

**MORPHOBIOCHEMICAL CHARACTERISTICS AND REPRODUCTIVE
BEHAVIOR OF OXALIS SPECIES FOUND OF ASSAM**

Jinu Devi Rajkumari

Assistant professor, Botany Department,
Cotton College, Ghy-1

ABSTRACT

Oxalis is a cosmopolitan herbaceous genus having tremendous medicinal values and used widely in pharmaceutical industries. There are about 900 oxalis species are reported and two species namely O.corniculata L. and O.corymbosa Kunth are widely found in Assam as well as in other parts of North East India. Another species O. triangularis A. St.-Hil. is found in some places of Assam.. All three species are rich source of vitamin C, oxalic acid and calcium. The present investigation was carried out to find out the diversity by considering some morphological, biochemical characters and reproductive behavior of Oxalis species found in Assam. All the three varieties show considerable variation in morphological, biochemical and reproductive behavior.

Introduction

Oxalis species is one of the most demandable plant species belonging to the family Oxalidaceae that are having several medicinal values. The plant is sub-tropical and it is originated from India. The plant having most diversified genus and consist of about 900 species. It is a somewhat delicate-appearing, low growing & herbaceous plant. Two important species are found in North East India viz: Oxalis corniculata L. (yellow-sorrel) and O. corymbosa Kunth. (Pink-sorrel). Another species known for their dark purple-leaves is O. triangularis A. St. Hil. All three species are edible & grown in damp shady places, roadsides, plantations, lawns, nearly in all areas of NE India. Oxalis corniculata L. and O. corymbosa Kunth. are good source of vitamin C and is used as an antiscorbutic in the treatment of Scurvy The plant is traditionally used as a remedy for convulsions in children and for healing fractured bones (Mohamd and Mir, 2000). In the folk medicines, the juice of the plant is given in stomach trouble; decoction of roots is useful for

worms. Roots are useful for worms, giddiness, diarrhea and dysentery. Medicinal value of *Oxalis triangularis* A. St. Hil is not exactly known but leaves and roots are edible and the plant is the good source of Vitamin C, oxalic acid and calcium. Phenotypic variation and variation in biochemical attributes is the reflection of the genetic constitution of the individuals and their interaction with the environment. Morphological and biochemical descriptors were used to determine the intra-varietal diversity (Pissard, et al. 2008). and considerable amount of variability are essential to deserve adequate conservation strategies and to maintain genetic resources Therefore the present investigation was carried out to find out the diversity by considering some morphological and biochemical characters among the *Oxalis* species found in Assam.

Materials and Methods

Three (3) species of *Oxalis* collected from different parts of Assam are planted in an open area with maximum exposure to sunlight, high temperature, rain fed area in the departmental garden of Department of Botany, Cotton College, Guwahati, Assam. The three (3) species are *Oxalis corniculata* L, *O. corymbosa* Kunth. and *O. triangularis* A. St. Hil. *Oxalis corniculata* L. is having green leaf & yellow flower, *O. corymbosa* Kunth. has green leaf & pink flower while *O. triangularis* A. St. Hil. is having purple leaf & light pink flower. Three (3) plants of each cultivar are regarded as an individual of the species, sampled, were carefully uprooted & taken for morphological and biochemical analysis. Characters considered for morphological analysis are root length, number of branches per plant (within one square feet area), petiole length, length and width of leaflet and flower characters. Fiber content, vitamin C content (Sadasivam & Manikram 1992), ash content and phenol content (Malick & Singh 1980) are the biochemical attributes taken for consideration & were estimated by following standard biochemical method. Mean values for each attribute, standard deviation and coefficient of variation were estimated by using standard statistical methods.

Results

Morphological characters

The results as mean value for all morphological attributes were presented in Table 1. The root system varies considerably in all three species. In *O. corymbosa* Kunth., the root is long subterranean bulb that produces small white colour bulbils of about 1.6 cm long. The species *O. corniculata* L. do not produces bulbils while *O. triangularis* A. St.-Hil. produces light orange colour bulbils of about 2.8 cm. Mean values for number of branches per plant show significant difference among the species. Maximum number of branches per plant was observed in *Oxalis corniculata* L. and minimum was counted for *Oxalis triangularis* A. St.-Hil. and were recorded as 8.7 and 3.6 respectively. *Oxalis triangularis* A. St.-Hil. exhibited the maximum petiole length of 27.5 cm while, the lowest petiole length was observed for *O. corniculata* L. which was 5 cm. Leaflet length revealed the most elongated leaflets in *Oxalis triangularis* A. St.-Hil. while most narrow in *O. corniculata* L. which were 5.3cm and 1.1cm respectively. In *O. corymbosa* Kunth. leaflet length is 3cm. Similarly maximum leaflet width 9.1 cm was recorded in *Oxalis triangularis* A. St.-Hil. and minimum 1.6 cm was recorded in *O. corniculata* L.

Floral Character

In all the three species flowers are pedicilate, ebracteate, complete, actinomorphic, bisexual, pentamerous, and hypogynous. Stamens occur in two (2) whorls.

***O. corymbosa* Kunth** Each plant ou 4-5 inflorescences and 5-6 flower per inflorescence and flower is pink in colour, not homostylous. The flower has two sets of stamen each with dehiscent pollen sac. Four (4) carpels at the mid, four (4) long stamens are above stigma and four (4) short stamens are below the stigma. Pollen fertility is low in this species and it was recorded maximum as 2.9% (Table 2). Pollen fertility is comparatively high in the anther of short stamen than in long stamen. No seed setting is found.

***O. triangularis* A. St.-Hil** : Each plant produces 5-6 flower /inflorescence and flower is light pink in colour. The fplant is not homostylous. The flower has two sets of stamen each with dehiscent pollen sac. Four (4) stigma at the top, four (4) long stamen and four(4)short stamens are arranged in two(2) whorl below the stigma. No seed setting is found. Pollen fertility was

extremely low and it was recorded maximum 2.9% after 4 hours of anther dehiscence and no fertile pollen was recorded after 8 hours of anther dehiscence. (Table 2)

***O. corniculata* L :** The flower is Yellow in colour, , 10 stamens arranged in two whorls ,five (5) long stamens remain at the same length of the stigma and five (5) short stamen below the stigma, carpels five (5). Maximum pollen fertility percentage was observed as 82.3 % at 8 hours of anther dehiscence and pollens fertility percentage was more in upper than the lower stamens. Stigma receptivity last for long period with declining trends (Table 2). Unlike other varieties *O. corniculata* produces fruit which is hairy capsule of about 5-7 mm long.

Biochemical parameters

Biochemical analysis reveals that maximum moisture content was observed in *O. corymbosa* Kunth. and lowest was in *O. triangularis* A. St.-Hil which was 85.6 % and 80.1% respectively. Maximum fiber content 9.78% was recorded in *O. triangularis* A St.-Hil. and minimum 7.65% was recorded in *O. corymbosa* Kunth. Among the three (3) species *O. corniculata* L. shows highest amount of vitamin C content, Ash content and phenolic content which were 53.4%, 3.11%,and 3.51% respectively. While the minimum value for these parameter were recorded in *O. triangularis* A. St.-Hil. (Table 3)

Discussion

Three (3) species of *Oxalis* show considerable variation in morphological, biochemical and breeding characters. Regarding morphological traits highest coefficient of variation was found in root length and it was 11.3%. But except root length all the morphological traits show significant variation. All the three species show differences in floral character which is considered as important determinant of breeding behavior of the species. In

O. corymbosa Kunth. and *O. triangularis* A. St.-Hil. stamens are far away from the stigma. While in *O. corniculata* L. upper five (5) stamens are in the same position with the stigma. Low percentage of pollen fertility and short stigma receptivity in *O. corymbosa* Kunth. and *O. triangularis* A. St.-Hil. may be the major cause of failure in seed setting in these two species. High nutraceutical value in terms of Vitamin C content, fiber content, phenol and ash content in

O.corniculata can be used as selection criteria for the breeding programme. Variation in the characters in all three species grown under same environmental conditions concludes the genetic control on the characters.

References

1. Malick, C.P. and singh, M.B.(1980).In Plant Enzymology and Histoenzymology, Kalyani Publicaion, New Delhi. Pg 286.
2. Mohammad, I.S .and Mir, AK (2000). Folk use of medicinal herbs of Margalla Hills National Park, Islamabad, Journal of Ethnopharmacology,69: 48-56.
3. Pissard, A.; Rojas-Beltran, J.; Faux, A.-M.; Paulet, S.; Bertin, P. Plant Systematics & Evolution;Jan2008, Vol. 270 Issue 1/2, p59) .
4. Sadasivam, S and Manickam, A (1992) In Biochemical Methods for Agricultural Sciences, Wiley Eastern Limited, New Dwlhi, pg 179-180

Table 1: Morphological characters of *Oxalis* species found Assam.

Species	No. of branches	Size of the bulbil (cm)	Length of the petiole(cm)	Length of the leaflet(cm)	Bredth of the leaflet(cm)
<i>O. corniculata</i> L.	8.7	----	5.0	1.1	1.6
<i>O. corymbosa</i> Kunth.	4.2	1.6	19.2	3.0	4.2
<i>O. triangularis</i> A. St.-Hil.	3.6	2.8	27.5	5.3	9.1
CV%	5.9	—	4.3	11.3	3.1

Table 2: Pollen fertility and receptivity of stigma of *Oxalis* species found in Assam

Species	Pollen fertility(%)					Stigma receptivity(%)				
	Time of anther dehiscence(hr)					Time of opening of flower (hr)				
	4	8	12	16	20	4	6	8	12	18
<i>O. corniculata</i> L.	73.6	82.3	65.4	56.7	12.9	72	67	35	20	9

<i>O. corymbosa</i> Kunth.	2.9	2.1	0	0	0	1.8	0	0	0	0
<i>O. triangularis</i> A. St.-Hil	2.19	1.87	0	0	0	1.53	1.02	0	0	0

Table 3: Biochemical characters of *Oxalis* species found in Assam.

Species	Moisture Content (%)	Fiber Content (%)	Vitami C Contrnt (mg/g)	Phenol content (%)	Ash content (%)
<i>O. corniculata</i> L.	84.8	9.65	53.4	3.51	3.11
<i>O. corymbosa</i> Kunth.	85.6	7.65	50.1	2.93	3.04
<i>O. triangularis</i> A. St.-Hil	80.1	9.76	47.5	2.02	2.98
CV %	3.13	1.20	14.3	12.2	11.4



Oxalis triangularis A. St.-Hil.



Oxalis corymbosa Kunth.

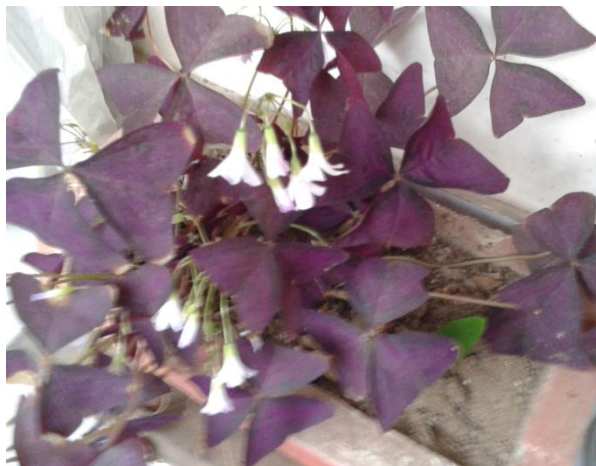


Oxalis corniculata. L

Fig. Flowers of three species of *Oxalis*



Oxalis corniculata. L



Oxalis triangularis A. St.-Hil.



Oxalis corymbosa Kunth.

Fig. : Three species of *Oxalis* found in Assam