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Addition of *Butea monosperma* var. *Lutea* (Fabaceae) in the flora of district Rajnandgaon, Chhattisgarh, India

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Abstract
Golden yellow flowering *Butea monosperma* was recorded for the first time in district Rajnandgaon near Ambagarh Chowki. The plant is identified as *Butea monosperma* (Lam) Taub. Syn *B. Frondosa* Koenig Ex. Roxb.var. *lutea* (Witt) Maheshwari. The location of the plant is 20° 49' 19.1"N; 80° 44' 45.8"E. On-site observation and morphological characteristics were examined. Counseling with local peoples was done to gather its socio-economic importance.

Keywords: Chhattisgarh, golden yellow, new species, palash, taxonomy

Introduction

Butea monosperma has a place with the family Fabaceae and is commonly known as the Flame of forest. It has various local names like palas, palash, chichra, dhak, bastard teak, bijasneha, bengal kino, khakara, mutthuga (Firdaus and Mazumder, 2012) [1]. *B. monosperma* is a very slow developing deciduous tree distinguished by the trifoliolate pinnate leaves. It is naturally grown in the tropical and subtropical climate of India, Sri Lanka, Thailand, Laos, Bangladesh, Nepal, Myanmar, and Cambodia (Kandasamy & al., 2013) [2].

The different parts of plant and extract have been utilizing in Unani, homeopathy, and traditional system medicine since a long year ago. It is useful in hepatic disorder, diarrhea, ulcer, diabetes, improving memory, and abnormal menstruation. Antihelminthic, antibacterial, anti-inflammatory activities, free radical scavenging activities are likewise such properties of *B. monosperma* (Yadav & al., 2020) [3].

Flavonoids are very important naturally occurring polyphenol and are active biomolecules with medicinal values. The flower and bark of *B. monosperma* contain flavonoids such as butin, butrin, isobutrin, and butein (Chauhan and Mahish, 2020) [4].

The finding of new plant species is always excited and uncovers the magnificence of nature. Likewise gives additional way to track down its morphological, anatomical characteristics, bioactive compound, pharmacological properties, and genetic relationship among species, and so on. *Butea monosperma* var. *lutea* was reported from places around Pune, Aurangabad in Maharashtra, Jillella block of Sirsilla forests of Karimnagar, Peddagutta of Nizamabad and Kummarigudem and Mallakpally of Warangal district of Andhra Pradesh and Gujarat (Naqvi, 2001 [5]; Reddy *et al*. 2001 [6]; Patil and Mahajan, 2018 [7]). Therefore, by the present study, golden butea, *Butea monosperma* (Lam) Taub. Syn *B. Frondosa* Koenig Ex. Roxb.var. *Lutea* (Witt) Maheshwari is added in the flora of district Rajnandgaon, Chhattisgarh, India. It is very rare, declared as globally endangered medicinal plant by Conservation Assessment Management Planning Workshop for Medicinal Plants of Andhra Pradesh (Jadhav *et al*. 2001) [8].

Materials and Methods

Study area: Bandha bazaar is a small village located in the block of Ambagarh Chowki, district Rajnandgaon, Chhattisgarh state.

It is 08 km from Ambagarh Chowki and 48 km from the district headquarter.

Bandha bazaar is located 315 meters above sea level. During sampling, the temperature was 38.5°C, humidity 5%, wind 5.50 m/sec towards NW.

The study area belongs to the tropical wet and dry climate. The major population is tribal with the dominance of Gond. The residence can communicate in Hindi and Chhattisgarhi. The location of the study area is presented in Fig. 1.

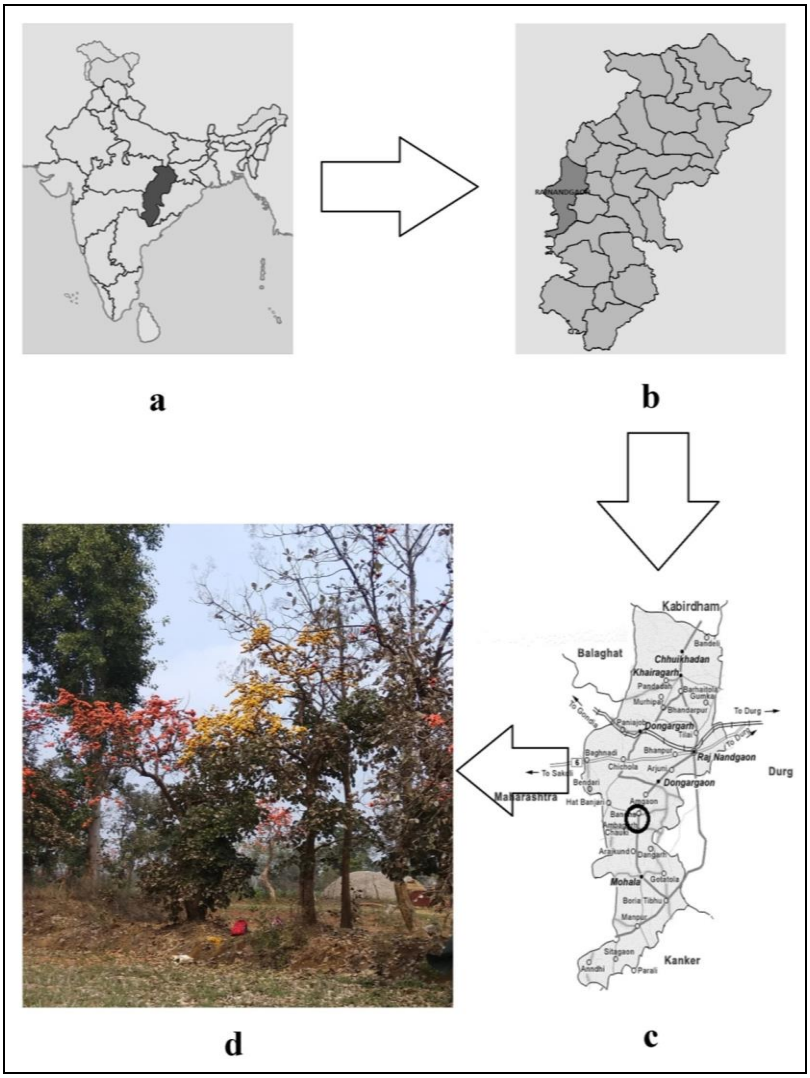

Fig 1: Location of Plant: a. Position of Chhattisgarh state in India; b. Position of district Rajnandgaon in Chhattisgarh state; c. Location of the study area in the circle; d. The Golden yellow *Butea monosperma* (Lam) Taub. Syn *B. Frondosa* Koenig Ex. Roxb.var. *lutea* (Witt) Maheshwari at 20° 49' 19.1" N; 80° 44' 45.8" E

Sample collection and identification: Plant related information was gathered from the local residents. Tree height, leave status, bark, and flower were examined at the spot. Leaves and dropped fresh yellow flowers were collected and placed in the sterile polythene bag and transported to the laboratory within 02 hours. After transport flower components were separated and its measurement was taken.

Results

A rare golden yellow *Butea monosperma* (Lam) Taub. Syn *B. Frondosa* Koenig Ex. Roxb.var. *lutea* (Witt) Maheshwari was recorded from Bandha Bazar, Block Ambagarh Chowki district Rajnandgaon, Chhattisgarh. The geographical location of the plant is 20° 49' 19.1"N; 80° 44' 45.8" E. The plant is not incorporated in the literature of flora found in Rajnandgaon district and Chhattisgarh state (Verma *et al*., 1985 [9]; Verma *et al*.1993 [10]; Mudgal *et al*. 1997 [11]; Khanna *et al*. 2001 [12]; Khanna & al., 2005 [13]). Therefore, the present collection is a new distribution and record for the flora of Rajnandgaon district, Chhattisgarh.

Taxonomic treatment

Butea monosperma (Lam) Taub. Syn *B. Frondosa* Koenig Ex. Roxb.var. *lutea* (Witt) Maheshwari. Descrip. List, N. et Ber. For. Circ. C. P. 75, 1916. Butea *lutea* Sagreiya, Indian for. 65: 560, 1939, Maheshwari, Bul. Bot. Surv. India 3(1): 91-94, 1961[14]. Figs. 2,3.

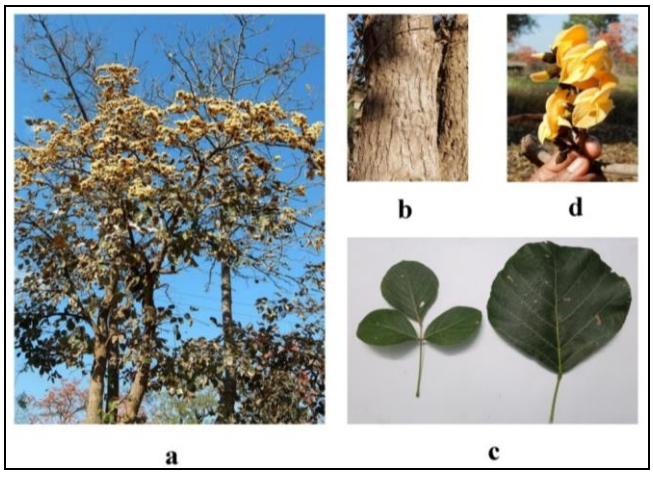

Fig 2: Plant description: **a**. The plant *Butea monosperma* (Lam.) var. *lutea* (Witt) Maheshwari; **b**. Bark of the plant; **c.** Leaflet; **d**. Inflorescence

The plant is a deciduous, erect medium-sized tree of about 24 feet long naturally grown. Stem: Usually crooked and

sometimes twisted with irregular branches and rough grey bark, rough, thick, fibrous, wound with gum, reddish exudates. Leaves: The leaves are pinnately compound with the long petiole (10-14 cm) with stipules, pulvinus leaf base; tripinnate unequal leaflets, each leaflet 15-20cm long; broadly ovate to rhomboid, glabrous; coriaceous leaflet, texture smooth in young and rough in mature; leafless while flowering; arrangement – alternate, base – cuneate; shape – rhomboid or ovate, margin – entire. Inflorescences: racemes, big and rigid 12-15 cm. Flowers: Golden yellow, bisexual, terminal or axillary; bracts small, pedicels 3cm long. Calyx: Black velvety cup shaped 1.5-1.8 cm long. Corolla: Standard ovate 5.3-6.4 x2.6-3.2 cm glabrous, acute apex, entire margin; wing petals lanceolate, 6.4-7 x 1.4-1.6 cm pubscent, base oblique, apex aucte; keel petals elliptical 6.3-7.3x 1.10-2.6 cm, base oblique, apex acute, margin entire, vexillary aestivation. Stamens: Diadelphous (9+1), filaments 5.8-7.0 cm long; anther elliptical to oblong. Ovary: Stalked oblong densely tomentose; style 5.8-6.2 cm long sparely pubescent, curved. Pod: single seeded inside a pod; pod thin stalked and oblong, green in color; silky tomentose, size 15-18 cm in length, and 3 to 4.8 cm broad. Fruit: ellipsoid, flattened, 2.5 to 3.0 cm long.

Flowering: March - April.

Fruiting: April - June.

Flowering fruiting Period: The flowering, fruiting time of *B. monosperma* (Lam.) var. *lutea* (Witt) Maheshwari is presented in Fig. 4.

Distribution*:* In India: Pune, Aurangabad in Maharashtra; Karimnagar, Peddagutta of Nizamabad and Kummarigudem and Mallakpally in Andhra Pradesh; Gujarat and Chhattisgarh.

Vernacular: Parsa (Chhattisgarhi), Palas, Palash, Chichra, dhak, Bastard Teak, Bijasneha, Bengal Kino, Khakara, Mutthuga.

Specimens examined: India, Chhattisgarh, Bandha Bazar, district of Rajnandgaon, 20° 49' 19.1 "N; 80° 44' 45.8" E.

Field note: Noted single plant from the area.

Key to the species of Butea

1. Trees, lowest flower 4-6 cm long orange red, calyx-tooth much shorter than the side ones……*B. monosperma*
2. Flowers golden yellow; pod oblong, brownish, 1 seeded….*B. monosperma* var. *lutea*
3. Woody climbers; lowest calyx-tooth equal to the side one, flowers orange scarlet……*B. superba*

Socio-economic use of Plant

According to the conversation with local peoples, the plant is socio-economically important. It acts as a host for lac insects and produces shellac. The plant is a source of earning for local peoples. Leaves are utilized for making plates, cups, native umbrellas (Khumri), and wrapping mud houses. Roots are used as small ropes for bundling of Tendu Patta (*Diospyros melanoxylon* leaves).

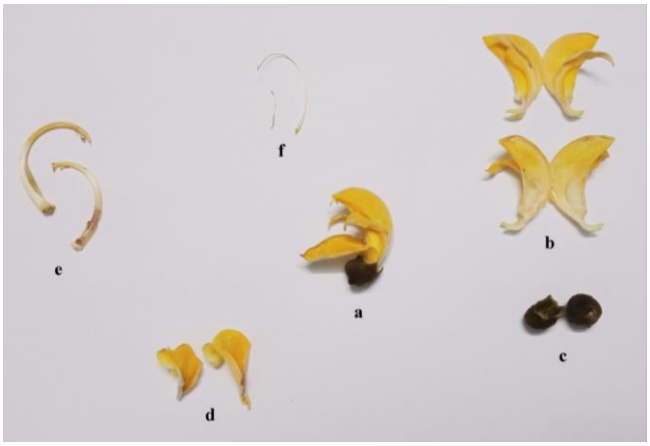

Fig 3 Flower description: a. Whole flower; b.&d. V.S. of flower; c. Calyx; e. Stamens; f. Pistil

Discussion

Leaf shape, leaf arrangement, flower color, seed shapes are some common variations found in plant species. New additions of *B. monosperma* in the flora of different locations have been previously done worldwide. These additions are based on the flower color, foliolate of the leaves, and flowering or nonflowering of the plant. Patel and Patel (2015) [15] reported a golden *B. monosperma* (Lam.) var. *lutea* from the Sabarkantha District of Gujarat State, India. A unifoliolate *B. monosperma* was observed by Rana and Nagar (2019) [16]. This plant has some other properties like it do not produce flower and fruit but gives small bracts and bracteoles only. The plant is located on agricultural land at Meghpar village, Jamnagar district, Gujarat State India. Patil and Mahajan (2018) [7] also reported golden yellow *B. monosperma* (Lam.) var. *lutea* from Bombay Pune highway at Pune. Based on the flower color, marker-related genetic diversity was studied by Vashishtha *et al*. (2013) [17]. The study notice similarity in the RAPD, SRAP markers but differences were observed in ISSR. ISSR was also used by Kandasamy *et al*. (2013) [2] for the molecular diversity among Golden yellow, Yellow, Mustard, Chrome yellow, White and Scarlet Flowering *B. monosperma* and found these plants are moderately similar.

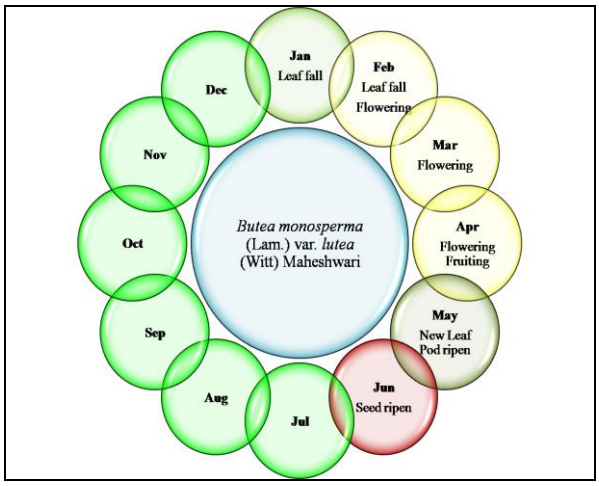

Fig 4: Cyclicity of *Butea monosperma* (Lam.) var. *lutea* (Witt) Maheshwari

Conclusion

Butea monosperma is a very essential medicinal and socio-economic important plant of local living. Variation in the same species of the plant allows contemplating it and comparing its morphological, physiological, chemical, and genetic characteristics. The plant identified in the present study is showing the variation in flower color. A similar plant was also recorded from the Gujarat and Maharashtra state of India yet not recorded in the district Rajnandgaon, Chhattisgarh.

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