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***Putranjiva pundrabogura* Zinia & Miraz, A new species from Bangladesh**

Zinia nasrin Shumon¹ Dr. Md. Ashrafuzzaman²

¹Independent researcher, RDA campus, Bogura, Bangladesh.

²Professor at Bangladesh Agricultural University

Bangladesh

Corresponding author: zinianasrin5@gmail.com

Abstract

Putranjiva pundrabogura Zinia & Miraz is described and illustrated as a new species from the district of Bogura, Bangladesh. *Putranjivaceae* contains 3 genera and about 210 species of evergreen trees of the tropics, especially Africa to Malesia. *Drypetes* (about 200 species) is found throughout this area. Angiosperm Phylogeny Group (2009). Botanical Journal of the Linnean Society. 161 (2): 105–121. Retrieved 2013-06-26. Christenhusz, M. J. M.; Byng, J. W. (2016). First published in Pl. Vasc. Gen. [Meisner] Tab. Diagn. 345, Comm. 258. 1842 [13-15 Feb 1842] (as "*Putranjiveae*") (1842) isonym. It is morphologically similar to *P. roxburghii* but is distinguished by the tree size, leaves texture, bark texture, fruiting position, smallest leaf size etc. *Putranjiva pundrabogura* Zinia & Miraz, this new species available in Bogura district and RDA campus. After the rainy season seedlings are available under this tree. After diagnostic the morphological characters for ***Putranjiva pundrabogura* Zinia & Miraz** include the round wavy trunk (Images-G & H), not hairy leaves and branches. These are the main characteristics of this new species. Whitish-ash color bark on trunk and branches of this species compare with another species *P. roxburghii* Wall. Morphologically (Fig-1) most similar, which is also available in Bangladesh. Also, the fruits shape, leaves-shape difference showing below in mentioned of these 2 species (Fig-2). Showing chart (Fig-3). Distribution showing in maps (Fig-4) also. Medium to big tree also seen in *P. pundrabogura* Zinia & Miraz. But ***P. roxburghii* Wall** seen as a medium tree. Mentioning also that Chinese *Putrajiva* is a big shrub. "The leaves are dotted beneath with glands which exude a waxy excretion. Seed 1.2 x 0.55 cm, drying orange brown."- ***Putranjiva zeylanica***. This narration not matching with *P. pundrabogura* Zinia & Miraz leaves, fruits color and seeds. Showing these 3 species differences below.

Keywords: *Putranjivaceae*, *Putranjiva*, New species, Bangladesh.

1 Introduction

Putranjivaceae is a rosid family that is composed of 218 species in 2 genera of evergreen tropical trees that are found mainly in the Old-World tropics, but with a few species in tropical America. Botanical Journal of the Linnean Society. 161 (2): 105–121. (Christenhusz, M. J. M.; Byng, J. W. (2016) & First published in Pl. Vasc. Gen. [Meisner] Tab. Diagn. 345, Comm. 258. 1842 [13-15 Feb 1842] (as "Putranjiveae") (1842) isonym.

Members of this family have 2-ranked; coriaceous leaves, which, if fresh, typically have a radish-like or peppery taste. The flowers are fasciculate and usually small, and the fruits of these species are a single-seeded drupe crown by the persistent stigmas. This family has its origin in Africa and Malesia. It is the only family outside Brassicales that produces mustard oils.

The native range of this family is Tropical Asia. This tree grows primarily in Indian sub-continent, China and Malesia. From Putranjivaceae family, there are 4 accepted species (Kew) only one species found in Bangladesh. The seeds of these species have a secret value from ancient time. So, In Hindu-Buddha temples, this tree planted from ancient time. For its medicinal value, its name is **Jeoputa or Putrajivi (Save child life)**. Believed that, the seed have the power to save

Children. Weak son and mother also. That is why this oil compare with Olive oil, which called “Joytoon” in Arabic language, locally called “Joytoon oil” in Bogura District, for the medicinal value. That seed contains mustard oil like element. Flowers are small, 2 types – male & female. Born in one by one in leaf-axis. Leaves also used as a medicine. Old tree make crown but drooping branches like big Salix tree.

Methods

Description of this species is based on living plant. All the Images captured from 2/3 tree, from the same species. Flowers, Fruits, Twigs, Seeds collected from living trees. And also compare with another species that seen in Bangladesh, *P. roxburghii*. Collected fruit and seeds from this living tree. Also from Scientific Illustration of *P. roxburghii*. Color Illustration painted by Miraz Rahman Zarif on the base of living tree 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. Twigs, Leaves, Fruits, Inflorescence (Images), seeds & seedlings. 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.

Taxonomic treatment

Putranjiva pundrabogura Zinia & Miraz sp. nov. p- 17, 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.

Diagnosis

Morphologically **Putranjiva pundrabogura Zinia & Miraz** is similar to *P. roxburghii*. But differs in its Tree size, Leaves, Fruits, Seed-shell, Trunk, Trunk color, Bark texture, Fruit position, Branch-texture, Bottom leaves. Also, tomentose leaves and branches a main character. (See-Table-1) Showing differs in both illustrations. “The leaves are dotted beneath with glands which exude a waxy excretion. Seed 1.2 x 0.55 cm, drying orange brown.”- ***Putranjiva zeylanica***. This is another species showing differ with *P. pundrabogura* Zinia & Miraz.

Taxonomic tree

Kingdom: Plantae
Clade: Tracheophytes
Clade: Angiosperms
Clade: Eudicots
Clade: Rosids
Order: Malpighiales
Family: Putranjiva Wall.

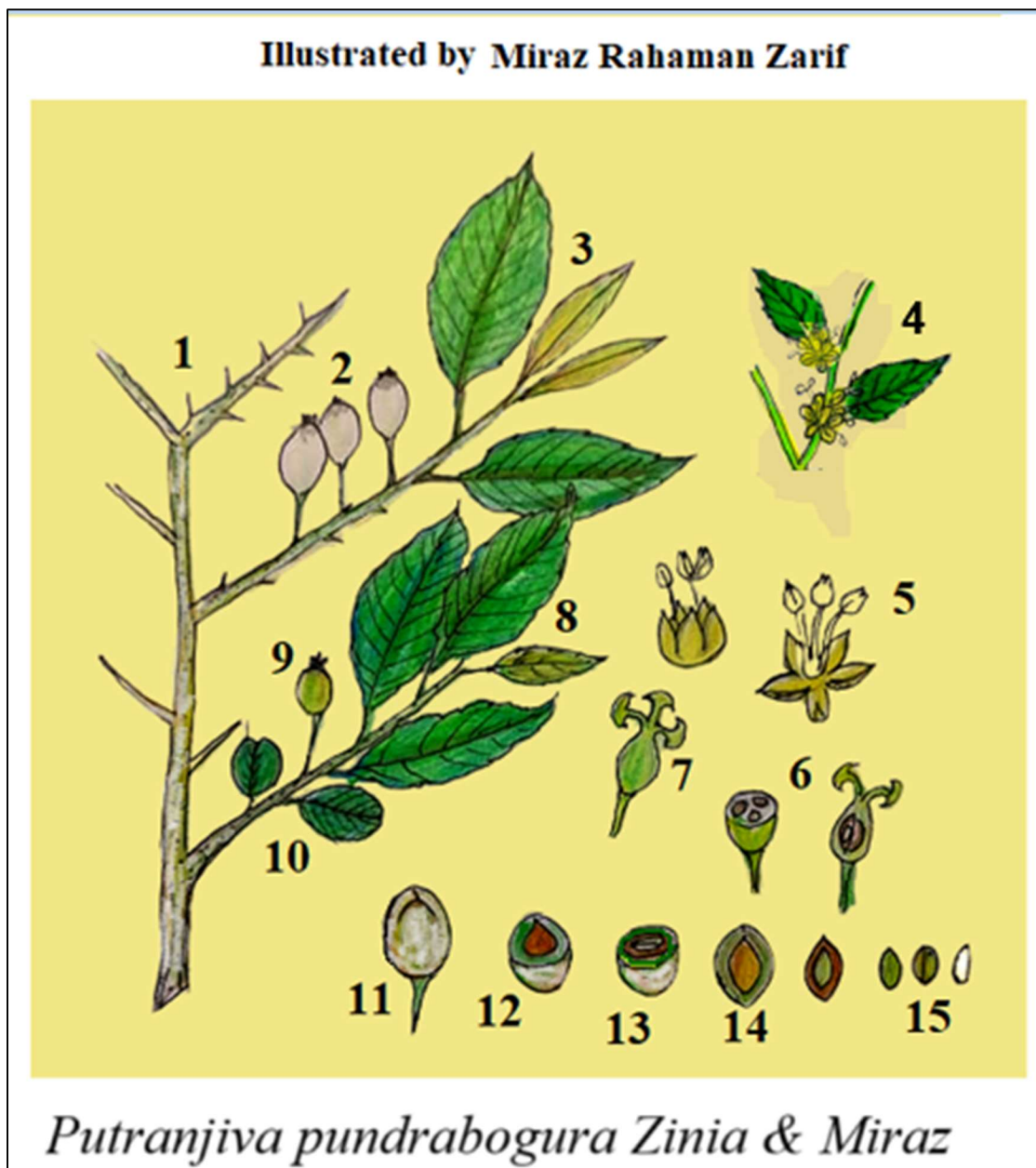
Description

Tree, Medium to big (15-17m), evergreen. Trunk has a round wavy shape-which is the main characteristic of this species. Old tree trunk of *Putranjiva pundrabogura* Zinia & Miraz showing at Nawabbari Palace Museum about 40 inches dia. At RDA campus, about 25 inches dia. Bark color whitish-ash. Young tree bark smooth, not rough like *P. roxburghii*. (Fig-2: Difference between *Putranjiva pundrabogura* Zinia & Miraz & *Putranjiva roxburghii*) Drooping branches look like *Salix* tree. Whitish branch skin has small wart like texture. Leaves undulate, sometimes deeply. Light color underneath. Size (1’3-10cm) X (1-3’5cm). Pointed tip usually curled. Petiole (4-5mm). 14-15 lateral veins. Prominent midrib. Margin serrate. Opposite. Small round shape leaves on bottom of branch. New light green glossy leaves with dark green glossy leaves. Dioecious flower. Yellowish male flowers as round axillary clusters on branches. Female flowers from axil 1-3, greenish. Drupes 1’5-6cm, ellipsoid. Narrowly pointed 2 sides. Skin whitish-green, 3 loop-shape at apex. Branches, leaves, fruit-skin not tomentose at all like *Roxburghii*. Pedicles 9-12 mm. Fruits grow only leaf-axil of fruiting branch. Stone pointed both sides. Very hard to crake. Size about 1’5cm. 3 parts of stone and seed like a nut. 2 parts, size 1’2-1’4 cm. Green outside and whitish outside (Fig-1: Botanical Illustration).

Seeds taste like mustard oil.

Season - March-May the flowering season. Fruiting – October-December.

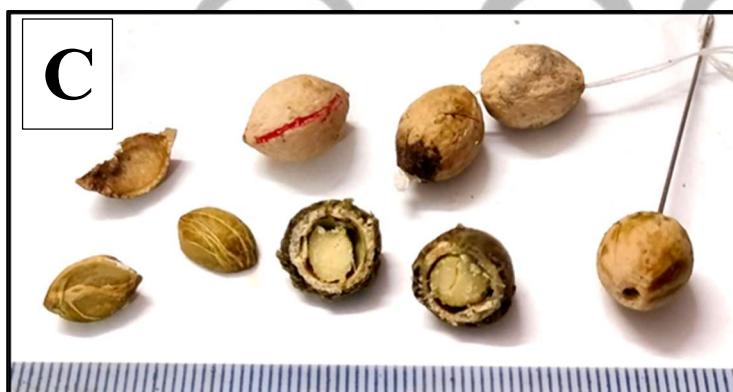
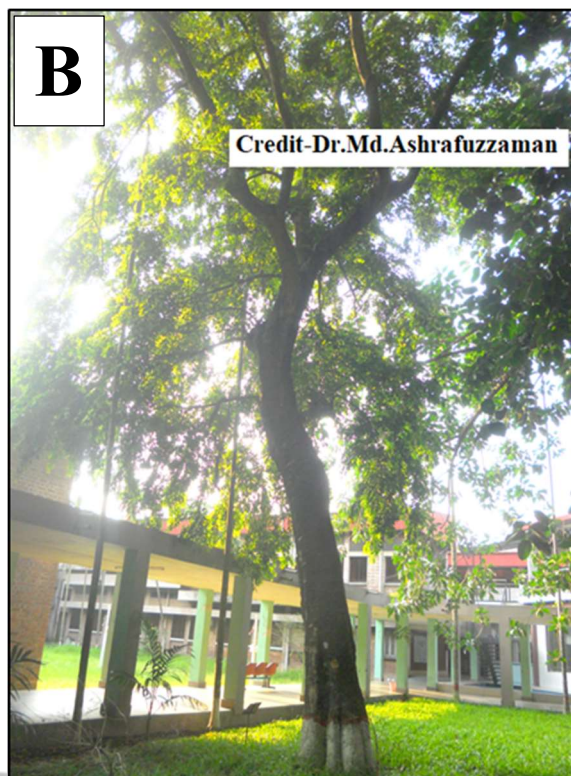
Illustration (Fig-1)



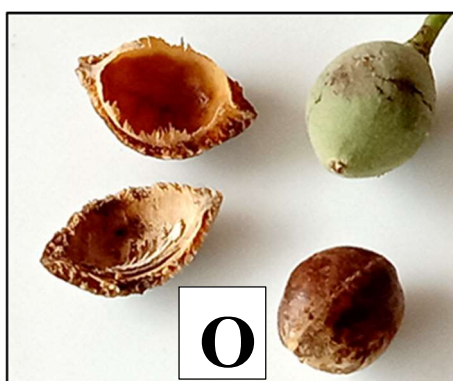
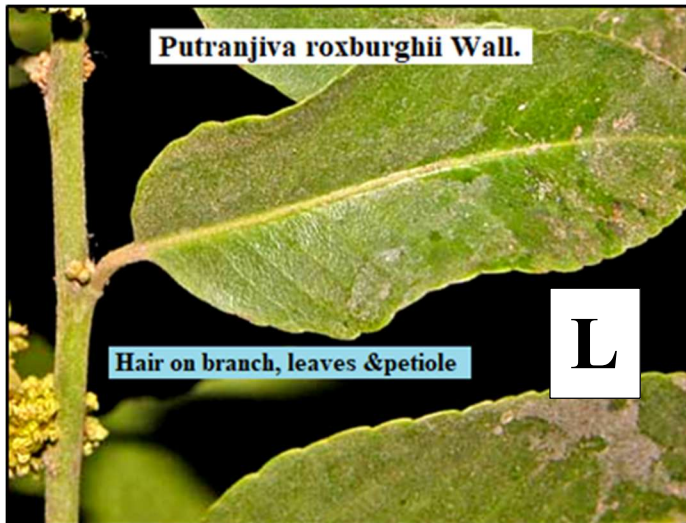
1. Fruiting twigs. 2. Mature grey-whitish fruits. 3. New leaves. 4. Inflorescence on leaf axil only. 5. Single male flowers. 6. Showing ovary. 7. Female flower turning into fruits. 8. Immature light green leaves always seen with mature dark-green leaves. 9. Immature fruits with greenish color. 10. Bottom small and round leaves. 11. Mature fruit. 12. Cut the skin, showing pointed half-fruit. 13. Cut the fruit, showing inside nut. 14. Fruit skin and seed shape. 15. Nut showing inside seed-shell, whole nut with green skin, 2 parts of nut and white texture inside.

Fig-2. Difference between Putranjiva pundrabogura Zinia & Miraz & Putranjiva roxburghii.

<i>Characters</i>	<i>Putranjiva pundrabogura Zinia & Miraz</i>	<i>P. Roxburghii</i>
Tree size	Medium to Big (17m)	Medium to big (20m)
Leaves	Glossy dark green mature, new leaves bright green	Green & Tomentose.
Fruits	Narrowly pointed both sides.	Globosely pointed. Wider in middle.
Seed-shell	Narrow & boat shape.	Wider than new species.
Trunk	Wavy-rounded smooth trunk	Rough trunk, not round
Trunk color	Whitish-ashy. Branches whitish, wood white.	Brown color.
Bark texture	Smooth when young, not so rough in old.	Rough and showing inside wood.
Fruit position	Only from leaf-axil.	From axil & branches also.
Branch-texture	Branches showing white color with small warty texture.	Not known
Bottom leaves	Round-shape (1'3-2cm)	Lance-shaped
Fruit shell	Not fleshy, skinny.	Showing fleshy in Illustration (See-X)





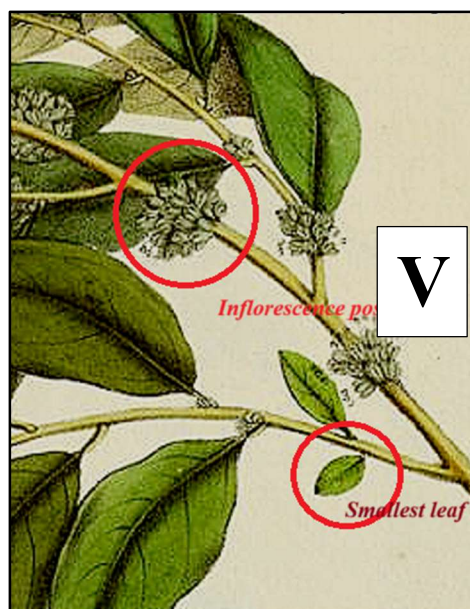
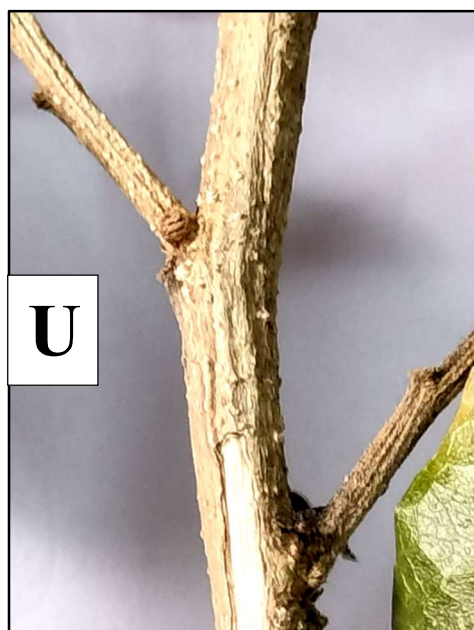


P





Female Inflorescence on leaf axis.



Location: Nawab-bari Palace Museum, Bogura

- A. Habitat in RDA campus with *Zinia nasrin*.
B. At RDA campus, Bogura.



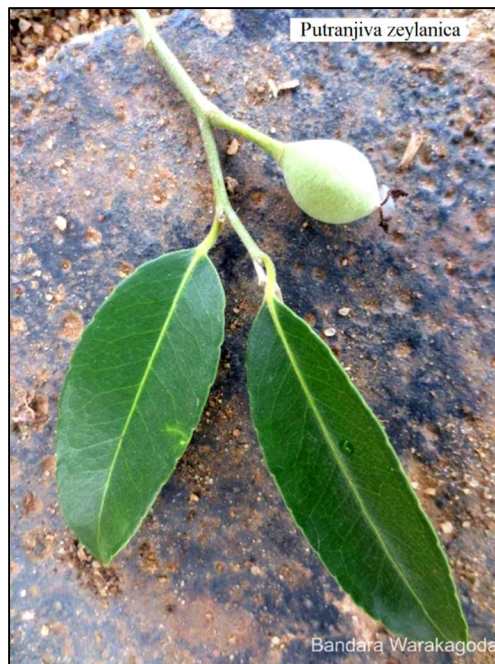
- C. Showing details with scales. Making necklace from seeds.
- D. Showing nut inside seed-shell.
- E. Roxburghii seeds, nut with scale.
- F. Roxburghii rough tree trunk.
- G. RDA putrajivi tree ashy-white trunk.

- H. Old tree trunk of **Pudra Jeoputa** at Nawab-Bari Palace Museum, Bogura.
- I. Rough tree trunk of *Roxburghii*.
- J. Fruiting twigs of *Roxburghii*.
- K. Fruiting twigs of **RDA Putrajivi**.
- L. Brown tomentose branch, leaf & petiole.
- M. 3 loops type part of fruit.
- N. Details showing with scale, undulate leaves, tips, 1'2cm round-shape bottom leaf.
- O. **RDA Putrajivi** seed shell.
- P. 3 parts showing on seed-shell.
- Q. Mature fruit skin.
- R. New bright green new leaves with oily dark green old leaves.
- S. Fruit cut – showing skin, nut & seed texture.
- T. Inflorescence.
- U. Branches showing white color with small warty texture.
- V. Illustration showing inflorescence on axil & branches also. Small lance-shaped bottom leaves. Mat tomentose over all.
- W. Drooping branches and crown like *Salix* tree. Very old **Pudra Jeoputa tree** at Nawab-Bari Palace Museum, Bogura.
- X. Fruits, seeds, leaves and other details of another *Putranjiva* species with brown-orange fleshy fruits.
- Y. About 1cm bottom leaves size, showing warts all over branches, sub-branches and fruit's petiole also.

Putranjiva zeylanica (For compares')

Tree about 20m tall. 1mm long stipule. Leaf size (5'5-12cm) X (1'5-4'5cm). Which is bigger than *P. roxburghii* & *P. pundrabogura* Zinia & Miraz. Leaves and branches whitish green. No light green leaves like *P. pundrabogura* Zinia & Miraz. The leaves are dotted beneath with glands which exude a waxy excretion. (Ref.) Male flowers pedicellate. Several flowers in leaf axil. Groups of female flowers about 3. So group of 2/3 flowers also seen in this *zeylanica* species.

The buds excrete a gum (Ref.). This character made differ with **P. pundrabogura** Zinia & **Miraz**. Fruit size also big. 2 x 1.25cm. Seed 1'2 x 0'55cm. Drying color orange-brown.



Etymology

The name of this new species Putranjiva pundrabogura Zinia & Miraz. Here. "Pundra" word comes from the 3000 years ago capital of Mauryan empire- "Pundranagar". Another word 'bogura" from Bogura district, Bangladesh.

Habitat

In Primary bamboo forest. Near Local area. Planted in Hindu temple also.

Key identifying characters

The smallest leaf is round and 1cm. In branches no hair at all. Wavy trunk. Black-ashy bark.

Specimen examined

At RDA campus. Old tree at Bogura town (At Nawab-Bari palace). 26.10.23, Zinia Nasrin Shumon, Herbarium sheet number - ZNS 501 (AAHBAU)

Distribution

The genus distributed in India and Sri Lanka.

Economic uses/values/harmful aspects

Putranjivah is an Indian native medicinal plant used to treat many diseases such as treatment of mouth and stomach ulcers, hot swellings, smallpox, burning sensation and ophthalmopathy. The main medical uses for fertile woman for child. Myth is the garland of seeds protect the ill mother and child. This's why it is called "Save the Child" tree.

Ethical approval

Sample collected from live tree at RDA campus, Bogura. Illustration made using the plants' parts like flowers, leaves, fruits and seeds. Also testing the seeds. It was belonging to brassica family. And 3 parts of seed belongs to Euphorbiaceae.

Author's contribution

Zinia Nasrin Shumon completed the manuscript and prepared the images. And Dr. Ashrafuzzaman Sir did the final task.

Conflicts of interests

The author declares that there are no conflicts of interest.

Funding

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Data and materials availability

All data associated with this study are present in the paper.

Acknowledgements

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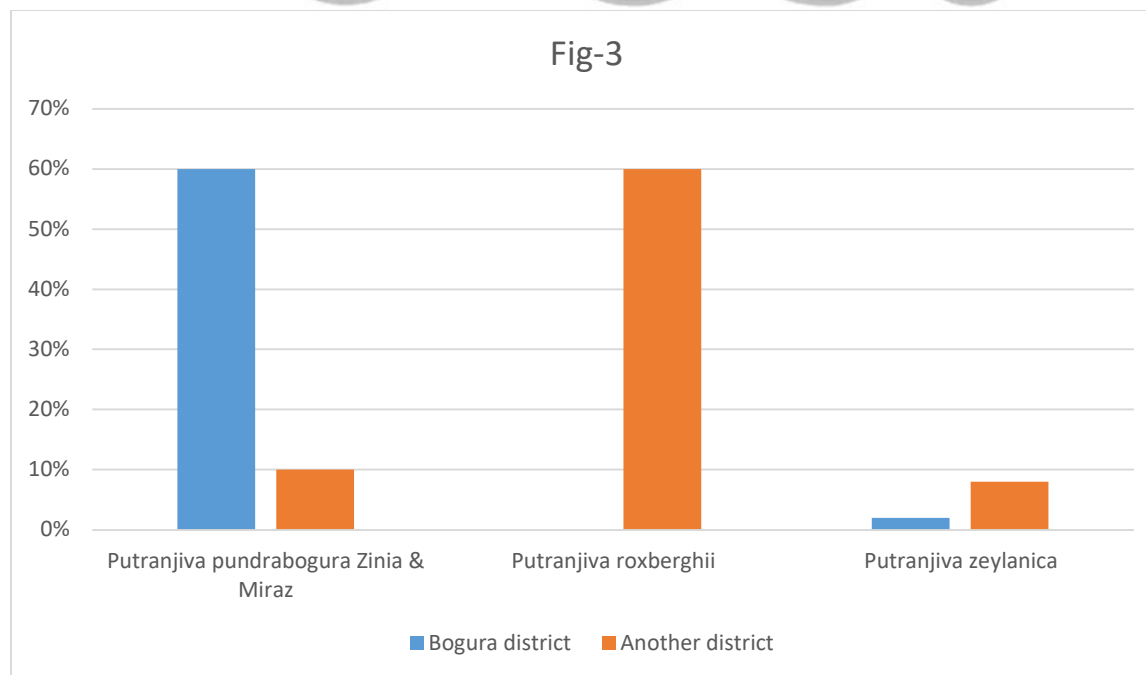
We thanks to Mr. Miraz for collecting all of the herbarium materials for getting the full description. He made herbarium sheet. Botanical Illustration also done by him. Mohammad Zainul Abedin for guiding to take photographs with white paper and scale. Thanks to Dr. AKM Zakaria, Firoz Hossain to make 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.

Common name & Meaning

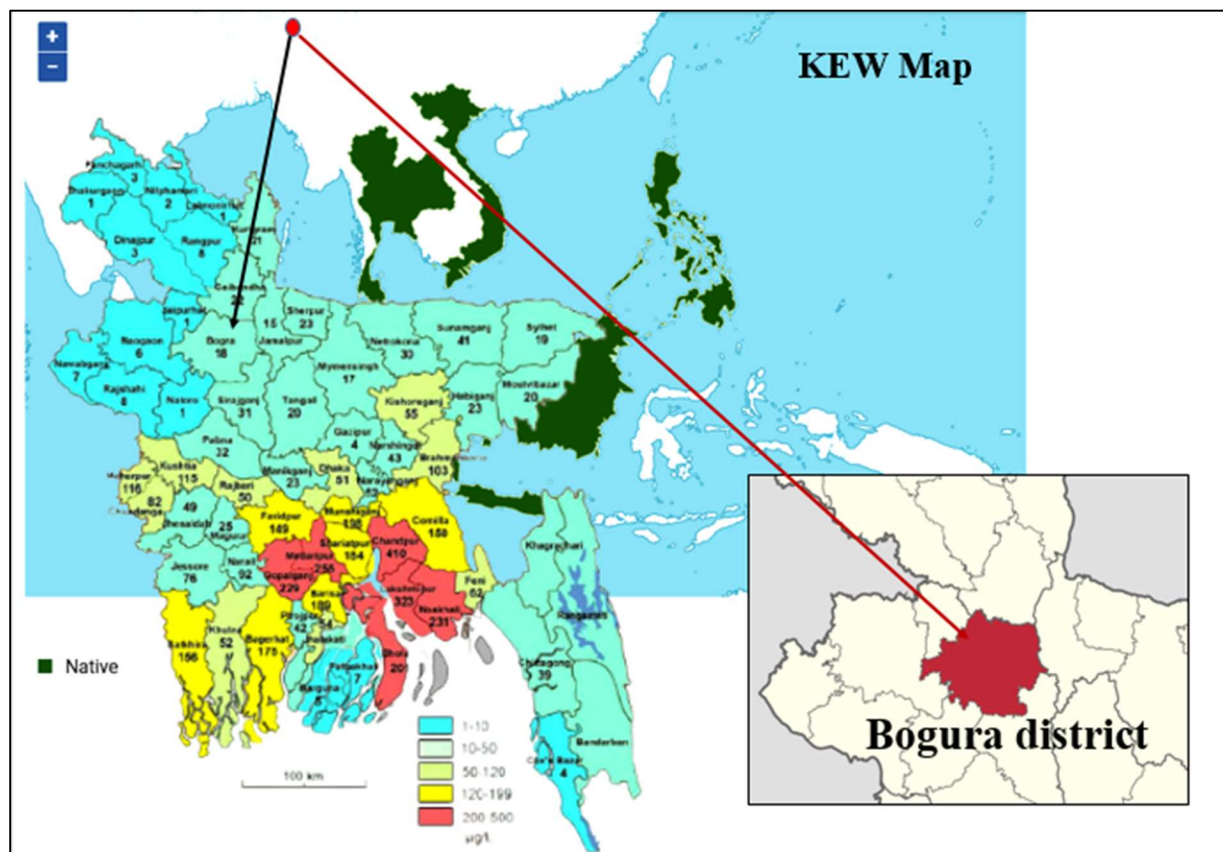
Common name of this new species "**Pundra Jeoputa**" for its medicinal value from thousand years in Indian Sub-continent. পুন্ড্র জিয়াপুতা in Bengali language. "**RDA Putrajivi**" in English RDA from Rural Development Academy, Bogura, Bangladesh. *Pundra* from Ancient 3000-2500 years ago Fort-capital named "**Pundranagar**", now Bogura.

Conclusion

After all the discussion, it is sure that Putranjiva pundrabogura Zinia & Miraz is new to taxon. We illustrated and described a new species of Putranjiva genus, Family - Putranjivaceae (Old Euphorbiaceae) in Bogura district, Bangladesh. There're showing differences with *P. roxburghii* and *P. zeylanica*.



Distribution Map (Fig-4)



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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