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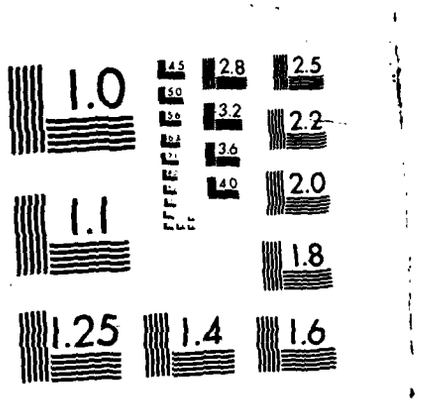
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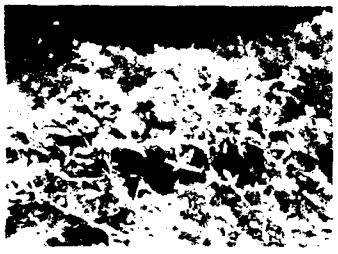

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ENVIRONMENTAL IMPACT RESEARCH PROGRAM

TECHNICAL REPORT EL-86-29

PARTRIDGE PEA (*Cassia fasciculata*)

Section 7.3.3, US ARMY CORPS OF ENGINEERS WILDLIFE RESOURCES MANAGEMENT MANUAL

by

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A plant materials report on partridge pea (*Cassia fasciculata*) is provided as Section 7.3.3 of the US Army Corps of Engineers Wildlife Resources Management Manual. The report was prepared as a guide to assist Corps biologists and resource managers in the selection, cultivation, and management of suitable plant materials for habitat development and wildlife management projects. Topics covered for partridge pea include description, distribution, habitat requirements, wildlife value, establishment, maintenance, and cautions and limitations.

Partridge pea is a native annual legume that frequently volunteers on disturbed sandy soils. In association with other legumes, it provides food and cover for several species of wildlife, especially the northern bobwhite (*Colinus virginianus*). Diagnostic features of partridge pea are described, and similar species of *Cassia* are noted. Habitat and soil preferences and tolerances to moisture and shade are described. Procedures for enhancing
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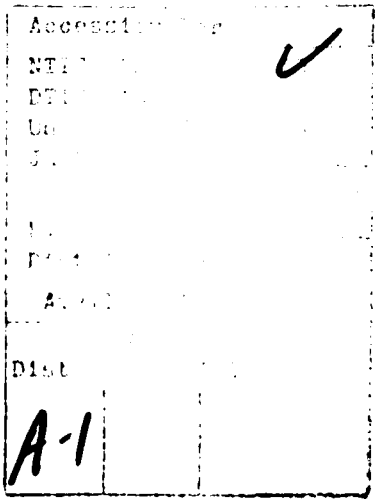
natural stands of partridge pea and developing food plots are given under the heading Establishment; topics covered include site selection, site preparation, propagule selection, planting methods, and production. Maintenance requirements and management cautions are discussed.



PREFACE

This work was sponsored by the Office, Chief of Engineers (OCE), US Army, as part of the Environmental Impact Research Program (EIRP), Work Unit 31631, entitled Management of Corps Lands for Wildlife Resource Improvement. The Technical Monitors for the study were Dr. John Bushman and Mr. Earl Eiker, OCE, and Mr. Dave Mathis, Water Resources Support Center.

This report was prepared by Mr. Larry E. Marcy, Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, Tex., and Mr. Chester O. Martin, Wetlands and Terrestrial Habitat Group (WTHG), Environmental Laboratory (EL), US Army Engineer Waterways Experiment Station (WES). Mr. Marcy was employed by WES under an Intergovernmental Personnel Act contract with Texas A&M University during the period this report was prepared. Mr. Martin, Team Leader, Wildlife Resources Team, WTHG, was principal investigator for the work unit. Review and comments were provided by Drs. Wilma A. Mitchell and Thomas H. Roberts, WES.

The report was prepared under the general supervision of Dr. Hanley K. Smith, Chief, WTHG, EL; Dr. Conrad J. Kirby, Chief, Environmental Resources Division, EL; and Dr. John Harrison, Chief, EL. Dr. Roger T. Saucier, WES, was Program Manager, EIRP. The report was edited by Ms. Jessica S. Ruff of the WES Publications and Graphic Arts Division (PGAD). Drawings were prepared by Mr. David R. (Randy) Kleinman, Scientific Illustrations Section, PGAD, under the supervision of Mr. Aubrey W. Stephens, Jr.

COL Allen F. Grum, USA, was the previous Director of WES. COL Dwayne G. Lee, CE, is the present Commander and Director. Dr. Robert W. Whalin is Technical Director.

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NOTE TO READER

This report is designated as Section 7.3.3 in Chapter 7 -- PLANT MATERIALS, Part 7.3 -- LEGUMES, of the US ARMY CORPS OF ENGINEERS WILDLIFE RESOURCES MANAGEMENT MANUAL. Each section of the manual is published as a separate Technical Report but is designed for use as a unit of the manual. For best retrieval, this report should be filed according to section number within Chapter 7.

PARTRIDGE PEA *(Cassia fasciculata)*

Section 7.3.3, US ARMY CORPS OF ENGINEERS
WILDLIFE RESOURCES MANAGEMENT MANUAL

Partridge pea (*Cassia fasciculata*) is a native annual legume that frequently volunteers on disturbed sandy soils. It is considered a pioneer plant that fixes nitrogen and conditions the land for establishment of other species. Partridge pea has also been used successfully as a soil stabilizer and is a potential forage or hay crop because it grows on a wide variety of soil types (Atkins and Young 1941; Foote and Jackobs 1966a,b,c). In association with other legumes, partridge pea provides valuable food and cover for several species of wildlife, especially the northern bobwhite (*Colinus virginianus*). It is also considered an important honey plant in parts of the Southeast. Other common names for the species include showy partridge pea and large-seeded partridge pea.

DESCRIPTION

Partridge pea is a leafy, reseeding species with showy yellow flowers and elongated seedpods (Fig. 1). Plants usually grow to about 2 ft (0.6 m) tall, but heights vary from 6 in. to 3 ft (0.2 to 0.9 m) (Grelen and Duvall 1966). Growth form varies from few-branched and narrow to diffusely branched and full, depending on density of stands (Correll and Johnson 1970). The 2-ranked

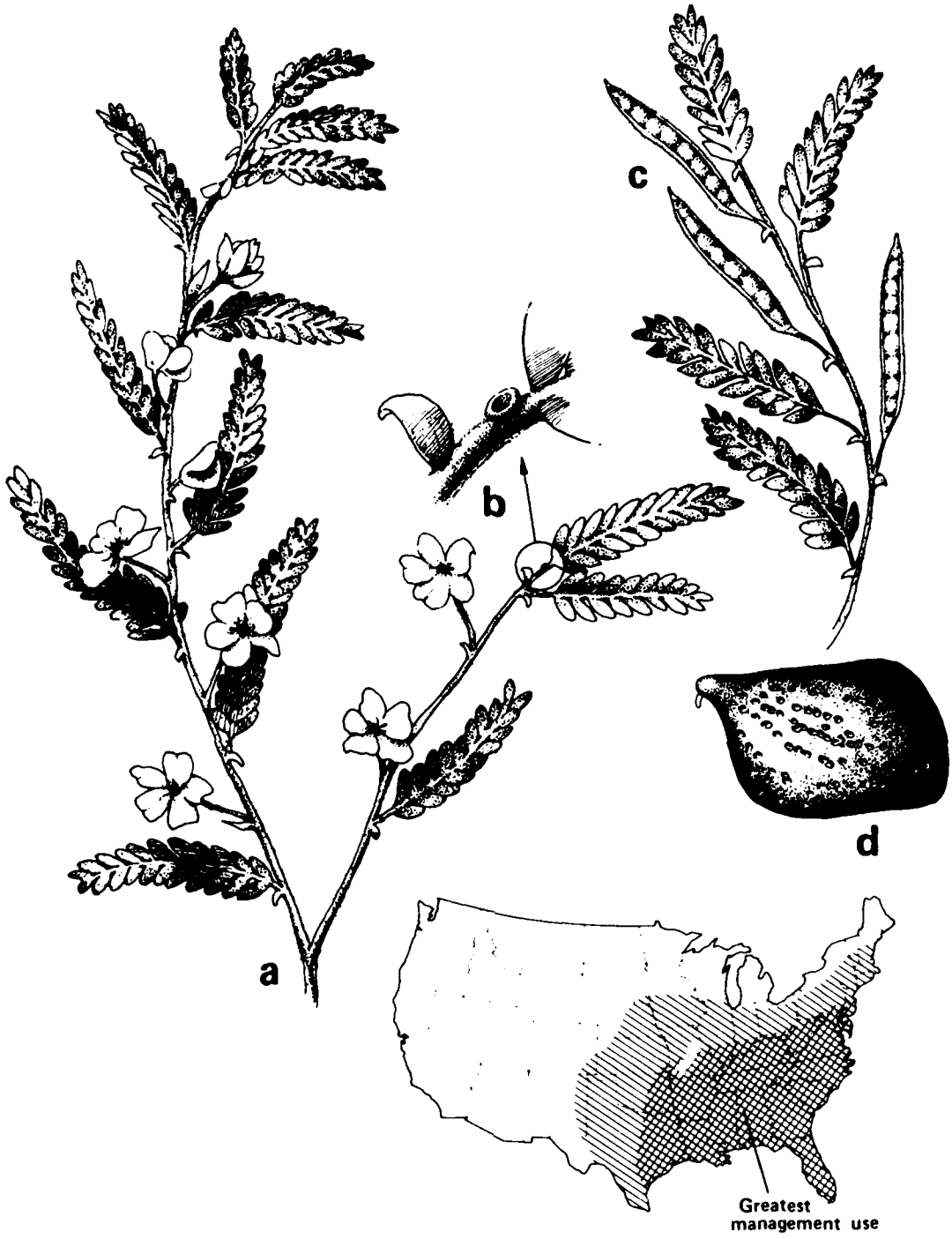

Figure 1. Distribution and distinguishing characteristics of partridge pea (*Cassia fasciculata*): (a) flowering branch, (b) honey gland, (c) seedpod, and (d) seed. The map shows the overall species distribution (diagonal lines) and region of greatest management use (crosshatching)

leaves are alternate and evenly pinnately compound with 14 to 26 oblong, inequilateral leaflets. Leaflets are 0.4 to 0.8 in. (1 to 2 cm) long and 0.08 to 0.16 in. (2 to 4 mm) wide; the margins are sparsely hairy and distinctly veined. A reddish-brown nectary (honey gland) is present near the base of each compound leaf. The leaves are touch sensitive, and leaflets fold together when handled (Owensby 1980).

Two to 6 bright yellow flowers are clustered in the leaf axils. The flower has 5 free petals and 6 to 7 large, drooping, red-violet anthers. The dehiscent seedpod is 2 to 3 in. (5 to 8 cm) long, highly flattened, linear, and straight or nearly so (Owensby 1980). Seeds are black, flattened, and rhomboidal; diagonal rows of circular depressions are evident when magnified (Martin and Barkley 1961). Seeds mature in September and early October; when ripe, the pods split open with explosive force, throwing seeds several feet from the plant. Some seeds sprout the following spring, while others remain on the ground throughout the year (Allen and Waters 1972).

DISTRIBUTION

Over 20 species of *Cassia* are found in the United States, most of which occur in central and southeastern regions. The 2 most common and important species of *Cassia* used by wildlife in the Southeast are partridge pea and sensitive partridge pea (*C. nictitans*); *C. leptadenia* is a major species in the Southwest (Martin et al. 1951). Figure 1 shows the general distribution and region of greatest management potential for *C. fasciculata*.

HABITAT REQUIREMENTS

Partridge pea grows on poor sites and competes well with other vegetation (Atkins and Young 1941). It has been reported from roadsides, waste places, sparse woodlands, woodland borders, fields, littoral prairies, and coastal dunes (Martin et al. 1951, Radford et al. 1968, Correll and Johnston 1970).

Soils

In the Southeast, partridge pea grows best on low, poorly drained sandy soils that are moderately high in lime content (Nixon and Halls 1969, Rosene 1969, Allen and Waters 1972). Growth is best on silty clay loams in the north-central states. The species tolerates a wide range of pH, but greatest

occurrence is in soils with a pH of 6.0 to 6.5. Growth is poor in highly acidic soils (Foote and Jackobs 1966c).

Partridge pea does well on nutrient-deficient soils that are low in phosphorus and nitrogen and have a low rate of nitrification. Nutrient deficiencies of some sites may limit the growth of other plants, especially grasses, thus reducing competition. In time, through nitrogen fixation and soil stabilization, partridge pea may improve a nonstable or eroding site sufficiently to allow the establishment of other plants (Gooding et al. 1949).

Moisture

Partridge pea is adapted to a variety of soil-moisture regimes. Moist, but not wet, sites are generally preferred. It is present near streams and on moist soils throughout the Southeast but may be successfully propagated in many upland areas. Experimental plots in Texas and Oklahoma have shown that stands are fair to good with much reseeding when moisture is favorable (Knox City Plant Materials Center, undated). A lack of adequate moisture limits production, especially during summer months.

Shade

Harshbarger and Perkins (1971) found that shade has a pronounced effect on partridge pea seed production (Table 1). Of 4 treatments examined, highest seed production was obtained under 30% shade, followed in decreasing order by 55% shade, full sunlight, and 92% shade. Average number of seedpods per plant varied from 80 pods under 30% shade to 1 pod under 92% shade. Plants grown in full sunlight produced approximately 1/2 as many seedpods as did plants grown under moderate shade. Initial flowering and formation of seedpods were not affected by shade; however, maximum flowering and fruiting occurred somewhat earlier under moderate shade (Harshbarger and Perkins 1971). Ripley and Perkins (1965) suggested that increased seed production in moderate shade was due to reduced grass competition.

Table 1. Average growth of partridge pea under different degrees of shade (modified from Harshbarger and Perkins 1971)

Shade Treatment (%)	Survival (%)	Height (cm)	Crown Diameter (cm)	Dry Weight of Seed (g)	Dry Weight of Total Plant (g)
0	85	13.8	22.9	1.9	7.4
30	100	14.4	33.7	3.4	11.6
55	99	13.1	37.1	2.8	10.2
92	60	9.7	21.0	0.1	0.8

WILDLIFE VALUE

The majority of species known to use partridge pea are upland game birds. Its greatest value is to bobwhite quail, but seeds are eaten by both greater and lesser prairie-chickens (*Tympanuchus cupido* and *T. pallidicinctus*). White-tailed deer (*Odocoileus virginianus*) are known to consume the foliage in the Southeast (Martin et al. 1951).

Although bobwhite utilize partridge pea throughout the year, it is not a significant part of their diet until late fall (Stoddard 1931, Davison 1958, Rosene 1969). In Georgia and Florida, Stoddard (1931) found that the average occurrence of seeds in the diet from November to May was 9.7%; greatest occurrence was in December (15.6%) and January (23.6%). Two studies in Alabama showed that partridge pea occurred in an average of 36% of quail crops on managed food plots, whereas on unmanaged areas its use was less frequent (Speake 1966, Rosene 1969).

In a study of quail food preferences, Michael and Beckwith (1955) found agricultural crops to be selected over naturally occurring foods such as partridge pea and common lespedeza (*Lespedeza striata*). Other studies showed that food selection was based on availability (Speake 1966, Brunswig and Johnson 1972, Weber 1975). As agricultural crops decrease in availability in late fall and winter, natural foods provide a "carry-over" food supply (Brunswig and Johnson 1972, McRae et al. 1980); therefore, partridge pea and other legumes can help lessen the effect of crop failures or shortages (Weber 1975, McRae et al. 1980).

ESTABLISHMENT

If partridge pea occurs naturally on a site, it may be desirable to stimulate the production of existing stands instead of planting food plots. In southern Georgia, Buckner (1969) found that light disking of mature, open longleaf pine (*Pinus palustris*) stands increased partridge pea seed production; however, intensive cultivation reduced seed production. Single disking resulted in better overall growth and seed production, but legume production decreased the first growing season after double-disking (Buckner and Landers 1979). Roller chopping, especially double-chopping, also decreased productivity (Buckner et al. 1979).

Site Selection

Plant establishment for upland game birds should be concentrated in areas where species normally feed. Bobwhite prefer to feed near the protection afforded by shrubs, vines, thickets, hedgerows, and woods (Pearson and Sturkie 1950). Therefore, food plots should always be located adjacent to good escape cover. Suggested sites for cultivation of partridge pea include forest openings, rights-of-way, and fencerows where soils and moisture are suitable.

Site Preparation

Plot design. Food plots for bobwhite quail should be from 1/8 to 1/4 acre in size and at least 15 to 20 ft wide (Allen and Waters 1972). Several well-scattered 1/8-acre plots are better than one large food plot, and long rectangular plots are better than square blocks of the same acreage (Lay 1969). Goodrum and Reid (1954) suggested that plots be located at 1/4-mile intervals. Partridge pea is also suitable for planting in strips along field edges, fencerows, ditch banks, firelanes, and access roads (SCS 1984).

Mechanical treatment. Shrubs, grasses, and dead vegetation should be cleared from food plot sites. Burning provides the most efficient means of clearing sites, but chaining, disking, and other mechanical means may be used when burning is not feasible. After it has been cleared, the seedbed should be disked lightly but thoroughly to a depth of 4 in. The best period for disking is from January to March, but it can be done any time from the first frost in the fall to the following May (Lay 1969). Margins of the food plot should receive moderate disking to increase ground cover diversity at the site (Buckner et al. 1979).

Soil amendments. Partridge pea will grow on poor soils but responds well to fertilizer (SCS 1984). However, fertilizer must be applied with care to avoid damaging quail range. The goal is to provide enough fertilizer on poor soils to make weeds grow but not to stimulate grasses (Lay 1969). For example, species such as bermuda grass (*Cynodon dactylon*) could be stimulated by fertilization to the extent that any quail food produced is lost in deep grass.

Sites should be fertilized with phosphate and potash (0-13-13 or 0-20-20) before planting; the fertilizer should be applied at a rate of 300 to 600 lb/acre depending on soil requirements (Rosene 1969, Allen and Waters 1972). The SCS (1984) recommended 200 to 300 lb/acre of 0-20-20 for sites in Mississippi. Speake et al. (1975) found that large increases of legumes, primarily species of *Cassia* and *Lespedeza*, resulted from broadcast applications of phosphorus. Speake (1967) broadcast basic slag at a rate of 1 ton/acre on fire-managed pine stands in Alabama and doubled legume coverage over the burned areas. Nitrogen should not be used because it stimulates grass production (Speake 1967).

Propagules

Partridge pea seeds are not generally available from local suppliers but may be obtained from larger seed houses, particularly in Alabama, Georgia, and Florida (SCS 1984). Natural seed crops are usually large but difficult to gather due to the uneven rate of maturity and a strong tendency for each pod to open soon after maturity (Atkins and Young 1941). Seed collections have been successful by harvesting the entire plant before the seedpods open. Pods should be dried on a tarpaulin or floor and then threshed to obtain seeds.

Seed scarification is necessary if good stands of partridge pea are to be quickly established (Cushwa et al. 1968, Nixon and Halls 1969, Rosene 1969). Weather eventually breaks down the hard seed coat, but disking or controlled burning of vegetation accelerates the process (Rosene 1969). Martin and Cushwa (1966) suggested scarifying seeds by soaking them in water at 70° C for 30 min or by treating them with sulfuric acid for 25 min. Better germination occurred after seeds were refrigerated at 2° C (Cushwa et al. 1968).

Planting Methods

Seeds may be either broadcast or planted in rows. Seeds should be sown at a rate of 16 to 20 lb/acre at a depth of 1/4 to 3/4 in. and covered just

enough to prevent drifting (Lay 1969, Rosene 1969, Allen and Waters 1972). If row planting is used, a distance of 30 to 40 in. is recommended between each row (David G. Lorenz, Knox City Plant Materials Center, pers. commun., 1983). Deep plowing should be avoided because it may cause a loss of seeds (Pearson and Sturkie 1950). Seeds may be broadcast at a rate of 15 lb/acre, followed by light disking or cultipacking, on a prepared seedbed; seeds have also been broadcast "on the rough" with moderate success after controlled burning in February (SCS 1984).

Seeds should be planted in the spring after the danger of frost has passed. Seeds planted in mid-April flower during the first and second weeks of September, and fruit production begins approximately 12 days later (Harshbarger and Perkins 1971). The SCS (1984) recommended planting in February or early March in Mississippi.

Partridge pea should not be planted in pure stands but should be seeded with other species to ensure an adequate food supply for quail. Species commonly planted in association with partridge pea include the lespedezas and clanton tick-clover (*Desmodium perplexum*). Seeds of common lespedeza and Korean lespedeza (*Lespedeza stipulacea*) ripen in early fall and remain available until mid-March. Bicolor lespedeza (*L. bicolor*) is an excellent species to plant in association with partridge pea because it produces large volumes of seeds and provides good cover (Pearson and Sturkie 1950).

Production

Partridge pea production is highly variable and depends primarily on site location and soil moisture. Near the extremes of its range, production may be low. In Maryland, partridge pea stands were found to yield 300 lb/acre (Allen 1969). However, in north-central Texas under optimum growing conditions, seed production has been as high as 1540 lb/acre with over 65,300 seeds/lb. Under less favorable conditions (inadequate moisture), seed production was approximately 800 lb/acre (David G. Lorenz, Knox City Plant Materials Center, pers. commun., 1983).

MAINTENANCE

Artificially or naturally seeded areas that are maintained in early stages of succession yield more quail food and provide better habitat than older undisturbed sites (Speake 1966). Stands will usually reseed and remain

productive for 1 to 3 years but will gradually degrade without maintenance (SCS 1984). Haugen and Fitch (1955) found that stands of partridge pea (4 to 7 years old) were low in seed production. Succession may be controlled by disking or burning of ground cover, which also increases the amount and variety of other food and cover plants used by game and nongame birds (Speake 1967, Rosene 1969).

Old growth partridge pea should be disked or burned with a hot fire approximately every 2 to 3 years (Haugen and Fitch 1955, Speake 1966, Allen and Waters 1972). Disking or burning as soon as the danger of frost has passed has the advantages of sparing young plants and stimulating the germination of additional seeds (Stoddard 1931). Buckner et al. (1979) found that January burns consistently increased production more than May burns in Georgia, and February burns are recommended in Mississippi (SCS 1984). However, late disking or burning retards or kills seedlings. On regularly burned areas, attention should be given to improving stands of legumes with basic slag. Speake (1967) found that fertilization of burned sites with basic slag had a long-term effect (4 years after application) and doubled legume production.

CAUTIONS AND LIMITATIONS

Partridge pea has the disadvantage of being palatable to both wildlife and livestock. Therefore, it is recommended that food plots be fenced where heavy grazing occurs (Allen and Waters 1972). Goodrum and Reid (1954) found greater incidence of grazing on partridge pea stands after fertilizer application. Damage to wildlife plantings is often caused by cottontails (*Sylvilagus* spp.), house sparrows (*Passer domesticus*), and rodents, especially cotton rats (*Sigmodon hispidus*). The best method of rodent control is destruction of their preferred habitat, such as rank stands of grass, by burning or disking (Pearson and Sturkie 1950).

If seed is obtained from a commercial supplier, the strain purchased should be adapted to the environmental conditions in which it will be planted. Foote and Jackobs (1966b) found that partridge pea strains from southern states were not adapted to sites in northern states.

Practices used to manipulate succession can be damaging if not applied properly. Late burning and disking damages or kills seedlings, greatly reducing seed yield (Stoddard 1935). Partridge pea is susceptible to drought;

therefore, it is recommended that a combination of food plant species be used to increase the effectiveness of supplemental food plots for wildlife. Sensitive partridge pea is a good quail food but should be used with caution in food plots because it is susceptible to wilt during hot summers (Pearson and Sturkie 1950, Allen and Waters 1972).

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