



The New Diverse accession to the list of the Monospecific Genera *Bixa orellana* L., a Natural Food Dye Plant from Bangalore, Karnataka.

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ABSTRACT

Bixa orellana L., is an evergreen shrub or a small tree, measuring 2-8 m and is a native of Brazil. The tree is Cultivated for its Non-Toxic, Edible Food dye Bixin also called popularly as Annatto having Orange- red color. *Bixa orellana* L., is one of the 13 natural food dye yielding plants. The pigment bixin extracted from its seeds are economically important next to caramel and saffron .Bixin also replaces the most expensive saffron as a colouring agent in various food preparations as it is not all that expensive as saffron. *Bixa orellana* L., being Monospecific genera, there are no concrete evidences in the literature to classify the various species in this genus. Our earlier studies reported the existence of Intraspecific diversity by identifying the 5 diverse accessions out of 20 accessions of *Bixa orellana* L., identified and studied from various areas of Bangalore, Karnataka showing Morphological, Physiological and Genetic Variations and also variations in the dye-Bixin content among the above mentioned 5 diverse accessions of the same. The present study reported the 6th diverse accession of *Bixa orellana* L., identified from Bangalore itself in confirmation of our earlier reports of the existence of intraspecific diversity in the same.

KEYWORDS : *Bixa orellana* L., Intraspecific diversity, Morphological Variations, Bangalore.

INTRODUCTION

Bixa orellana L., is an important Natural Food dye yielding plant which yields Non toxic Food dye called Bixin and Nor –Bixin also called as Annatto. Annatto is one of the 13 basic food pigments approved by US FDA and ranks 2nd in the world. Annatto is used in dairy industry for colouring butter, cheese, ice-creams and cosmetics for colouring hair oils, lipsticks and in textile industry for dyeing cotton, silk clothes etc. (Mercandante et al., 1998).

All the parts of *Bixa orellana* L., is used as a traditional medicine and by Ayurvedists for various medicine preparations. The acid extract of leaf is used as an anticancer drug. The seed pulp is antidiabetic, useful in epilepsy, skin and kidney diseases and prevents blister formation in burns (Guha et al 1999). *Bixa orellana* L., is a highly cross pollinated plant producing variability in the saplings obtained from the seeds. There is also variation in the composition of the seed bixin content among the trees and this limits marketability. A wide variation for most of the characters is observed in *Bixa orellana* L., and there is much scope for identification of divergent types. As research work on this species is very limited in India, hence a detailed study was undertaken to understand intraspecific diversity in this species (Poornima and Ambika 2012).

In this regard, We could identify the morphological variations between the different accessions of *Bixa orellana* L., collected from Various Parts of Bangalore, Karnataka (Ambika and Poornima, 2004). Out of the total 20 accessions screened for Genetic diversity (Poornima, 2006) the 5 Divergent accessions of *Bixa orellana* L. out of 20 were identified from North (Yelahanka & Hesarghatta) and South (N.R. Colony) of Bangalore, Karnataka. and these were labeled as Y2 and H1, H2 and H3, NR Colony- South of Bangalore-N1 accessions.

The Genetic Divergence Studies were carried out based on the morphological variations among these 5 accessions, using RAPD analysis. All the 5 accessions were highly diverse and exhibited maximum variations with respect to habit, leaf shape, colour of flower, stamen and capsule, capsule size and texture of hence these 5 accessions were subjected to RAPD (Randomly Amplified Polymorphic DNA) assay and Genomic DNA was extracted from fresh leaf samples by CTAB method (Poornima et al., 2009 and Poornima and Ambika, 2012). So, *Bixa orellana* L., being monospecific genera, we could establish the 5 diverse accessions under the level of species and because it is an important natural food dye yielding plant, it was found necessary to establish a field gene bank to conserve the Intraspecific diversity in *Bixa orellana* L., accessions. In this regard the field gene bank was established to maintain the different accessions of *Bixa orellana* L., in the field allotted behind the Department of Botany, Ban-

galore University, Bangalore, being established in the year 2005, the plants are now 7 years old and are flowering and fruiting (Poornima, 2006).

In addition to the above mentioned 5 divergent accessions the 6th divergent accession was identified from Lalbagh, Bangalore, Karnataka. Hence the authors were curious to analyze the morphological parameters to establish the intraspecific diversity and add to our list of 5 prior identified diverse accessions of *Bixa orellana* L. (Poornima, 2006).

MATERIALS AND METHODS

The Passport data of this New Lalbagh accession-L₁ was collected. These were Habit, Height of the tree, Branching pattern, No of Branches, Leaf shape, Flowering time, Flower and Stamen color, Fruiting Period, Capsule Colour, Capsule shape, Capsule Size (Length and Breadth), Capsule texture, Number of seeds per Capsule and Seed color (unripe) .

RESULTS AND DISCUSSION

All the 6 accessions of *Bixa orellana* L., collected from different areas of Bangalore and Outskirts of Bangalore, Karnataka, showed wide variations with respect to habit, branching pattern, flowering time, flower colour, fruiting time, Capsule colour, capsule shape, texture, number of capsules per branch and number of seeds per capsule (Table 1; Plates 1-4).

The new Lalbagh - L₁ accession of *Bixa orellana* L., reported from Lalbagh, Bangalore, Karnataka showed variations in all the above mentioned parameters too. (Table-1; Plates 1-4). Hence the new L₁ accession of *Bixa orellana* L., reported in our studies should be further subjected to DNA analysis to find out the genetic relatedness of this to other already identified 5 divergent accessions to establish the genetic diversity in the same.

TABLE 1 : Morphological Characters of *Bixa orellana* L., accessions

Sl. No.	Area of Collection	Habit (Size)	Ht of the tree	Branching Pattern	No. of Branches	Leaf Shape	Flowering time	Flower and Stamen Colour	Fruiting Period	Capsule Colour	Capsule Shape	Capsule Size (Length and Breadth)	Capsule texture
Bangalore North													
Yelahanka													
1	Y ₂	Medium	3.9	3/4"	24	Cordate (Narrow)	July	White	August	Green	Cordate	3.86 4.82	Rough
Hessaraghatta													
2	H ₁	Shrub	2.1	From base	15	Cordate (broad)	July	White	August	Green	Ellipsoid	5.25 4.4	Soft
3	H ₂	Shrub	2	From base	16	Cordate (broad)	May	Rose with rose	July	Red	Ellipsoid	5.38 4.57	Soft
4	H ₃	Small	2.6	From base	8	Cordate (broad)	March & May	Rose with Pink	May & August	Maroon	Ovate	5.08 4.42	Rough
Bangalore South													
N.R. Colony													
5	N ₁	Big	4.5	3/4"	30	Cordate (broad)	March September	Rose with Pink	June & September	Pinkish Green	Ellipsoid	9.01 7.41	Soft
Lalbagh													
6	L ₁	Medium	3.2	From the base	25	Cordate (broad)	June - July	Rose and rose	July - August	Green	Ovate	4.5 4.0	Rough

1a (Y₂)



1b (N₁)



1c (H₁)



1d (H₂)





1e (H₃)



1f (L₁)

Plate 1 : Habit of *Bixa orellana* L., accessions collected from different areas of Bangalore (1a : 1Y₂- Yelahanka; 1b: N₁ - N.R. Colony, 1c; 1d and 1e- H₁, H₂ & H₃ - Hessarghatta ; 1f-L1 -Lalbagh)

2a (Y₂)



2c (H₁)



2b (N₁)



2d (H₂)



2e (H₃)



2f (L₁)



Plate 2: Variation in Leaf Shape, Size and Colour in *Bixa orellana* L., accessions

3a (Y₂)



3b (N₁)



3c (H₁)



3d (H₂)



3e (H₃)



3f (L₁)



Plate 3 : Variation in Flower Colour in *Bixa orellana* L., accessions

4a (Y₂)



4b (N₁)



4c (H₁)



4d (H₂)





Plate 4 : Variation in Colour, Shape & size of the capsules

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