

MORPHOLOGY OF THE FRUITS OF *DAMPIERA* SPECIES AND ITS TAXONOMIC SIGNIFICANCE

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Abstract

SEM study of the fruits of *Dampiera* exhibit a complex morphological and micromorphological diversity providing valuable taxonomic information. The shape and surface pattern can be of high systematic significance. Ridged and non-ridged surface with colliculate to irregularly colliculate pattern are recognised. Six different fruit shapes are identified which provide a useful basis for distinguishing species at sectional level.

Introduction

During the course of the revision of *Dampiera* R.Br. (Goodeniaceae) by Rajput & Carolin (1992) and discovery of a new species *D. heteropetra* Rajput & Carolin (1988) near Augusta, Western Australia, it has prompted us to provide detailed information on the fruits of other species of *Dampiera*. During the examination of about 6000 herbarium specimens of this genus, it was noted that only a few specimens possess fruits and that knowledge of fruit shape and structure has been very limited. Carolin (1966) while studying the fruits of the family Goodeniaceae suggested that the shape of the fruit is frequently a good attribute for distinguishing species. The survey of *Dampiera* fruit revealed various shapes and surface patterns and indicated that a detailed study would be worthwhile. The present study describes the fruit shapes and fruit surface patterns found in the species of *Dampiera* to assess the significance of these fruit attributes in the taxonomy of this taxa.

Materials and Methods

Samples of fruits were taken directly from the herbarium specimens deposited at the Sydney University herbarium (SYD), and obtained on loan from other Australian herbaria. In *Districta* samples were taken from the field collections.

Mature and healthy fruits were selected and examined with stereomicroscope at a magnification of 5-40 X. For SEM study, the complete fruits were mounted onto the specimen stubs with double-stick cellophane tape. The stubs were then vapour coated with 200-400 Å thickness of gold in a polaron coating machine, before being examined and photographed with JSM-U3 Scanning Electron Microscope. Atleast two to three samples of fruit were examined for each specimen. List of voucher specimen of the species used for photomicrographs are given in the caption of Fig. 1 & 2.

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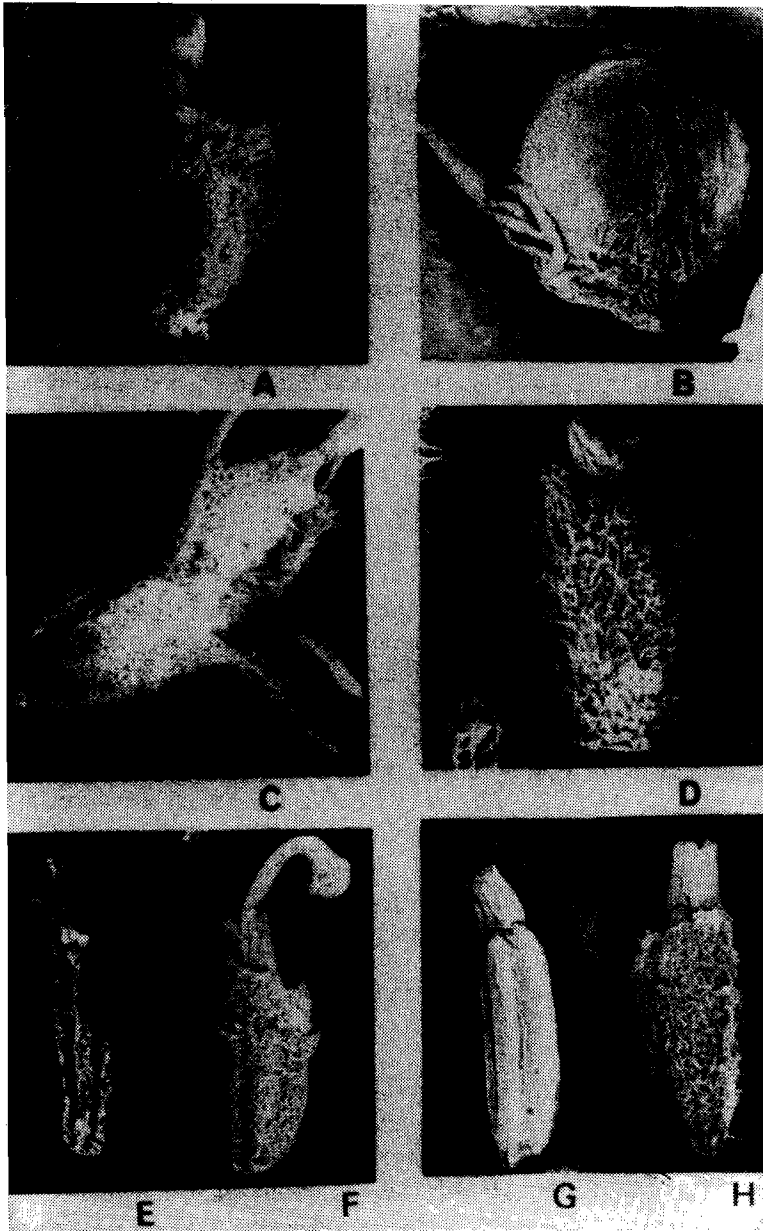


Fig. 1. Morphology of the fruits of *Dampiera* species. A-D. *hederacea* 20X. (S. Carlquist 983, SYD); B- *D. heteroptera* 18X. (A.M. Ashby 3696, SYD); C- *D. cinerea* 18X. (A.S. George 8715, Perth); D- *D. haematotricha* 20X. (R.D. Royce 7605, Perth); E- *D. leptoclada* 10X. (R. Carolin 3481, SYD); F- *D. lavandulacea* 15X. (Beaglehole ABC 49147, SYD); G- *D. pritzelii* 10X. (C.A. Gardner 12728 Perth).

Observation and Discussion

The fruit of *Dampiera* is an inferior nut, usually surmounted by the persistent sepals, stamens (Fig.1C) and sometimes by style (Fig.1A & F). The fruit mostly contains single seed or rarely it may have 2 seeds e.g., *D. trigona*. Except *D. trigona* and *D. diversifolia*, the fruits of most of the species are tomentose or glabrescent. At maturity of the fruit a significant change was observed with the decrease in the density of hairs on the surface of the fruit.

Fruit shape: The shape of the fruit was determined by the presence of a gibbous swelling and the obliqueness of the fruit top which proved to be a distinct feature for separating species into different sections. The shape of the ovary or fruit to a large extent was correlated with the ovule or seed type (Carolin, 1959). All the members of Sect. *Camptospora* have horse-shoe shaped ovules with the exception of *D. incana* and *D. tephra* which have curved ovules.

During the course of present study, fruit shapes recognized among the species of *Dampiera* were orbicular, oblong, ovoid, obovoid, oblong-elliptical and globular-oblique. The orbicular fruit shape is mostly found in the members of sect. *Camptospora* e.g., *D. heteroptera* (Fig.1B), which have gibbous ovary and horse-shoe shaped ovule.

The members of Sect. *Dicoelia* mostly have oblong type of fruit e.g., *D. leptoclada* (Fig.1E). The globular-oblique type of fruit shape is found in the species of *Dampiera* which have curved and obliquely placed ovule in the ovary e.g., *D. salehae*. Ovoid obovoid, oblong-elliptical fruit shapes are found in the species of different sections (Table 1).

The size of the fruit varies from 1.7-7.0 mm long. Small sized fruit was found in *D. lavandulacea* (1.7-2.5 mm long) with large sized fruit in *D. oligophylla* (3-7 mm long). Orbicular type of fruit varies from 2-3.5 mm in diameter. Large sized orbicular fruit was found in *D. heteroptera*. Details of the size of fruit of other species of *Dampiera* are given in Table 1.

FRUIT SURFACE PATTERN

During SEM study of fruit surface pattern of *Dampiera* species, the following patterns were recognised:

Ridged surface pattern: Fruit of some species have well developed continuous longitudinal ridges on the surface e.g., *D. leptoclada* (Fig.1E & 2D). The inner and outer ridge surface may be smooth or may have irregular colliculate surface pattern. The individual ridge unit (Fig.1E) are mostly distinct, angular or oval in shape, may be smooth or have a colliculate type of surface pattern (Fig.2E). Another type of ridged surface pattern was also noticed in some species e.g., *D. pritzelii* in which the veins are prominent but are depressed on the surface and gives an appearance of depressed ridges. The surface of the fruit is concavely sloping towards the veins (Fig.1G & 2D). The above types of surface pattern are found in the species which have either glabrous or glabrescent fruit.

Non-ridged surface pattern: In non-ridged surface pattern, the ridges or veins are not distinct on the surface of fruit but regular to irregular colliculate type of surface pattern

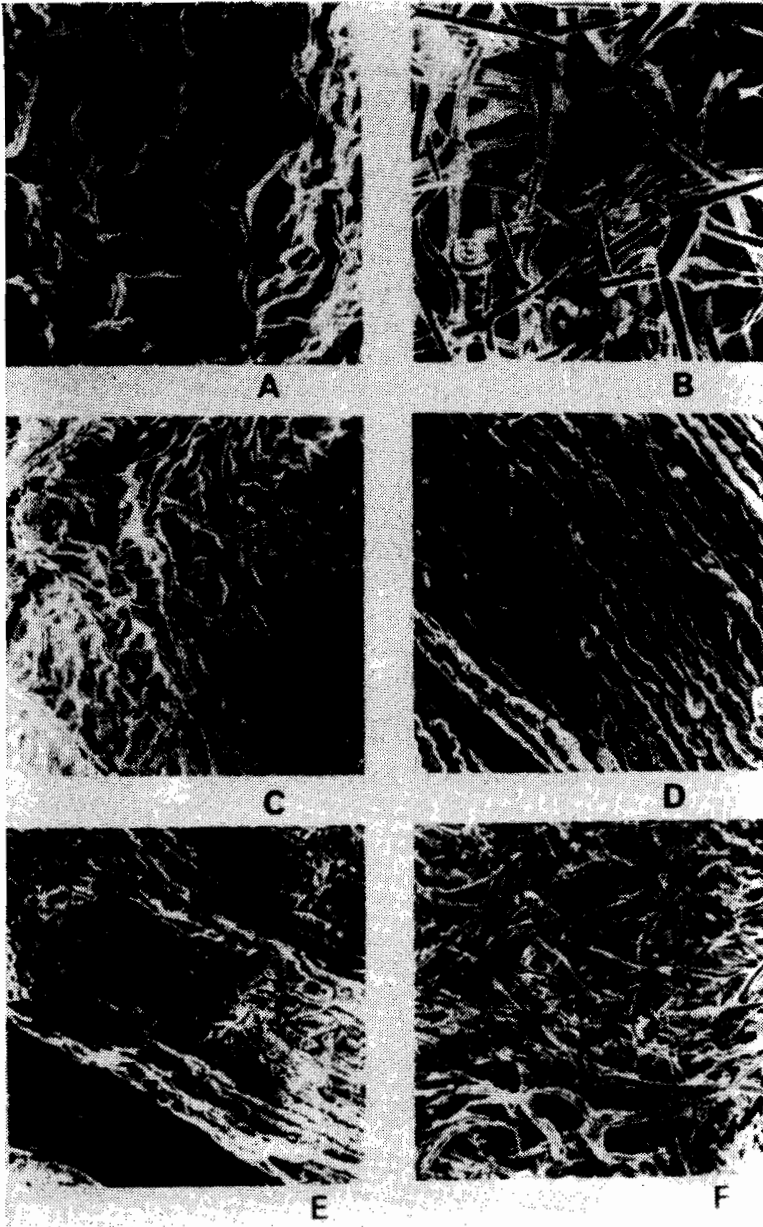


Fig.2. Surface of the fruits of *Dampiera* species. A- *D. hederaceae* 100X. (S. Carlquist 983, SYD); B- *D. cinerea* 150X. (A.S. George 8715, Perth); C- *D. heteroptera* 80X. (A.M. Ashby 3696, SYD); D- *D. leptoclada* 100X. (R. Carolin 3481, SYD); E- *D. pritzelii* 100X. (C.A. Gardner 12728, Perth); F- *D. haematotricha* 20X. (R.D. Royce 7605, Perth).

Table 1. Some characteristics of the fruit of *Dampiera*.

Name of the species	Shape	Size in mm	Nature of the surface
Sect. Camptospora			
<i>D. coronata</i>	Orbicular	2.5-3.0	Glabrescent
<i>D. heteroptera</i>	Orbicular	2.0-3.5	Glabrescent
Sect. Dicoelia			
<i>D. fusca</i>	Oblong	2-3	Tomentose rarely Glabrescent
<i>D. glabraithiana</i>	Oblong	2.5-3.0	Glabrescent rarely Tomentose
<i>D. latealata</i>	Oblong	2.0-5.4	Glabrescent
<i>D. leptoclada</i>	Oblong	2-3	Glabrous or Glabrescent
<i>D. stricta</i>	Oblong	2.2-3.5	Glabrescent to Tomentose
<i>D. trigona</i>	Oblong	4-5	Glabrous
<i>D. triloba</i>	Oblong	2.0-2.5	Tomentose
Sect. Dampiera			
<i>D. diversifolia</i>	Oblong	1.5-2.0	Glabrous
<i>D. adpressa</i>	Oblong-narrow elliptical	2.5-3.5	Tomentose
<i>D. haematotricha</i>	Oblong	4.0-5.0	Tomentose
<i>D. hederacea</i>	Oblong- elliptical	2-2.5	Glabrescent to Tomentose
<i>D. lavandulacea</i>	Oblong	1.7-2.5	Tomentose
<i>D. linearis</i>	Oblong	2.0-4.5	Glabrescent or Tomentose
<i>D. oligophylla</i>	Oblong- ovoid	3.0-7.0	Tomentose
<i>D. pritzelii</i>	Oblong	3-4	Glabrescent
<i>D. rodwayana</i>	Obovoid	3.0-3.5	Tomentose
<i>D. salehae</i>	Globular oblique	ca.3	Tomentose
<i>D. tenuicaulis</i>	Ovoid	3-4	Tomentose
Sect. Linschotenia			
<i>D. candicans</i>	Ovoid	3-4	Tomentose
<i>D. cinerea</i>	Ovoid	3.0-3.5	Tomentose
<i>D. krausiana</i>	Ovoid	2-3	Tomentose
<i>D. ramosa</i>	Ovoid	4-5	Tomentose
<i>D. spicigera</i>	Oblong-ovoid	2-3	Tomentose
<i>D. stenotrachya</i>	Ovoid	2.0-3.5	Tomentose
<i>D. teres</i>	Obovoid	2-3.5	Tomentose
Sect. Cephalantha			
<i>D. dentata</i>	Oblong-elliptical	2.0-3.2	Tomentose
<i>D. eriocephala</i>	Ovoid	2-3	Tomentose

is found (Fig.1A,B, 2A & 2C). This type of surface pattern is common among the species of Sect. *Camptospora*, which was recognized by Bentham (1868) and Krause (1912), but in some species e.g., *D. heteroptera* the surface pattern on the fruit is regularly colliculate, but near the apex of the fruit the pattern becomes irregular (Fig.2C).

The members of Sect. *Dicoelia* which was recognized by Bentham (1868), mostly have oblong fruits with usually regular colliculate pattern e.g., *D. leptoclada* (Fig.2E). The non-ridged surface pattern is commonly found in the members of Sect. *Camptospora*, in which the fruits are mostly glabrescent.

Tomentose surface pattern: When the surface of the fruit is covered with short and long intermixed hairs (Fig.2B & 2F) sometimes the hairs are appressed against the fruit surface e.g. *D. glabraithiana* or spreading e.g., *D. haemotrichia* (Fig.1C,D, H). Majority of the species of the genus *Dampiera* have hairy fruits. The details of hair types has been discussed by Rajput *et al.*, (1985). Tomentose type of surface pattern is common among the species of Sect. *Eu-Dampiera*, Sect. *Linschotenia* and Sect. *Cephalantha*.

In order to assess the taxonomic usefulness of fruit morphology in this genus, the fruit shape and surface pattern data has been compared (Table 1). The shape of the fruit and its surface patterns are fairly constant within the species of *Dampiera*. The fruit shape and surface pattern is not only significant for the identification at species level but also hold good at sectional level eg., the members of Sect. *Camptospora* and sect. *Dicoelia* can be recognised on the basis of orbicular and oblong type of fruit shape, respectively. The present study suggests that fruit shape and fruit surface pattern can be used as diagnostic attributes in this genus at sectional level. However, their value as a taxonomic criterion would be greatly increased in combination with other lines of evidence.

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