

Establishment of Perennial Irrigated Pastures¹

The University of Arizona • College of Agriculture • Tucson, Arizona 85721

Robert E. Dennis, Extension Agronomist and Professor of Agronomy, University of Arizona

Irrigated perennial pastures supplement range forage, are useful during breeding and calving time and are suitable for "warming-up" feeder cattle before they are placed in feedlots. Irrigated pastures also may be used on small farms that do not have forage harvesting machinery. Some pasture grasses grow and produce well on soil too salty for other field crops. A well managed pasture helps to conserve and improve the soil.

Choice of Species

Arizona has many different climates, which range from very mild, nearly frost-free at the lowest elevations to severe at the higher elevations. Warm-season grasses, such as bermuda grass and blue panic grass, are suggested for low and intermediate elevations. The cool-season grasses are most productive at intermediate and high elevations.

An important consideration in the selection of a variety of alfalfa is its relative dormancy, since this characteristic plays an important role in the persistence and adaptation of individual plants. At the lowest elevations, non-dormant alfalfa varieties are most productive and persistent. At 5,000 feet elevation, varieties with intermediate dormancy yield and persist well. Dormant alfalfa varieties are suggested for the highest irrigated valleys.

There are many varieties of grasses and legumes for pasture. Consult your agricultural extension agent for suggestions concerning varieties best adapted to your area.

Land Preparation

Stand establishment for irrigated perennial pastures sets the stage for all that follows. Suggestions concerning stand establishment for alfalfa are given in University of Arizona Cooperative Extension Service Bulletin A-16, *Alfalfa for Forage in Arizona* (pp. 12-13) and these also generally apply to other legumes and grasses used for irrigated perennial pasture.

¹ The publication, *Management of Perennial Irrigated Pastures* Q421, is also available.

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Grass and Legume Species Suggested for Arizona by Elevation

Elevation (feet)	Alone	Suggested Species In Mixture
0-2000	Alfalfa ^a	Alfalfa and tall fescue grass ^a
	Bermuda grass	
	Blue panic grass	
2000-4000	Bermuda grass	Alfalfa and tall fescue grass ^a
	Blue panic grass	
	Tall fescue grass	
	Tall wheat grass (above 3000 ft.)	
Over 4000	Tall fescue grass	Alfalfa and tall fescue grass ^a
	Tall wheat grass	Tall fescue grass and orchard grass
		Tall fescue grass and birdfood trefoil (narrow leaf) ^b

^a Alfalfa is very productive when used for hay or pasture, but special precautions are necessary to reduce the incidence of bloat. The risk of bloat is somewhat less in Arizona when an alfalfa-grass mixture is used rather than alfalfa alone. Suggestions concerning steps to reduce the incidence of bloat are given in Q400, "Management of Perennial Irrigated Pastures".

^b Birdfood trefoil (narrow-leaf) provides excellent quality forage and is said not to cause bloat. Stand persistence has been a problem in Arizona plantings.

Plowing is usually the first step in seedbed preparation. After plowing, the seedbed should be tilled with a disk, harrow, or other implements. Seeds should be planted in a firm, well-prepared seedbed. Small seeds should be covered with about one-fourth inch of soil.

When borders are used, they should be constructed so that checks are not necessary and so that the entire border ridge can be seeded. Border ridges should be large enough to withstand livestock walking over them. On sandy soils, border ridges may need to be rerun periodically.

Suggested Planting Dates and Seeding Rates for Irrigated Pasture Species.

Species	Elevation (feet)	Preferred Planting Dates	Seeding Rates (lbs. per acre) ^a	
			Single Species Drill ^c	Mixture Drill ^c
Alfalfa	0-2000	October ^b	20	10-12
	2000-3000	September ^b	20	
	3000-5000	August ^b	20	
Bermuda grass (hulled)		May-Aug. ^d	5	-
Birdsfoot trefoil (narrow leaf)	Above 4000	August	-	10 ^e
Blue panic grass	0-3000	June	10 ^g	-
Orchard grass	Above 4000	August ^f	20	10-12
Tall fescue grass	0-2000	October ^f	-	10-12
	2000-4000	Aug. 15-Sept. 15 ^f	20	10-12
	Above 4000	August ^f		
		Aug. 15-Sept. 15 ^f	20	10-12
Tall wheat grass	2000-4000	Aug. 15-Sept. 15 ^f	20	10-12
	Above 4000	August ^f	20	10-12

^a Calibrate the seeder to be sure the correct amount of seed is used and that it is properly distributed. Plant to obtain about 30-40 strong seedlings per square foot of land area.

^b At the lower elevations (0-3000 feet) good stands have been established throughout most of the year. At intermediate and higher elevations, seedings may also be made in the spring. However, best results have generally been obtained with early fall seedings, after temperatures have moderated. Seeding alfalfa in the fall has been popular because a higher yield can be harvested during the following season, and there is usually less trouble with weeds. Make fall seedings early enough so that young plants will become established before cold weather begins. See University of Arizona Cooperative Extension Service Bulletin Q-16, "Alfalfa for Forage in Arizona."

^c Use these rates when seeding is made with a cultipacker or other seeder that distributes seed uniformly and that provides proper

seed coverage. When seeding is by broadcast methods, seeding rates usually must be adjusted upward, since distribution is less accurate and many seeds are covered by too much or too little soil.

^d See "Establishing Bermuda Grass".

^e Plant in alternate rows with tall fescue grass.

^f Cool season grasses and legumes may be planted in the spring, but weed competition is usually greater at that time. The rate of water loss from soil may be greater for spring than for fall seedings and this increases germination and seedling emergence problems. For both spring and fall plantings, weed competition in new seedings may be a problem. Reduce or eliminate this problem by repeating as necessary, irrigation and cultivation before planting.

^g Use this seeding rate when planting in 14-inch rows.

Inoculation of Legume Seed

Legume² seed should be inoculated with the correct strain of fresh nitrogen-fixing bacteria to achieve adequate nodulation. Bacteria in the nodules take nitrogen from the air and convert it to a form that is available to the host plant. Follow directions given on the container when inoculating seed. Keep inoculated seed in a cool place out of direct sunlight and plant it within 24 hours after treatment.

Some seed houses sell pre-inoculated legume seed. When using pre-inoculated seed, be sure that the seed has been recently inoculated and that it has not been exposed to high temperatures in storage.

Seeding Methods

Best results are usually obtained when seeds are planted in pre-irrigated soil with borders in place. The rate of seeding varies with the method of seeding, and more seeds are required with broadcast methods than when a drill or cultipacker type seeder is used. One should use the correct a-

mount of seed, distribute it evenly, and cover it lightly with soil. Depth of planting is important. The goal in general terms is to plant seeds about four times as deep as their greatest length. After planting use light irrigations to keep the surface soil moist. This will speed germination and seedling emergence. As seedling plants become established, the irrigation interval may be lengthened.

Lightweight, chaffy seeds may be mixed with rice hulls, or other inert material and drilled to obtain a more uniform distribution. Some fertilizer spreaders are equipped to plant seeds in this manner.

Establishing Bermuda Grass

Bermuda grass and giant bermuda grass are usually propagated with seed, but all bermuda grasses may also be established by vegetative means. Coastal bermuda grass, Coastcross 1, Tifton 44, Alicia, Callie and other non-seed producing varieties are established by sprigging only. Sprigging should be done as soon as possible after plant parts have been harvested. Sprigging may be done May through August, but best results are obtained when sprigs are planted in May, after the soil is warm, but before hot weather.

² Legumes suggested in this publication are alfalfa and birdsfoot trefoil.

Machine planters may be used to place sprigs in rows 20-40 inches apart, with 12-18 inches between sprigs in the row. Usually 10-20 bu. of sprigs/acre are used. For best results, sprigs should be placed with about one inch of the tip remaining above the moist soil surface. Sprigs may also be spread over the surface of the soil and disked in. Growth is most rapid when the soil is firmed around the sprigs after the planting operation. Soil should be maintained in a moist condition until the plants are well established. Herbicides may be used to control broadleaf weeds after bermuda grass has become established.

Irrigation

Water may be applied by surface methods or by sprinklers. For surface irrigation, make certain the soil has been properly leveled before planting, because high spots receive insufficient water and ponding in low spots scalds plants and encourages weeds.

There are many advantages to planting in a pre-irrigated, moist seedbed. Tillage operations during seedbed preparation that follow these irrigations help to destroy weeds and water is stored deep in the profile for later use. Many growers, however, prefer to plant in dry soil and irrigate up. Sometimes this method is best on coarser-textured soils, and less time may be required to establish the pasture.

After the pasture has been seeded, apply several light irrigations to prevent crusting and to keep the surface soil moist during germination. The frequency of these irrigations will be determined by soil type, temperature, and other factors, such as humidity and wind velocity. Avoid erosion, which washes seeds out or covers them too deeply.

Some growers prefer sprinkling because cost of land preparation is greatly reduced; however, the expense of sprinkler irrigation equipment must be considered. Sprinkler irrigation is especially effective during stand establishment.

Two or three irrigations are usually needed between harvests during the period of active growth. Less frequent irrigations will be required during late fall, winter and early spring. The irrigation interval for sands or sandy loam soils is much shorter than it is for fine-textured soils.

Fertilization

Grasses respond well to applications of nitrogen when adequate irrigation water is supplied. Small applications of nitrogen (20 to 40 lbs. per acre) at planting time increase early growth and development. The largest portion of the total annual nitrogen application should be made during the time when the most vigorous growth occurs, which is usually during the spring and early summer. For cool-

season grasses, apply nitrogen again in the early fall. It is important to irrigate as soon as possible after fertilization to prevent nitrogen loss and foliage burn.

Up to 400 pounds of nitrogen per acre may be needed on perennial grasses at the lower elevations. Since the growing season is shorter at the higher elevations, less nitrogen is required. Application of nitrogen to well-nodulated legumes grown in pure species is not recommended.

The frequency of fertilization in a specific area will depend upon the soil texture and the quality and quantity of irrigation water used. Coarse-textured soils usually require more frequent fertilization than do finer-textured soils, because of the greater amount of leaching that occurs on the coarser soils.

Vigorous, dark green plants associated with livestock urine spots suggest that plants in adjacent areas may be deficient in nitrogen; however, excessive rates of nitrogen fertilization may result in pasture forage containing toxic amounts of nitrate nitrogen. Do not use pastures for at least two or three weeks after heavy fertilization with nitrogen because of risks associated with nitrate poisoning. Risks from nitrate poisoning have been observed to be greatest during cloudy periods and especially when plants are growing vigorously in the spring or early summer. Tolerance to nitrate varies from animal to animal. Researchers suggest that forage containing 1½% (1500 ppm) or more $\text{NO}_3\text{-N}$ is potentially dangerous.

The yield of legumes may often be increased by phosphate application and the phosphate requirement for several years may be worked into the soil during seedbed preparation. Grass yields are sometimes increased by phosphate preparation. Grass yields are sometimes increased by phosphate fertilization. Phosphate may also be applied after stand establishment. For these applications, broadcast it on the surface of the soil when this operation will not interfere with the pasture management program. Phosphorus does not move readily from the point of contact with the soil in calcareous soils. Data from soil tests provides information that is useful in determining optimum levels of phosphate fertilization.

Generally, potassium applications have failed to increase the yields of field crops in Arizona. It is likely, however, that there are specific locations where applications of potassium may increase dry-matter yield and the potassium content of forage.

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