



OBSERVATIONS ON ANTHESIS TIMING AND FLORAL PHENOLOGY OF *ADANSONIA DIGITATA* LINN. IN BULANDSHAHR DISTRICT, UTTAR PRADESH, INDIA

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ABSTRACT: *Adansonia digitata* Linn. trees are recognized as the sacred Parijat, kalpavriksha and wishing tree of Indian mythology. The aim of this research was to record the anthesis time of baobab tree (*Adansonia digitata* L.). The initiation time of anthesis recorded at mean $18:55 \pm 05$ and completion time of anthesis recorded at mean $19:50 \pm 05$ in the evening; however, on a (wet) rainy day, the anthesis process was recorded at mean $17:55 \pm 05$, $18:25 \pm 05$. The study focused on five flower buds per tree. One tree about 35 years old was recorded at IP College, Bulandshahr and one tree about 15 years old was recorded at Numaish Ground, Bulandshahr. Two trees were recorded at both study sites. This study was conducted from July 2025 to October 2025 at I. P. P.G. College and Numaish Ground, Bulandshahr district of Uttar Pradesh. The white petals inside the green sepals gradually unfolded, forming a structure resembling a ceiling fan; this process was recorded between 18:55 PM and 19:30 evening. The sight was captivating and truly amazing. During this time, more than 400 cream-coloured stamens and a long style were observed inside the flower. At night, five green sepals and five white petals were observed moving upwards between 19:30 and 19:45. Within 20 to 25 minutes sight was recorded complete anthesis, it means the flower is at its absolute peak of bloom and is fully ready for pollination. During this time, the staminal tube or stamina column inside the flower was clearly visible. Temperature and rainfall play a crucial role in the anthesis of *Adansonia digitata*. The overall objective of this study was to generate information on the anthesis time of *A. digitata* in Bulandshahr district of Uttar Pradesh.

Keywords: *Adansonia digitata*, Anthesis, Observation, Biodiversity, Conservation

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INTRODUCTION

Adansonia digitata 'Kalpavriksha' is an endangered tree of Uttar Pradesh (according to Uttar Pradesh Biodiversity Board). The species is native to Africa and is considered an introduced species in India. It is the national tree of Madagascar. Its populations are limited in the Uttar

Pradesh state. Population decline may be attributed to habitat loss, climate change, lack of awareness, urbanization, low fruit set, and poor germination. *Adansonia digitata* L. trees are revered in many Indian states such as Rajasthan, Gujarat, Madhya Pradesh, and Uttar Pradesh etc. It is a heritage tree declared in some locations of

Uttar Pradesh, hence its conservation need and awareness are very important. It is a deciduous, massive and majestic tree up to 25 m high, which may live for hundreds of years (Gebauer *et al.*, 2002). Its role as a landmark and social hub further cements its position as a cultural and practical centrepiece (Theophilus Deenadayal and Tarun Jain 2024). The remarkable, long-lived baobab tree has a short, swollen trunk with a girth of up to about 28 m, ending in thick, wide-spreading branches that carry a large, round canopy reaching a height of up to 25 m (Sidibe and Williams 2002). *Adansonia digitata* L. belongs to the Malvaceae family and is generally known as the Baobab, Dead rat tree, Elephant Tree, Upside-Down Tree, Khurasani Imli, Tamarind Baobab, Hathion ka jhad, Gorakh Chinch, Gorakh Imli, Kalpavriksh, Parijat tree, Bottle tree, The tree of life, Monkey bread tree, Sour gourd, Cream of tartar tree, Gorakshi tree etc. *Adansonia digitata* species is hermaphrodite with both male and female reproductive structures in the same flower. The bud of the flower is the size (length about 6.4 cm, width 6.2 cm, weight 73 g) and shape of a golf ball and is covered by a green velvet type protective layer (five calyx). *Adansonia digitata* flower is unique, very large (length about 15 cm, width about 19.4 cm. and fresh flower weight about 69 g) number of stamens (about 380 to 425) attached to a central column (length 4.2 cm), which are visited at night by honey bees and other insects to take nectar. *Adansonia digitata* flower have a long style (4.5-10.2 cm) that extends from the top of the ovary, growing through and projecting beyond the staminal tube. The ovary is ovoid (egg-shaped) and typically has 8 to 10 locules. The ovary is also covered in fine hairs. At night, when the flowers bloom, the white petals emerge from the tip of the calyx. The flowers have a pleasant fragrance. This fragrance persists from night until day. The actual blooming time of *Adansonia digitata* L. flowers was not found on the internet (Google) or mentioned in any research papers of Uttar Pradesh. Hence, the baobabs play an important biological role in the conservation of

ecosystems, of which lemurs, fruit bats, sunbirds, and hawk moths are important constituents (Baum, 1996). In India, Wickens and Lowe (2008) reported that the baobab's "sweet-smelling flowers" are "used...for religious and other festivities," and we can conclude from Vaid's (1978) work that the flower has long been of importance in Hindu religious thought. In his widely cited article on the introduction of *Adansonia digitata* into India. John Rashford (2015), the uses of the flower in the increasingly sophisticated research on the baobab that is now being done in Africa and elsewhere. The large, white flower that blooms at night hang upside down from the branch like a chandelier. During anthesis at night, the white corolla, about 400 stamens, and pistil emerged from inside the calyx of the *Adansonia digitata* L. The anthesis process of *Adansonia digitata* is completed between 7:30 PM and 7:50 PM. Within 20-minutes sight of anthesis inspires a love for nature and awareness for biodiversity conservation. This study is very significant for the future. The present study aimed to document the anthesis timing and flowering behavior of *Adansonia digitata* under field conditions in Bulandshahr district, Uttar Pradesh.

MATERIAL AND METHODS

Bulandshahr is a district in Western Uttar Pradesh, located in the fertile Ganga-Yamuna Doab (plain), characterized by alluvial soil. Temperature of Bulandshahr, Uttar Pradesh is 44°C maximum and temperature is 5°C minimum. Maximum Humidity Period of Bulandshahr (Monsoon & Winter): Relative humidity peaks significantly during the monsoon month of August (75% – 85% average) due to heavy rainfall, 93% of the annual precipitation falls during these months. July and August are the wettest months, with August alone receiving an average of over 190 mm to 250 mm of rain. During the observations, a Nikon D 5600 camera and a Realme mobile model RMX3381 were used for photography. A survey on anthesis time in *Adansonia digitata* L. was conducted in I.P. College and Numaish Ground, Bulandshahr, from

July 2025 to October 2025. During the survey period, approximately 10,000 photographs were taken by Author. These photographs were archived as documentation at department of Botany, I.P. College Bulandshahr. Observations were conducted four times one month at both study sites. Observation of timing anthesis evening to night (17:30 to 23:00) and morning to afternoon (07:00 to 15:00). Field work was done over four Months, starting in July 2025 and ending in October 2025.

RESULTS

The time of anthesis in *Adansonia digitata* L. was recorded at IP College and Numaish Ground, Bulandshahr, district Uttar Pradesh initiation anthesis time mean $18:55 \pm 05$, figure no 4 date 29 September 2025, figure no.16 date 6 october 2025 and completion time of anthesis mean $19:50 \pm 05$ in July, August, September, and October months 2025, figure no.15 and 27 ;results show in (Table 1, and Fig.4 to 15 and 16 to 27). Rainy day at these study sites initiation anthesis time mean was recorded from $17:50 \pm 05$, completion time of anthesis mean $18:20 \pm 05$ results mention in table 1 and Fig. 27 and 28a and 28b). The movement of the petals with the sepals was recorded as rapidly moving upwards during this (19:30 to 19:50). On dry days the anthesis time for *Adansonia digitata* is late evening then rainy day. It is also true that the *Adansonia digitata* tree acts as a time indicator. Significant roles of sunlight, temperature, and humidity were observed anthesis of *Adansonia digitata* in dry and rainy days of Bulandshahr district, Uttar Pradesh.

DISCUSSION

The primary research on the anthesis (flower-opening process) of *Adansonia digitata* Linn. was recorded in the Bulandshahr district of Uttar Pradesh. This research has been supported by the research of several authors. Reported that (Baum A.D. 1995), anthesis begins in the evening; flowers last for less than 24 h and pollination occurs over ca. 12 h. Flowers produced during dry or wet season; buds globose with an acute conical apex,

solitary, rarely paired; flower stalk pendulous, 15-90 cm long. African baobabs exhibit steady state flowering between one to five months (Oct–Apr) and the trees collectively peak in flowering at the same time each year (Venter and Witkowski, 2019). There is no difference in the number of flowers produced or the length of flowering time between poor producer and producer tree types observed in South Africa (Venter and Witkowski, 2019). David Baum and Tricia Handasyde (1990) Australian baobab has flowers that open relatively slowly compared to other baobabs; anthesis lasts about 20 or 30 minutes as compared to minutes for *A. fony*. Goody (1993), focused on the flower as a harvest forerunner rather than a rain indicator or planting cues, and yet all three kinds of floral temporal markers are associated with the baobab flower. The full bloom commenced from the third week of September till the mid-week of October. Baobab tree species was taken two months of 60 days to reach full bloom (Table 3). Matured flowers started to wither and dried from the first week of October and ended in the last week of October. During the flowering season, trees produce 10–50 flowers per night (F. Von Breitenbach, J. Von Breitenbach) The rapid anthesis of bat-pollinated baobabs around dusk can be hypothesized to serve the biological role of reducing pollen and nectar loss to diurnal animals (e.g., bees and sunbirds) while allowing nectar presentation to primarily crepuscular paleotropical fruit bats (Baker, 1973; Marshall, 1983). Observations have recorded the flower remaining on the *Adansonia digitata* tree for 15 hours during dry weather and 24 hours during the rainy day. The flower wilt initial stage 10:30 A.M. and completely withered in evening 18:00 (figure no 34,35 and 36) The anthesis time of *Adansonia digitata* was recorded at I.P.P.G. College and the numaish ground in Bulandshahr district, Uttar Pradesh. This actual time will provide important information to other states of India, and any difference in timing will provide a direction for new research. The study of anthesis in *Adansonia digitata* is crucial for biodiversity conservation.

Table 1. Recorded Time of Anthesis in *Adansonia digitata* Linn.

STUDY SITES	DATE OF OBSERVATION	ANTHESIS INITIATION AND COMPLETION TIME OF <i>Adansonia digitata</i>	WEATHER CONDITION TEMPERATURE/ HUMIDITY
I.P. P.G. College, Bulandshahr.	28 July 2025	18:55 ± 05, 19:50 ± 05	Average 37°C / 72%
Numaish Ground Bulandshahr.	29 July 2025	18:55 ± 05, 19:50± 05	Average 37°C / 72%
Numaish Ground Bulandshahr.	25 August 2025	18:55 ± 05, 19:50± 05	Average 36°C / 73%
I.P. P.G. College, Bulandshahr.	30 August 2025	18:55 ± 05, 19:50 ±05	Average 36°C / 74%
I.P. P.G. College, Bulandshahr.	2 September 2025	18:55 ± 05, 19:50 ± 05	Average 35°C / 71%
Numaish Ground Bulandshahr.	29 September 2025	18:55 ± 05, 19:50 ±05	Average 35°C / 73%
Numaish Ground Bulandshahr.	6 October 2025	18:55 ± 05, 19:50 ± 05	Average 34°C / 65%
P. P.G. College, Bulandshahr.	1 October 2025	18:55± 05, 19:50 ± 05	Average 34°C / 67%
I.P. P.G. College, Bulandshahr.	4 September 2025 (Rainy day)	17:50 ± 05, 18:20 ± 05	Average 29°C / 88%
Numaish Ground Bulandshahr.	17 September 2025(Rainy day)	17:50 ± 05, 18:20 ± 05	Average 28°C / 85%



Fig.1 View of mature buds (09:10)



Fig. 2. Anthesis scene of *Adansonia digitata* L. buds after 24 hours, 17 minutes. in I.P.P.G. College, Bulandshahr.

Photo - Dr. Yashwant Rai

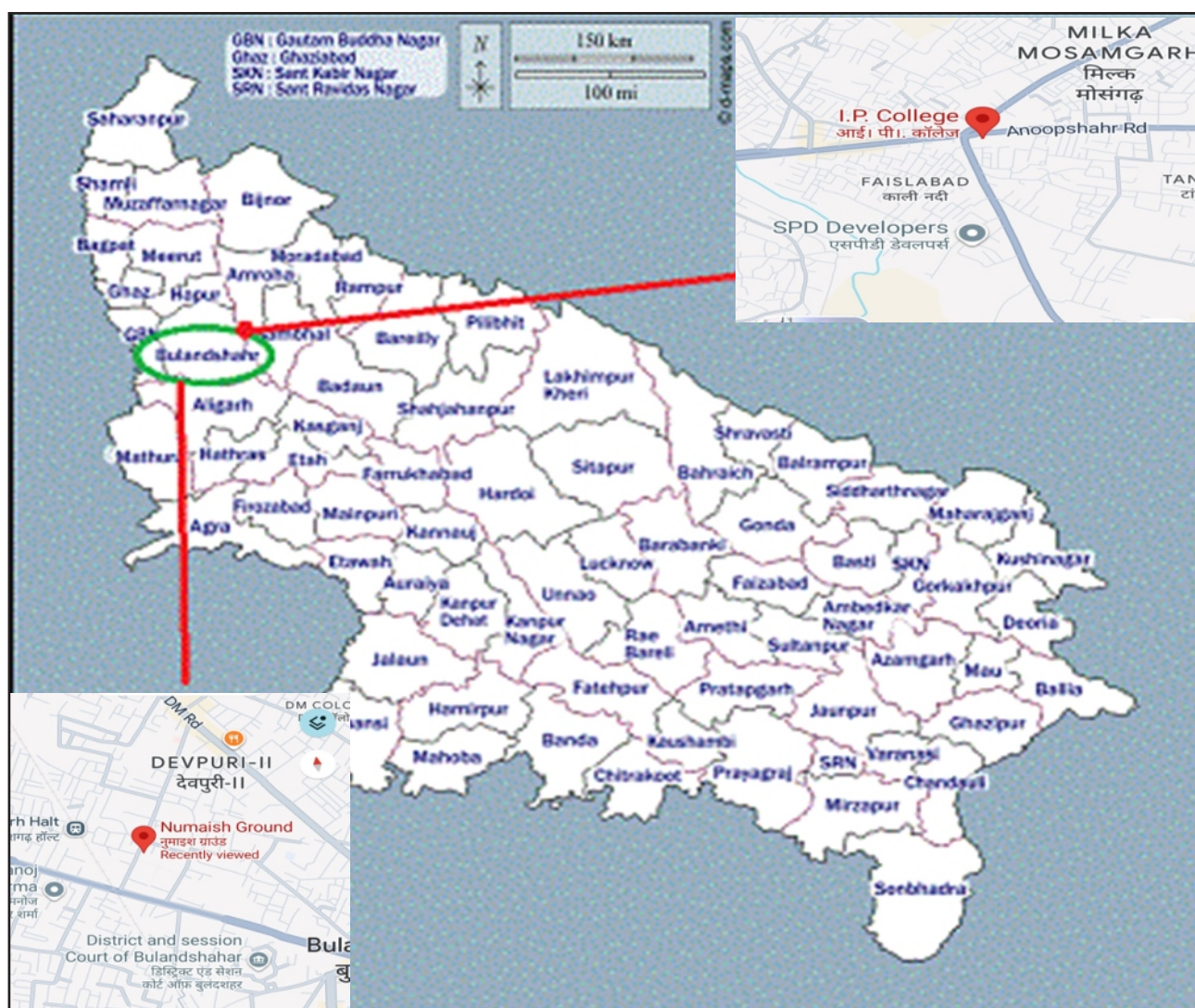


Fig. 3. Uttar Pradesh Map presenting location of two study sites of *Adansonia digitata* L.



Fig. 4. View mature bud (18:55)



Fig.5. View of open calyx



Fig.6. View of open calyx 44



Fig. 7. View of open calyx



Fig .8. View of folded Petals



Fig .9. View of calyx (19:30)



Fig. 10. View of calyx (sepals)



Fig. 11. View of calyx and corolla



Fig. 12. View of calyx and corolla



Fig.13. View of calyx and corolla



Fig. 14. view of unfolded petals and fan like structure of petals



Fig. 15. view of upward movements of the petals and visible stamens and style (19:50)

All Photos taken by Dr. Yashwant Rai



Fig. 16. View mature bud (18:55)



Fig. 17. View of calyx movements



Fig. 18. View of calyx movements



Fig. 19. View of folded corolla



Fig. 20. View of calyx and corolla



Fig. 21. View of calyx and corolla



Fig. 22. View of calyx and corolla



Fig. 23. View of calyx and corolla



Fig. 24. View of calyx and corolla



Fig. 25. View of fan like of calyx



Fig. 26. view of upward movements of the petals



Fig. 27. view of upward movements of the petals (19:50)

All Photos taken by Dr. Yashwant Rai



Fig. 28 a. and 28 b. View of *Adansonia digitata* flower with pollinators Honey bees in I.P. College P. G. College Bulandshahr.

Anthesis Time (18:16 Fig. 28 a) and 18:23 (Fig. 28 b) (Rainy day)

Photo Dr. Yashwant Rai

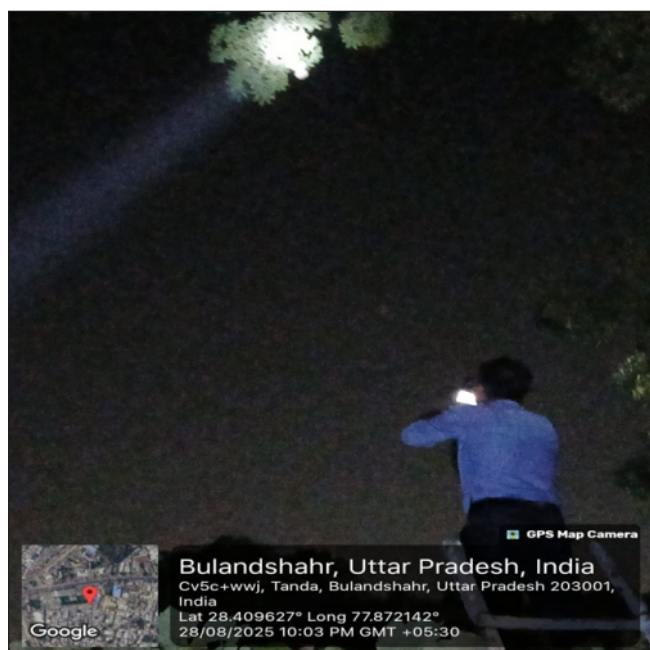


Fig. 29. Author capturing a photograph of *Adansonia digitata* at night.



Fig. 30. View Author capturing a photograph of anthesis at night



Fig. 31. View of (female sunbird) *Cinnyris asiaticus*, sipping nectar from *Adansonia digitata* flower



Fig. 32. View of *Cinnyris asiaticus*, sipping nectar from *Adansonia digitata* flower



Fig. 33. View of structure of *Adansonia digitata* L flower.

Photo Dr. Yashwant Rai



Fig. 34. View of *Adansonia digitata* L flower in noon.

Photo Dr. Yashwant Rai



Fig.35. View of withered flower at afternoon



Fig.36. View of withered flower
Photo Dr. Yashwant Rai



Fig. 37. View of *Adansonia digitata* L. dry flower

CONCLUSION

It is concluded that the aim of the present study is to spread awareness towards conservation of endangered tree *Adansonia digitata* in those areas where the plant is now rarely found. This research work will also prove to be of immense usefulness for the time of anthesis in Bulandshahr district, Uttar Pradesh.. Since this plant is beneficial for humans in many ways, therefore, it is required that wide propagation and conservation of this plant should be carried out, in order to ensure that future generations can benefit from it.

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