

Management of Perennial Irrigated Pastures

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Summary

Forage stands are maintained longer when pastures are properly managed. When a mixture is used, try to maintain each species in its original proportion. The management program should be planned to use pasture forage when it is high in protein and low in fiber and yet prolong the life of the stand. In practice, the grower usually utilizes plants somewhat later than their point of maximum nutritive value. This is done to maintain strong plants.

Grazing Management

Growth of pasture plants begins slowly in the spring. Rate of growth increases as temperatures become favorable. After plants are about 12 inches high, the manufacture of nutrients exceeds that required for new growth. The surplus is stored in the roots. The time of first harvest on a newly established stand should be delayed until most grass seed heads have emerged or until most legumes stems have flowered. This permits storage of food in the roots and strengthens the plants. For established stands delay the first pasturing in the spring until early bloom, near the end of the first period of active growth.

Several different methods may be used for harvesting pasture. Many Arizona growers have obtained good results by dividing the entire pasture area into five or six fields, using temporary or permanent fence. Each field should have a source of water for livestock. The use of pastures should then be planned so that each field has about four weeks to recover after pasturing.

For maximum yields, pasture about seven days after each four-week rest period. After pasturing move the animals into another field in which plants have had about four weeks for recovery and regrowth. When there is excess forage production it may be harvested as hay.

Grazing should be terminated in the fall soon enough to permit plants to grow to full bloom, just before their period of inactive growth or dormancy. Forage may be removed after the plants have become "dormant" by pasturing or by cutting for hay.

The rotation system for using grass and legume forage as pasture may also be adapted for harvesting forage as hay or green-chop. Always leave three or more inches of stubble after pasturing or when cutting plants for hay or green-chop. For blue panic grass, 8 to 10 inches of stubble should be left. With this height of stubble for blue panic grass, the time required for regrowth is reduced. It is also usually advisable to mow the new stand of blue panic grass at this height once before pasturing the first time, to promote tillering.

Irrigation Management

Irrigations should be scheduled so that the soil will be firm enough to support livestock without injury to plants when the grazing cycle begins. This helps to avoid soil compaction. Compacted soils take water slowly, are poorly aerated and produce less forage.

Provide readily available water in the soil to the full depth of the root zone to maximize production. Drought periods cause severe plant stress, deplete food reserves in the root and reduce forage production. To check soil moisture, observe plants carefully and use a soil probe.

On the rotation plan described, a given plot is pastured for about seven days and the animals are then removed. The pastured plot is then fertilized and irrigated. A second irrigation is applied about 10 days later if plant appearance suggests moisture stress and if moisture depletion is verified by examination of the soil with a probe. A third irrigation may be needed during the summer, before the next grazing cycle.

All plots are similarly managed and are grazed about one week of each five if the pasture is divided into five parts. Modification of this plan of management may be made to fit each individual situation. Temperature, texture of the soil, species of plant, availability of water, month of the year and other factors will determine the most effective and efficient pasturing and irrigation schedule.

Fertilizing Established Stands

Divide the annual application of nitrogen for grass pastures into 40 or 50 pound increments. Each fertilizer application should be made just before or with an irrigation. Do not use nitrogen on nodulated legumes because it will increase the growth of competitive grasses.

Each ton of legume dry matter contains the equivalent of about 4.6 lbs of phosphorus (10 lbs. P_2O_5). Grass forage contains somewhat less phosphorus than legume forage. When residual phosphorus and phosphorus applied at seeding have been used by the plants, annual applications to the soil surface may be made any time they do not interfere with the pasture or irrigation schedule.

Fertilizer application can influence the makeup of the stand when a mixture of grass and a legume has been planted. Phosphorus favors legumes and nitrogen favors grasses. Careful attention to fertilizer application practice helps to keep the desired ratio of legume to grass plants.

Weed Control

Periodic clipping of pastures prevents weeds from producing seed and reduces weed competition. Weed problems in pastures vary from one part of the state to another and weeds encroach wherever pasture stands decline.

For current recommendations concerning the use of herbicides for the control of weeds, refer to University of Arizona Bulletin A-1, Chemical Weed Control Recommendations for Irrigated Areas of Arizona.

Reducing the Risk of Bloat on Alfalfa or Alfalfa-Grass Mixture Pastures¹

Give cattle dry forage before turning them into irrigated pastures and provide dry roughage for them while they are on pasture. This may be done by mowing strips in the pasture. Dry forage helps to increase the total consumption of dry matter and reduces the incidence of bloat. This is especially important for legume pastures.

For greatest safety to the cattle, Polaxalene in salt blocks or as a liquid supplement should be provided several days before grazing is started as well as during grazing. After the grazing process has started, the cattle should usually be left in the field except for unusual circumstances such as during and following a heavy rain. Never turn hungry cattle into an alfalfa field; they should be fed dry hay and turned in full.

When heavy rains and wind cause alfalfa plants to lodge, crowns are exposed to sunlight and shoot growth is stimulated. Pasturing this undergrowth has been observed to be especially hazardous from the bloat standpoint.

There are, no doubt, some areas in Arizona where danger from bloat is too great a risk to take; but if alfalfa can be grazed as described above, it will have the greatest chance of succeeding. Research at the University of Arizona has shown that 2.25 mother cows and their calves per acre can be grazed for approximately 86% of each year in the Tucson area. Maximum use efficiency demands that cattle numbers be varied during the growing season to correspond with forage production.

Grazing Use Suggestions

Cattle often leave mature, unpalatable clumps of grass. Remove these clumps and weedy growth by clipping or with a flail type chopper. Do this before weed seed has developed and cut high enough to avoid damage to pasture plants. Clippings may be raked and placed along fences or on the tops of border ridges. Cattle may eat these dried plants during the next pasture cycle.

Plants near manure spots may not be eaten by cattle. As these plants become mature, they are still avoided. Spread cattle droppings with a harrow or other suitable tool once or twice each year after animals are removed from the pasture and before irrigating. After spreading droppings it may be desirable to mow, fertilize and irrigate.

Livestock on well fertilized and managed pastures need a salt supplement at all times. Granular salt is preferred but block salt is often used because of its convenience. If the pasture is grazed after the growing season is finished, then one should use a source of phosphorus with the salt. This could be 50% salt plus 50% steamed bone meal, or 60% salt and 40% dicalcium phosphate.

Sometimes forage production exceeds that used by livestock. The excess may be mowed and left on the soil without windrowing or a portion of the forage may be used for hay. Cut when grass seed heads are well formed or when most legume stems have flowers.

Do not leave large quantities of dry forage in the field in windrows for cattle. The windrows shade plants beneath them and cattle trample plant crowns growing near the windrows. Remove the forage from the field, fertilize, irrigate, and allow sufficient time for regrowth before pasturing again or making hay.

Actual carrying capacity during the period of grazing is dependent upon many factors. One may expect, however, that a good stand of a well managed pasture will provide sufficient forage to an

¹From University of Arizona Bull. A-16, "Alfalfa for Forage in Arizona." Bloat may occasionally be a problem with other diets, including grass.

average of 1½ to 2 or more animal units per acre during its period of use. An animal unit is a 1,000 pound animal or an appropriate combination of animals.

Pasture mixtures, when used, should be kept simple, usually consisting of one grass and one legume. Complex mixtures of grasses and legumes are difficult to manage and the grazing schedule used favors some but hurts other plant species.

Factors Affecting the Germination of Safflower Seed (*Carthamus tinctorius* L.)

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Summary

The influence of several factors on the germination of two normal-hulled cultivars and two thin-hulled lines of safflower seed was studied at Tucson, Arizona.

There was no dormancy in freshly harvested seed. A temperature of 15°C was nearly optimum for the germination of seed of cultivars Gila and Frio and of the lines A12417 and A101. The minimum temperature at which germination occurred was somewhat lower than 5°C and the maximum somewhat above 40°C. Germination was most rapid at 30°C. Moisture applied to dry, mature seeds to simulate rain damage reduced germination unless seed was dried quickly after wetting. When seeds were dried soon after being wet, germination percentages of 80% or above were obtained.

Mechanical damage inflicted during the harvest of safflower seed, even though not visible externally, reduced germination by almost 20%. Laboratory germination percentages averaged higher than those obtained in the corresponding field emergence tests.

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Introduction

The germination of seed is one of the most important phases in the life cycle of a plant. Freshly-harvested seeds of some species often do not germinate immediately. This delay in germination may be undesirable, but may be advantageous in that sprouting of grain in the head may be prevented in a wet-harvest season. Laboratory tests do not always represent the actual germinating capacity of a given lot of seed, because seeds germinating in the soil are affected by many factors, most of which are not easily controlled. However, there is a close relationship between laboratory germination percentages and field emergence. Therefore, a germination test is a good criterion as to the amount of seed to plant per acre to secure a satisfactory stand. During mechanical harvesting of safflower, bruising and breaking of the embryo may be extensive without external visible evidence. The optimum planting date for safflower for any area cannot be stated in simple terms, however, the soil temperature should be above 40°F. Temperatures below 20°F are not favorable for plant growth and development in safflowers.

The objectives of this study were to determine: (1) the extent of dormancy in freshly-harvested safflower seed, (2) the cardinal temperatures required for the germination of safflower seed, (3) the extent of damage caused by soaking safflower seed simulating rain damage, (4) the extent of reduction in germination and emergence caused by mechanical harvesting, and (5) seedling emergence in the field in comparison with that expected on the basis of laboratory tests.

Materials and Methods

For the dormancy study, germination tests were made at 1, 15, 30, 45, and 60 days after harvest at 15/24°C and 20/30°C temperature alterations. The minimum, optimum, and maximum temperatures were determined by conducting germination tests at constant temperatures of 5°, 10°, 15°, 25°, 30°, 35°, and 40°C. Damage due to rainfall was simulated by soaking safflower seed in 100 ml of water for 5, 10, 15, 20, and 25 hours followed by germination tests at 20°C. The extent of mechanical seed damage from combine harvesting was determined by comparing laboratory germination and field emergence percentages of both hand harvested and combine harvested samples of safflower seed. Two normal-hulled cultivars, namely Gila and Frio, and two thin-hull lines of safflower seed were used for this study.