

Bitterbrush Seed Harvesting: When, Where, and How

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Bitterbrush is widely recognized as one of the better browse plants for stock and wildlife range seeding programs. Either species, antelope bitterbrush (*Purshia tridentata* (Pursh) DC) or desert bitterbrush (*P. glandulosa* Curran), can be established by direct seeding (Brown and Martinsen, 1959; Holmgren and Basile, 1959; Hubbard, Nord, and

Brown 1959; Plummer Stapley, and Christensen, 1959). But the supply of seed is often a bottleneck to large-scale seedings; more efficient methods of seed collection are needed. Evaluation and analysis of data from ecological studies of bitterbrush have provided some new clues to seed production characteristics.¹ Knowledge of these character-

istics is one key to more efficient seed harvesting. The following suggestions may help range managers in determining when, where, and how to harvest seeds.

The only source of bitterbrush seed is the native stands. Production varies according to the species, site, season, and diversity of soil and climate. Seed production in antelope bitterbrush is more consistent, year to year, than in desert bitterbrush. Antelope bitterbrush may produce fair to excellent seed every second to third year in most

¹Nord, Eamor C. Autecology of bitterbrush in California. U.S. Forest Serv. Pacific Southwest Forest and Range Expt. Sta. 1963. (Manuscript in preparation.)

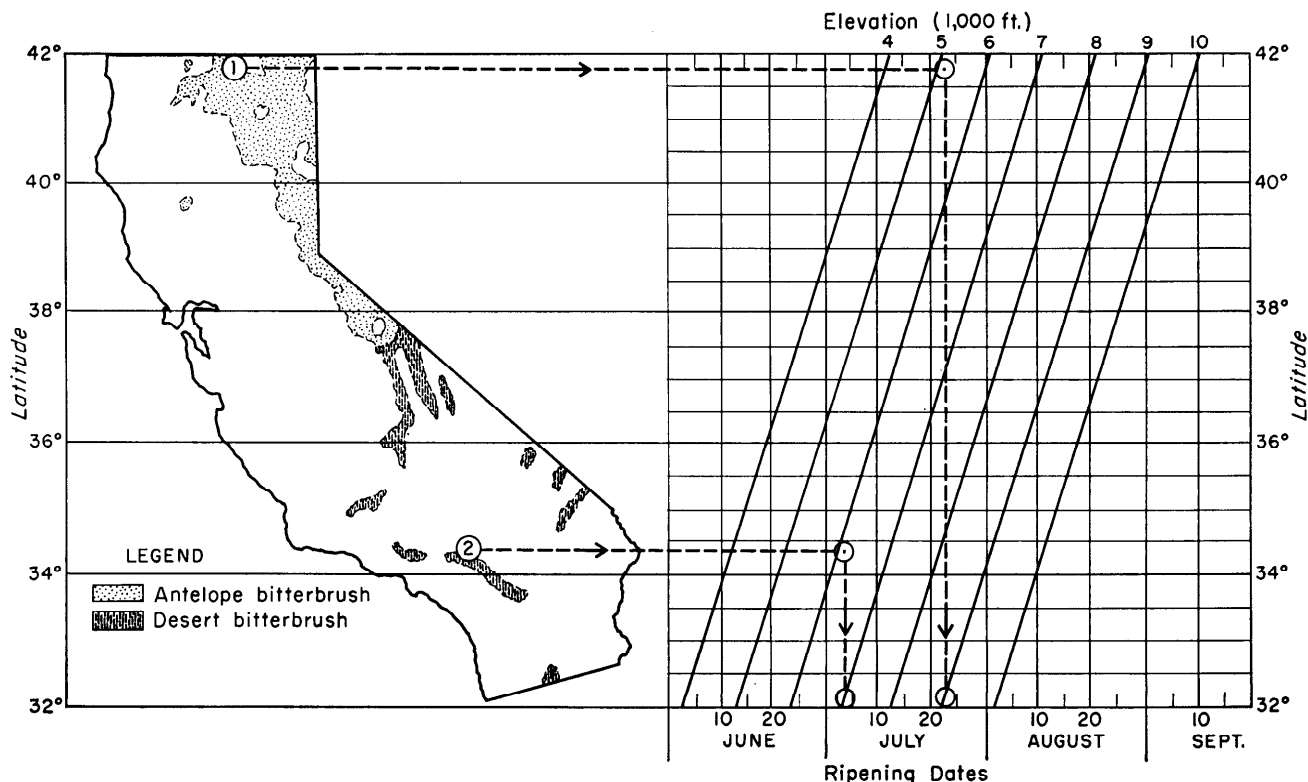


FIGURE 1. Predicted bitterbrush seed ripening dates by latitude and elevation in California. Seasonal variation is about six to ten days before or after the predicted dates. Expected dates for seed to ripen at (1) Lava Beds at 5,000 feet elevation is July 22 and at (2) Cactus Flat at 6,000 feet elevation is July 2.

Table 1. Bitterbrush seed collecting sites in California.

Site and County	Location of Stand	Elevation (feet)	Soil characteristics	
			Parent materials	Reaction (pH)
ANTELOPE BITTERBRUSH				
Bolam, Siskiyou	15 miles NE Weed; along Hwy. 97	5,000	Volcanic ash	6.5-7.0
Tionesta, Modoc	25 miles SE Tule Lake; near Hwy. 139	5-6,000	Pumice and basalt	6.0-6.5
Janesville, Lassen	15-25 miles SE Susanville; along Hwy. 395	5,000	Granite-Lake Terrace	6.0-7.0
Truckee-Verdi, Nevada & Sierra	15-35 miles W Reno; along Hwy. 40	5-6,000	Granite-mixed alluvium	6.0-6.5
Mono-Crowley Lakes, Mono	Between Leevining & Bishop; along Hwy. 395	7-9,000	Granite-basalt-pumice	6.0-6.5
Buttermilk ¹ , Inyo	10-15 miles W Bishop; off Hwy. 395	5-9,000	Granodiorite, some metamorphic	6.0-7.0
DESERT BITTERBRUSH				
McMurray Meadow ¹ , Inyo	20 miles S Bishop; near Hwy. 395	5-6,000	Granodiorite, some metamorphic	6.5-7.0
George's Creek, Inyo	15 miles NW Lone Pine; near Hwy. 395	6,000	Granite	7.0-7.5
Valyermo, Los Angeles	20 miles SE Palmdale; near Ranger Station	3,700	Granite, some sandstone	7.5-8.0
Cactus Flat, San Bernardino	10 miles NE Big Bear; along Hwy. 18	5,800	Granite, basalt & sandstone	7.5-8.0

¹Sites contain both bitterbrush species and intergrades.

stands, whereas a good crop in desert bitterbrush develops with less regularity. This disparity in seed production is attributed to differences in climate and site conditions. More frequent and generally higher production is found where annual rainfall averages ten inches or where plant roots reach underground watertables. The climatic influence, however, is not manifested in the year of occurrence; it generally lags by a year.

²The prediction chart was the outcome of analyses which tested the application of Hopkin's Bioclimatic Law (1918) to actual and predicted bitterbrush seed-ripening dates. A 3-variable multiple regression analysis of seed ripening dates at a base date established at Doyle, Lassen County, adding or subtracting one day for each 100 feet of elevation, 15 minutes of latitude, and 1¼ degrees of longitude, led to a highly significant relationship between the actual and theoretical seed ripening dates for both bitterbrush species throughout California. Longitude was not significant—at least within the range tested. This variable was dropped from the analysis, and the ripening date was fitted as a linear function of elevation and latitude. These two factors accounted for 74 percent of the variation.

When to Collect

A bitterbrush seed crop may be forecast a year before the fruit develops. Good crops generally follow average or better moisture and stem-leader growth averaging three inches or longer. In any year following good plant growth, seed production is generally high even though current precipitation may be scant.

Ripe seed of either species ready for harvest may be expected on different dates at different locations as shown in the prediction chart² or nomogram (Figure 1). The intersections of a horizontal line projected from the latitude in which the stand occurs and the diagonal elevation line of the site gives the predicted seed ripening date shown on the base of the vertical scale. For example, the predicted seed ripening date for antelope bitterbrush at 5,000 feet elevation located near the Lava Beds National Monument in Modoc County (41°40'N) would be about July 22. For desert bitterbrush growing at 6,000 feet elevation a few miles north of Big Bear in San Bernardino County (34°20'N), it would occur about July 2.

Some departures from the predicted seed ripening dates may be expected, because conditions vary through time and from place to place. About a six- to ten-day spread, one way or the other, from the predicted date was indicated by the analysis and observations made in other areas (Blaisdell, 1958).

Practically all bitterbrush fruit in an area usually ripens within a period of a week, sometimes less. Soon thereafter, the mature fruit shatters and falls to the ground where it is eaten by rodents or removed by other agents. Therefore, the harvesting season is short; delays in harvesting may reduce both the quality and the quantity of seed obtained.

Where to Collect

Bitterbrush occurs over a vast range, and experience during the last several years has indicated that in some areas production is usually more certain and consistent. A few stands in California that are readily accessible and possess good potential for producing seed are listed in Table 1. During favorable years, all these



FIGURE 2. Native stands provide the principal source of bitterbrush seed. An energetic worker using a "window-screen" tray and paddle can collect up to 50 pounds per day; the average rate is about one pound per man hour.

sites have yielded good quality seed and most of them have produced rather large amounts. These sites typify conditions where the two species generally occur; antelope bitterbrush on slightly acid to neutral soils (pH 6.0 to 7.0) and desert bitterbrush on neutral to basic soils (pH 7.0 to 8.0). The bitterbrush stands in these areas generally run 200 or more plants per acre and range from a few acres of the desert form to several thousand acres of antelope bitterbrush.

Seed is generally of a better quality and more abundant along or near drainage channels or other catchment basins, especially where the underground watertable is within reach of the plants. Even where the watertable lies 15 to 25 feet below the surface, the plants generally are

thrifty and vigorous, and they form dense, massive stands.

Under such conditions, less time is consumed in collecting seeds than from the drier sites where the plants are somewhat smaller and more widely dispersed.

How to Harvest: Hand or Machine

To date practically all harvested bitterbrush seed has been collected by hand. Equipment has generally consisted of a tarp laid on the ground or a tray held beneath the plant to catch the seed loosened by beating the branches with a stick or paddle. Using a "window screen" tray and paddle (Figure 2), an energetic worker can collect up to 50 pounds of fruit or about 30 to 35 pounds clean seed per day if seed production is high and the plants lay close together. But the average rate is only about one pound of seed per man hour. Seed harvesting costs exclusive of processing and grading have run from \$1.00 to \$1.50 per pound. Costs of marketing and distributing the seed are additional.

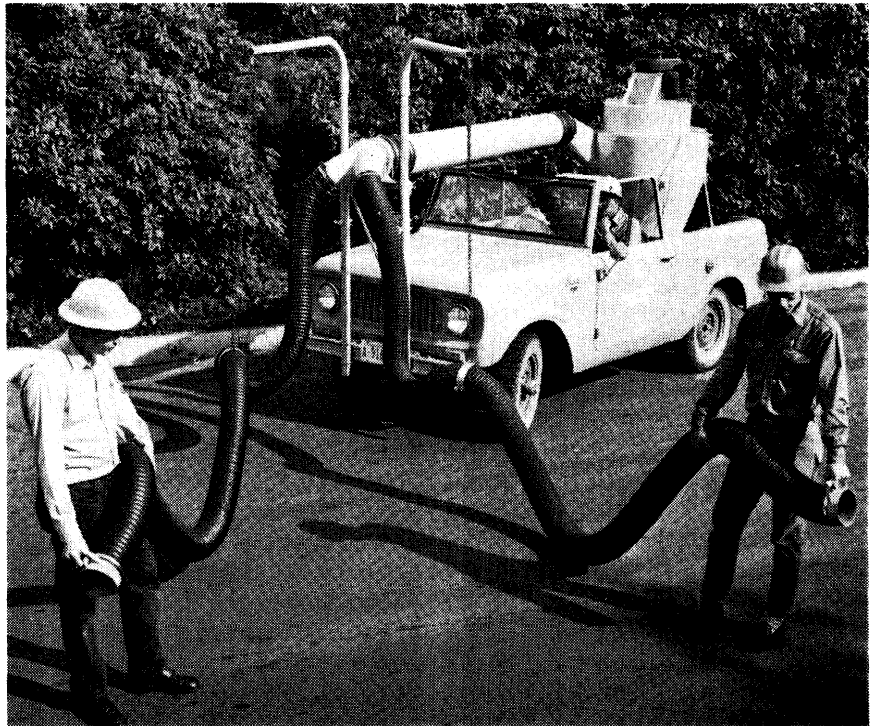


FIGURE 3. Pilot model of a "vacuum" (or suction) browse seed harvester shows the position of flexible tubes, settling tank, and blower (top rear). (Photo courtesy Arcadia Equipment Development Center, U. S. Forest Service.)

³For more complete information on browse seed harvesters, contact the Chairman, Range Seeding Equipment Committee, Division of Range Management, U. S. Forest Service, Washington 25, D. C.

The recent development of mechanical browse-seed harvesters should make collecting bitterbrush seed easier. The first harvester³ was built and tested in 1961. The harvester consists of a motor and "vacuum" plant which sucks the seed from the shrubs into a hopper through large flexible tubes (Figure 3). It can be mounted on a pickup truck or trailer. A 3-man crew operating two suction hoses can collect about 160 pounds of bitterbrush fruit per day. This rate may be stepped-up and costs somewhat reduced by operating the harvester under more favorable conditions than experienced during the tests.

The method to use in collecting bitterbrush seed will depend upon labor conditions, the amount of seed that is to be gathered, and the efficiency of browse seed harvesting equip-

ment. Even though seed crops may be forecast almost a year ahead of the crop by knowing weather and plant growth conditions, some scouting is necessary to locate bitterbrush stands of a character that can produce seed, unless the particular area is well known. To prevent any possible conflicts, collectors must obtain permission of the land operator before harvesting the seed and find out if other collectors use the proposed collecting grounds. New and improved mechanical harvesters which are ready for field tests probably will replace hand collecting methods to take care of anticipated needs for bitterbrush seed wherever this shrub may be used in planting programs.

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