowering plants in the family *Elaeocarpaceae* native to the Western Indian Ocean, Tropical and Subtropical Asia. The genus *Elaeocarpus* Burm. ex L. First published in Sp. Pl.: 515 (1753). Rudraksha tree and blue marble fruit are rarely in Bangladesh as ornamental, non-native. The native range of this species is Java. Indo-China to the West and Central Malesia. This is not true Rudraksha fruit, but belongs to the Rudraksha family (*Elaeocarpaceae*). Grows in tropical biomes like Bangladesh also. Bangladesh is also in Indo-Chinese climate ranges. Native species belongs to Malesia.

5 wild species found in Bangladesh. They are, *Elaeocarpus serratus* L. (Encyclopedia of Life. eol.org. Retrieved 11 May 2021) and *Elaeocarpus floribundus* Blume (Bijdr. Fl. Ned. Ind.: 120 (1825). *Elaeocarpus aristatus* Roxb (Mao, A.A. & Dash, S.S. (2020). Flowering Plants of India an Annotated Checklist (Dicotyledons) 1: 1-970. Botanical Survey of India. *Elaeocarpus acuminatus* Wall. ex-Mast (Mao, A.A. & Dash, S.S. (2020). Flowering Plants of India an Annotated Checklist (Dicotyledons) 1: 1-970. Botanical Survey of India). *Elaeocarpus rugosus* Roxb. ex G.Don (Pandey, R.P. & Dilwakar, P.G. (2008). An integrated check-list flora of Andaman and Nicobar Islands, India. Journal of Economic and Taxonomic Botany 32: 403-500).

Taxonomic treatment:

Elaeocarpus zeus MRDA sp. nov. p- 19, Figs.1, 2, 3, 4, 5, 6, Table-1

TYPE: Bangladesh, Bogura district, RDA campus, Doshmile. Latitude. Fig-6: Map & Location: Bogura district, RDA campus, Doshmile. Latitude 24.70632° or 24° 42' 23" north. Longitude 89.39486° or 89° 23' 42" east.

Diagnosis: Morphologically *Elaeocarpus zeus* MRDA (Fig-1) compared with *Elaeocarpus obtusus* Blume (Table-1). But fruits shape is different. Also compared with *Elaeocarpus angustifolius* – The blue marvel tree.

Taxonomic tree:

Kingdom: Plantae

Family: Elaeocarpaceae

Genus: *Elaeocarpus*

Species: *E. zeus* MRDA

Binomial name

Elaeocarpus zeus MRDA

Description

Tree, Small to medium-sized with buttressed root. Young shoots grew from the roots near the buttressed root (Fig -2). Dark brown trunk with rough bark. New shoots from the bottom of tree is an unusual characteristic of this species (Image-Z). Near to 30 cm diameter. Spirally arranged leaves create crown. The leaves varied from 5cm-14cm. Obtuse to broadly rounded apex. Occasionally acuminate. Dark green leaves turned red when mature. Short petiole 1cm to 3cm. Raceme- type Inflorescence. Size 10cm long. Off-white flowers. About 1.2cm across. Petal number 5, size 6-7mm. Sepal hardy 5 in number, 4-5mm. Stamens 30-40 in number, size 2mm. Stigma have no lobe, pipe type, narrow in top, style size 3mm. Longer than stamen. Ovary orange color. Peduncle long 5-6mm. Fruits oblong with pointed apex, which is a characteristic of *Elaeocarpus obtusus* Blume. But this species fruits are ellipsoid with pointed tip 4mm. Drupe not shiny, dark green with blackish spots. Flesh not sours at all, sweet in taste. Size 3-3.5cm x 2cm. Stone/Seed coat deeply sculptured within the fruit. Seed coat pointed both sides, 3cm length, size1-loculed, Seed fleshy endosperm/nut ca. 1.8cm. (Fig-1,3,4).

Fruits seed is a nut (Image-K, L). Taste like cashew nuts. The stone was too hard to crake. Therefore, the germination rate will continue until the next year.

Flowering May-July & Fruiting Sep-Dec.

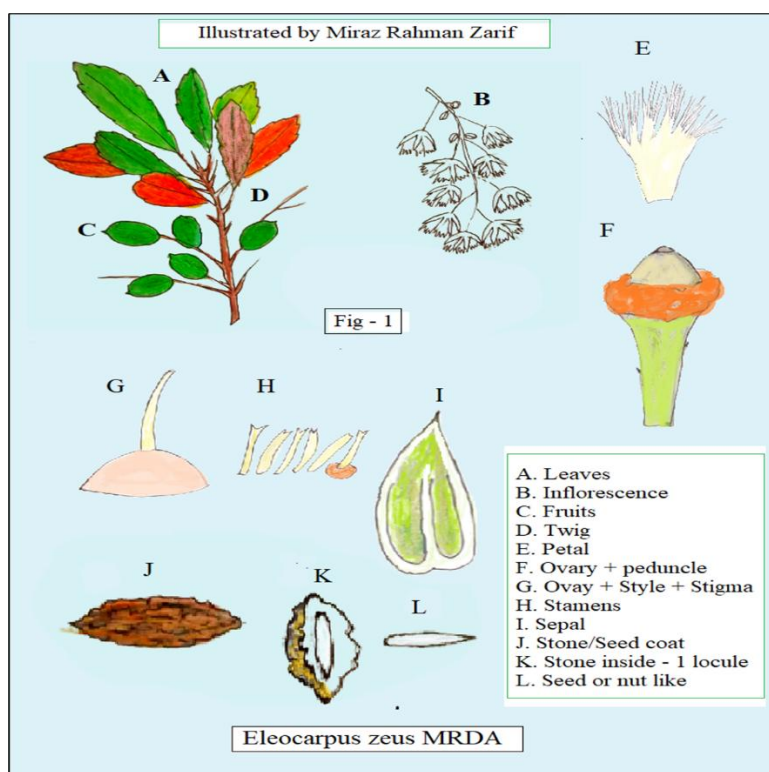


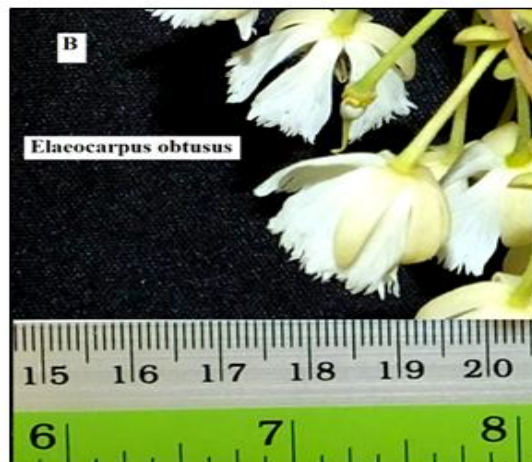
Table-1. Difference between *Elaeocarpus zeus* MRDA & *Elaeocarpus obtusus* Blume

Characters	<i>Elaeocarpus zeus</i> MRDA	<i>Elaeocarpus obtusus</i> Blume
Tree size	10-13m	15 m tall, 30 cm diam
Leaves	Dark green, glossy. 4cm-13cm long & 2-3.3 cm wide	Up to 14cm
Petiole	Petiole size 4mm-11mm	Petiole short, about 1 cm long
Leaves-shape	Have some similarity to <i>Elaeocarpus obtusus</i> Blume. But bottom leaves sometimes heart shaped and wider.	Oblong-obovate, apex obtuse to broadly rounded or shortly acuminate, base cuneate.
Inflorescence	Raceme type. Long up to 10 cm	Raceme. Long 5cm-10cm
Flower	1.2-1.3 cm across,	Flower about 1.3 cm across.
Petals & Sepals	Petals 6-7mm long, Sepals 6-7mm long.	Petals 5-6mm, Sepals the same.
Flower peduncle	About 5-6mm long	3-4 cm long and tiny
Fruits	Ellipsoid with pointed apex.	Fruit oblong to globose, long pointed apex which 1.5cm when young.
Fruit size	Size 3-3.5cm x 2cm. Ellipsoid	3-3.5 x 2.5-3cm, Globose
Fruits pointed tip	Size 4mm	Size 1.5 cm
Seed-shell/Stone	3cm length, narrowly pointed both sides, deeply sculpted.	1.8cm stone with deep sculpted.
Seed size	Tiny 1.8cm	Tiny 1.5cm
Trunk color	Brown with blackish upper	Rough dark-brown
Tree shoots	Young shoots grow from roots	Unknown

Images



A. *E. zeus* MRDA flower size with scale.



B. *E. obtusus* flower.

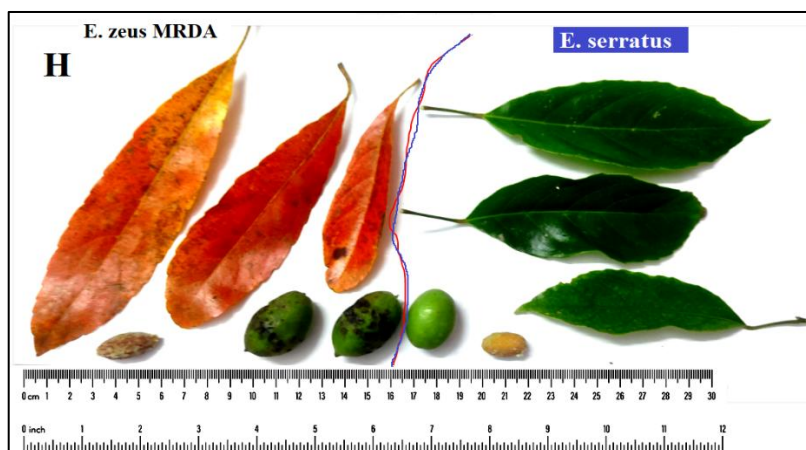
C. *E. grandiflorus* flower.

D. *Elaeocarpus* species flower.





- A. Flowers, inflorescence, sepal, stamens, pistil, style of *E. zeus* MRDA with scale.
B. Inflorescence with scale.
C. Showing sepal, stamens, pistil with scale.



- A. Leaves of various sizes, fruits and stones of *E. zeus* MRDA and *E. serratus* with scale.

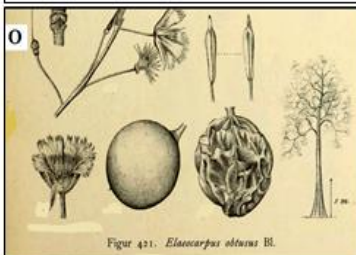
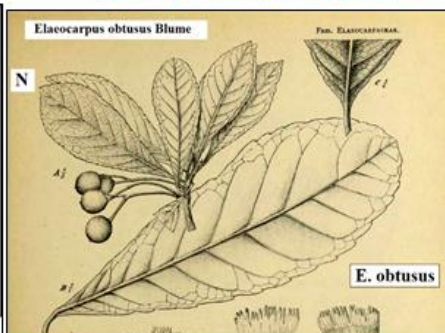


- B. *E. zeus* MRDA inflorescence.

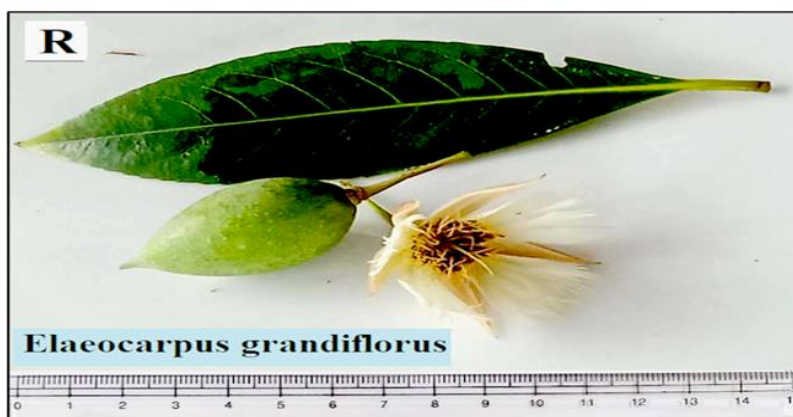


E. grandiflorus compare with one kind of *Elaeocarpus* species.

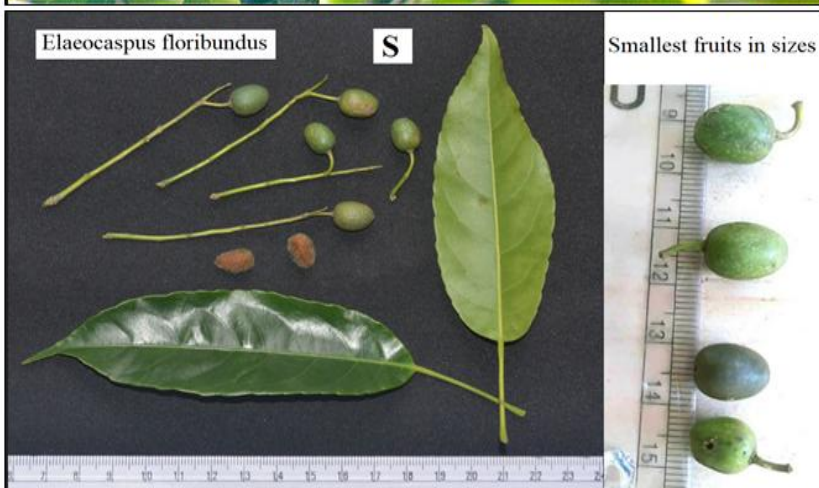
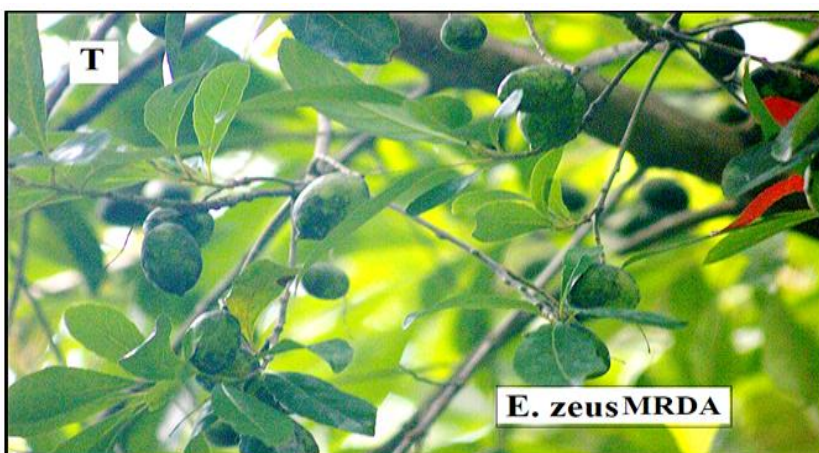
Fruits, fruit-cut, stones, nut like seeds with scale.



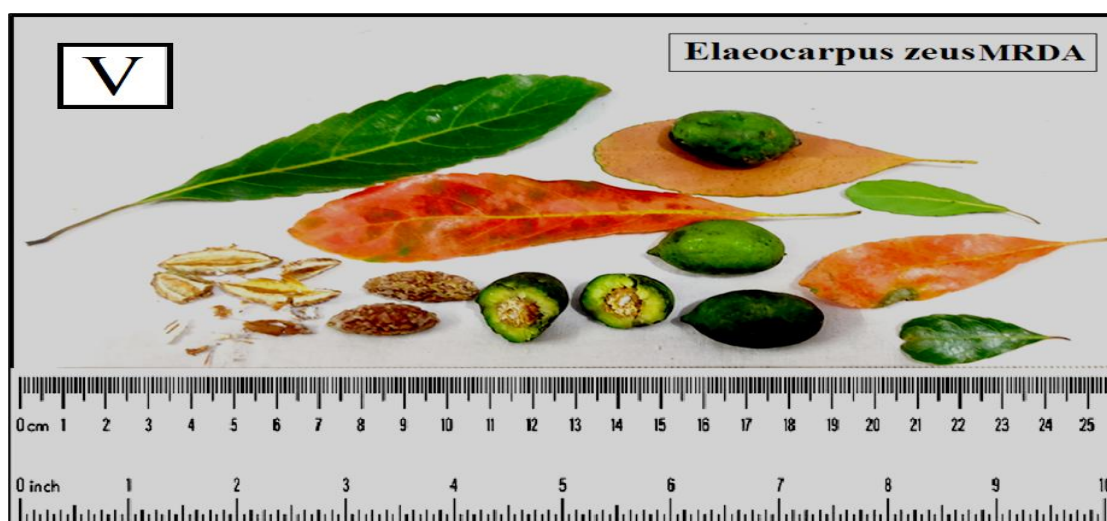
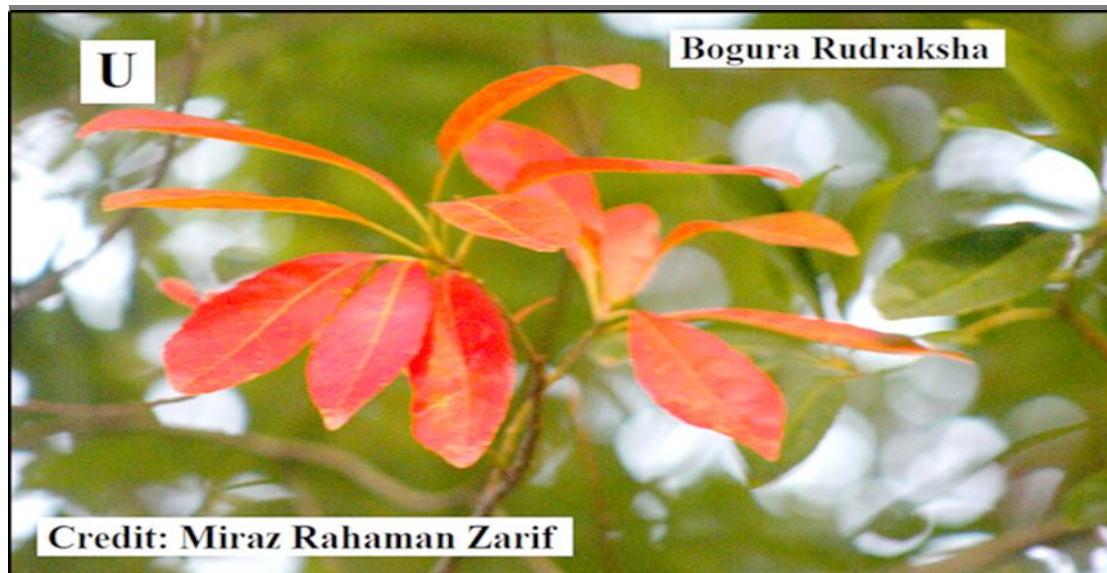
- A. Close view of stones and seeds.
- B. Seedling of *E. zeus* MRDA.
- C. Botanical illustration of *E. obtusus* showing leaves and fruits.
- D. Botanical illustration of *E. obtusus* showing flowers, fruit, stone and tree shape.
- E. Botanical illustration of *E. angustifolius* Blume.



- A. Details of *E. angustifolius* Blume with leaves, blue fruits, seeds, botanical illustration.
B. *E. grandiflorus* leaf, fruit and flower with scale. This species found ornamental in Bangladesh.



- A. *E. floribundus* leaves, fruits and stones with scale.
B. *E. zeus* MRDA fruits on tree at RDA Campus, Bogura, Bangladesh.



A. Mature red leaves of *E. zeus* MRDA.

B. Slowing leaves (Big to small), fruits, stones and seeds with scale



Fig-2: Living tree at RDA campus, Bogura, Bangladesh.

Common names and folklore

The word “Rudraksha” comes from Rudra (Hindu devotee) + Aksa (Sanskrit word meaning “Eye”). So the whole meaning “**Eye of Rudraksha**”. For the stone of some blue fruits from *Elaeocarpus* species. Rudra is another name of Shiva.

Pundra Jalpie (পুন্ড্র রুদ্রাক্ষ / পুন্ড্র মিষ্টি জলপাই) in Bengali. “Bogura Rudaraksha” or “RDA Jalpie” in English.

Etymology

This new species named after the Greek god “*Zeus*”. However, the seeds were too hard to crack. So, germination take may be 2 years. The word “*Zeus*” for Greek god for rare distribution habit of this new species also. “M” for Miraz Rahman Zarif and “RDA” for Rural Development Academy, Bogura, Bangladesh.

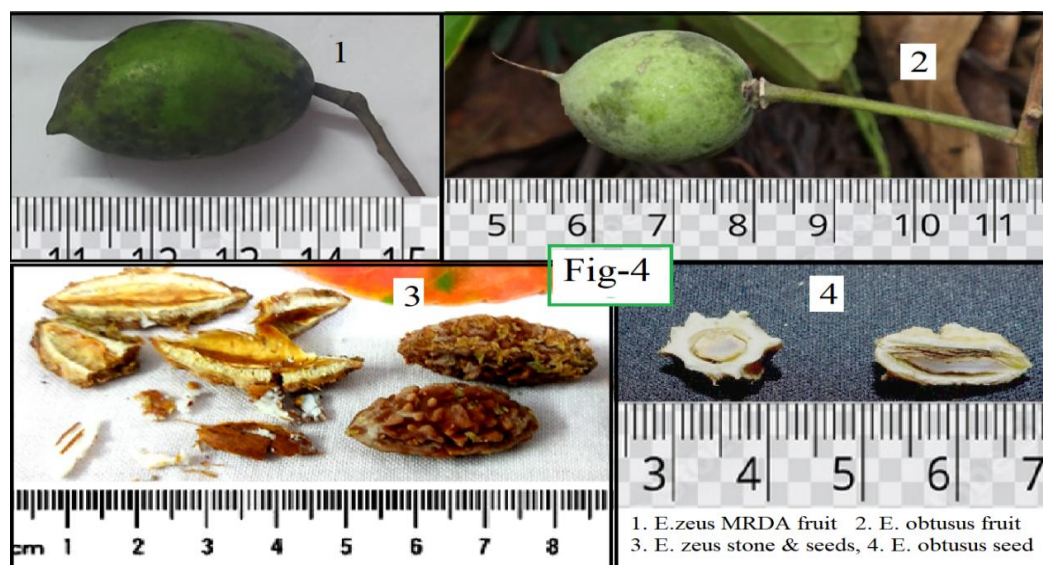


Fig-4: Compare of two species showing fruits, stones and seeds.

Materials & Methods

This new species has been found at RDA campus, Bogura (Fig-2). Specimen examined At RDA campus, Bogura district, Bangladesh. Location: (Fig-6) Bogura district, RDA campus, Doshmile. Latitude 24.70632° or 24° 42' 23" north. Longitude 89.39486° or 89° 23' 42" east. Herbarium sheet number - ZNS 503 (AAHBAU). Images captured by Miraz Rahman Zarif from living tree. Branches, twig, leaves, flower, fruits collected for herbarium sheet and botanical illustration.

Habitat

At RDA Campus, Bogura. Also found in hilly areas of reserve forest. At red soil.

Key identifying keys

1. Fruits shape,
2. Fruits color,
3. Fruits pointed tip differ from *E. obtusus*.
4. Stone shape (Deeply sculpted as Rudraksha),
5. Stone or seeds have pointed tips both sides,

6. Leaves shape,
7. Leaves size,
8. New shoots from bottom of tree.
9. Fruits taste sweet.
10. Flowering and fruiting season.
11. Buttressed root.

Specimen examined

At RDA campus, Bogura district, Bangladesh. Location: Bogura district, RDA campus, Doshmile. Latitude 24.70632° or 24° 42' 23" north. Longitude 89.39486° or 89° 23' 42" east (Fig-6). Herbarium sheet number - ZNS 503 (AAHBAU).

Distribution

The genus distributed in Bangladesh and Indo-Chinese countries. At RDA campus, Bogura district, Natore district, hilly areas from Bangladesh. Widely the genus distributed from Madagascar in the west through India, Southeast Asia, Malaysia, Southern China, and Japan, through Australia to New Zealand, Fiji, and Hawaii in the east. Around 120 species of the genus, *Elaeocarpus* were reported from different parts of Asia. This species found in Bogura, Natore and hilly areas (Fig-5,6).

Ethical approval

Sample collected from live tree at RDA campus, Bogura. **Location:** Bogura district, RDA campus, Doshmile. Latitude 24.70632° or 24° 42' 23" north. Longitude 89.39486° or 89° 23' 42" east (Fig-2,6).

Acknowledgements

Mr. Miraz made herbarium sheet. Botanical Illustration also done by him. His photographs added in this article. Thanks to Dr. AKM Zakaria, Firoz Hossain to make RDA campus green with planted many wild species. This's why RDA campus known as "Green RDA". Mentioning Khalid Aurangozeb & Rebeka Sultana for their contribution. Thanks to Sir Dr. Md. Ashrafuzzaman & Mohammad Salah Uddin, how to write a new species paper.

Special thanks to Rawshan Ara from Dhaka, proving that the Rudraksha tree is present in Bangladesh.

Conclusion

After all these discussions, Analysis, Compare, Botanical Illustration – it is clear that *Elaeocarpus zeus* MRDA is different from all known species in the world (Fig-4,5). Although it is compared with *Elaeocarpus obtusus* Blume. But leaves similar only, fruits pointed but round. Another species *Elaeocarpus angustifolius* Blume ornamental and original Rudraksha but our species' fruits not round nor blue in color. *Elaeocarpus polydactylus* fruits blue, *E. zeus* MRDA fruits are dark green. It tastes sweet, not sour at all. Seeds also different from another species present in Bangladesh. So, our *Elaeocarpus zeus* MRDA species is a new species from Bangladesh.

1. *Zephyranthes octothreada* B.Uddin, S.Uddin & Z.Nasrin, A new species from Bangladesh

Abstract

Zephyranthes octothreada B.Uddin, S.Uddin & Z.Nasrin, was described and illustrated as a new species from the district of Bogura, Latitude: 24.843559, Longitude: 89.370108, Bangladesh from Amaryllidaceae family. Amaryllidaceae J.St.-Hil. First published in Expos. Fam. Nat. 1: 134. 1805 [Feb-Apr 1805] (1805).

Zephyranthes Herb. First published in Appendix: 36 (1821), nom. cons. *Zephyranthes carinata* Herb. First published in Bot. Mag. 52: t. 2594 (1825). *Zephyranthes minuta* (Kunth) D.Dietr. First published in Syn. Plant. 2: 1176 (1840). *Zephyranthes rosea* Lindl. Amaryllidaceae first published in Bot. Reg. 10: t. 821 (1824). The family, which was originally created in 1805, now contains about 1600 species, divided into 71 genera, 17 tribes and three subfamilies. their common name refers to their habit of blooming soon after a heavy rainfall. However, cultivated specimens of *Z. carinata* can be induced to flower all throughout the year by maintaining humidity. *Zephyranthes rosea* (like other rain lilies) are so named because they produce short-lived flowers only after seasonal heavy rains or storms. *Zephyranthes minuta* is a plant species very often referred to as *Zephyranthes grandiflora*, including in Flora of North America. *Zephyranthes minuta* is native to Mexico and Guatemala but widely cultivated as an ornamental and reportedly naturalized in Hawaii, the Andaman Islands, the islands of the Southwestern Caribbean. *Zephyranthes octothreada* B.Uddin, S.Uddin & Z.Nasrin (Fig-1) native to Bangladesh.

Keywords: Amaryllidaceae, *Zephyranthes*, New species, Bangladesh.

Description

Height 32 cm. Bulb diameter 1.5 cm across. Leaves size 25cm long & 5mm wide. Leaves color dark green. Leaves texture plain, smooth & thick. Leaves base white (2cm more). Inflorescence stalks/Scapes long 29-30 cm. Light green in color. Whitish base 7/8 cm. Flower size 4 cm long and 4.5 cm across. Flower shape funnel. Flower color pink with light magenta. Flower stalk 7.5cm. Petals number 6/7/8 and lobes in some petals also. Which indicates more petals number in future. Spathe/Bract 2-2.5 cm and greenish-brown color. Perianth tube 1cm. Perianth color white-green. Stamens number 6 /7/8 according to petals number. Stamen size 14mm. Anther size 5mm. Filament 1.3 cm. Style 4.3 cm (Pink + white + green). Stigma 3/4 divided parts Full pink color stigma. Lobes size 3,4 parts. Ovary 4-locules. Capsule/seeds 8mm/0.8cm size and number 1,4,6. Seeds size gram shaped and others flat. Seed germination..... Flowering time June-July

Native to Bangladesh. Common name ‘Eight stamens Rain lily’. Bengali name অষ্টকেশর বর্ষা লিলি.

Methods

Description of this species *Zephyranthes octothreada* B.Uddin, S.Uddin & Z.Nasrin is based on living plant. All the Images captured from living species. Bulb, flower, leaves and other parts collected from living plant. And also compare with another species like *Z.carinata*, *Z. minuta* and *Z.rosea*. Also, from Scientific Illustration from net and research articles. Color Illustration painted by Miraz Rahman Zarif on the base of photos captured in RDA campus in Bogura district. Measurement showing in images with scales. That’s also help to complete the full description. Mr. Miraz collected all the herbarium sheet elements. Mr. Miraz also collected most of photographs from living plant t at RDA campus, Bogura (Fig-map of Bogura, Bangladesh).

Taxonomic treatment:

Zephyranthes octothreada B.Uddin, S.Uddin & Z.Nasrin sp. nov. p-18 Figs.1,2 & map

TYPE: Bangladesh, Bogura district, RDA campus, Doshmile. Latitude. Fig-3: Map & Location: Bogura district, RDA campus, Doshmile. Latitude 24.70632° or 24° 42' 23" north. Longitude 89.39486° or 89° 23' 42" east. (Fig-3)

Diagnosis: Morphologically *Zephyranthes octothreada* B.Uddin, S.Uddin & Z.Nasrin compare with *Z. carinata*, *Z. minuta* and *Z. rosea*.

Taxonomic tree:

Kingdom:

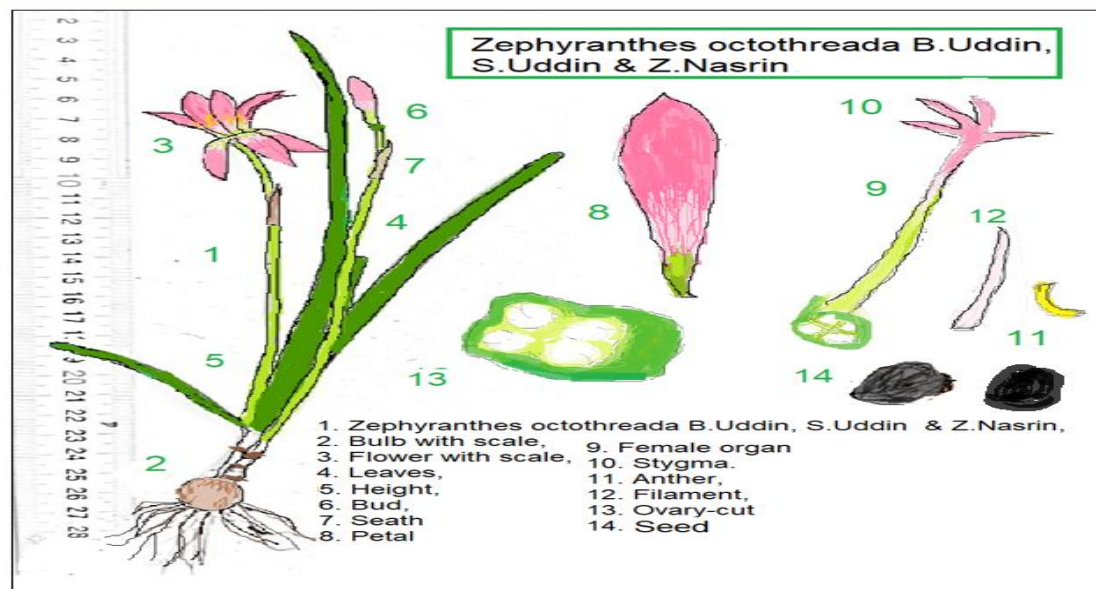
Family: Amaryllidaceae

Genus: *Zephyranthes*

Species: *Z. octothreada* B.Uddin, S.Uddin & Z.Nasrin

Binomial name: *Zephyranthes octothreada* B.Uddin, S.Uddin & Z.Nasrin

FIGURE-1



Etymology

The genus name *Zephyranthes*, commonly known as rain lilies, literally translates to "flowers of the west wind" from Greek words "zephyros" (God of the west wind) and "anthos" (flower). This name is a reference to the west wind, *Zephyrus*, who was associated with rainfall in Greek mythology, and the plant's tendency to bloom after rain showers. *Minuta* meaning plant with a short life cycle. The species name, "*carinata*," means "keeled" or "ridged," possibly referring to the prominent veins on the petals. The species epithet "*rosea*" is Latin for "rosy," referring to the pink color of the flowers. The new species name 'Octo' meaning eight and 'Threada' meaning 'thread like' which indicates the stamen number. B. Uddin - Prof. Dr. Shaikh Bokhtear Uddin. S. Uddin – Mohammad Salah Uddin and Z. Nasrin – Zinia Nasrin Shumon (The author).

Images



A. *Zephyranthes octothreada* B.Uddin, S. Uddin & Z. Nasrin full plant and 2-3-4 leaves and bulbs size.



B. *Zephyranthes octothreada* B.Uddin, S. Uddin & Z. Nasrin flowers with 8 petals, 8 stamens and 4-lobed stigma.

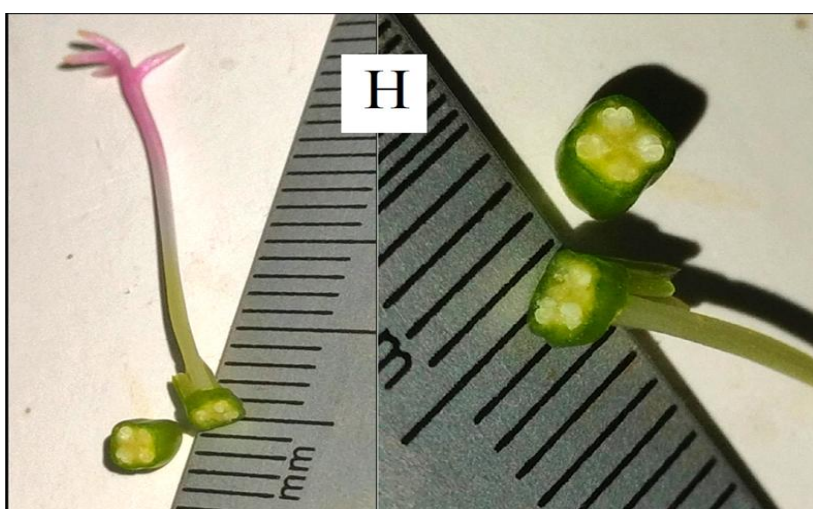
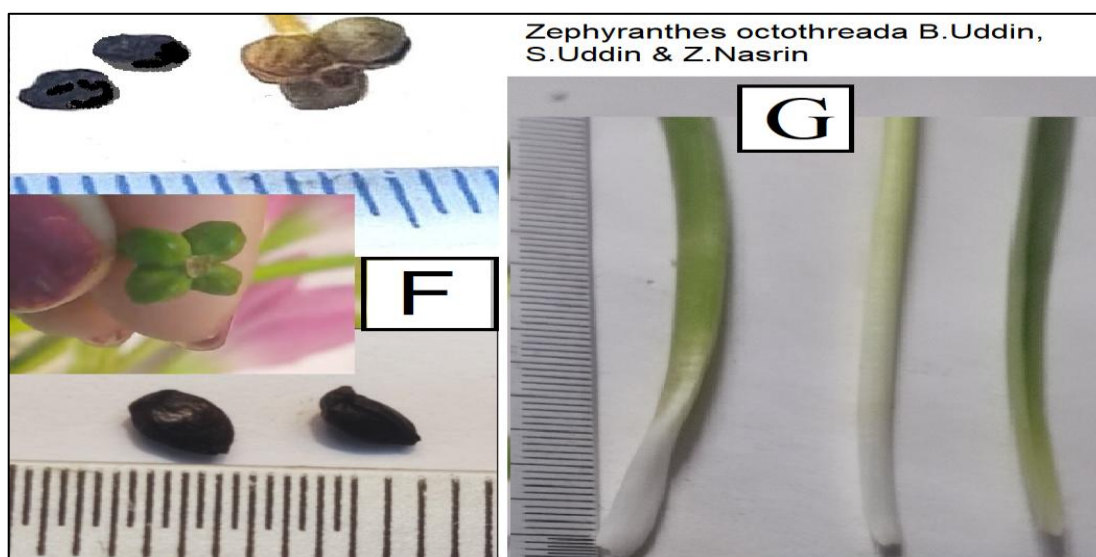
C. *Zephyranthes octothreada* B.Uddin, S. Uddin & Z. Nasrin habitat at RDA Campus, Bogura, Bangladesh.





D. Flower, Petal, Spathe, Ovary size with scales.

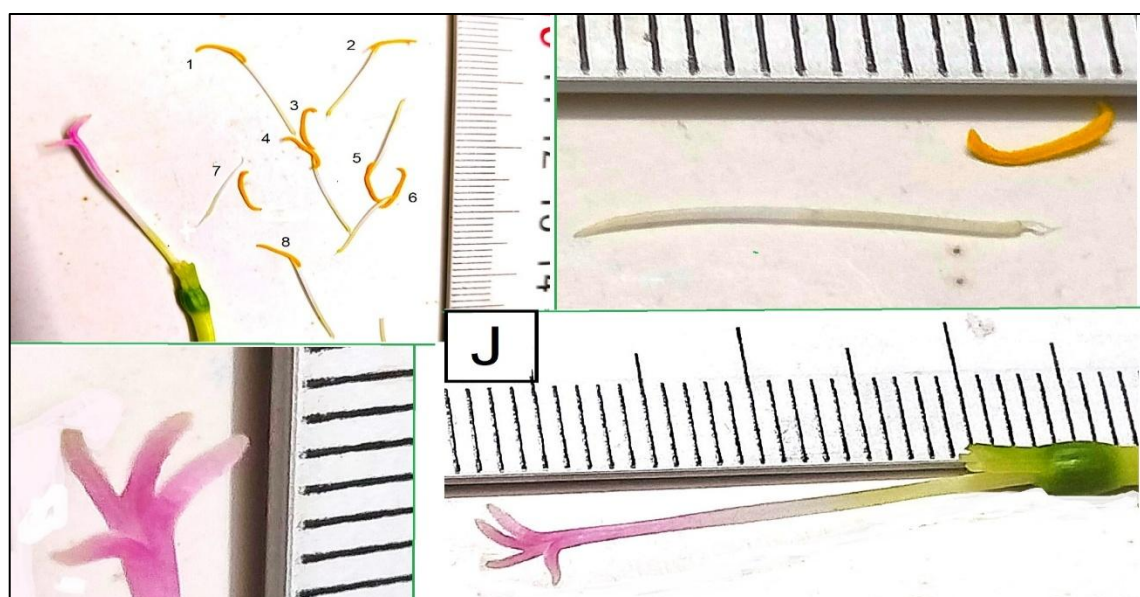
E. Flowers, leaves, seed-pods, spathe long and wide sizes with scales.



F. Seed-pods, seeds size and shape in scales.

G. Leaves color white-light green and green portion.

H. Stigma (Thread like) 3mm and color full pink. Style pink +Whitish pink+ greenish pink. Ovary 4 chambered of *Zephyranthes octothreada* B.Uddin, S.Uddin & Z.Nasrin.



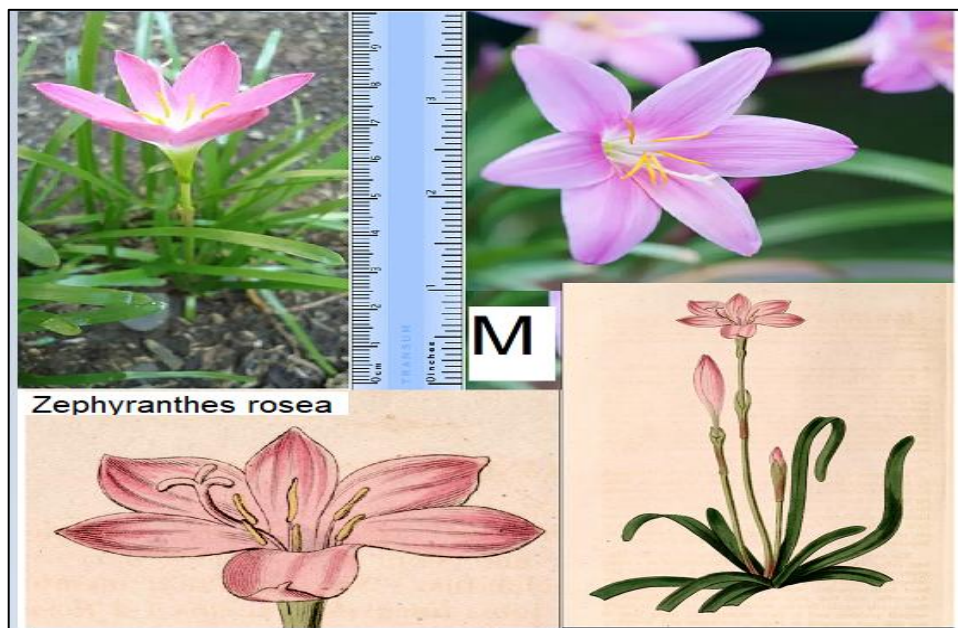
I. Petals color, size and shape of *Zephyranthes octothreada* B.Uddin, S.Uddin & Z.Nasrin.

J. 8 stamens, 8 anthers, 8 filaments, 4 lobed stigmas, ovary, style with size in scales.

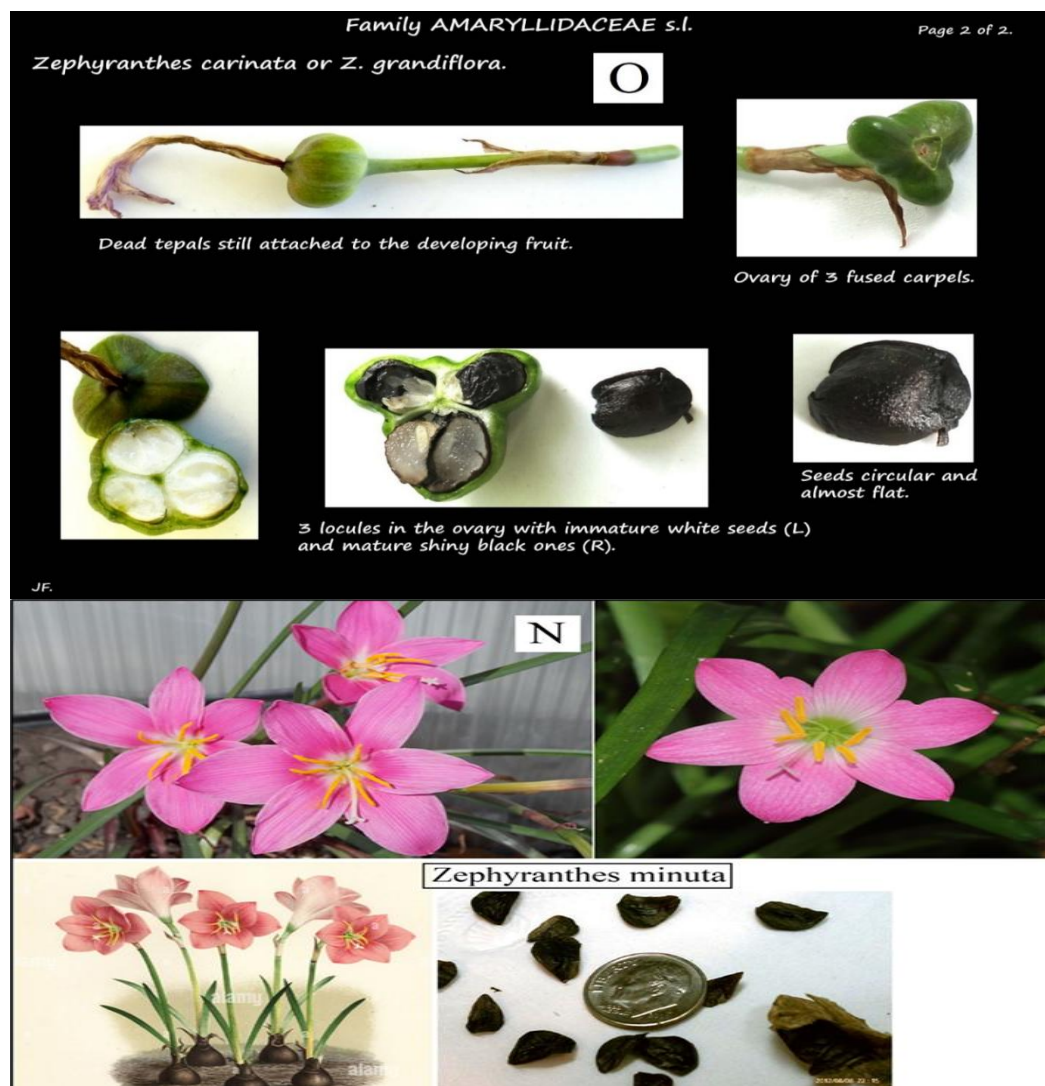


K. Bud of *Zephyranthes octothreada* B.Uddin, S.Uddin & Z.Nasrin in scale. While height 32 cm.

L. Bulb shape, size and diameter. Flower and spathe size.

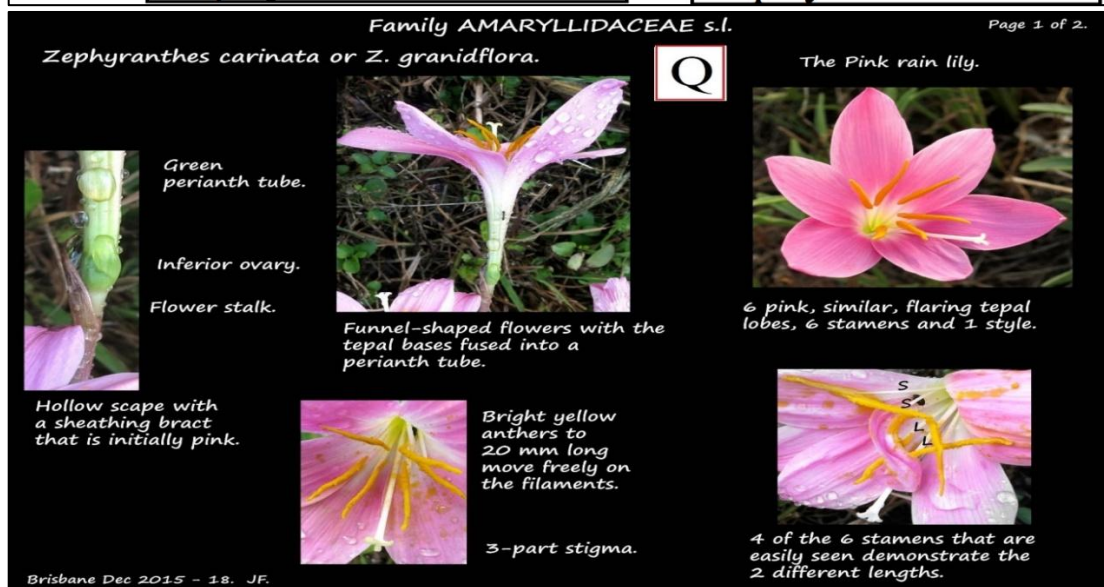
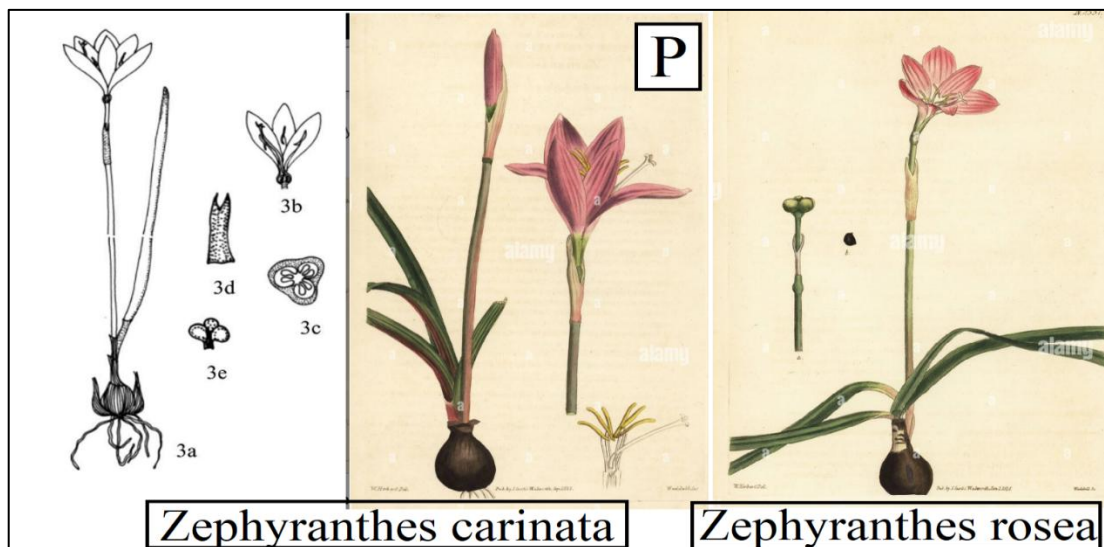


Flower color light pink, 6 variable size filaments, white stigma with blunt shape and height 4-6 inches of *Zephyranthes rosea*. Clearly showing in morphology.



M. *Z.minuta* with flowers, flower color, leaves, and seeds shape and size with coin.

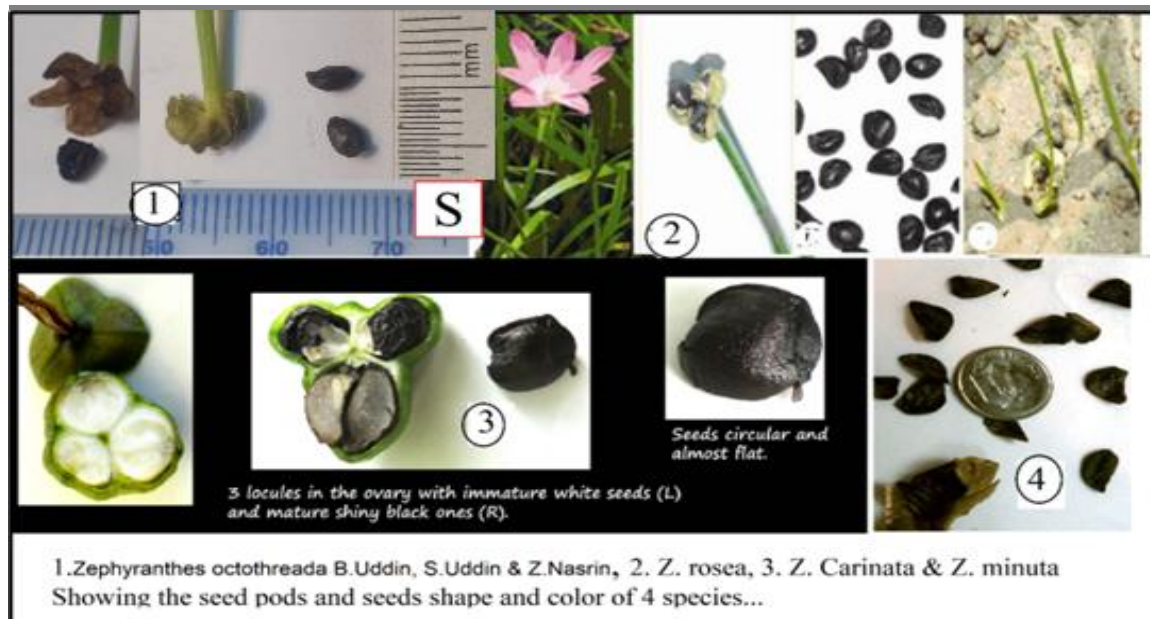
N. *Z. carinata* seed-pods, seeds shape, spathe.



O. Compare between *Z. carinata* & *Z. rosea* in morphology.

P. Details of *Z. carinata* or *grandiflora* (Big size flower of all species).





Q. Details of *Z. rosea*.

R. Compare of 4 species with seed-pods & seeds shape, color and size.



S. Compare of 4 species flowers with color, shape, stamens, stigma.

T. Square shape of flower, leaves, seed-pods, seeds, full plant, ovary-cut, stigma, spathe with scales.



U. 4 parts of seed-pods, average seeds number 2 of *Zephyranthes octothreada* B.Uddin, S.Uddin & Z.Nasrin.

Specimen examined

At RDA campus, Bogura district. Natore district and all over Bangladesh, Zinia Nasrin Shumon, Herbarium sheet number - ZNS 514 (AAHBAU).

Figure-2: *Zephyranthes octothreada* B.Uddin, S.Uddin & Z.Nasrin compare with *Z. carinata*, *Z. minuta* and *Z. rosea*.

Subject	<i>Z.octothreada</i>	<i>Z.carinata</i>	<i>Z.rosea</i>	<i>Z.minuta</i>
Height	32 cm	20 cm	15-20 cm	15 to 30 cm tall.
Bulb (Dia)	1.5 cm across	Tunicate globular 2 to 3 cm across	Ovoid (1.5-2.5)	Small and globose, located just below the soil surface.
Leaves size	25cm long & 5mm wide	Each is 15 to 30 cm long and 6 to 8 mm wide	15-20cm, wide 3 to 5-7 mm wide.	10-30 cm long. narrow and strap-like. leaves up to 7 mm wide.
L. color	Dark green	Bright green	Dull green	Green
L. texture	Plain, smooth & thick		Hollow, striped & thin	Slightly glossy or shiny surface
L. base	White (2cm more)	Reddish	Reddish	Reddish
Inflorescence stalks/Scapes long	29-30 cm 7/8 cm white color	10 to 15 cm	Inflorescence a solitary flower borne atop a leafless scape up to 20-12 cm long.	25-30 cm

Flower size	4 cm long and 4.5 cm across (dia)	Big (10cm)	around 2.5 cm in diameter and 3 to 3.5 cm in length	10 cm across, up to 5.6- 9 cm long.
Flower shape	Funnel	Funnel, erect		Funnel-shaped,
V. color	Pink with light magenta	Pale pink	Bright pink, Light pink	Pink with a small white throat.
F. stalk	7.5cm	2cm	3cm with a split lip	Flower-stalks are 1.3-3.8 cm
Petals & Lobes	6/7/8 and lobes in some petals	6, (4-5cm long) lobes obovate, 3–6 cm, apex subacute.	6, (2.7-2.5 cm) 6 subequal oblanceolate petals 3–4.5 cm long fused at the base, borne on a pedicel 2.5–4 cm long	6 lobes. These lobes are oblong,
Spathe/Bract	2-2.5 cm (Greenish-brown)	3-4cm (Pink)	2 to 2.8 cm long, slightly divided at the tip,	Spathe is 3-4 cm
Perianth tube	1cm	1.5cm long Perianth rose red to pink; tube 1–2.5 cm.	0.2-0.4cm perianth tube whitish at the base,	1.8-2.3 cm, increasing in diameter, about 1/4 (1/5-1/3) perianth length,
P. color	White-green	Reddish + White	Green	flower-tube green,
Stamens number	6/7/8	6, Sub-equal Stamens 2/3–4/5 as long as perianth;	6, alternating long and short, inserted at the top or in tube of the perianth.	6
S. size	14mm	2 cm long	2.1-1.5cm	1.3-2.2 cm
Anther size	5mm	15-20mm long anther versatile.	3-6 mm.	1.3 to 2.2 cm
Filament	1.3 cm		1.7-1cm	Thread like 2-3 cm.
Style	4.3 cm (Pink+white+green)	White, slender	Style is 1.8–2.7 cm, longer than perianth tube.	Style is longer than perianth tube
Stigma	3/4 divided parts Full pink color. Lobes size 3mm (thread like)	Same length. stigma strongly 3-lobed. White in color.	1–5 mm beyond anthers. shallowly 3-lobed stigma.	stigma 3-fid, protruding more than 2 mm beyond anthers.
S. lobes	4 parts	3 parts	3 parts	3
Ovary	4-locules	3 locules	3 locules, Ovary	Trilocular:

			inferior,	
Capsule	8mm/0.8cm	Capsule sub globose.	Fruit a sub globose capsule ca. 1.2 cm in diameter.	The capsule is described as stubby, with its width roughly equal to its length.
Seeds & Color	1,2,4 (Dark brown)	2-8 Seeds are described as papery	10-25 seeds Shiny, black, and flattened	Shiny black and flattened.
Seeds size	Gram shaped and round also. 1-2-4 seeds	Circular & flat.....	Shiny black and flattened. D-shaped.	Typically small, black, and flat, with a rounded or slightly irregular shape.
Seed germination	Fruiting in August	July		
Flowering time	June-July	Fl. summer to autumn.	March-July. Late summer and early fall	April-July.
Native	Bangladesh	Eastern Queensland	Peru and Colombia	Mexico and Guatemala
Common name	Eight stamens Rain lily	Fairy Lily/ Storm lily	Rosy Rain Lily	Large Anther Rain Lily
Bengali name	অষ্টকেশর বর্ষা লিলি	পরীর বর্ষা লিলি/ঝড়ো লিলি	গোলাপী বর্ষা লিলি	বড় কেশর বর্ষা লিলি

Common name and Bengali name

Common name Eight stamens Rain lily.

Bengali name অষ্টকেশর বর্ষা লিলি

Habitat

In wild besides vegetable garden lawn and playground at RDA Campus, Bogura. Also identified wrongly all over Bangladesh.

Identification keys

1. 8 petals,
2. 8 stamens (Octo),
3. Same size filament,
4. Same size anthers,
5. 4 – locules ovary,
6. 4-3 parts seed-pods,

7. Average 1-2 seeds.
8. Seeds shape round and gram-shaped. Not like D-shaped and thin papery.
9. 4 mm thread like stigma (Threada),
10. 4 lobed stigmas,
11. 3-4-5 leaves only with bulb. (Not 6 and more like *Z.rosea*).
12. Leaves are straight, not like grounded like *Z. rosea*.
13. Whitish and light green leaves base.
14. Flowering time.
15. Fruiting time.
16. Tetramerous habit with 8 petals, 8 stamens, 4 lobed stigma, 4-parts seed-pods and 2 seeds.

Distribution

The genus *Zephyranthes*, one of the largest genera in the family Amaryllidaceae, is widely native to the Americas, specifically tropical and subtropical regions. They are widely cultivated and naturalized in various parts of the world, including Africa, Asia, and Australia. Now Bangladesh also.

Conclusion

After all the discussion, it is sure that *Zephyranthes octothreada* B.Uddin, S.Uddin & Z.Nasrin is new to taxon. We illustrated and described a new species of *Zephyranthes* genus, Family – Amaryllidaceae, in Bogura district, Bangladesh. There're showing differences with *Z. carinata*, *Z. minuta* and *Z. rosea* (Fig-2). Prepared 16 identification keys also for proper description and identification.

2. *Artemisia kholabaria* Zabber & Zinia, A new species from Bangladesh.

Abstract

Artemisia kholabaria Zabber & Zinia was described and illustrated as a new species from the district of Bogura, Latitude: 24.843559, Longitude: 89.370108, Bangladesh from *Asreraceae*. First published in Prir. Rostlin 254. 1820 [Jan-Apr 1820] (1820) nom. cons. family. Hind, D. J. N. (2007). Asteraceae (Compositae). In: V. H. Heywood, R. K. Brummitt, A. Culham & O. Seberg (eds), Flowering Plant Families of the World, pp. 46–52. Royal Botanic Gardens, Kew. *Artemisia* L. First published in Sp. Pl.: 845 (1753). K. Bremer, Asteraceae Clad. & Class.: 458 (1994). Asteraceae is a large family of flowering plants that consists of over 32,000 known species in over 1,900 genera within the order Asterales. *Artemisia* comprises hardy herbaceous plants and shrubs, which are known for the powerful chemical constituents in their essential oils. *Artemisia* species grow in temperate climates of both hemispheres, usually in dry or semiarid habitats. Notable species include *A. vulgaris* (common mugwort), First published in Sp. Pl.: 848 (1753), Balkrishna, A. (2018). Flora of Morni Hills (Research & Possibilities): 1-581. Divya Yoga Mandir Trust. There is another species found in Bangladesh may be *Artemisia vulgaris*, but have not proven yet in a scientific way. May be that species also *Artemisia kholabaria* Zabber & Zinia. There is a big difference with *Artemisia vulgaris* also (Fig-2). Also, with the Botanical illustration of *A. kholabaria* Zabber & Zinia also (Fig-1). Describe these in A-P images of 3 species. Compare with *Artemisia absinthium* (First published in Sp. Pl.: 848 (1753), Flora of North America Editorial Committee (2006). Flora of North America North of Mexico 19(1): 1-579. Oxford University Press, New York, Oxford, also for few similarities.

Keywords: Asteraceae, *Artemisia*, New species, Bangladesh.

Methods

Description of this species is based on living plant. All the Images captured from living species. Twigs and leaves collected from living plant. And also compare with another species that from abroad. Also, from Scientific Illustration from net. Color Illustration painted by Miraz Rahman Zarif on the base of photos captured in RDA campus in Bogura district. Measurement showing in images with scales. That's also help to complete the full description. Mr. Miraz collected all the herbarium sheet elements. Twigs, Leaves. Mr. Miraz also collected most of photographs from living plant t at RDA campus, Bogura (Fig-3).

Taxonomic treatment:

Artemisia kholabaria Zabber & Zinia sp. nov. p-15 Figs.1,2,3

TYPE: Bangladesh, Bogura district, RDA campus, Doshmile. Latitude. Fig-3: Map & Location: Bogura district, RDA campus, Doshmile. Latitude 24.70632° or 24° 42' 23" north. Longitude 89.39486° or 89° 23' 42" east. (Fig-3)

Diagnosis: Morphologically *Artemisia kholabaria* Zabber & Zinia compare with *Artemisia vulgaris* and *Artemisia absinthium* species.

Taxonomic tree:

Kingdom:

Family: Asteraceae

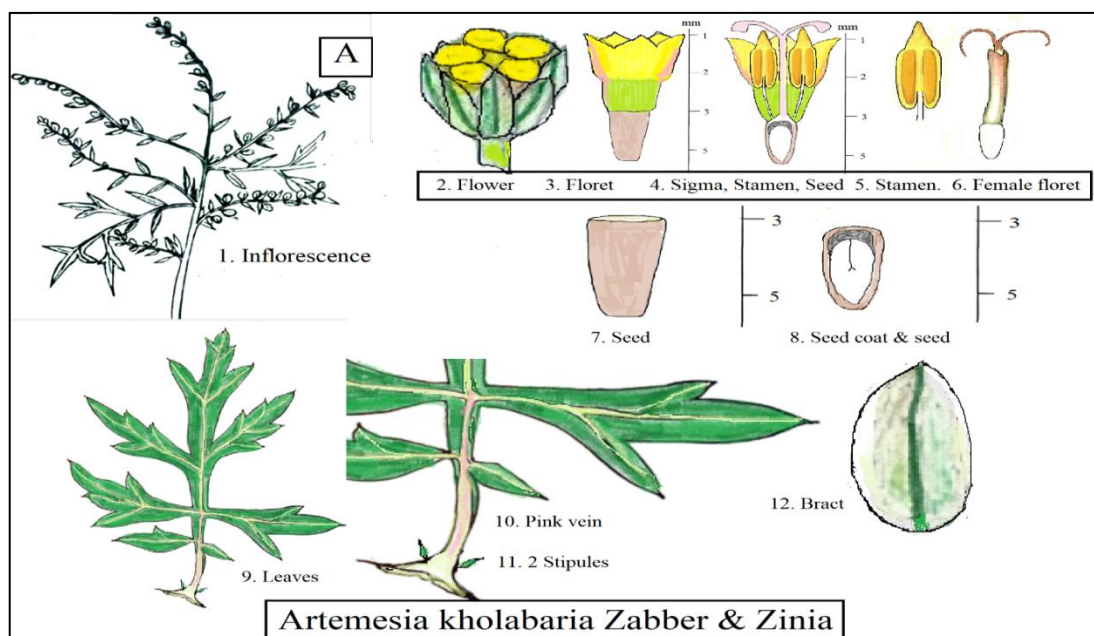
Genus: *Artemisia*

Species: *A. kholabaria* Zabber & Zinia

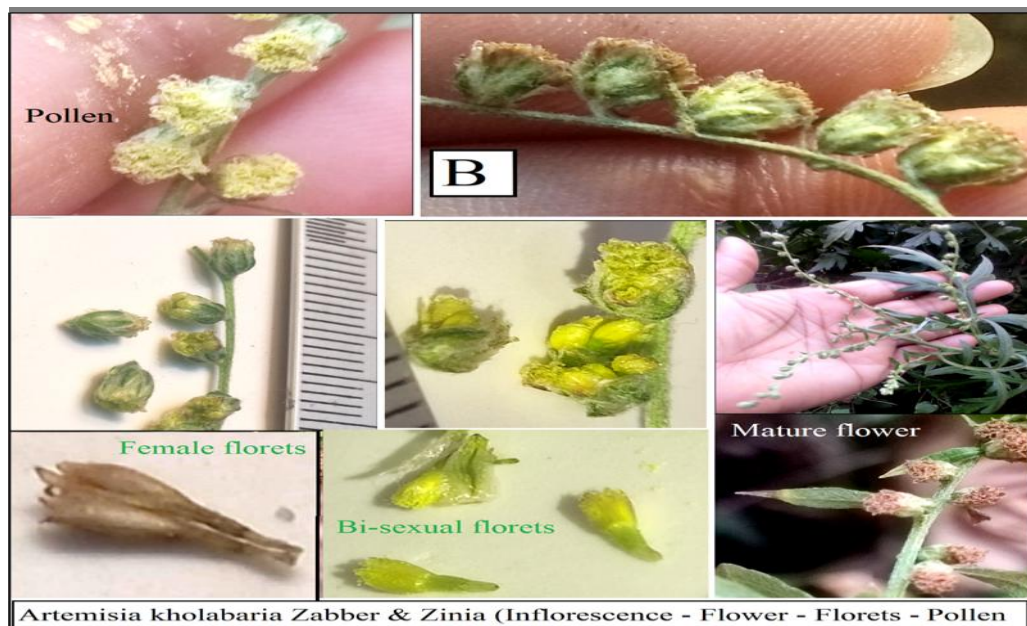
Binomial name

Artemisia kholabaria Zabber & Zinia.

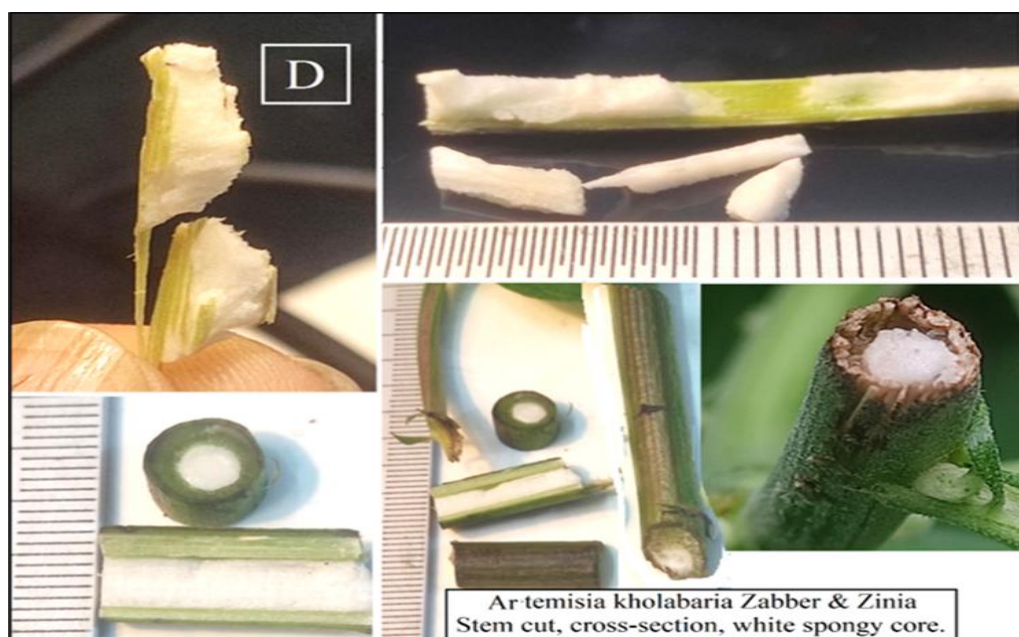
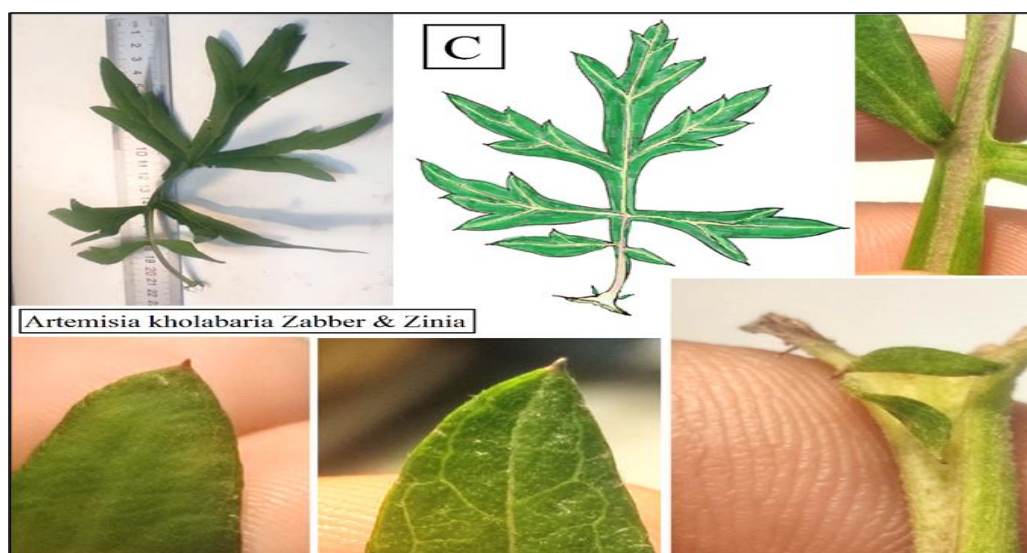
Images (Fig-1)



A. Inflorescence, Flowers, Florets, Stigma, Stamen, Seed, Female floret, Leaves, Pink vein stalk, Stipules, Bract.

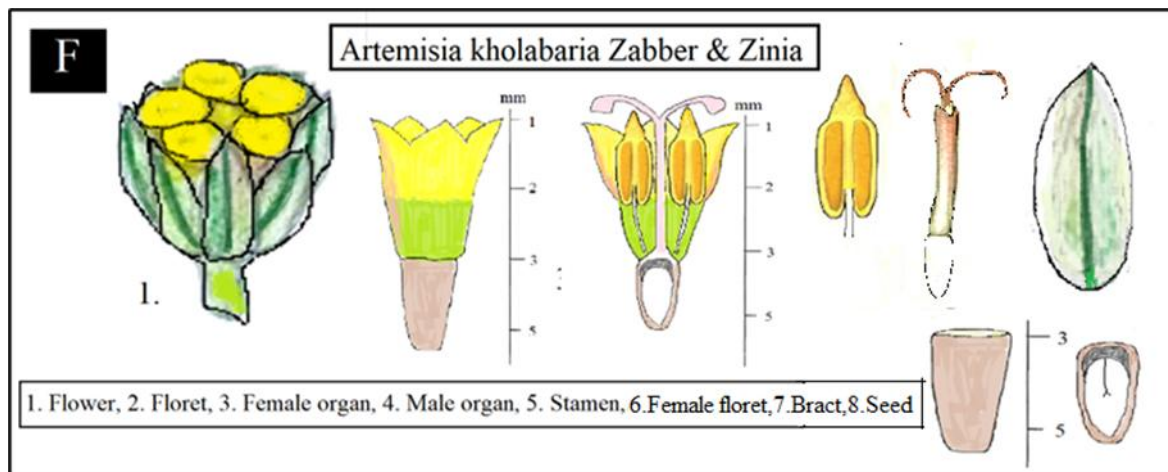


B. Inflorescence, Pollens, Florets, B-sexual florets with scale.



C. Leaves shape and size with scale. Leaves texture, pointed tips. Stipules.

D. Stem-cut, Cross-section, Spongy core.



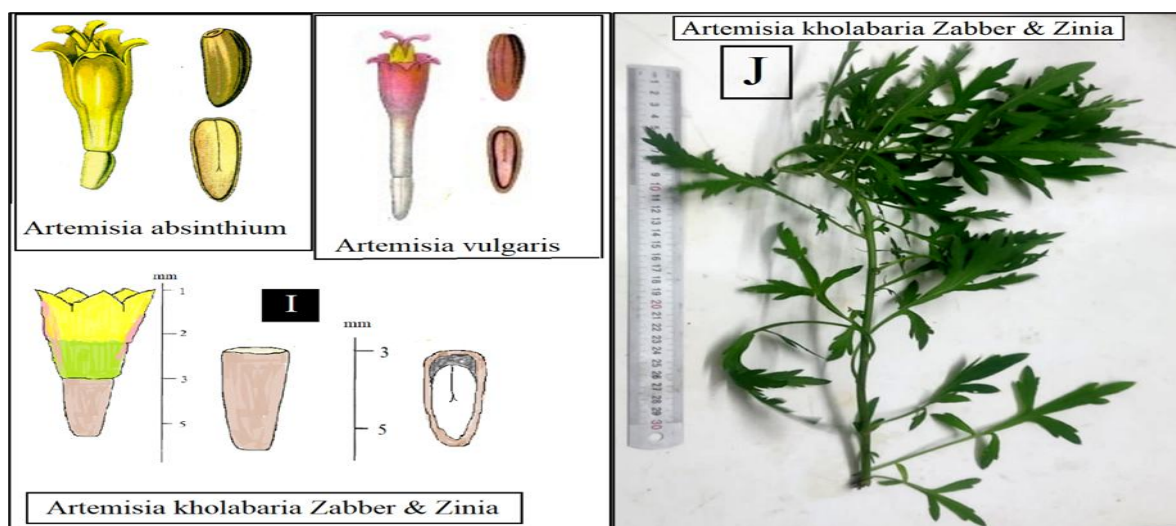
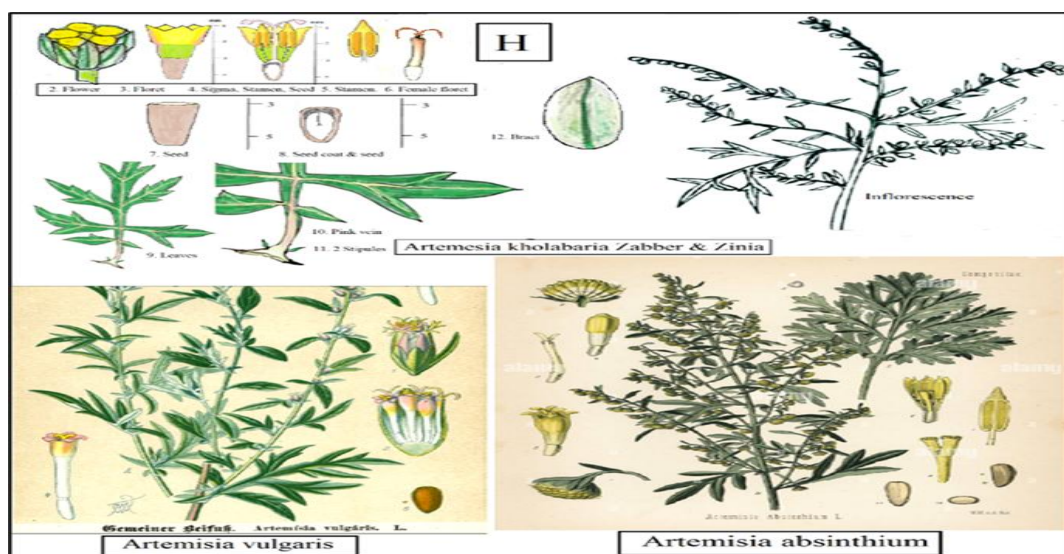
E. *Artemisia kholabaria* Zabber & Zinia stem texture, color, spongy core, cross section.

F. Flower, florets, female organ, male organ, stamens, female florets, bract, seeds.



G. *Artemisia kholabaria* Zabber & Zinia compare with *Artemisia absinthium*.

H. Botanical illustration of *Artemisia kholabaria* Zabber & Zinia compare with *Artemisia absinthium* and *Artemisia vulgaris*.



I. Compare of *Artemisia kholabaria* Zabber & Zinia compare with *Artemisia absinthium* and *Artemisia vulgaris* florets, seeds.... etc.

J. A twig of *Artemisia kholabaria* Zabber & Zinia

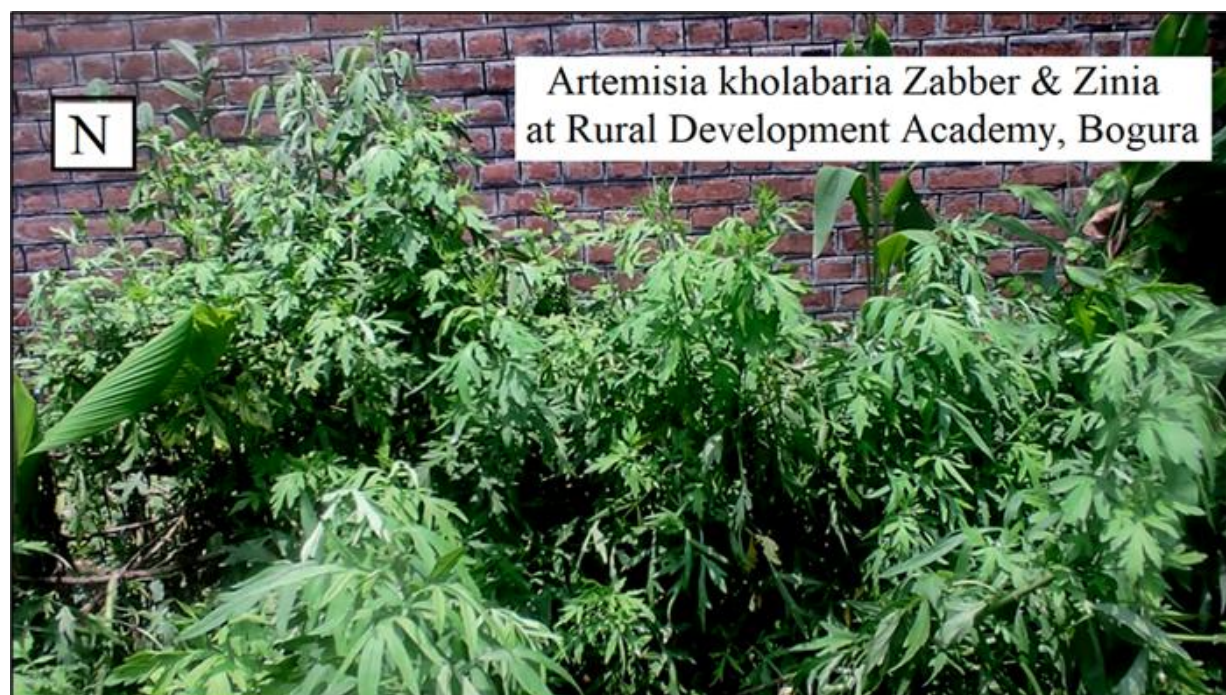
K. Purplish stem of *Artemisia vulgaris*.

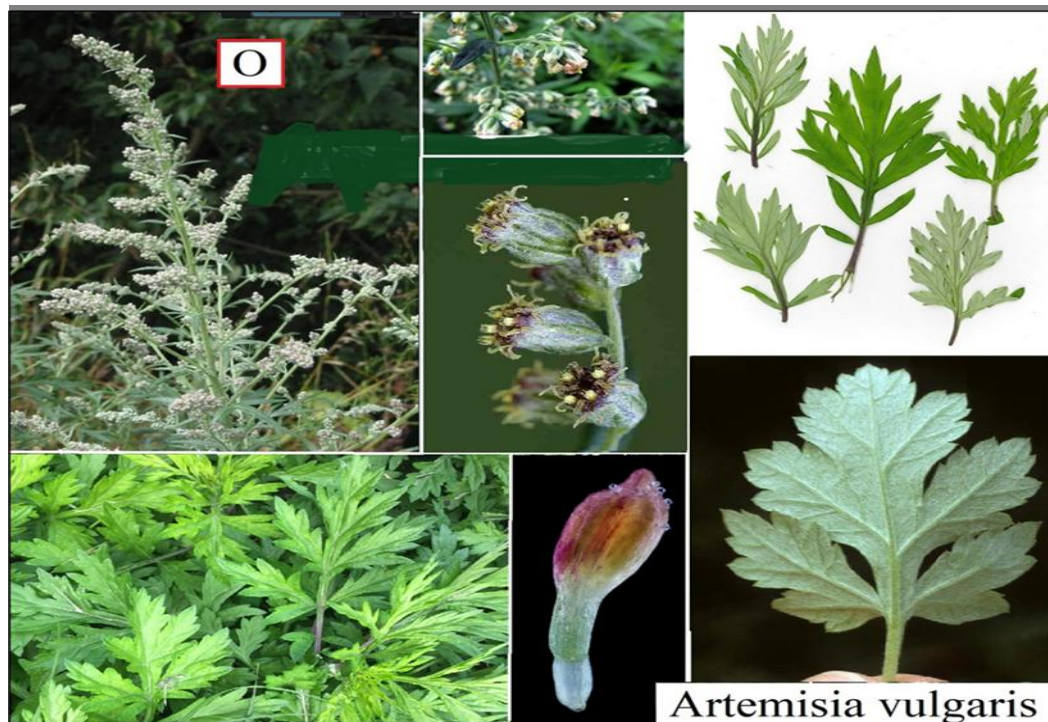


L. Compare of *Artemisia kholabaria* Zabber & Zinia compare with *Artemisia vulgaris* leaves, shape.

M. A twig or branches of *Artemisia kholabaria* Zabber & Zinia with inflorescence in scale.

N. Natural habitat at RDA Campus, Bogura, Bangladesh.





O. Details of *Artemisia vulgaris*. Inflorescence, Leaves, Floret, Seeds.

P. Woody lower stem, new shoots (Vegetative propagation) with scale.

Description

A perennial, large, basally suffrutescent shrub, erect aromatic herb, up to 1.3 m high and 1.5m broad with a woody root. Leaves pinnatifid, deeply lobed, glabrous and dark green above, whitish tomentose below. Young shoots whitish-green with petioles. Tall stems from the upright, 1 cm thick rootstock. Leaves are 28-20 cm. Leaves petiolate 2-4.5cm. Primary segments with acute lobes. Pointed lobes with 1mm. Leaves densely whitish arachnoid hairy beneath, green and sparsely hairy to glabrous above. Stipules number-2. Always present in both young and old leaves, size 5mm. Capitula disciform, many together in terminal panicle. Broadly pyramidal panicle with 30-40 cm long, ray florets female, filiform. Disc florets cylindric, yellow

color. Few florets with reddish tinged. Capitula erect to nodding, primary and secondary branches. Flower head 4-5mm, oblong. Florets 10-12, yellow with reddish tinge; marginal florets 5, female, fertile, with 2mm x 0.5mm, corolla tube. Disc florets 5, bisexual, fertile, with 2.5mm x 1.5mm, narrowly tubular-campanulate 5-toothed corolla. Yellow and lower part green. Cypsela light brown, c. 1 mm long, finely striate. Old stem erects, light brown color, woody. Propagate with cutting stem, a vegetative way. Inflorescence and seeds not available all time.

Native of Eurasia. Flowering time - February-March.

Specimen examined

At RDA campus, Bogura district. Natore district and all over Bangladesh, Zinia Nasrin Shumon, Herbarium sheet number - ZNS 510 (AAHBAU)

Fig -2: Compare *Artemisia kholabaria* Zabber & Zinia with *Artemisia vulgaris* and *Artemisia absinthium*.

Species	<i>A.kholabaria</i> Zabber & Zinia	<i>A.vulgaris</i>	<i>A.absinthium</i>
Height	1.3 m	1.5 to 2.5 m	1.1-1.5m
Stem color	Whitish-green	Purplish-brown	Gray-green
Stem dia.	1 cm	1 cm	5cm
Stem pith/core	4 mm in mature & 3.4 mm in old woody	-	The pith is the soft, central tissue of the stem, which is lignified
Stem rib	No rib only design like ribbed.	Ribbed	Ribbed
Leaves size	28-20 cm	3-10 × 1.8-8 cm	2.5 to 12.7 cm
Petiole size	2-4 cm	1.5-1.9 cm	2.5-5 cm long
Leaf blade edges	Pointed with 1 mm	Toothed and pointed	These lobes often have entire (smooth) margins.
Stipule size	5mm	2 cm	Stipules are small.
Stipule number	2	2	They lack the presence of stipules.
Rootstock dia.	1 cm	Few millimeters to larger than 1 cm.	5 cm
Inflorescence size	30-40cm	Panicle-like, arranged in a branched structure.	The entire panicle can be 10-23 cm by 10- 13 cm.
Flower head size	4-5mm, oblong	Globular and 1-2 cm in diameter.	Depressed globose, 2.5-3.5 x 3-5 mm
Bisexual florets number & size	5 with 2.5mm x 1.5mm	(5-)8 to 20 and size 1.5 and 3 mm.	30-50 and 1-2 mm, glandular.

Ray florets number & size	3-4 with 2mm x 0.5mm	5-10 and size 1.75-2 mm long and are bidentate (two-toothed)	8 to 10, and their corollas are 1-2 mm in length.
Floret color	Yellow-green, red tinged	Yellow with a reddish tinge.	Greenish-yellow.
Bract color	White as glass with dark green stripe in middle.	Light green	Whitish green
Achene size	1mm, strait shape.	Small, ovoid achenes with curved. The achene has ridges, a narrow base, and tiny bristles on the end.	1mm. They are oblong-cuneate in shape.
Achene color	Light brown/Whitish	Brown	Greyish in color
Flowering time	February-March	July to September.	July to September.
Bengali name	জ্বারের দোনা/মা গাছ	নাগদোনা	আফসান্টিন/ইন্দানা

Etymology

Old English *Artemesia*, via Latin from Greek, ‘wormwood’, named after the goddess Artemis, so called from the association of Artemis with childbirth and the gynaecological use of the plant. ‘Kholabaria’ is a place called medicinal village at Natore district. They cultivated medicinal plants as other crop plants on the other parts of Bangladesh. Zabber is my father’s name and Zinia for Zinia Nasrin Shumon (Author).

Common name and Bengali name

Zabber’s artemisia. Zinia’s Artemisia common name. Bengali name - জ্বারের দোনা/মা গাছ।

Medicinal uses

Artemisia is one of the diverse genera with many important medicinally valuable essential oils and secondary metabolites. Essential oils of *Artemisia* spp. have been widely used for a variety of medicinal purposes for many years. Different species of *Artemisia* have been used to treat fever and malaria, anthelmintic stomachache, high blood pressure, and diabetes, diarrhea, cough, and common cold . A decoction of the leaves and flowering tops is used to treat measles in children. In Bangladesh, this new species used by village doctor (Kaviraj’s) to treat pregnant mother to reduce labor pain. One of the Kariraj named Afaz Uddin told me that he gave many pregnant women this plant leaves for reduce their labor pain. It’s also called ‘worm-plant’ for killing worm and mosquitoes.

Habitat

In wild besides vegetable garden, in all village kaviraj’s garden at Natore and Rajshahi district in Bangladesh.

Key identifying characters

1. Stem color - Whitish-green
2. Stem rib - No rib only design like ribbed.
3. Leaves size (28-20 cm).
4. Stipule size - 5mm

5. Inflorescence size.
6. Flower head size, 4-5mm, oblong
7. Bisexual florets number & size, 5 with 2.5mm x 1.5mm
8. Bract color. White as glass with dark green stripe in middle.
9. Achene size -1mm, strait shape.
10. Flowering time - February-March

Distribution

The genus *Artemisia*, one of the largest genera in the family Asteraceae, is widely distributed in Asia, western North America, and Europe. Now Bangladesh also.

Conclusion

After all the discussion, it is sure that *Artemisia kholabaria* Zabber & Zinia is new to taxon. We illustrated and described a new species of *Artemisia* genus, Family – Asteraceae, in Bogura district, Bangladesh. There're showing differences with *A. vulgaris* and *A. absinthium*. Prepared 10 identification keys also for proper description and identification.

3. *Alpinia rda* Zinia & F.H.Khan, A new species from Bangladesh.

Abstract

Alpinia rda Zinia & F.H.Khan is described and illustrated as a new species from the district of Bogura, Bangladesh Zingiberaceae family contains First published in Tekhno-Bot. Slovar 682. 1820 [3 Aug 1820] (as "Zinziberaceae") (1820) nom. cons. *Alpinia* Roxb. First published in Asiat. Res. 11: 350 (1810), nom. cons. *Alpinia mutica* Roxb. First published in Asiat. Res. 11: 354 (1810). Baksh-Comeau, Y., Maharaj, S.S., Adams, C.D., Harris, S.A., Filer, D.L. & Hawthorne, W.D. (2016). An annotated checklist of the vascular plants of Trinidad and Tobago with analysis of vegetation types and botanical 'hotspots'. Phytotaxa 250: 1-431. *Alpinia malaccensis* (Burm.f.) Roscoe First published in Trans. Linn. Soc. London 8: 345 (1807). Govaerts, R. (1995). World Checklist of Seed Plants 1(1, 2): 1-483, 1-529. MIM, Deurne. *Alpinia nutans* (L.) Roscoe. First published in J.E.Smith, Exot. Bot. 2: 93 (1806). Larsen, K. (1996). A preliminary checklist of the Zingiberaceae of Thailand. Thai Forest Bulletin (Botany) 24: 35-49. *Alpinia zerumbet* (Pers.) B.L.Burt & R.M.Sm. First published in Notes Roy. Bot. Gard. Edinburgh 31: 204 (1972). Acevedo-Rodríguez, P. & Strong, M.T. (2005). Monocotyledons and Gymnosperms of Puerto Rico and the Virgin Islands. Contributions from the United States National Herbarium 52: 1-415.

Keywords: Zingiberaceae, New species, Bangladesh.

Description

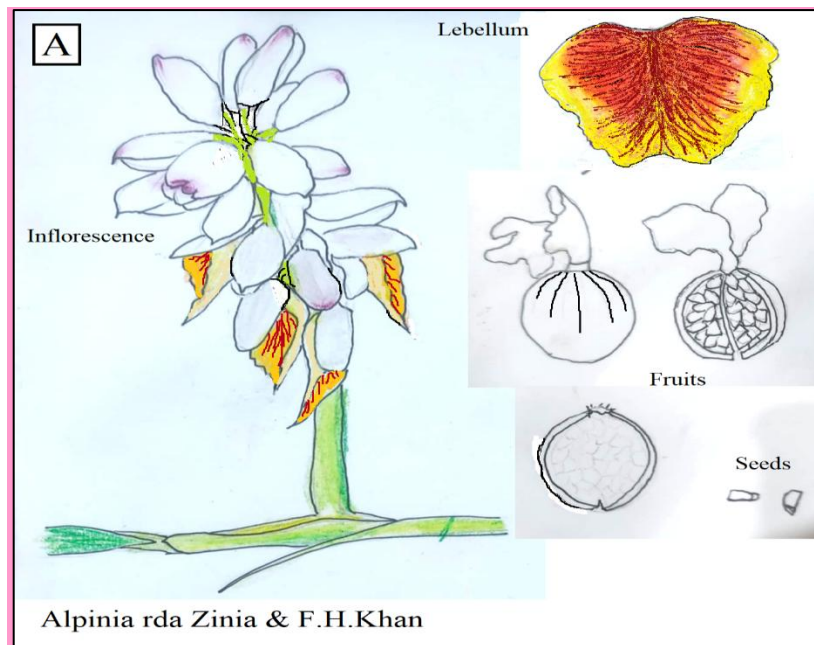
Alpinia rda Zinia & F.H.Khan is a robust herb that can grow measures up to 1.2-2.4 m tall and with strong aromatic when bruised. The leaves are narrowly lance-shaped, measuring 41(-30) cm x 8(-5) cm, acuminate, no hairs in margin or underneath nor midrib or a very short few. The ligule is two lobes, up to 1-1.1 cm long, few hairies and with 3-6 cm long petiole.

The inflorescence is racemose, upright, measures about 20-35 cm long, with 10-20 or more cincinni and absent bracts are on a 0.5 cm long peduncle. There are elliptic bracteoles around 3 cm long under each flower. The pedicel is 0.5-1.5 cm long. The calyx is 3.8 cm long, shortly 3-lobed. It is white. The petal is white. The tube is measuring up to 1 cm long and ciliate lobes. The lateral lobes are 3 cm x 1 cm while the dorsal lobe measures up to 2.6 cm x 1.3 cm. The labellum is broadly ovate, 3-5 cm long and at the widest part is 3 cm across,

incurved sides, narrow to emarginate apex where at the base is with 2 papillose fleshy swellings that is yellow-orange with scarlet lines. The lateral staminodes are subulate and measuring up to 3.2cm long. The filament of stamen measures about 1.5 cm long. The anther connective is not prolonged into a crest.

The light brown capsule is globose, up to 2.5 cm in diameter and shortly pubescent.

The seed is 3-4 angular and about 7 mm long. 40-45 seeds.



Taxonomic treatment

Alpinia rda Zinia & F.H.Khan nov. p- 9, Figs. 1, 2, 3, 4

TYPE: Bangladesh, Bogura district, RDA campus, Doshmile. Latitude. Fig-3: Map & Location: Bogura district, RDA campus, Doshmile. Latitude 24.70632° or 24° 42' 23" north. Longitude 89.39486° or 89° 23' 42" east.

Taxonomic tree

Kingdom: Plantae

Clade: Tracheophytes

Clade: Angiosperms

Clade: Monocots

Clade: Commelinids

Order: Zingiberales

Family: Zingiberaceae

Subfamily: Alpinioideae

Tribe: Alpinieae

Genus: *Alpinia* Roxb., 1810

Species

Alpinia rda Zinia & F.H.Khan

A. Botanical illustration,



Images

B. Inflorescence,

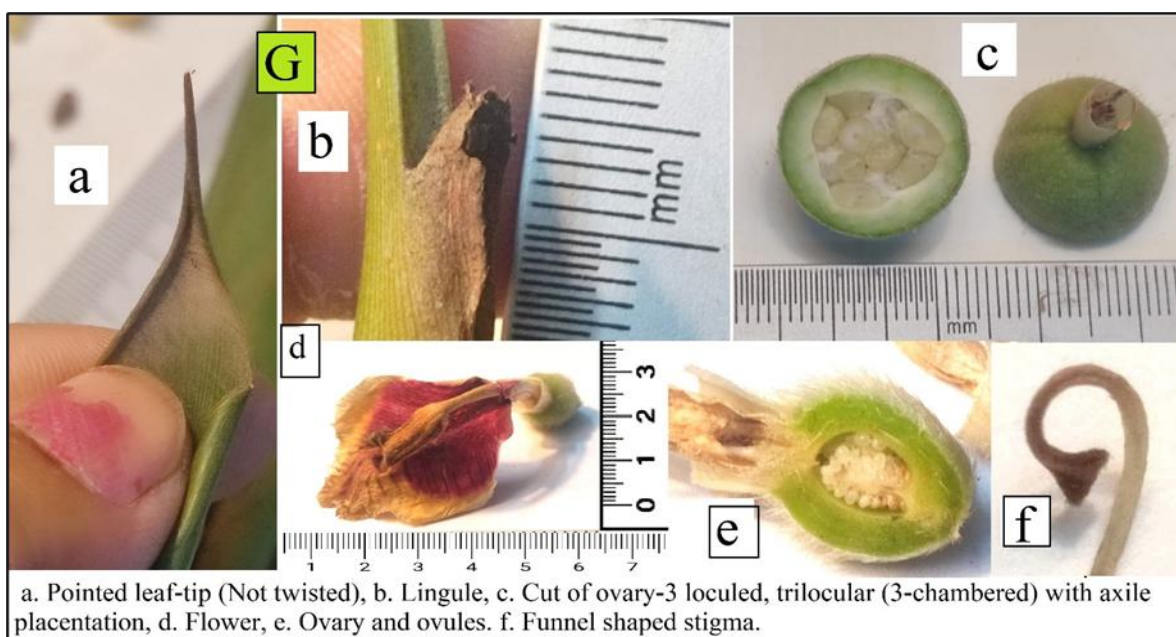
C. Upright position showing,

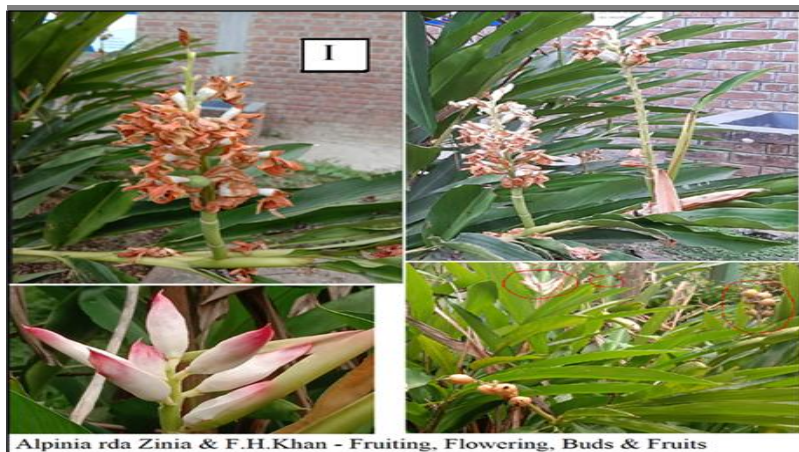
D. Details with fruits, flower, petals, seeds, leaves, etc.



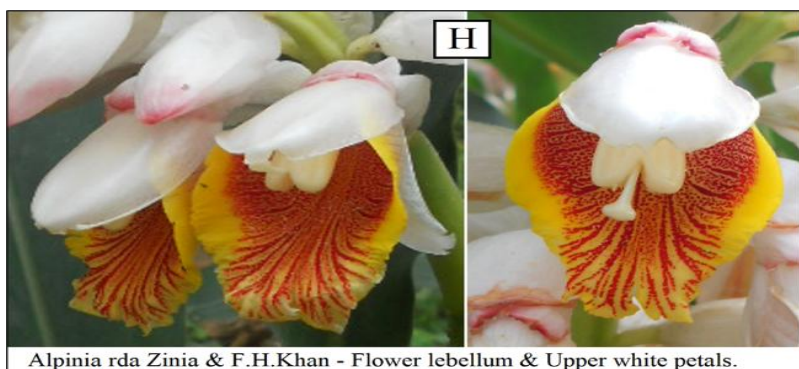
E. Mature fruits, Dry fruits, Seeds, Buds, Sepal, Calyx.

F. Showing big petal (Upper) size, Seeds' size, Calyx, Sepal, Ovary, Labellum, Stamen, Filament, Style, Stigma, Ovary and ovules in scales.





G. Leaf-tip, Ligule, Ovary-cut, Single flower, Ovary & ovules, Funnel shaped stigma.



H. Labellum design which differs in each *Alpinia* species. Upper white petal is the main characteristics of *Alpinia rda* Zinia & F.H.Khan.

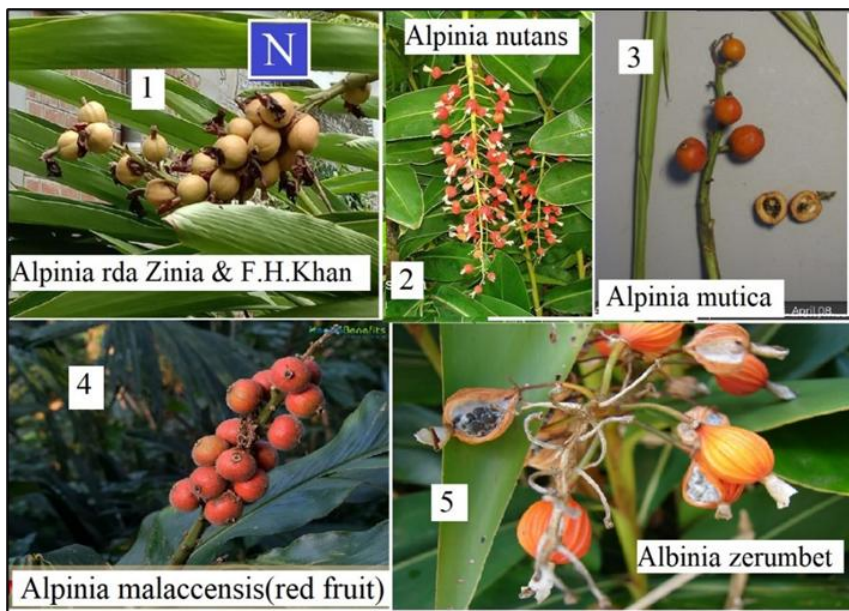


J. Details of *Alpinia Zerumbet*, Flower design, Upper petal with pink-tip, Ribbed fruits, round seeds with scale. Hanging inflorescence.

K. *Alpinia nutans* labellum design and fruits pattern.

L. *Alpinia malaccensis* labellum, Inflorescence, Red fruits pattern. Big leaves.

M. *Alpinia zerumbet* height showing 15ft. *Alpinia zerumbet* biggest inflorescence-1-2 ft, hanging.



N. 5 different fruits of *Alpinia* species.



O. *Alpinia mutica* inflorescence, single flower, red-orange fruits. sepals, petals, upper creamy-spotted upper petal.

Key identifying characters

1. The labellum design is different with all listed species.
2. Fruits color brown,

3. an angled seeds are dark brown,
4. The seeds shapes are different also.

Specimen examined

At RDA campus and All over Bangladesh, Zinia Nasrin Shumon, Herbarium sheet number - ZNS 508 (AAHBAU)

Fig-2

Species	Flower (Petal)	Fruits	Seeds	Leaves-Stem	Height
<i>Alpinia rda</i> <i>Zinia</i> & F.H.Khan	White upper petal	Broun color (2cm)	Angled, long shape, (Blackish- brown) -4mm	Pointed Tip, Green & brown stem, (43cm-9cm)	1.5-2m
<i>Alpinia zerumbet</i>	Pink color on upper petal	Orange-red (Ribbed) 1.5 - 3 cm, 3 - 7 cm.	Round shape (Ashy-brown)) - 2mm	Red stem & Inflorescence stem. 30 to 70 centimeters long and 5 to 14 centimeters wide.	3.5-4.2 m
<i>Alpinia malaccensis</i>	White color upper petal	Red-round fruits, about 2.5 cm in diameter.	Relatively small-triangular shape.	Huge leaves that can reach 90 cm long and 15 cm wide.	3 m tall
<i>Alpinia mutica</i>	Upper petal white	2.2 cm long and 2 cm in diameter (Green to orange or red)	6-7 mm long. Color: Black.	They can reach 40-60 cm in length and 10-13 cm in width.	1.5-2 meters
<i>Alpinia nutans</i>	Upper petal white	Around 3 cm wide. These fruits are initially green and mature to orange or red	Black, angled seeds, about 6-7 mm long.	Inflorescence stem yellow-green. It has glossy green leaves that release a spicy, cardamom-like fragrance when crushed.	1 to 1.5m

Acknowledgements

Thanks to Mr. Ferdous Hossain Khan for his contribution. Thanks to Mosharef Bhuiyan, Madhobi Lata, and Foyzullah-al-Noman for their images.

AKM Zakaria, Firoz Hossain to make RDA campus green with planted many wild species. This's why RDA campus known as "Green RDA".

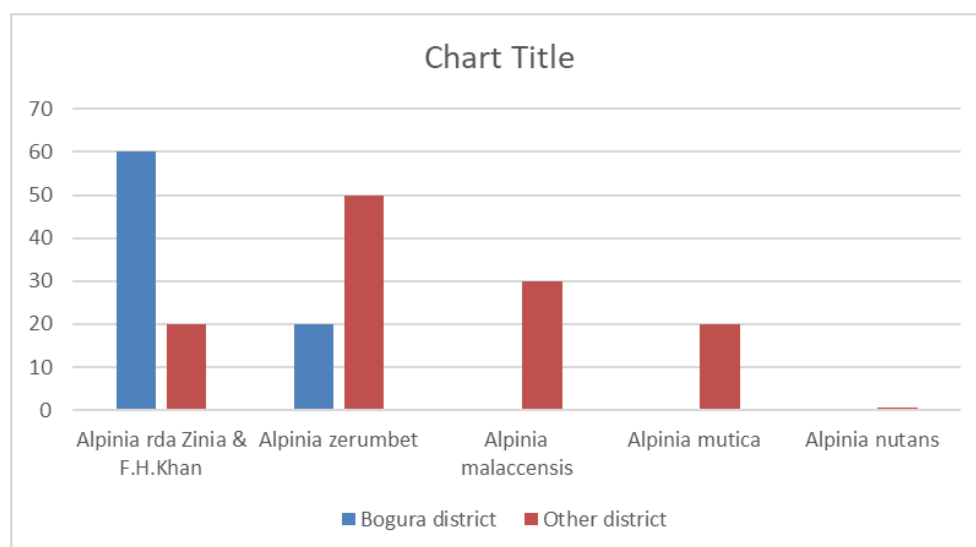
Common name & Meaning

Common name of this new species "*Alpinia rda Zinia & F.H.Khan*", rda=Rural Development Academy, Bogura. Zinia for the Author. F.H.Khan = Ferdous Hossain Khan. Common name "RDA Galangal" in English and "আরডিএ গালাঙ্গল"।

Conclusion

After all the discussion, it is sure that *Alpinia rda Zinia & F.H.Khan* is new to taxon. We illustrated and described a new species of *Alpinia* genus, Family - Zingiberaceae in Bogura district, Bangladesh. There're showing differences with 4 *Alpinia* species.

Fig-3



4. *Helianthus bangladeshinensis* Zinia, A new species from Bangladesh.

Abstract

Helianthus bangladeshinensis Zinia from *Asteraceae* family was described and illustrated as a new species from the district of Bogura, Latitude: 24.843559, Longitude: 89.370108, Bangladesh. First published in *Prir. Rostlin* 254. 1820 [Jan-Apr 1820] (1820) nom. cons. family. Hind, D. J. N. (2007). *Asteraceae* (Compositae). In: V. H. Heywood, R. K. Brummitt, A. Culham & O. Seberg (eds), *Flowering Plant Families of the World*, pp. 46–52. Royal Botanic Gardens, Kew. First published in *Sp. Pl.*: 845 (1753). K. Bremer, *Asteraceae* Clad. & Class.: 458 (1994). *Asteraceae* is a large family of flowering plants that consists of over 32,000 known species in over 1,900 genera within the order *Asterales*. *Asteraceae* Bercht. & J.Presl. First published in *Prir. Rostlin* 254. 1820 [Jan-Apr 1820] (1820) nom. cons. *Helianthus* L. First published in *Sp. Pl.*: 904 (1753). Roskov Y. & al. (eds.) (2018). *Species 2000 & ITIS Catalogue of Life Naturalis*, Leiden, the Netherlands. *Helianthus debilis* Nutt. First published in *Trans.*

Amer. Philos. Soc., n.s., 7: 367 (1841). Helianthus debilis subsp. cucumerifolius (Torr. & A.Gray) Heiser. First published in *Madroño* 13: 160 (1956). *Helianthus debilis subsp. cucumerifolius*, or cucumberleaf dune sunflower, is a subspecies of the species *Helianthus debilis* in the genus *Helianthus*, family *Asteraceae*. It is native to the South-Central regions of the United States and exists naturalized in every continent except Antarctica.

Description

Stem 2.5 ft/75cm. Stem branches. Straight, 1cm across, whitish color with warts. Stem look no branch, single, straight. Leaves size. Long 15cm & wide 3cm. The leaves are lance-shaped. Simple and less leaves, not like others. Shallowly lance shape & needle point tip. Petiole 7cm. Flowers 5.5 cm across. Heads one only. Petals size 3.5cm & wide 5mm. Petals number 20 -22. The disk florets are relatively small, measuring around 2.5 mm across. These florets are bisexual and radially symmetrical. They feature a 5-lobed corolla, roughly 5.5 mm long, with a cylindric tube and darker lobes. The disc florets also include stamens, a style, and an ovary, all contributing to their reproductive function. Ray flower deep yellow & disc floret with orange-red color. Ray-floret 30mm & 8mm wide. Disc florets 25mm & wide 4mm. Bracts 1.2-1.5 cm, needle point. No axis buds. Seeds size 1 cm long.

Season – February-March, flowering season. Fruiting – April.

Specimen examined

At RDA campus, Bogura district, Natore district and all over Bangladesh. Zinia Nasrin Shumon, Herbarium

sheet number – ZNS 514 (AAHBAU).

Keywords: *Asteraceae, Helianthus, New species, Bangladesh.*

Taxonomic treatment

Helianthus bangladeshinensis Zinia nov. p-14, Figs. 1, 2 & Map of Bogura district, Bangladesh.

TYPE: Bangladesh, Bogura district, RDA campus, Doshmile. Latitude. Fig-3: Map & Location: Bogura district, RDA campus, Doshmile. Latitude 24.70632° or 24° 42' 23" north. Longitude 89.39486° or 89° 23' 42" east.

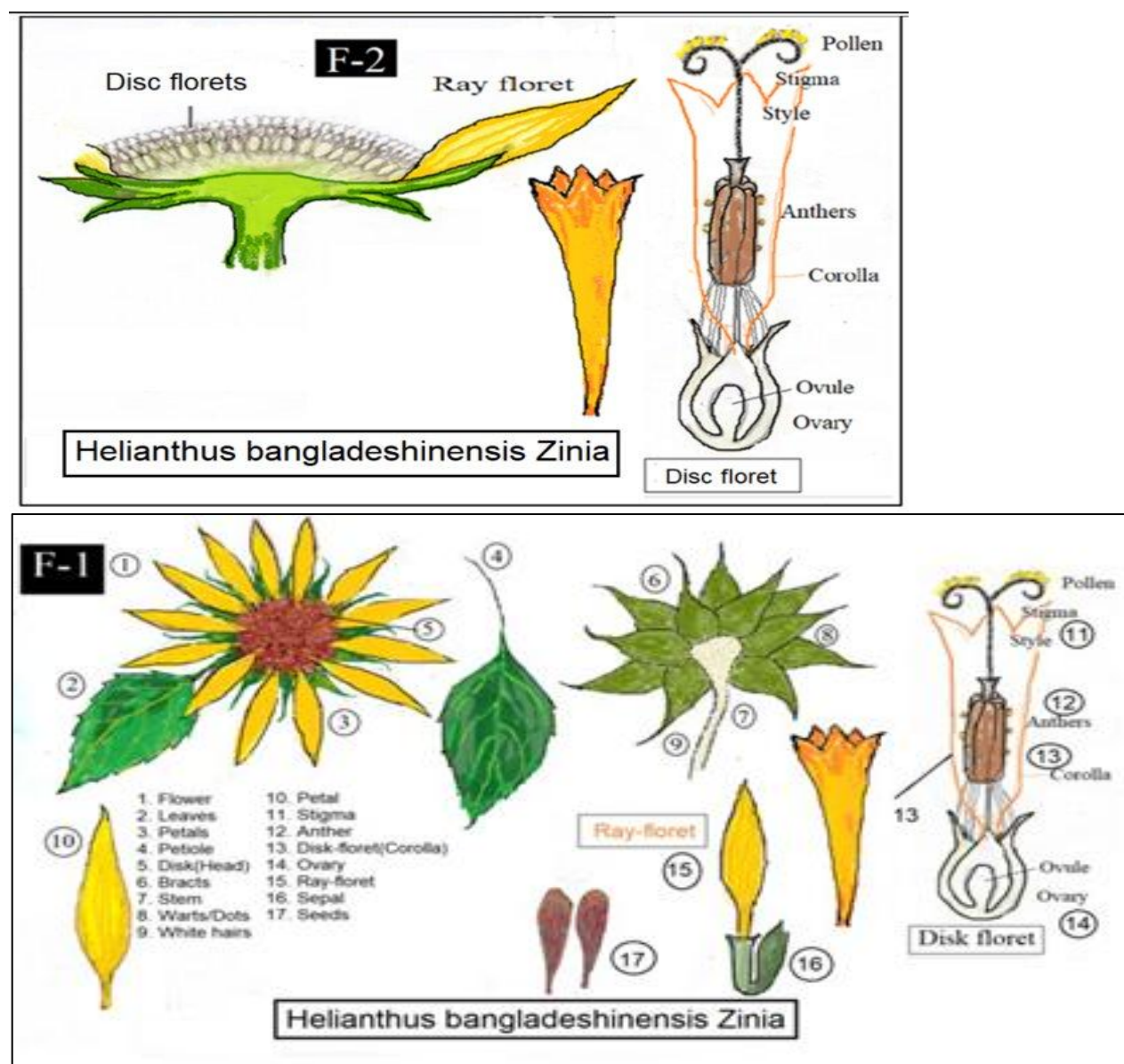
Taxonomic tree

Kingdom: Plantae Clade: Tracheophytes Clade: Angiosperms Clade: Eudicots Clade: Asterids Order: Asterales Family: Asteraceae Genus: *Helianthus*.

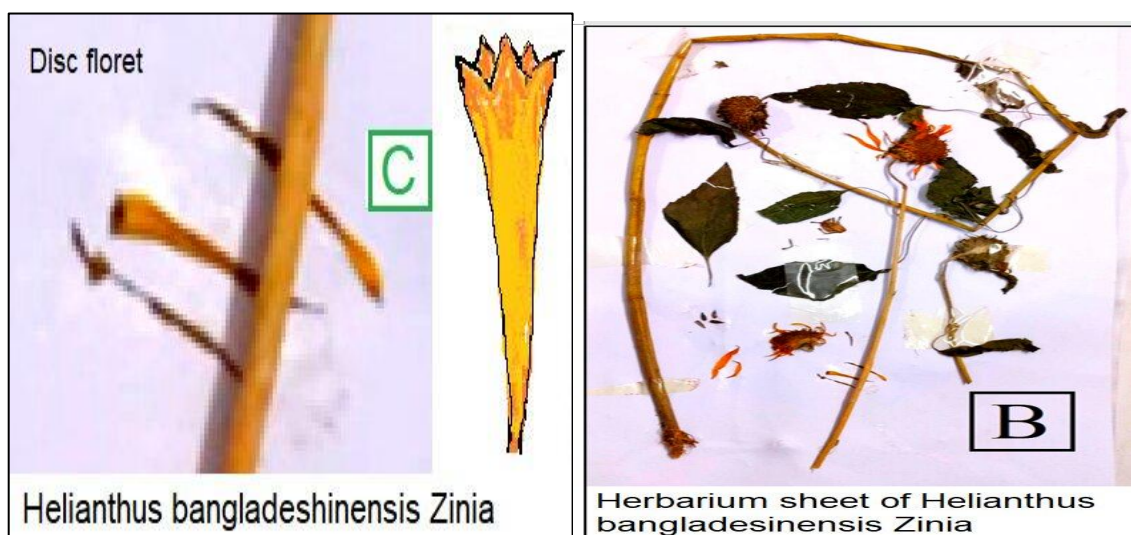
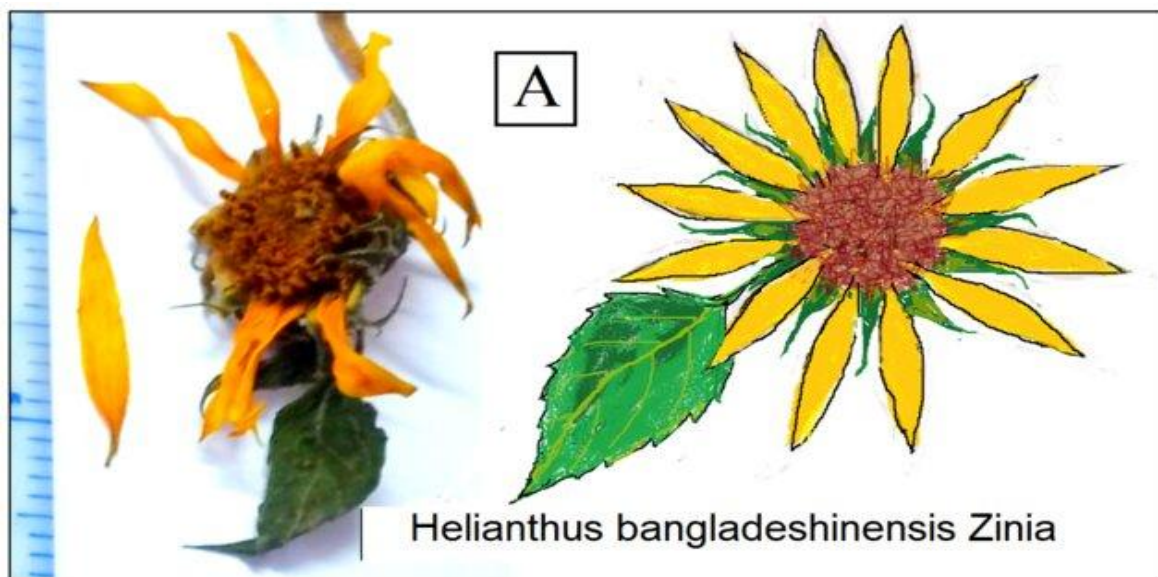
Species: *H. bangladeshinensis* Zinia.

Binomial name - *Helianthus bangladeshinensis* Zinia.

Figure-1,2 (Botanical illustrations)



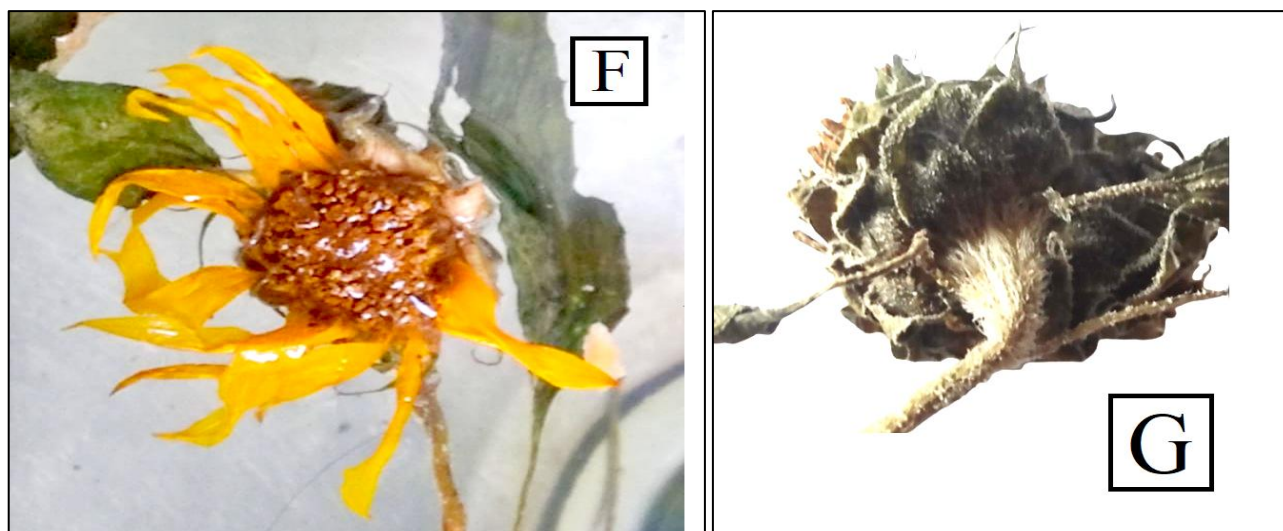
Images



A. Helianthus bangladeshinensis Zinia flowers and morphology.

B. Herbarium sheet of new species.

C. Disc florets shape and color.



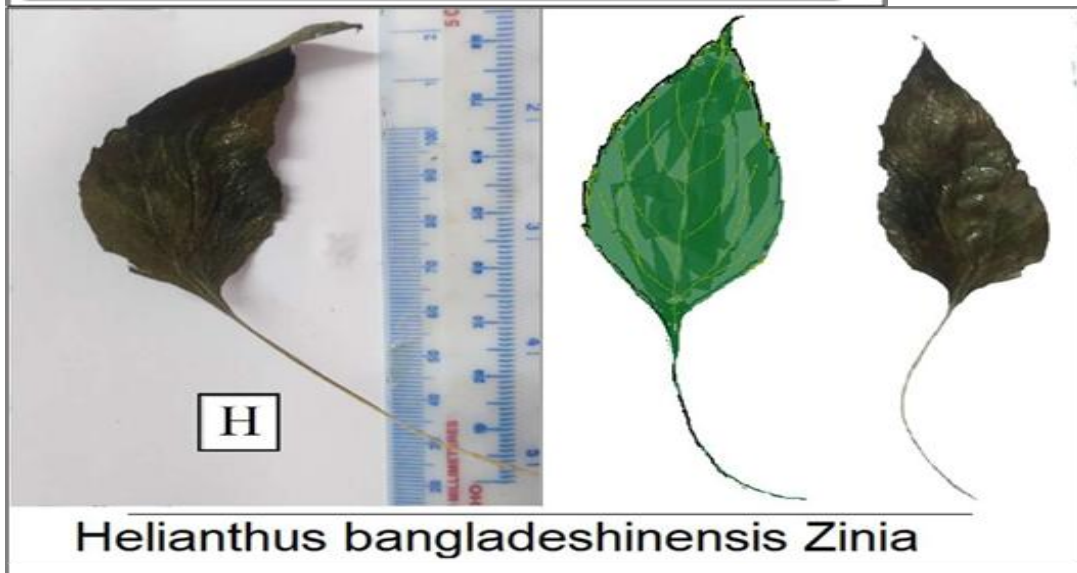


D. A twig with flower heads with scale.

E. Flower heads, leaf, petiole, ray- petals showing with scale.

F. Close view of flower head with disc and ray florets.

G. Bracts with pointed tips, white hair all over bracts, white dotted warts.

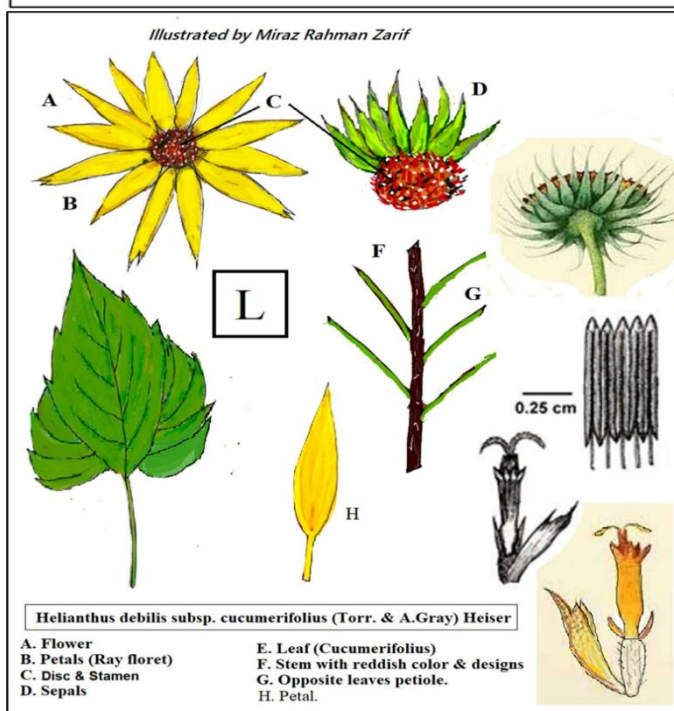
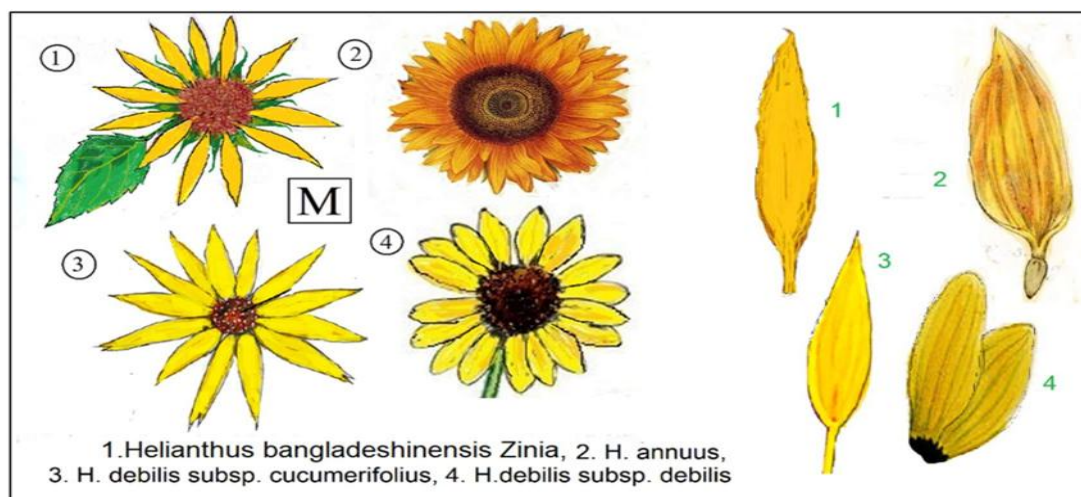




H. Lance shaped leaves with long pointed tips and long thin petiole.

I. Disc florets and seed with scale.

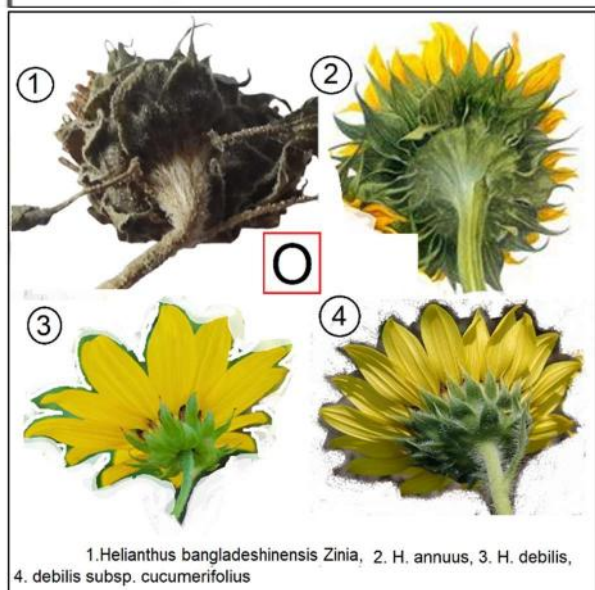
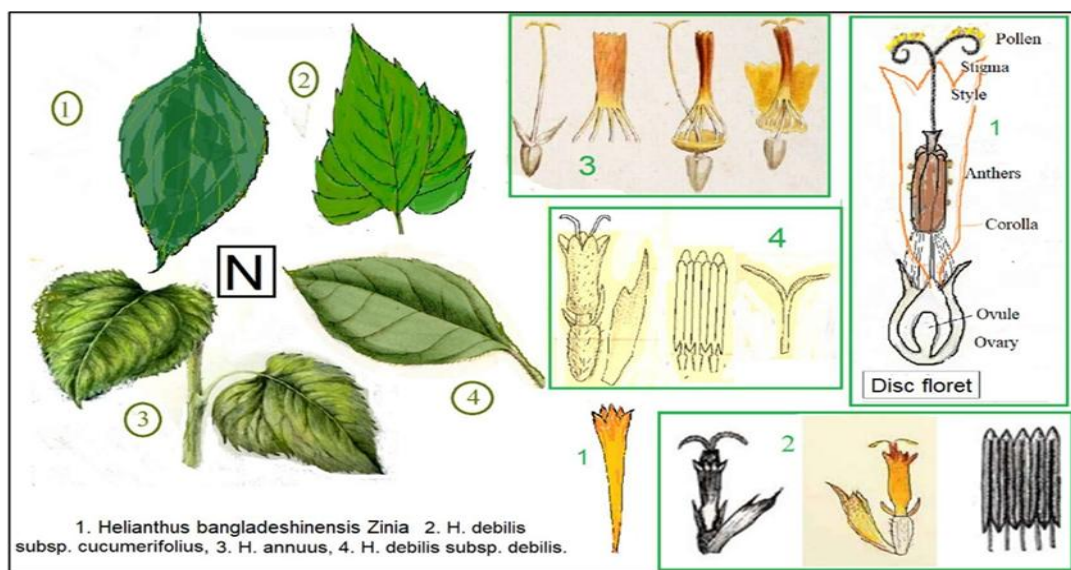
J. Seeds shape and size of *Helianthus bangladeshinensis* Zinia.



Helianthus debilis subsp debilis Botanical illustration

K. *Helianthus debilis* subsp. *cucumerifolius* Botanical illustration.

L. Compare with 4 species flower heads and petals. Differs one to another in shape, size and color.



M. Compare with 4 species leaves shape & color, female organ, male organ, stigma shape and size, stamens shape and size, disc florets shape and color...etc.

N. Compare with 4 species bracts. Showing differences in color, size and shape.

O. Showing differences in 4 species seeds color, size and shapes.



P. A twig with flowers, white hairy branch, petals and leaf with scale.

Fig-3: Table – *H. bangladeshinensis* Zinia compare with *H. debilis*, *H. cucumerifolius* and *H. annuus*.

Subject	<i>Helianthus debilis</i>	<i>Helianthus cucumerifolius</i>	<i>Helianthus bangladeshiensis</i> Zinia	<i>Helianthus annuus</i>
Plant size	Can grow up to 3-4 ft tall.	2 to 4 ft high and equivalently wide.	2.5 ft/75cm	2 and 10 feet (0.6 to 3 meters) tall
Stem	Decumbent, glabrous or puberulent.	Erect, hispid. (Dark chocolate color with small white dots.	Straight, 1cm across, whitish color with warts	Sunflower stems can grow from 1 to 4.5 meters tall and up to 5 cm in diameter.
Stem branches	Many branches that are decumbent (lying along the ground) or horizontal.	Densely branched	No branch, Single	Typically erect and can be branched or unbranched.
Stem look	Erect	Erect	Straight	Erect
Petiole	3cm (Big leaf)	6.5 cm	7cm	20 to 200 mm (0.8 to 7.9 inches
Leaves size	3–10 cm 2.5 to 14 cm long and 1.8 to 13 cm wide.	Blades 4–9 cm, Wide same as long. 2.5–14 cm long and 1.8–13 cm wide.	Long 15cm & wide 3cm.	10-40 cm long and 5-35 cm wide
Leaves description	Typically, deltoid-ovate, lance-ovate, or ovate, meaning they	Typically alternate, triangular to heart-shaped, and have	The leaves are lance-shaped. Simple and less	Arranged alternately on the stem. They are ovate to

	can be triangular-egg-shaped, lance- shaped-egg- shaped, or egg-shaped.	toothed (serrate) margins. The leaves can be lance-shaped to ovate (egg-shaped) and are 3-veined from the base.	leaves, not like others.	triangular in shape and have serrated edges. The leaves are also described as rough-hairy.
Leaves base & Tip	The leaf bases can be heart-shaped.	Triangular to heart-shaped.	Shallowly lance shape & needle point tip	The leaf base is often cordate (heart-shaped) or truncate (abruptly ending). The tip of the leaf is usually acuminate (tapering to a long point).
Gland	Dotted	Sometimes gland-dotted.	-	Glandular hairs.
Flowers	3 inches (7 cm) across. 2 to 4 inches (5-10 cm) wide.	2-3 cm	5.5 cm across	Flower head can range from 7.5 to 15 cm 3-6 inches
Heads	2-3	1-3	1 only	One large flower head at the end of its stem, though some wild varieties can have multiple flower heads.
Petals size	1.2-2cm	1.5-3cm (Pointed petals)	3.5cm & wide 5mm	1.5 to 4 cm long
Petals number	11-20	13-21	20 -22	7 - 20 petals/rays
Ray & Disc corolla color	Yellow, though some cultivars may have white, reddish, or orange rays.	Yellow, while the disc florets (center of the flower head) can be reddish, yellowish, or purplish.	Ray flower deep yellow & disk floret with orange color	Typically yellow, but can also be red or orange in some cultivars.
Ray floret size	12-20 mm long.	15–30 mm long.	Ray-floret 30mm & 8mm wide	1.5 to 4 cm (0.6 to inches) long
Disc floret size	Roughly 5.5 mm long, with a cylindric tube and darker lobes.	The disc diameter is around 16–20 mm.	Disk 25mm & wide 4mm	Corolla length of 7.45 mm and a corolla opening of 1.27 mm
Bracts & Tip	About 1 cm	Lanceolate, meaning they are widest above the base and taper to a point. The bracts are hairy on the outer	1.2-1.5 cm Needle point	Bracts are leaf- like structures that form the involucre, supporting the flower head. They

		surface with simple hairs. The bract tips are acuminate,		are typically ovate (egg-shaped), with an abruptly tapered, sharp tip.
Axis buds	Have	Have	No	Axis buds refer to the axillary buds located at the nodes of the stem,
Seeds size	2.5 to 3.2 mm long	3-3.7 mm in length and 1.1-1.9 mm in width	1 cm long	10-15 mm long and 4 mm wide

Identification keys

1. Straight, 1cm across, whitish color with warts.
2. Less leaves,
3. One flower head,
4. Stem straight, 1cm across, whitish color with warts,
5. Petal's number,
6. Ray florets,
7. Disc florets,
8. Bracts needle point,
9. No axis bud
10. Seeds size & shape.
11. Disc florets shape.

Etymology

Helianthus is derived from Greek ἥλιος hēlios "sun" and ἄνθος ánthos "flower", because its round flower heads in combination with the ligules look like the Sun. bangladeshinensis for country Bangladesh. Also, Zinia for Zinia Nasrin Shumon (Author).

Methods

Description of this species is based on living plant. All the Images captured from 2/3 tree, from the same species. Full plants, flowers, leaves, seeds collected from living trees. And also compare with another species that seen in Bangladesh, Helianthus debilis, Helianthus cucumerifolius and Helianthus annuus. Also, from Scientific Illustration of those 3 species.

Color Illustration painted by Miraz Rahman Zarif on the base of living plants at the location, RDA campus in Bogura district. Measurement showing in images with scales. That's also help to complete the full description. Mr. Miraz collected all the herbarium sheet elements. Plant, leaves and seeds. Mr. Miraz also collected most of photographs from living tree at RDA campus, Bogura. Bogura district, RDA campus, Doshmile. Latitude 24.70632° or 24° 42' 23" north. Longitude 89.39486° or 89° 23' 42" east.

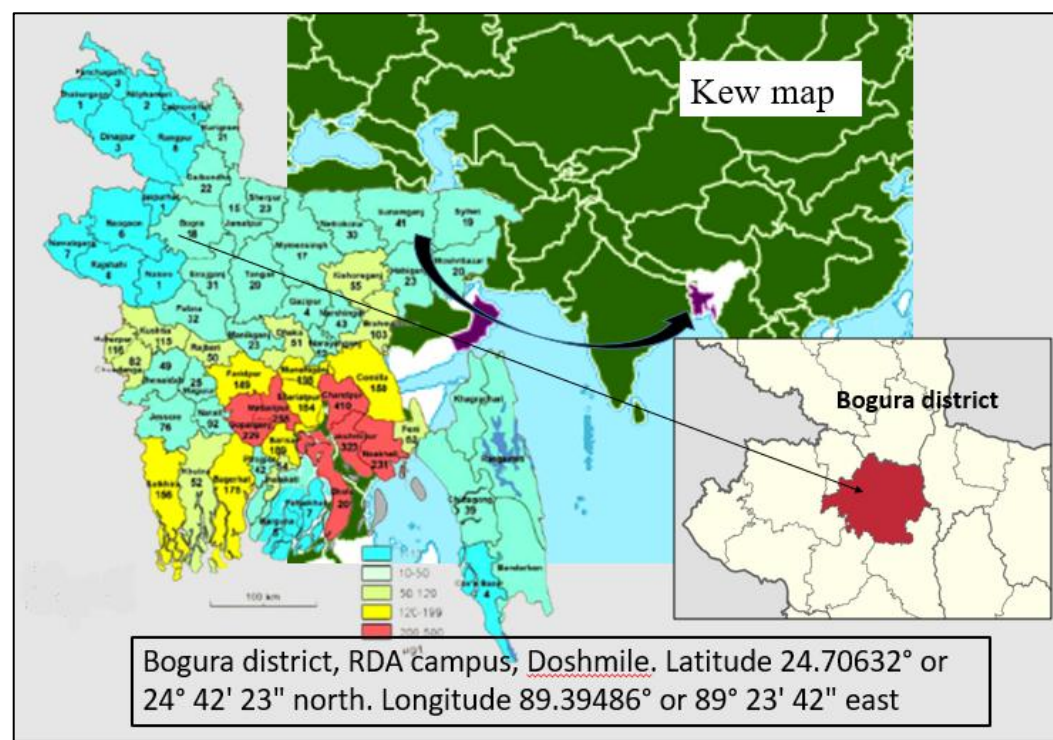
Common name & Bengali name

Common name of this new species *Helianthus bangladeshinensis* Zinia is 'Two inches Sunflower' and 'Sunflower of Bangladesh'. দুই ইঞ্চি সূর্যমুখী ও বাংলাদেশী সূর্যমুখী in Bengali.

Conclusion

After all the discussion, it is sure that *Helianthus bangladeshinensis* Zinia is new to taxon. We illustrated and described a new species of *Helianthus* genus, Family - Asteraceae in Bogura district, Bangladesh. There're showing differences with 3 *Helianthus* species. And 10 identification keys and differ from those 3 species.

Map of Bangladesh



Bogura district, RDA campus, Doshmille. Latitude 24.70632° or 24° 42' 23" north. Longitude 89.39486° or 89° 23' 42" east.

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