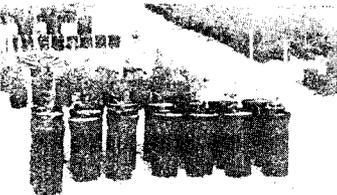
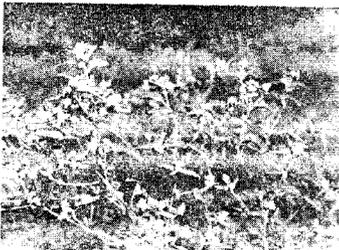
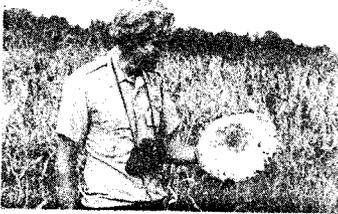




**US Army Corps
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**ENVIRONMENTAL IMPACT
RESEARCH PROGRAM**

TECHNICAL REPORT EL-86-23

BICOLOR LESPEDEZA
(Lespedeza bicolor)

Section 7.3.2, US ARMY CORPS OF ENGINEERS
WILDLIFE RESOURCES MANAGEMENT MANUAL

by

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<p>A report on bicolor lespedeza (<i>Lespedeza bicolor</i>) is provided as Section 7.3.2 of the US Army Corps of Engineers Wildlife Resources Management Manual. The report contains information that would be needed by the Corps District or project biologist for establishing bicolor food plots on project lands. Major topics include plant description, distribution, habitat requirements, wildlife value, establishment, and maintenance.</p> <p>Bicolor lespedeza is an imported perennial legume planted as supplemental food for northern bobwhite (<i>Colinus virginianus</i>) in the southeastern United States. In this report the characteristics of bicolor are described and its naturalized range is graphically illustrated. Soil and shade requirements are given, and the food value to bobwhite is discussed. Establishment of food plots is outlined in detail and includes site selection and preparation, propagule selection, and methods used to plant both seeds and seedlings. Other</p> <p style="text-align: right;">(Continued)</p>			
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species of lespedeza are suggested for planting with bicolor because of its 2-year maturation period. Proper management of bicolor plots is described, and a few cautions in their use are pointed out.

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. David Mathis, Water Resources Support Center.

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NOTE TO READER

This report is designated as Section 7.3.2 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.

BICOLOR LESPEDEZA (*Lespedeza bicolor*)

Section 7.3.2, US ARMY CORPS OF ENGINEERS
WILDLIFE RESOURCES MANAGEMENT MANUAL

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Bicolor lespedeza is a perennial legume planted as supplemental food for northern bobwhite (*Colinus virginianus*) in the southeastern United States. Introduced from Japan, bicolor was sold chiefly as an ornamental shrub until the mid-1930's when the USDA Soil Conservation Service (SCS) began planting it for erosion control and wildlife food (Rosene 1969, Allen and Waters 1972). By the 1940's game authorities in the Southeast had become interested in the potential use of bicolor in bobwhite management, and during the next decade millions of seeds and seedlings were produced annually and distributed to farmers through Pittman-Robertson projects (Haugen and Fitch 1955, Rosene 1969). Bicolor is now one of several lespedeza species generally planted in conjunction with other legumes as food sources for bobwhite in the Southeast.

DESCRIPTION

Bicolor lespedeza is a deciduous shrub that grows from 3 to 10 ft (1 to 3 m) tall and has several grooved, woody stems (Fig. 1). The leaf is composed of 3 ovate to elliptical leaflets that are 1 to 2 in. (2 to 5 cm) long and pubescent on one or both surfaces. The terminal inflorescence consists of loosely arranged clusters of flowers with purple and white petals, thus the name "bicolor" (Radford et al. 1968). The densely pubescent, 0.2- to 0.3-in.

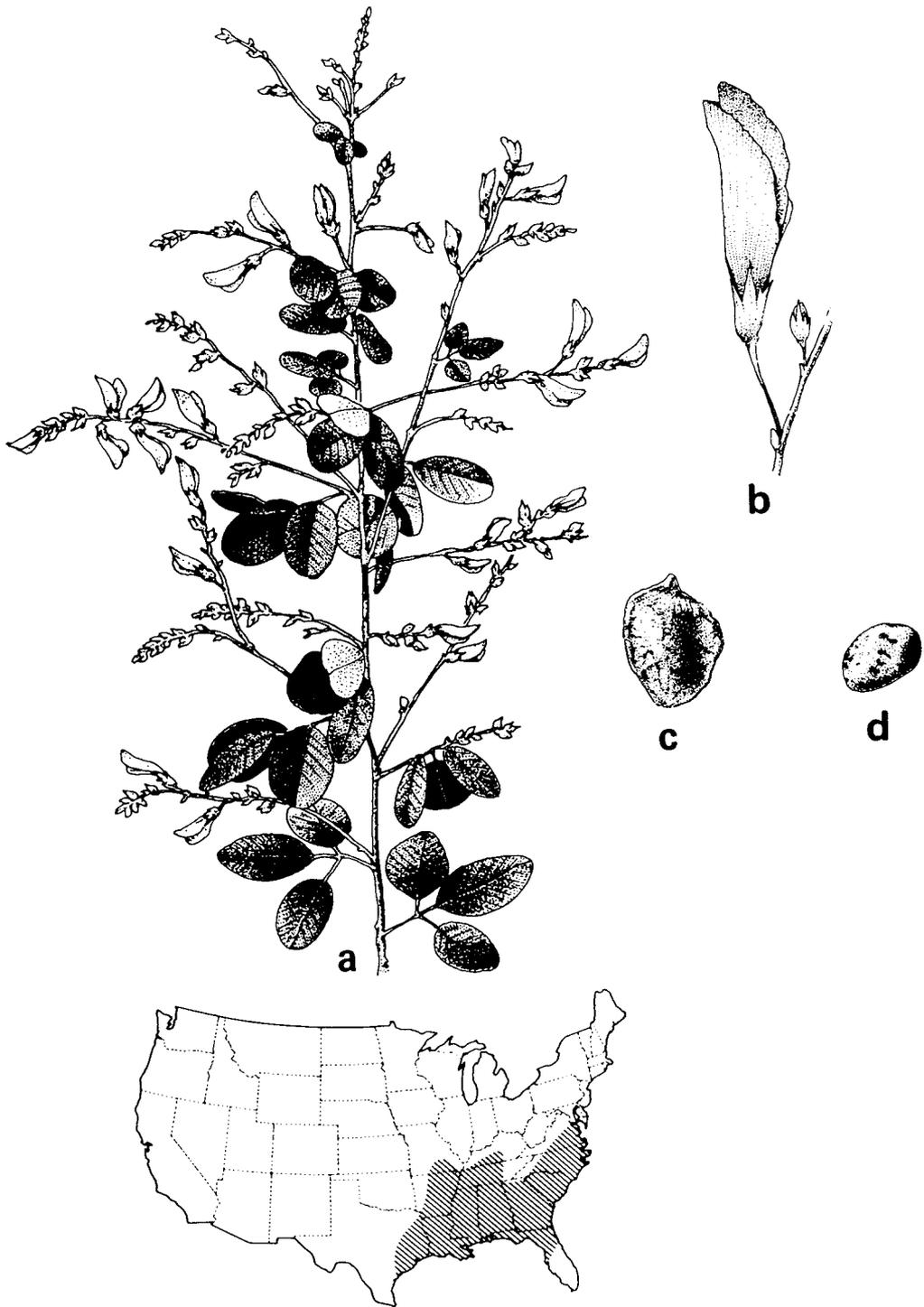


Figure 1. Distribution and distinguishing characteristics of bicolor lespedeza (*Lespedeza bicolor*): (a) flowering branch, (b) flower, (c) seedpod, and (d) seed

(6- to 8-mm) elliptical seedpod produces a single shiny, olive-green seed mottled with purple (Coastal Zone Resources Division 1978).

Flowering occurs during the summer, and seeds mature from October through early November; some seeds drop upon ripening, but others are shed gradually throughout fall and winter (Radford et al. 1968, Allen and Waters 1972). Because the hard seed coat resists deterioration, seeds do not germinate until the outer waterproof coating is disrupted by fire or scarification; therefore, bicolor does not readily spread among wild vegetation or become a pest of cultivated crops (Stoddard 1931, Allen and Waters 1972).

DISTRIBUTION

Because of its long growing season, bicolor lespedeza is limited to the Southeast (Fig. 1). This species is particularly adapted to the Piedmont and Coastal Plain but grows readily throughout most of the South (Radford et al. 1968). Its range extends from the southeastern Coastal Plain and central Florida to eastern Texas, Arkansas, and the southern parts of Missouri and Ohio (Coastal Zone Resources Division 1978). Recently developed strains such as Natob can be grown further north because they have relatively short growing seasons and can tolerate colder climates (Belcher and Sharp 1979).

HABITAT REQUIREMENTS

Bicolor is adapted to a variety of soil types and can tolerate a wide range of soil conditions; however, it grows best on moist to well-drained soils within a pH range of 4.4 to 6.5 (Allen and Waters 1972, Coastal Zone Resources Division 1978). Sandy loams are most suitable, but bicolor will grow on other soils if properly fertilized. Soils that should be avoided are deep thin sands, poorly drained lowlands, highly alkaline soils, and extremely eroded sites (Pearson and Sturkie 1950, Rosene 1969, Allen and Waters 1972). Although bicolor is a plant of open areas, it can tolerate 50% shade; typical habitats are fields, fencerows, and open woods (Radford et al. 1968, Coastal Zone Resources Division 1978).

WILDLIFE VALUE

Bicolor lespedeza is a choice food of bobwhite in the Southeast (Martin et al. 1951, Rosene 1956, Davison 1958). Although feeding trials of penned wild birds have shown that bobwhite prefer grass seeds to legume seeds

(Michael and Beckwith 1955), crop analyses have indicated they will consume large quantities of bicolor seeds if they are available (Rosene 1969, Weber 1975). Bicolor provides an excellent supplemental food source for quail in late winter and early spring; seed drop occurs from November through May, and the hard seeds remain viable on the ground throughout the year (Pearson and Sturkie 1950, Allen and Waters 1972).

Few wildlife species except bobwhite are known to eat bicolor seeds. Cotton rats (*Sigmodon hispidus*) are the chief competitors, and one rat can consume 3 to 4 times as many seeds per day as can a quail (Pearson and Sturkie 1950). White-tailed deer (*Odocoileus virginianus*) will browse the foliage of young plants, and cottontail rabbits (*Sylvilagus floridanus*) will eat the stems, leaves, and bark (Davison 1945, Pearson and Sturkie 1950, Coastal Zone Resources Division 1978).

ESTABLISHMENT

Site Selection

Bicolor food plots should be located where bobwhite generally prefer to feed. Suitable sites are field borders, fencerows, powerline rights-of-way, forest clearings, and open areas near woods (Allen and Waters 1972). Plots should be distributed over the quail management area; at least 1 plot per 20 to 25 acres is recommended for southern forestland (Davison 1949, Murray and Frye 1957). Cover should be available during the establishment of bicolor and may consist of fencerows, thickets, hedgerows, and forest edges (Pearson and Sturkie 1950).

Site Preparation

Plot design. Bicolor is usually planted in long, narrow strips to form edge or border plots of 1/8 to 1/4 acre. Strips should be 300 to 400 ft long and 15 to 20 ft wide, and rows should be from 30 to 40 in. apart (Davison 1949, Pearson and Sturkie 1950, Murray and Frye 1957, Gray 1967, Rosene 1969, McConnell 1971, Allen and Waters 1972). From a literature review of bobwhite habitat requirements in the Southeast, Casey (1965) concluded that 1/7 acre of bicolor can probably maintain 1 covey of 12 birds throughout the winter.

Mechanical treatment. To reduce competition from weeds, a bicolor plot should be established on previously uncultivated land. The soil should be

plowed, disked, and harrowed several weeks before planting to allow time for it to thoroughly settle before sowing (Allen and Waters 1972).

Soil amendments. The amount of fertilizer required for bicolor establishment should be determined by soil tests. Suggested rates for moderately fertile soils range from 300 to 600 lb/acre, but poor soils may require 1000 lb/acre. Although low-nitrogen fertilizers are generally recommended, a 13-13-13 ratio may be used if competition is not expected to be a problem (Gray 1967, Rosene 1969, McConnell 1971, Allen and Waters 1972, SCS 1982). However, care must be taken to avoid overfertilizing plots, as excessive fertilizer will increase the growth of foliage and decrease seed production. Lime will be needed on soils that are highly acidic; rates of application should follow those suggested by soil tests.

Propagule Selection

Bicolor plots may be established from seeds or seedlings, and each has certain advantages. As bicolor requires 2 years growth for good seed production, planting seedlings reduces the time for plot establishment. The 1-year-old plants also produce a limited amount of seeds and usually have a greater survival rate than seeds planted during dry years (Allen and Waters 1972).

Depending upon the locale, seeds may be easier to obtain than seedlings. Seeds can be purchased from seed companies that sell propagules for wildlife plantings, whereas seedlings may only be available from certain nurseries. To obtain seedlings or information concerning availability, one may contact area personnel with the SCS, Forestry Commission, or State wildlife agencies.

Only scarified seeds should be used, i.e., those which have had the seed coats treated to hasten germination (McConnell 1971, Allen and Waters 1972, Environmental Laboratory 1978). Seeds obtained from commercial sources have usually been scarified, but a quick test can be made by soaking 2 lots of 100 seeds in separate containers of water for 24 hours; scarification is adequate if 50% of the seeds swell (SCS 1982).

Planting Methods

Seeds. Although bicolor seeds may be planted from mid-February to mid-June, the best months are March and April (Pearson and Sturkie 1950, McConnell 1971, SCS 1982). The critical factor for seed germination is soil moisture; therefore, seeds should be planted before May 15 in most regions (Allen and Waters 1972).

Seeds may be broadcast or planted in rows. Broadcasting requires less time than row planting and produces a heavier stand; however, row planting allows for cultivation and more effective weed control and permits easier removal of 1-year-old seedlings for transplanting (Allen and Waters 1972). Seeds should be sown uniformly at a depth of 1/2 to 3/4 in. in rows 30 to 40 in. wide; this should ensure germination yet prevent drifting in heavy rains. A garden seeder is convenient for planting, and a cultipacker or other roller can be used for covering and smoothing the seedbed (Pearson and Sturkie 1950, Gray 1967, McConnell 1971, Allen and Waters 1972).

Recommended seeding rates are 8 to 24 lb/acre for broadcasting and 3 to 12 lb/acre for direct seeding (Pearson and Sturkie 1950, McConnell 1971, Allen and Waters 1972, SCS 1982). The lighter rate for each method is probably sufficient, as the objective is to grow plants with seeds that are readily available to quail rather than to produce a thick stand of vegetation.

Seedlings. Seedlings must be planted during dormancy to prevent injury to growing tissues; the period from December through March should be safe for all states in the Southeast. Suggested planting dates are November 1 to April 1 for Arkansas (Gray 1967), December 1 to April 1 for Tennessee (McConnell 1971), and December 1 to March 1 for Alabama (Allen and Waters 1972).

Seedlings give best results when planted as soon as possible after they have been obtained from a nursery; if this is not feasible, they should be stored in a cool dry place with roots uncovered until planting (Allen and Waters 1972). Seedlings 18 to 24 in. tall should be spaced from 1-1/2 to 3 ft apart; approximately 1200 plants per plot will be required with this spacing (Gray 1967, Rosene 1969, McConnell 1971, Allen and Waters 1972, Coastal Zone Resources Division 1978).

Seedlings are generally planted by furrowing or by using a mechanical tree planter (Allen and Waters 1972). Furrows are best made with a turn plow and must be deep enough to allow sufficient space for the roots. Seedlings should be placed upright against one side of the furrow and covered lightly with a second furrow so that the soil, after settling, will be from 2 to 4 in. above the root crowns. Tractor-drawn tree planters are recommended for planting a large number of plots. Seedlings should be set in an open trench and held upright until soil closes 1 to 2 in. above the root crowns and is firmly packed by the wheels; care must be taken to drive slowly enough to permit proper spacing of seedlings. The time required to plant a 1/8-acre plot is

approximately 6 man-hours by furrowing and 1-1/2 man-hours with a tree planter.

Associated Species

Because of the 2-year maturation period, bicolor may be mixed with annual lespedezas such as Korean (*Lespedeza stipulacea*) and Kobe (*L. striata*), which are also commonly grown for bobwhite management. Bryan et al. (1982) evaluated lespedeza mixtures for use on regenerated pine sites in South Carolina and recommended sowing 3 lb of bicolor with 7.5 lb of Kobe/acre on the Piedmont and 3 lb of bicolor with 30 lb of Kobe/acre in the sandhills region. Commercial mixtures of lespedeza species may be purchased from wildlife food nurseries or seed companies. Mixtures containing annuals should be planted early, preferably in March (Bryan et al. 1982).

MAINTENANCE

With proper management bicolor plots will maintain adequate cover and good seed production for many years (Allen and Waters 1972). The major objective is to reduce existing stems to approximately ground level and thereby stimulate sprouting. Cutting back the stems will produce a low bushy canopy that provides cover for quail and dense shade that aids in weed control; the increased number of stems will ensure good seed production.

Plots should be disked, burned, or bush-hogged in February or early March before new growth begins (Rosene 1969). Single disking should be only deep enough to remove the tall stem residues and scratch the soil surface. Prescribed burning may be done in conjunction with burning of pine stands because fire has the same effect on bicolor as pruning. If plots are bush-hogged, 6 to 8 in. of stubble should be left, and plots should be burned afterward. The same fertilizer ratio and application rate used for establishment should be applied following stem reduction (Bill Tomlinson, Anderson-Tully Company, pers. commun., 1983).

Annual pruning will maintain plants at heights needed for optimum cover and seed production (Allen and Waters 1972). However, pruning at 2- to 3-year intervals is adequate and may be preferred whenever a large number of plots are managed or animal damage becomes a problem. Browsing of foliage can be detrimental to plants in areas of high deer populations; cutting the stems back every 2 to 3 years will eliminate this problem, as deer seldom browse the

older stems (James L. Buckner, International Paper Company, Southlands Experiment Forest, pers. commun., 1983). Cattle should be kept off the area during all seasons except winter, when bicolor is dormant.

CAUTIONS AND LIMITATIONS

Bicolor lespedeza has been used successfully as a supplemental food for bobwhite, but research has shown no significant population increases if native quail foods or farm grains are available (Gehrken 1954, Rosene 1956). Neither bicolor nor other food plots should be planted in anticipation of increased resident bobwhite populations.

Although bicolor does not increase the carrying capacity of suitable quail habitat, it provides excellent cover and food for birds in late winter; therefore, plots may attract and concentrate quail produced elsewhere (Rosene 1956). Concentration of birds can result in excessive kill on areas with heavy hunting pressure and unregulated kill; however, this should be no problem if hunting is controlled and an adequate number of properly spaced plots are provided on an area.

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