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Game Information Leaflet

Number 108

SHRUB THICKET ESTABLISHMENT IN COLORADO'S HIGH PLAINS¹

Shrub thickets are one of the most beneficial habitat supplements that can be provided to plains upland game in the High Plains of eastern Colorado. Ring-necked pheasants (*Phasianus colchicus*), northern bobwhites (*Colinus virginianus*), scaled quail (*Callipepla squamata*), desert cottontails (*Sylvilagus audubonii*), mourning doves (*Zenaida macroura*), deer (*Odocoileus* spp.), and many songbird species extensively use shrub thickets. These wildlife species need protective cover close to the ground which shrubs provide in contrast to self-pruning large trees. There is less avian predation of upland game and their nests where shrubs, rather than tall trees, are present (Snyder 1982a).

Shrub thickets are desirable because: (1) they are more economical to establish than tree shelterbelts, (2) they require less land and compete less with adjacent crops for moisture than trees, and (3) they can be established more rapidly than trees. A closed canopy shrub thicket can be achieved within a few years, whereas many years are usually required to establish a large, wide-row windbreak. Shrub thickets are also visually aesthetic and some species provide supplemental food for wildlife.

Woody plantings are not well adapted to the semi-arid plains of eastern Colorado necessitating conscientious weed control for a few years until they become established. Once they have survived the first critical years, many shrub species perpetuate themselves by root sprouts and survive for many decades with little additional maintenance. Since tillage and hand-hoeing maintenance of plantings is time consuming and easily neglected, this leaflet provides alternatives to reduce maintenance demands. However, if woody plantings are to benefit wildlife, their design, location, species selection, and other factors must be considered. This leaflet is intended for use by farmers, landowners, conservation agency technicians, and others interested in direct field application.

SIZE, SHAPE, AND PLACEMENT OF SHRUB THICKETS

It is essential that shrub thickets, like shelterbelts, be designed and positioned to provide relatively snow-free protective winter cover for wildlife. They, like shelterbelts, should be short and wide rather than long and narrow. Thickets should be placed south and east of natural snow barriers, such as tree rows, weedy fences, draw banks, dams, etc. Or, snow fences, tree rows, etc. can be positioned northwest of thickets to reduce snow drift impact. Snow fences can be positioned adjacent to the thicket for the 1st 1-3 years after planting to drift snow onto the shrubs to stimulate increased growth from melting snow (Fig. 1). Once shrubs are established, the fence should be moved 100 ft (30 m) or so away to prevent snow from drifting into the thicket increasing its value to wintering wildlife.



Figure 1. The snow fence will deposit snow on this plastic-organic mulch planting for 1-3 years and will be moved to hold snow out of the developing thicket when it becomes of value to wildlife.

¹Contribution from Federal Aid Project W-37-R.

Thickets should be placed adjacent to feeding sites and escape cover (Fig. 2). Most wildlife, especially quail and cottontails, cannot survive if feeding areas are not close to cover. Pheasants usually roost in weed patches or stubble fields, so the thicket or shelterbelt is of primary value after a blizzard is over, not while it is in progress (Warner and David 1982).



Figure 2. A dense plum thicket adjacent to wheat stubble provides an excellent combination for pheasants and cottontails.

Shrub thickets can vary in size from a few shrubs to large plantings, 100 ft (30 m) or more per side, depending on location and need. However, a small thicket, positioned to escape snow drifts is often equal in wildlife value to a larger, less well protected planting, and is easier to establish. One option is to use 1 larger woody planting per farm unit, primarily for use by wildlife in winter, and supplement it with several small clump plantings at tailwater pits, odd corners, and other sites distributed over the farm.

ESTABLISHMENT OF SHRUB THICKETS

One advantage of using shrubs is that they can be planted relatively close together to form a closed-canopy thicket within a few years. Shrubs can be planted 3-4 ft (0.9-1.2 m) apart in sub-irrigated sites where moisture is not deficient. Shrubs should be spaced at 6-8 ft (1.8-2.4 m) intervals in dryland sites. A drip irrigation watering system should be used, if possible, during the first few establishment years.

Mulch treatments are recommended for use on small thickets, 15-40 ft (4.6-12.2 m) per side assuming low or no cost mulches are available. Shrubs should be planted in shallow furrows with 4-mil black plastic sheeting spread over the between-row ridges to eliminate weeds and to direct precipitation toward the shrubs. The plastic should be overlaid with 2-4 in. (5.1-10.2 cm) of wood chips, corn cobs, or other mulch to protect the plastic and to prevent excessive heating of the ground. Wood chips are sometimes available from local tree trimmers or electric power companies. Straw is not a preferred mulch because it decomposes rapidly, is easily blown away, and attracts small

rodents. A 1-2 in. (2.5-5.1 cm) layer of gravel can also be used as a mulch over plastic. Mulching greatly increases shrub survival and growth in dryland sites while eliminating need for repetitious weed control (Fig. 3) (Snyder 1982b). R. Moss (pers. commun.) found that shrubs achieved greater growth using this approach during years of average or better precipitation, than drip irrigation-tillage treatments in northeastern Colorado.



Figure 3. This developing plum thicket in its 3rd growing season illustrates the rapid growth attained using the plastic-organic mulch technique.

Organic mulch without the black plastic sheeting can be used, but is not recommended primarily because the mulch must be retained at a 6-10 in. (15.2-25.4 cm) thickness to effectively suppress annual weeds. This thick layer absorbs light rains reducing precipitation availability to the shrubs and increases the need for supplemental watering with drip irrigation. Organic mulch, when in direct contact with the soil, decomposes more readily than when plastic sheeting is used.

Small thickets can also be maintained weed free by using a garden-type rototiller and hand hoe with 2-4 replications per growing season. Using these techniques, shrub survival and growth will be lower than with the mulch technique.

Thickets or block plantings, too large for practical treatment with mulches, can be established using tillage and pre-emergent herbicides in combination for weed control. Shrubs should be spaced 4-6 ft (1.2-1.8 m) apart within rows with the distance between rows being determined by the size of the tillage equipment (preferably 12 ft [3.7 m] or less).

Pre-emergent herbicides, trifluralin (Treflan) and EPTC (Eptam), can be applied in combination at respective rates of 0.5 and 2 lbs active ingredient per acre (0.6 and 2.3 kg/ha). The spray mixture should be applied and immediately incorporated into the top layer of soil over the entire area prior to shrub planting. This herbicide mixture is persistent for only a few weeks but can be used to reduce weed maintenance during the 1st year of shrub establishment. It can also be used between rows to partially reduce tillage maintenance in subsequent years.

A within-row band application of a persistent herbicide is recommended to replace hand hoeing where tillage implements cannot control weeds. Either of 2 herbicides, simazine (Princep 80W) or dichlobenil (Casoron), is suggested. Simazine should be applied at 2-3 lbs total product per acre (2.3-3.4 kg/ha) in fall or late winter. It is highly persistent and water insoluble; consequently annual applications are not recommended. If needed, a 2nd application at one-half the initial rate can be applied 2 years after the 1st treatment. Casoron should be applied in late winter at the rate of 150 lbs total product per acre (170 kg/ha) and at 100 lbs/acre (113.4 kg/ha) in successive years as needed using 4% granular herbicide. Casoron and simazine should not be soil incorporated and they should not be covered by between-row tillage. Neither herbicide is recommended for use on light, sandy soils (Heikes 1982).

Calibration, to apply the correct amount, is a major concern especially when applying herbicides to small tracts or within-row bands. Nozzle emitter size, sprayer pressure, spray band width, and forward speed must be considered when applying herbicides as liquids. Trial applications using only water are needed to determine proper mixtures. Calibration of granular herbicides is less demanding, but is equally important. Once the proper calibration has been achieved, all variables should be recorded and filed so that this time-consuming endeavor can be eliminated prior to subsequent applications. Application equipment must, at times, be improvised to meet a particular need (e.g., when applying herbicides to within-row bands). The complexity of calibration and cost of a container of herbicide (when only a small amount is needed) may make use of herbicides impractical unless several shrub plantings are being established.

None of the herbicides or mulch techniques mentioned is effective against deep-rooted, persistent, noxious perennials such as bindweed (*Convolvulus arvensis*) or Canada thistle (*Cirsium arvense*). Sites containing such plants should be avoided. Sites broken from perennial vegetation should be deep-plowed and summer fallowed 1 year in advance of planting.

Plastic-mesh tree protectors placed around individual shrubs (Fig. 4) reduce damage to young seedlings



Figure 4. Plastic tree protectors reduce damage to young seedlings.

by rodents, rabbits, hail, and insects (R. Moss, pers. commun.). Rodents and rabbits also can be excluded using poultry netting (18 in. high) placed around individual shrubs, or around the entire thicket, assuming it is small. These methods are preferred to annual applications of repellents.

WATER AND FERTILIZER

Shrub thickets placed adjacent to tailwater pits, below farm ponds, near windmills, or other water sources can be irrigated by one of several methods (e.g., drip [trickle] irrigation [Fig. 5], centrifugal pump and sprinkler, or flood irrigation). Shrubs can also be planted in low areas, seepage sites, or run-off sites to use supplemental moisture. Where adequate water is available, application of slow-release nitrogen fertilizer can be used. Nitrogen fertilizer is not recommended for dryland sites.



Figure 5. Drip or trickle irrigation increases shrub survival and growth.

SPECIES SELECTION

Optimum shrub growth form for plains upland game is provided by shrubs that develop into a closed canopy thicket, 6-10 ft (1.8-3.0 m) high, with an understory easily penetrated by wildlife. The species should be readily transplanted, hardy and long-lived, drought, cold, and alkaline tolerant, and not readily browsed by wildlife or damaged by insects or disease. It should root sprout to perpetuate itself. No single shrub species meets all these criteria.

American plum (*Prunus americana*) is recommended as a priority species for thicket use in eastern Colorado. It has an excellent height and growth form and extensively root sprouts to perpetuate itself and to increase the size of the thicket (Morton 1971). It is adapted to most soils and sites in farmland areas of eastern Colorado. Its primary weakness is susceptibility to browsing by rabbits. Tree protectors (Fig. 4) or poultry netting protectors should be used in problem areas. Common chokecherry (*P. virginiana*) has similar excellent growth form and root sprouting characteristics, but may not be quite as drought tolerant as plum. Numerous other shrub species can be used in

thicket plantings but few have the pronounced root sprouting characteristics of plum or chokecherry. Squawbush (fragrant) sumac (*Rhus aromatica*) is extremely drought hardy and long-lived but usually attains a height of only 3-5 ft (0.9-1.2 m). It is better suited for quail and cottontails than for pheasants and deer. Other, taller hardy species include common lilac (*Syringa vulgaris*) and tartarian honeysuckle (*Lonicera tatarica*). French tamarisk (*Tamarix gallica*) or New Mexico elderberry (*Sambucus neo-mexicana*) can be used in sandy soils of eastern Colorado (Kinghorn and Yeager 1969). Silver and russet buffaloberry (*Shepherdia argentea* and *S. canadensis*) and many-flowered and Peking cotoneaster (*Cotoneaster multifolia callocarpa* and *C. acutifolia*) are suggested for sites receiving supplemental water (e.g., sub-irrigated sites). Native sandbar willow (*Salix interior*) can be used in wet sites where cuttings can be placed into the ground in early spring to take root.

The Colorado State Forest Service Nursery usually carries several of the above species including plum, sumac, lilac, and Peking cotoneaster. They also carry species not normally recommended for wildlife plantings including Hansen rose (*Rosa* sp.), sand (Bessey) cherry (*Prunus besseyi*), and caragana (Siberian peashrub) (*Caragana aborescens*). Orders may be placed for shrubs at local Colorado State University Extension Service offices or U.S. Department of Agriculture, Soil Conservation Service offices. Some species not available in Colorado, may be obtained from out-of-state nurseries whereas others such as French tamarisk and sandbar willow can be obtained from cuttings, dug and transplanted, stock, or started from seed.

Walkingstick cholla (*Opuntia imbricata*) can be transplanted into small clumps as a shrub substitute in shortgrass scaled quail range in southeastern Colorado where many shrubs are not adapted (Hoffman, 1969). Fourwing saltbush (*Atriplex canescens*), rabbitbrush (*Chrysothamnus* spp.), and other native shrubs (transplanted or started from seed) may be used if supplemental water is provided during the 1st year of establishment.

Small trees such as Russian olive (*Elaeagnus angustifolia*), mulberry (*Morus* spp.), black locust (*Robinia pseudoacacia*), and Rocky Mountain juniper (*Juniperus scopulorum*) can be used in thicket type plantings. Russian olive is relatively short-lived and junipers should not be planted in sites where fire risk is high. Topping (coppicing) or half-cutting (in spring after leafing) is recommended for trees to retain a relatively low growth form. These techniques, if repeated every few years, can retain Chinese and Siberian elm (*Ulmus parvifolia* and *U. pumila*) in an excellent shrubby growth form of high value for wildlife.

Persons interested in establishing shrub thickets may contact Division of Wildlife personnel for assistance in locating funding sources and in design, placement, and species selection. Partial funding for wildlife habitat developments, including drip irrigation systems, can at times be obtained through the Agricultural Conservation Program (ACP) administered by U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service (ASCS), or through the Great Plains program administered by the U.S. Department of Agriculture, Soil Conservation Service (SCS). Personnel of the latter agency can provide expertise for installation of drip irrigation systems. A leaflet available at county extension service offices (Walker and Smith 1979) should be obtained and reviewed when contemplating use of drip irrigation.

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