Fabaceae—Pea family

Prosopis L.

mesquite

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Growth habit, occurrence, and use. Mesquites—the genus *Prosopis*—are deciduous, thorny shrubs or small trees native to the tropical or subtropical regions of the Western Hemisphere, Africa, the Middle East, and India (Sargent 1965). Three native and 1 naturalized species are considered here (table 1); all are small trees, rarely exceeding heights of 15 m. Mesquite wood is an excellent source of fuel and charcoal and enjoys heavy local use for fenceposts, crossties, and furniture. Mesquite legumes make high-quality forage for livestock and wildlife, and the seeds were widely used by native American peoples in the Southwest (Davis and others 1975; Martin and Alexander 1974; Vines 1960). The crude protein contents of honey and velvet mesquite seeds are 31 and 24%, respectively (Becker and Grosjean 1980), and the legumes of honey mesquite are high in carbohydrates (Harden and Zolfaghari 1988). Mesquite flowers are a source of excellent honey, especially in Hawaii (Skolmen 1990). The tree is a hardy nitrogen-fixer and has been planted for erosion control in Hawaii, as well as for highway landscaping and mine spoil reclamation in the Southwest (Day and Ludeke 1980).

Flowering and fruiting. Mesquite's tiny, perfect flowers are greenish white or greenish yellow in color. They are 2 to 3 mm in diameter and are borne in spike-like axillary racemes some 3 to 10 cm long. Flowering of the mesquites occurs generally from late March to September in the Southwest (Sargent 1965; Vines 1960). In Hawaii, mesquite begins to flower at ages of 3 to 4, and although flowering can occur throughout the year, it is most frequent in January to March (Skolmen 1990). The fruit is an indehiscent legume (pod) that ripens from August to September (Martin and Alexander 1974). Ripe legumes are typically yellowish in color, although legumes of velvet mesquite may also be a mottled red and black at maturity (Ffolliott and Thames 1983). Legumes of mesquite, honey mesquite, and velvet mesquite are flat in shape and vary from 10 to 30 cm in length. Those of screwbean mesquite are coiled and may be as long as 70 cm. The flat, tan or brown seeds range from 1.5 to 7 mm in length (Ffolliott and Thames 1983; Sargent 1965) (figure 2).

Good seed production data are lacking, but there is a record from southern California of an average of 7.2 kg (16 lb) of fruits per tree from velvet mesquite (Felker and others 1984). In the same record, other yield averages were 2.2 kg/tree (5 lb) for honey mesquite, and less than 1 kg/tree (2¼ lb) for screwbean mesquite. There are numerous species of insects that feed on seeds of the mesquites; seed beetles (Bruchidae) are the most important group (Johnson 1983; Solbrig and Cantino 1975).

Collection, extraction, and storage. Ripe legumes may be stripped from trees by hand or picked up from the ground. Seed extraction and cleaning are not easy. One suggested method is to dry the legumes thoroughly (which may require oven-drying in humid climates) then

running them through mechanical scarifiers or hammermills, and then screening out or blowing away the trash (Brown and Belcher 1979; Martin and Alexander 1974). Another method is to soak the legumes to soften them, then force the pulpy legumes and seeds through a sausage grinder with holes large enough for the seeds to pass. Hand grinders will suffice for small lots and commercial meat grinders have been successful for large lots (Skolmen 1990). Filled seeds may be separated from insect-damaged or immature seeds with aspirators or other blowers. If the seeds are dry, water flotation can also be used to separate good from damaged seeds. There are few seed yield and weight data for these 4 mesquite species: 1 kg of mesquite legumes may yield from 19,900 to 35,300 seeds (1 pound yields 9,025 to 16,000 seeds) (Goor and Barney 1968). Mesquite and honey mesquite average 8,000 to 30,000 seeds/kg (3,625 to 13,600/lb) (Glendening and Paulsen 1955; Von Carlowitz 1986), while as many as 38,300/kg (17,400/lb) have been reported for mesquite (Martin and Alexander 1974). Detailed studies of seed longevity are not available, but mesquite seeds, like those of most leguminous species, are orthodox in storage behavior. This means that seeds with low moisture contents may be stored at low temperatures for long periods without loss of viability. Air-dried seeds can be stored at ambient room temperature for at least 9 months with little loss in viability (Skolmen 1990). Martin (1948) reported that herbarium samples of velvet mesquite germinated after 44 years. Furthermore, mesquite seeds have been stored in liquid nitrogen (! 196 EC) for 30 days without loss of viability (González-Benito and others 1994).

Pregermination treatments. Like most Leguminosae, mesquites have very hard seedcoats (that is, hardseededness) that require scarification as a pretreatment for timely germination. Small samples, such as those used in germination tests, can be scarified effectively by nicking each seed with a knife (Martin and Alexander 1974) or rubbing it on rough sandpaper, or by treating the small seedlot with a mechanical scarifier. For seedlots of any size, water soaks are often effective. For mesquite and honey mesquite, 48 hours in cold or tepid water or 1 hour in boiling water has been recommended (Von Carlowitz 1986). Seedcoat hardness may vary by year or seed source, however, and acid scarification may be required on some seedlots. For mesquite, 10 minutes in sulfuric acid increased the germination of a seedlot from 64 to 88% (Skolmen 1990). The safest procedure to use with hot water or acid treatments is to treat a few small samples to determine the best treatment period.

Germination. Some increases in germination capacity of mesquite seeds that resulted from scarification are shown in table 2. Germination of scarified seeds was complete 10 days after exposure to the test conditions. When velvet mesquite seeds were scarified with a knife, 94 to 100% of the seedlot germinated when kept at a constant 27 EC in the dark (Glendening and Paulsen 1955). Germination is epigeal (figure 3).

Nursery practices. There are few published guidelines for nursery practices, but growing mesquite seedlings should not be too difficult. Cox and others (1993) recommended a sowing depth of 1 to 2 cm (2/5 to 4/5 in) for velvet mesquite. Greenwood cuttings from young plants of mesquite, honey mesquite, and velvet mesquite can be rooted in mist chambers (Felker and Clark 1981).

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Table 1—*Prosopis,* mesquite: nomenclature and occurrence

Scientific name & synonyms	Common name(s)	Occurrence
***P. glandulosa* Torr.** *P. chilensis* var. *glandulosa* (Torr.) Standl. *P. juliflora* var. *glandulosa* (Torr.) Cockerell	**honey mesquite**	East Texas & Oklahoma to Utah, S California & northern Mexico
***P. juliflora* (Sw.) DC.** (Hawaii)	**mesquite,**	Mexico, S to Brazil & Peru kiawe
***P. pubescens* Benth.**	**screwbean mesquite,** screwbean ,tornillo	Trans-Pecos Texas to Utah & S California
***P. velutina* Woot.** *P. juliflora* var.*velutina* (Woot.) Sarg.	**velvet mesquite,** mesquite	SW New Mexico, central Arizona, NW Mexico

Sources: Ffolliott and Thames (1983), Little (1979), Skolmen (1990), Vines (1960).

Table 2—*Prosopis,* mesquite: germination test conditions and results

Seed age (yr)	Scarification treatment	Germination medium	Temp (EC) Day	Temp (EC) Night	Avg % germination
11	Nicking	Wet paper	27	27	98
50	Nicking	Wet paper	27	27	60
—	None	Wet paper	27	27	18
—	H_2SO_4	Wet sand	30	20	88

Source: Martin and Alexander (1974).