

NOTES FOR NEOPHYTES

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The trees that produce Macadamia nuts are members of the plant family Proteaceae. Other members of the family to be seen in California as ornamental in landscaping, in botanical gardens and arboretums, or by floriculturists for the cut-flower trade are the silver tree from South Africa, the silk oak, the colorful banksia, and the waratah (*Grevillea robusta*, *G. banksii*), and *Telopea speciosissimum*, from Australia, the wheels of fire (*Stenocarpus* spp) from Australia and New Caledonia) and the beautiful proteas (*Protea* spp) from South Africa and Australia.

There are 5 species of *Macadamia* trees. Four species, *M. integrifolia*, *M. tetraphylla*, *M. ternifolia* and *M. whelami* are native in Australia. The fifth species, *M. hildebrandii* is native both in Australia and New Caledonia.

Only the nuts of *M. integrifolia* and *M. tetraphylla* are edible. The nuts of the other four species contain a cyanogenic glucoside which makes them poisonous as well as too bitter to be edible.

Commonly, *M. integrifolia* is called the smooth-shell Macadamia, and *M. tetraphylla* the rough-shell Macadamia. The terms *integrifolia* and *tetraphylla* are preferred in referring to the two species types and cultivars (varieties) of the species because some *integrifolia* types have pebbled or slightly rough shells and some *tetraphylla* types have perfectly smooth shells.

M. integrifolia also has been known variously as Australian nut, Queensland nut, Bauple (and sometimes bapply and papple), bush nut, and smooth-leaf Macadamia. *M. tetraphylla* has been known as Australian nut, bush nut, and nut oak. Fortunately, all of the various common names of both species have fallen into disuse.

Before 1956, the name *M. ternifolia* appeared in the literature with reference both to *M. integrifolia* and *M. tetraphylla* due to lack of proper identification and typification. Now we know that *M. ternifolia* (synonyms *M. minor* and *M. lowii*) actually is the small, bitter Gympie or Maroochy nut. The principal features which characterize the 3 species are given in Table 1 and shown in Figure 1. Adult leaves of the 3 species are shown in Figure 2.

A person is not likely to see any trees of *M. ternifolia* in Macadamia plantings in California. The only specimens known to me are one on the property of Reed and Carol Miller in Vista and the Botanic Garden of the University of California in Riverside.

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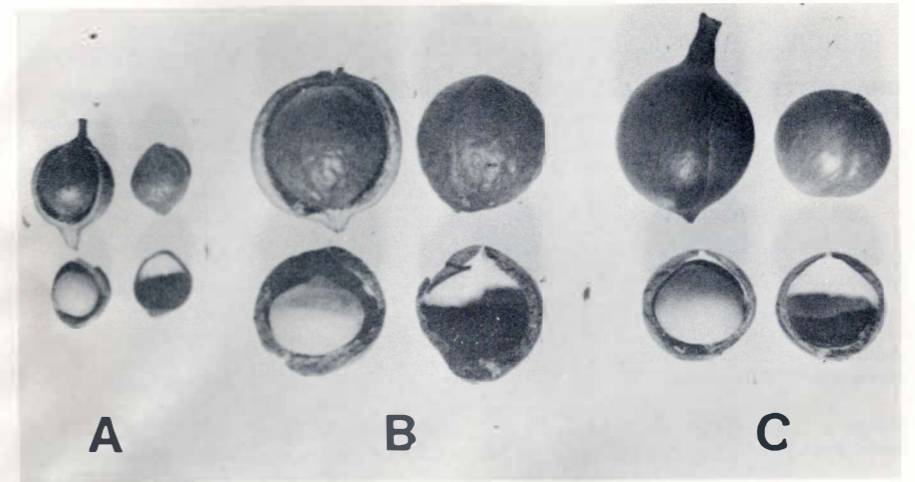


Figure 1. Nut characteristics of *Macadamia* species. A) *M. ternifolia*; B) *M. tetraphylla*; C) *M. integrifolia*.

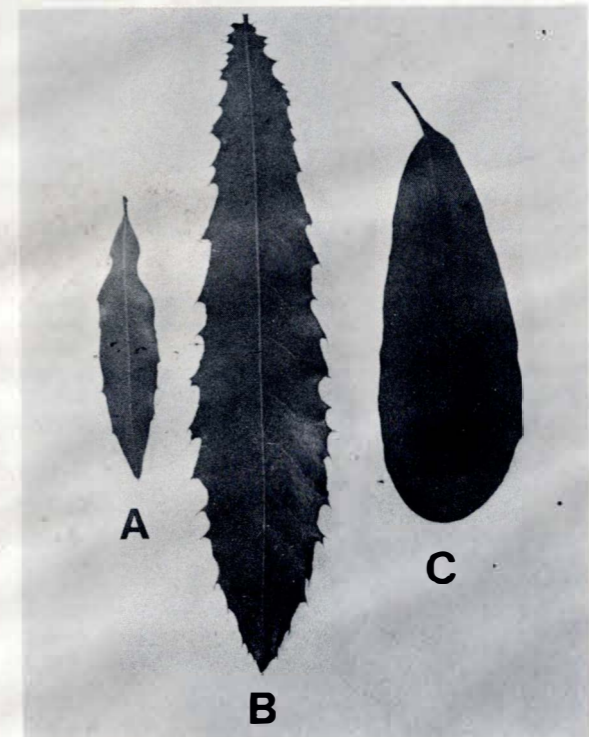


Figure 2. Adult leaves of *Macadamia* species; A) *M. ternifolia*; B) *M. tetraphylla*; C) *M. integrifolia*.

Table 1.
PRINCIPAL TAXONOMIC CHARACTERS OF *M. ternifolia*, and *M. tetraphylla*

CHARACTER	<i>M. ternifolia</i>	<i>M. integrifolia</i>	<i>M. tetraphylla</i>
Phyllotaxy	basically, 3 leaves in a nodal whorl; young seedlings may have only 2; occasional branches have 3 or 5	basically, 3 leaves in a nodal whorl; young seedlings usually have only 2; occasional branches have 4	basically, 4 leaves in a nodal whorl; young seedlings usually have only 2; occasional branches have 3 or 5.
Leaf attachment	petiolate	petiolate	sessile or scarcely sessile
Adult leaf shape	lanceolate	oblanceolate or obovate	oblanceolate
Adult leaf margin	scarcely serrate, with 8-10 teeth on side	generally entire; sometimes with 1-12 teeth on a side	numerous serrations, ranging from 15-40 on a side; occasional leaves have fewer than 15
Color of new growth	pink to red	pale green; occasional individuals with bronze tinging	pink to red; occasional individuals yellowish-green, due to lack of anthocyanin
Flower color	pink	white	pink, white or cream colored in individuals lacking anthocyanin
Racemes	2-5 inches long, with 50-100 flowers	4-12 inches long, with 100-300 flowers	6-18 inches long, with 100-300 flowers
Pericarp	grayish-green in appearance due to dense white pubescence; dehisces fully on tree before fruit drops	bright clear green, due to nearly glabrous condition; often fails to dehisce when fruit is still on tree	grayish-green in appearance, due to fairly dense white pubescence; dehisces fully on tree before fruit drops
Seed size	transverse diameter 3/8 - 1/4 inch	transverse diameter 1/2-1 1/4 inches	transverse diameter 1/2-1 1/2 inches
Seed shape	commonly fusiform to nearly spherical	commonly spherical	commonly fusiform, some nearly spherical
Seed surface	smooth to scarcely pebbled	generally smooth; rarely with slight pebbling	generally pebbled; infrequently smooth or nearly so
Kernel	bitter; unpalatable	sweet, highly palatable	sweet; highly palatable

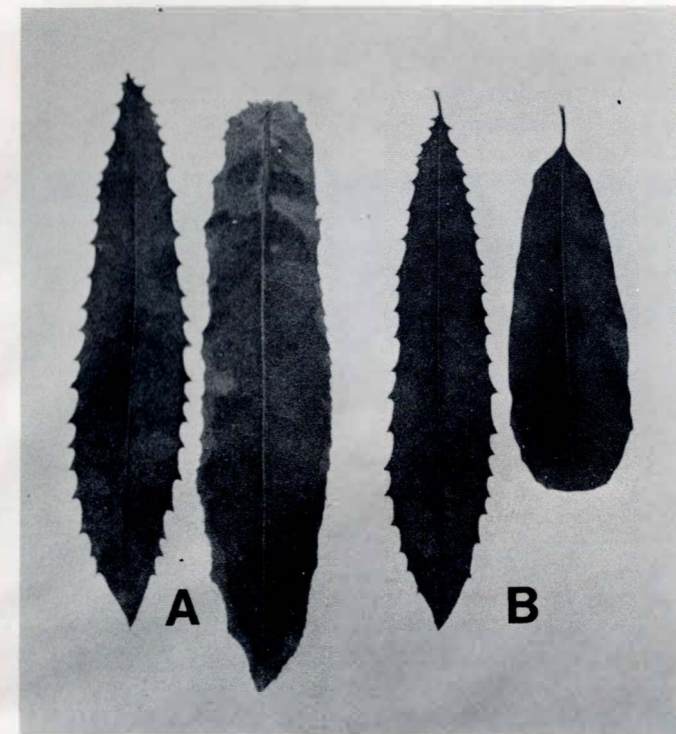


Figure 3. Juvenile and adult leaves of: A) *M. tetraphylla*; B) *M. integrifolia*.

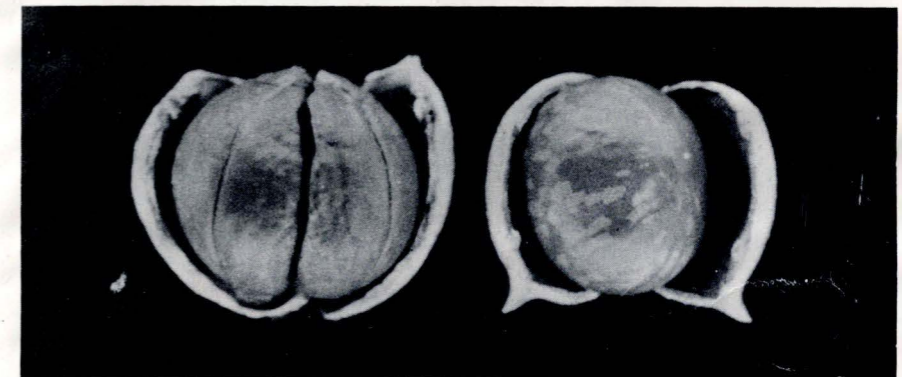


Figure 4. Follicles of *M. tetraphylla*, left, with twin hemispherical nuts developed from 2 ovules; right, with spherical nut developed from a single ovule.

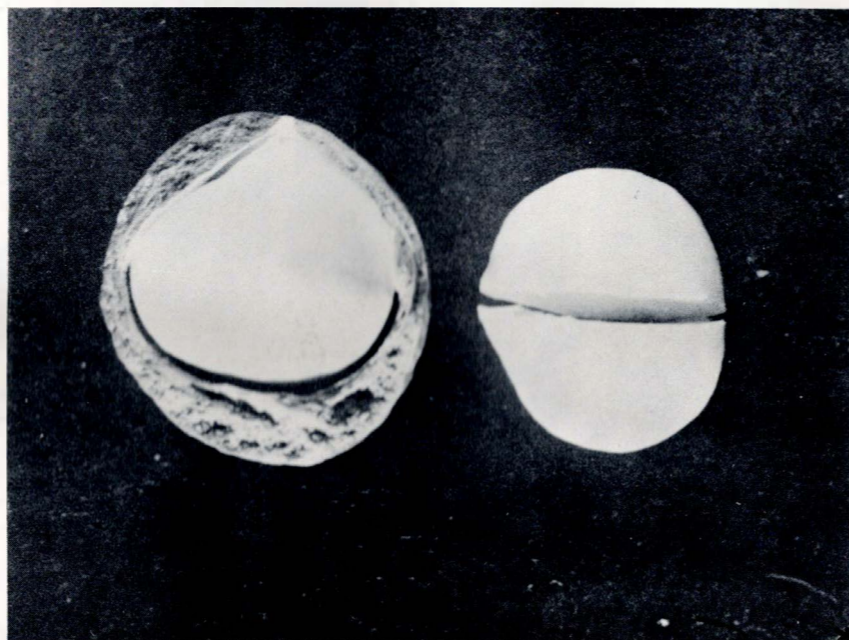


Figure 5. *M. tetraphylla* showing the large hemispherical cotyledons of the embryo.

The most easily recognized features of *M. integrifolia* and *M. tetraphylla* in orchard plantings are: *M. integrifolia* has mostly 3 leaves on a whorl at every node, the leaves have stalks (petioles) and blades that are nearly free or entirely free from teeth, the husks of the fruit do not split open before the fruit falls from the tree; *M. tetraphylla* has mostly 4 leaves at every node, the leaves lack a conspicuous petiole and the margin of the blade has many teeth, i.e. is serrate, the husk of the fruit splits open before the fruit falls from the tree.

Sometimes, one can be fooled by young seedlings. During the early stages of juvenility, the seedlings of both species look alike. The principal difference is that the leaves of *integrifolia* seedlings have fairly conspicuous petioles, *tetraphylla* seedlings have short, inconspicuous petioles, if any. (Figure 3). As the seedling develops, there is a gradual transition in leaf form from juvenile to adult.

Botanically, Macadamia fruits are of the type called follicle, which consists of a husk enclosing one or more seeds. (Figure 4). Generally, the husk splits open at maturity exposing the seeds, which, in Macadamia, are called nuts. Macadamia follicles contain 2 ovules both of which usually are fertilized following pollination of the flowers. When both develop, the husk contains 2 hemispherical "twin nuts" (Figure 5, A). Most frequently, however, one ovule develops at the expense of the other, resulting in the follicle's containing a single spherical or spindle-shaped seed.

The edible portion or nutmeat of a Macadamia nut is the kernel. This consists of a very small root-shoot axis to which 2 large hemispherical cotyledons (seed leaves) are attached. After air-drying, the nutmeats may be eaten raw or roasted in various ways depending on one's preference.

For up-to-date information on the essentials of culture and on cultivars i.e. varieties for particular purposes, ask the Secretary for the published material on The Macadamia Nut in California.

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