

A study of seed morphology of malvaceae plants in Gujarat state, India

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The ability to recognize seeds are always important in farming. It has become even more essential in modern scientific agriculture, without it there would be little merit in perfecting methods of growing useful plants. Ability to identify the seed is of particular importance to the agriculturist, biologist, forester, horticulturist, ethno botanist, pharmacist and others interested in land-use programs to identify the seeds in their particular ecological fields of interest. Though seeds are physiologically important for they provide fairly reliable attribute, seed characters are largely ignored except for a few cursory references in classic as well as contemporary floras (Cook, 1901- 1903; Shah, 1978)

The state of Gujarat with its unique climatic conditions, eco-geographical regions, agro climatic zones and five biogeography zonations holding ten biotic provinces represent a vast array of floral and faunal diversity. The state of Gujarat was separated from the east while Mumbai state on 1st May 1960. Referring to the taxonomical and floristic work in pre-independence era, quite a remarkable contribution deserves special mention. Mention has to be made about Graham (1839), Dalzell and Gibson (1861), Nairne (1894), Cooke (1901-1903), Talbot (1909-1911), Blatter and McCann (1926-1935), Santapau (1954). All these prolific workers have concentrated on different parts of the Western Peninsula and Southern parts of Bombay Presidency.

The Hooker's flora of British India (1875-1897) compiled during 18th century provides the culmination of floristic and taxonomic researches of a team of dedicated scientists. The flora proved a useful tool all these years and accelerated the documentation of many remarkable floras like the Flora of Madras Presidency (1915-1936); Flora of Bombay Presidency (1908, rep. ed. 1958); Flora of Upper Gangetic Plains (1973 rep. ed.) etc. The state of Gujarat is also blessed with first state level flora, *i.e.* The Flora of Gujarat State (1978).

Pioneering works on the seeds of the plants were carried out by Ducne (1947) and MC Clure (1957) who have studied the seed characters of some selected families

of U.S.A. Some notable workers on the seed are Scurti (1948), Murley (1951), Duke (1964-65), Vartak (1966), Duke (1969), Richard (1970), Schuyler (1971), Chuang and Heckard (1972), Whiffin and Tomb (1972), Berggren (1974), Skvortsov and Rusanovitch (1974), Brisson and Peterson (1976), Corner (1976), Hill (1976), Mulligan and Bailey (1976), maiti (1976), Simpson (1976), Seavey et al (1977), Gunn (1979), Mangaly *et al.* (1979) and Gavit (1990).

Seed is a small embryonic plant enclosed in a covering called seed coat and usually with some stored food. It is the product of the ripened ovule of gymnosperm and angiosperm plants occurring after the process of fertilization within the mother plant.

During the tenure of this work the author had visited different areas of the state. The plant specimens of Malvaceae family were collected to prepare herbarium specimens along with the seed. Seeds were collected, dried and were stored for further study. Some of the seeds were mounted in different position over a card slide with the help of domestic adhesive – like Fevicol. The seed slides were then subjected to detailed observation. Each and every collection was supported with the voucher specimen of the herbarium. Collected seed were either dried in sun or were dried by using incubator / oven at a temperature of 28°C - 30°C.

The most useful clues for recognition of seed are usually the seed shape, coloring, hilum shape, seed/fruit, seed weight etc. Colour of the seeds were compared with standard colour shade charts of RHS (Royal Horticultural Society, London). Seeds weight of individual seed or a unit of 10 seeds were made with the help of analytic balance and also Monopan balance.

This paper presents 51 seed plants of Malvaceae family and its seed morphology from the study area.

An earnest attempt has been made here to exploit the seed characters for taxonomic purpose. The descriptive accounts are rather lengthy. Much of the critical observation such as an attempt to mention nearer to the correct colour shade using RHS colour charts and the seed weight determination are more of academic interest rather than their practical utility to be used as a tool for the identification of taxa under investigation. This is the limitation. Above morphological characters of seeds are

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Sr. No.	Name of plants	Local name	Seed shape	Seed colour	Hilum shape	Seed/ fruit	Weight of seed
1.	<i>Abelmoschus esculentus</i> (L.) Moench.	Bhindi	Ovate	Grayish green	Oval	many	62- 66 mg/seed
2.	<i>Abelmoschus ficulneus</i> (L.) W. and A.	Jangli bhindi	Obovate	Yellowish grey	Oval	many	25 – 27 mg/seed
3.	<i>Abelmoschus manihot.</i> (L.) Medik. subsp. manihot	Ranbhindi	Oblong	Grayish brown	Oval	many	32 – 38 mg/seed
4.	<i>Abelmoschus manihot.</i> (L.) Medik. subsp. tetraphyllus (Roxb. Ex Horm) Borss.	Ran bhindi	Sub globose or Ovate	Brownish grey	Oval to oblong	many	30 – 33 mg/seed
5.	<i>Abelmoschus moschatus</i> Medik.	Khat bhindi	Reniform	Seed coat brown, ribs yellowish brown	Oval	many	13 – 15 mg/seed
6.	<i>Abutilon hirtum</i> (Lam.) G. Don	Kaski	Sub reniform	Brownish black	Oval	many	3 - 4 mg/seed
7.	<i>Abutilon indicum</i> (L.)	Khapat	Reniform	Reddish brown, pinkish brown	Circular	many	2.2 - 2.6 mg/seed
8.	<i>Abutilon pannosum</i> (Forst. f.) Schlect.	Makhmali Kapat.	Sub reniform or Ovate	Pinkish red	Circular to oval	many	3.0- 4.5 mg/seed
9.	<i>Abutilon persicum</i> (Burm. f.) Merr.	Khajavani	Reniform	Blackish brown	Oval	many	5 – 6 mg/seed
10.	<i>Abutilon ramosum</i> Guill., Perr, et. A. Rich.	Dholi Kapat	Sub reniform	Yellowish brown	Oval	many	1 - 2 mg/seed
11.	<i>Abutilon theophrasti</i> Medic.	Nani Kapat	Reniform	Blackish brown	Oval	many	2 - 3 mg/10seeds
12.	<i>Alcea rosea</i> L.	--	Sub reniform	Grayish black	Circular	many	2.4 – 3.7 mg/seed
13.	<i>Bombyx micranthus</i> (L.f.) Riedl.	Chank Bhindo	Oblong or cylindrical	Orange brown	Circular	6-8	2.5 – 3.0 mg/ seed
14.	<i>Fioria vitifolia</i> (L.) Mattei.	Van Kapas	Sub reniform	Reddish brown	Oval	many	12 - 13 mg/ seeds
15.	<i>Gossypium barbadense</i> L.	Vilayati Kapas	Conical	Reddish brown	Oblong	many	60 – 65 mg/seed
16.	<i>Gossypium herbaceum</i> L.	Dev Kapas	Ovate	Dark brown	oblong	many	75 – 85 mg/seed
17.	<i>Hibiscus caesius</i> Garcke.	--	Ovate or Sub reniform	Blackish brown	Oval	many	3 - 4 mg/ seeds
18.	<i>Hibiscus cannabinus</i> L.	Ambadi.	Sub reniform	Dark brown	Oval	many	28 – 30 mg/seed
19.	<i>Hibiscus hirtus</i> L.	Baporis	reniform	Pale brown	Oval	many	2.5 – 3.5 mg/seed
20.	<i>Hibiscus hispidissimus</i> Griff.	--	Sub reniform	Brownish	Oval	many	3- 4 mg/seed
21.	<i>Hibiscus lobatus</i> (Murr.) O. Ktze.	Tali	Ovate or Sub reniform	Dark brown	Oval	many	2.8 - 3.5 mg/seeds
22.	<i>Hibiscus lunariifolius</i> Willd.	--	Reniform or angular	Brown	Oval	many	16 – 20 mg/seed
23.	<i>Hibiscus obtusilobus</i> Garcke.	--	Reniform	Blackish brown	Oval	many	2 - 3 mg/seed
24.	<i>Hibiscus palmatus</i> Forsk.	--	Reniform	Brown	Oval	many	3 – 4 mg/seed
25.	<i>Hibiscus panduraeformis</i> Burm.	--	Sub reniform, or angular	Brown	Oval	many	3 - 4 mg/seed
26.	<i>Hibiscus radiatus</i> Cav.	Duno	Sub reniform	Brownish yellow	Oval	many	18 – 22 mg/seed
27.	<i>Hibiscus roasa-sinensis</i> L.	Jasud, Jasvanti	Reniform	Grayish purple	Oval	many	0.5 – 0.8 mg/10 seeds
28.	<i>Hibiscus sabdariffa</i> L.	Khati bhindi, Lalambadi	Sub reniform	Reddish brown	Oblong	many	26 – 27 mg/seed
29.	<i>Hibiscus trionum</i> L.	Mathio bhindo, Koadio bhindo	reniform	Grayish black.	Oval	many	3 – 4 mg/seed

Contd....Table 1

Table 1 contd.....

30.	<i>Kydia calycina</i> Roxb.	Warang, Moti Hirvani	Sub reniform	Pinkish brown- grayish brown	Oval	1 - 4	3 - 5 mg/seed
31.	<i>Malachra capitata</i> L.	Pardeshi Bhindo	Trigonal	Brown	Oval	5	2.5 - 3.5 mg/seed
32.	<i>Malva mauritiana</i> L.	--	Reniform	Brownish black	Oval	many	1.5 - 2.0 mg/seed
33.	<i>Malva parviflora</i> L.	Pranirak, Supra	Reniform	Grayish orange	Oval	1	1.5 - 2.0 mg/seed
34.	<i>Malvastrum coromandelianum</i> (L.) Garcke	--	Reniform	Reddish brown	Oval	10 - 14	1.0 - 1.4 mg/seed
35.	<i>Pavonia arabica</i> Steud.	--	Trigonus	Brown	Oval	4 - 5	4 - 5 mg/seed
36.	<i>Pavonia grewoides</i> Hochst.	--	Trigonus, angular	Reddish brown.	Oval	4 - 5	3 - 4 mg/seed
37.	<i>Pavonia patens</i> (Andr.) Chiov.	Adavia, Fuladan.	Reniform	Grayish brown	Oval	many	1 - 2 mg/seed
38.	<i>Pavonia zeylanica</i> Caw.	--	Trigonus	Reddish brown	Oval	5	2.0 - 2.8 mg/seed
39.	<i>Sida acuta</i> Burm. f. Fl.	Bala	Trigonal, ovate	Grayish brown	Oval	6	2 - 3 mg/seed
40.	<i>Sida alba</i> L.	Katalo Bala	Trigonal, ovate	Dark brown	Oval	5	1.8 - 2.4 mg/seed
41.	<i>Sida cordata</i> (Burm. f.) Borss	Bhoya Bala, Nidhidhatuval	Trigonal, ovate	Reddish brown	Oval	5	2.2 - 2.8 mg/seed
42.	<i>Sida cordifolia</i> L.	Baladana, Kharenti	Reniform	Grayish white	Oval	8 - 10	3.4 - 3.6 mg/seed
43.	<i>Sida mysorensis</i> Wight and Arn	Chikni Bala	Trigonus	Blackish brown	Oval	5	1.2 - 1.5 mg/seed
44.	<i>Sida orientalis</i> Cav.	--	Reniform	Dark brown	Oval	5	2.0 - 2.6 mg/seed
45.	<i>Sida ovata</i> Forsk. Fl.	--	Ovate, trigonal	Reddish brown	Oval	6	1.3 - 1.9 mg/seed
46.	<i>Sida rhombifolia</i> L. subsp. rhombifolia	Chikna Kharata.	Ovate	Blackish brown.	Oval	6-10	1 - 2 mg/seed
47.	<i>Sida rhombifolia</i> L. subsp. retusa (L.) Borss.	Ati-bala	Trigonal,	Brownish black	Oval	5	4.2 - 4.3 mg/seed
48.	<i>Sida spinosa</i> L.	--	Trigonus	Dull-brown	Oval	5	2.1 - 2.3 mg/seed
49.	<i>Thespesia lampas</i> (Cav.) Dalz. and Gibz.	Jungli Bhindi, Nano Paras Piplo	Obconical	Reddish brown	Oval	many	115 - 124 mg/seed
50.	<i>Thespesia populnea</i> (L.)	Paras Piplo, Pardeshi Bhindi	Obovoid	Reddish brown	Oblong	1 - 2	230 - 240 mg/seed
51.	<i>Urena lobata</i> L.	Vagadau Bhindo	Trigonal, ovate	Grayish brown	Oblong	5	14 - 15 mg/seed

used for plant identification from seeds.

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