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Pricklypear: Friend and Foe

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Pricklypear (Figure 1) is usually considered an undesirable plant on Texas rangelands. However, many wildlife species feed on pricklypear, and it can be used as supplemental forage for livestock during winter and drought periods. Pricklypear's ability to store water in its flattened, fleshy stems enables the plant to withstand long drought periods. Pricklypear density usually increases during droughts because range grasses are overgrazed; this allows pricklypear to spread. When grass cover improves, as a result of improved grazing management or rain, pricklypear density may decrease.

In most cases, though, herbicides or mechanical methods must be used to decrease stand size or density. Once the infestation is controlled, grazing management that allows desirable grasses to increase should then help maintain low pricklypear levels.

Identification

The most recent checklist of Texas plants lists 25 species of pricklypears and chollas, with another 15 named varieties. It is difficult to recognize different species of pricklypear mainly because of the way the plant reproduces.

Each pad, if broken away, can form a new plant that is genetically identical to the original plant. This is vegetative reproduction (cloning). Given enough time, an especially strong, adapted pricklypear can spread over an area as its pads become scattered, and each plant will look like its parent. The exception occurs when a new plant encounters a very different environment. For example, although genetically identical, clones growing in dense shade may be different from clones growing in full sunlight or another type of soil.

Pricklypear also spreads from seed. Pricklypear fruits, or tunas, are eaten by cattle, sheep, goats, deer, javelinas, humans, turkeys and a wide assortment of other animals that process the pulp and pass the seeds through their digestive systems. Young plants grown from seeds, unlike new plants from pads, may have genetic material from two parents and may be a little different from either parent. Small variations such as longer spines, different spine color, smaller pads or resistance to drought make some seedlings more adapted and successful than others. A well-adapted plant may look different than either parent, and when it spreads by vegetative reproduction a unique population may come to dominate a

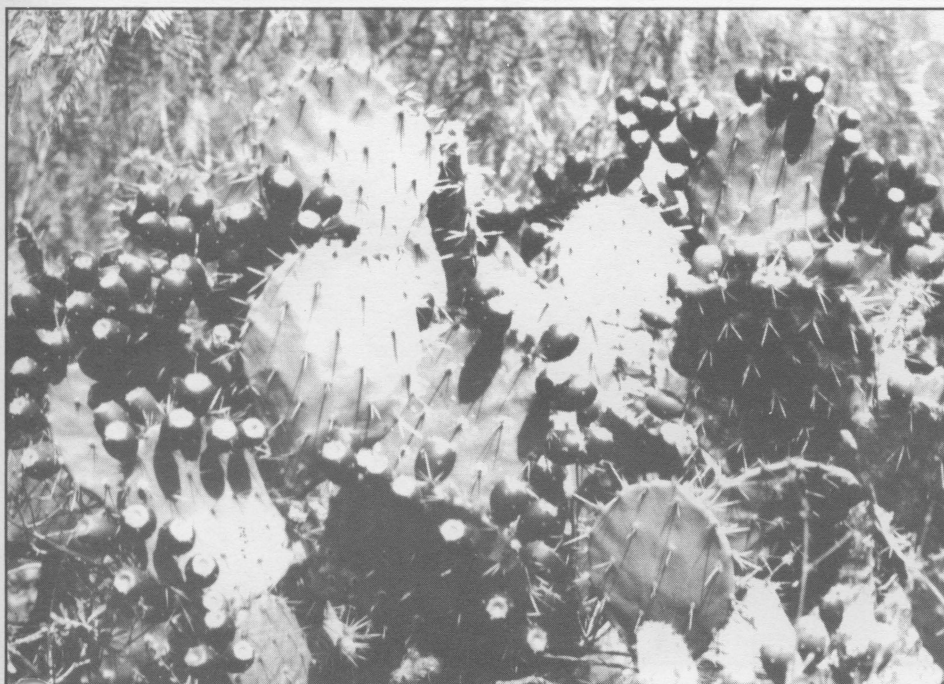


Figure 1. Pricklypear cacti are widely distributed in Texas.

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local area. These have been called clonal microspecies.

Botanists have sometimes described new species on the basis of small variations, a slightly different spine pattern, for example. However, differences in appearance may be the result of a clone growing in a new environment or a unique seedling, and not a new species.

All pricklypears belong to the genus *Opuntia* in the Cactaceae family. Pricklypears consist of jointed and flattened stems, called pads. These highly modified stems are not leaves. True pricklypear leaves are tiny, and appear only briefly at each cluster of spines when a new pad emerges.

The most abundant and widespread pricklypear in Texas is Lindheimer pricklypear (*Opuntia lindheimeri*), which may have more than 100 clonal microspecies. The typical Lindheimer pricklypear is 2 to 5 feet high, with elliptical pads 8 to 12 inches long covered with yellow, erect spines. Less abundant, and more or less restricted to the Edwards Plateau, is Edwards pricklypear (*Opuntia edwardsii*). It is usually less than 1 foot high, with rounded pads 4 to 6 inches long covered with gray, deflexed spines. Less abundant, but extending farther north, south and west, is brown-spined pricklypear (*Opuntia phaeacantha* var. *major*). It has the same size and pad shape as Edwards pricklypear, but the spines are dark brown, longer and occupy only the upper part of the pad. Hybridization among Lindheimer, Edwards and brown-spined pricklypear occurs frequently and these hybrids often spread over an area several miles wide.

Several other species of pricklypear are worth mentioning. Tasajillo (*Opuntia leptocaulis*), with pencil size cylindrical stems is abundant in much of Texas. Also called turkey pear or jumping pear, it is a nuisance for livestock and people but provides small tunas for wildlife. Engelmann pricklypear (*Opuntia phaeacantha* var. *discata*) has the largest pad – 8 to 16 inches long. It has white spines and grows to 6 feet or more. It is scattered throughout the

Edwards Plateau and Trans-Pecos. When its spines are burned away it is much more palatable to cattle than Lindheimer pricklypear. Blind pricklypear (*Opuntia rufida*), a Big Bend species, has no spines, only clusters of fine needles (glochids) which rub off easily and are thought to blind cattle. Dog cactus (*Opuntia Schottii*) is a prostrate cholla, not a pricklypear, that restricts the grazing of shortgrass where it grows on hillsides along the Pecos and Rio Grande Rivers.

Beneficial or Detrimental?

Pricklypear has been praised, defended, cursed, condemned and controlled. However, the extent of a pricklypear "problem" depends on where it is and the management objectives of the landowner or manager (Figure 2). A survey of attitudes and perceptions toward pricklypear in Texas indicated that only 16 percent of landowners attempted to control the plant, mainly because pricklypear stands were rela-

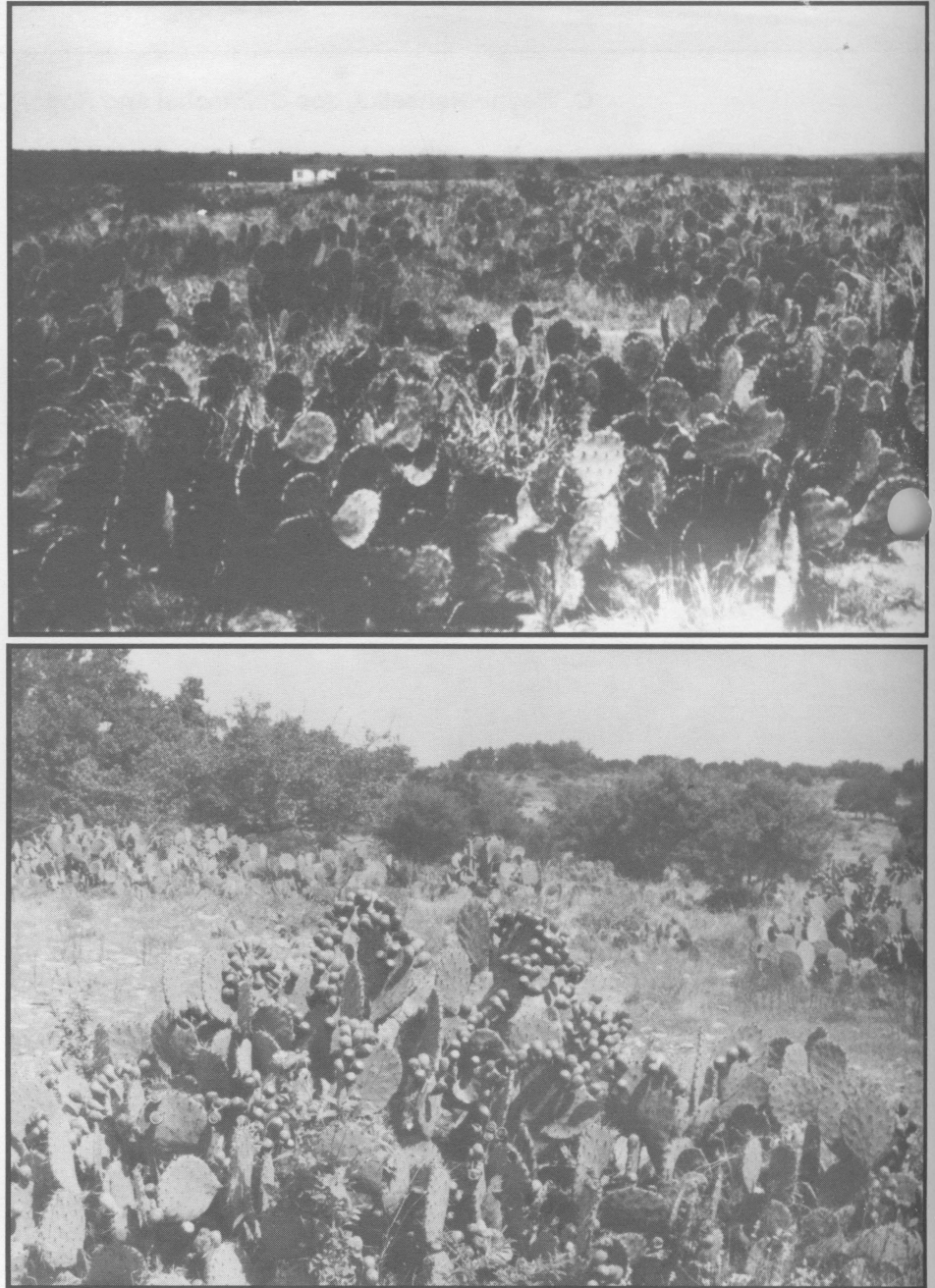


Figure 2. A dense pricklypear stand on the Rio Grande Plains following rootplowing (top), and Lindheimer's pricklypear on shallow limestone soils of the Edward's Plateau, (bottom).

tively light and the cost of treatment is high. In the survey, South Texas producers generally said they believed pricklypear was beneficial for livestock and wildlife, while people in other regions saw little or no value in pricklypear.

Some pricklypears are used as food by humans. More than 1.5 million pounds of "tunas" or "pears" (the fruit of the pricklypear) are imported from Mexico each year. These are largely from *O. ficus-indica*, *O. amyelaea* or *O. megacantha*. Tunas are large, sweet fruits which can be eaten raw, prepared as jelly or candied. The young, tender pricklypear pads, called "nopalitos," are eaten in salads and omelets, or as a garnish. Large amounts of nopalitos also are imported into the U.S. annually.

Many wildlife species use pricklypear for food, water and cover. In South Texas, more than 21 percent of the annual diet of white-tailed deer is cactus, and in summer months this may increase to 33 percent. Only 1 to 3 percent of the diets of deer on the Edwards Plateau is comprised of pricklypear.

Pricklypear pads and tunas are the bulk of the diet of the javelina (peccary), and the plant provides important food and cover for bobwhite quail and many other birds and mammals.

Pricklypear has become a major component of rangeland vegetation where sheep and goats are traditionally raised. It can cause severe economic loss to sheep and goat producers when more desirable forage is not available. Once animals begin eating tunas, they tend to continue until the tunas are gone, often losing weight in the process. In extreme conditions, pads are also consumed. The small spines (glochids) on the tunas and the pads cause ulceration and infection of lips, tongue, gums, palate and gastrointestinal tract (Figure 3). The seeds may cause rumen impaction, resulting in death. The effects of pricklypear consumption probably reduce the productive life of a ewe or nannie, but this has not been tested recently. Studies at the Lanhart Range Station have shown

that ewe health problems caused by pricklypear spines have little effect on ewe weights, death losses, lamb crops or wool production.

Cattle are less affected by pricklypear spines and glochids, but cows which are "pear eaters" can be recognized by their poor body condition. Although, white-tailed deer may also suffer damage from eating pricklypear, they benefit from the plant more than sheep or goats.

Pricklypear restricts livestock access to forage within the clumps, interferes with the movement and working of livestock, and competes with desirable forage plants for water and soil nutrients. However, the benefits of pricklypear as an emergency forage may outweigh these problems.

Forage Value as Emergency Feed

Pricklypear cactus has been used as an emergency forage for cattle and other grazing livestock in Texas and northern Mexico for more than 150 years. The nutrient content of pricklypear is often less than that required for maintenance by any animal other than a non-lactating, early-bred beef cow. Pricklypear is very high in moisture content and low in dry matter; hence, very large amounts of pricklypear (100 to 200 pounds) are necessary to satisfy minimal daily nutrient requirements. Pricklypear is high in dietary calcium and magnesium. The high intake of these ions results in an increased rate of passage and leads to scouring because of water retention in the gut. This increased rate of passage also reduces the absorption of nutrients contained in pricklypear. Therefore, cattle eating pricklypear should also have hay or some other forage



Figure 3. Ulcerated tongue and lips of a goat that has eaten pricklypear, Sonora Range Station, Texas.

available. Roughages increase the level of dry matter intake and reduce the rate of passage of pricklypear. Cattle have often been said to bloat on pear, but the distension on the left side of the rumen normally associated with bloat is caused by the bulk of the pricklypear.

Pricklypear has low levels of crude protein and digestible protein, too low to maintain a dry, pregnant cow except in early pregnancy. Therefore, it is always recommended that a good protein supplement be added to the diet of cattle being fed pricklypear.

Pricklypear is moderately high in energy levels expressed as total digestible nutrients (TDN), digestible nutrients (DE) or net energy (NE). These energy levels vary, depending on the source of plant material. Because energy is often a limiting nutrient on rangeland and has a significant effect on reproduction, pricklypear with a moderately high energy level should be considered as a reserve forage or emergency feed, although a slightly unbalanced one.

Pricklypear is generally very high in fiber and ash, both of which are responsible for digestive upsets. The large

amount of indigestible fiber often causes "fiber" or "pear balls," whereas the high ash content most likely acts as a laxative. This appears to result from the high levels of magnesium, potassium and sodium salts in pricklypear. Scours can be reduced by increasing dry matter intake with cottonseed hulls, hay or forage, while fiber balls can be reduced by increasing crude protein in the diet.

The phosphorus content of pricklypear is too low to meet the needs of most livestock, and it is high in calcium, which further aggravates the phosphorus shortage. Cattle fed pricklypear should receive a mineral supplement of 6 percent calcium and 12 percent phosphorus. When pricklypear feeding is discontinued, cattle should be returned to a 12 percent calcium and 12 percent phosphorus mineral.

Pricklypear also appears to be high in vitamin A which is often in short supply in the dry forages on drought-prone rangelands. Because it is stored in the liver for up to 3 months, vitamin A is not needed on a daily basis. It can be replenished quickly with high quality green forages, vitamin A injections or, more gradually, with adequate consumption of pricklypear.

Feeding and Managing Pricklypear

Pricklypear is a range resource for livestock enterprises, but as an alternative forage it must be considered in the context of a total drought management program. In any feeding program, livestock stocking must be adjusted to changing carrying capacities so that range grasses are not overgrazed. During periods of nutritional stress brought on by severe weather or lack of rainfall, many ranchers depend upon pricklypear cactus and woody browse plants to supply roughage, energy and some protein. Supplements must be fed to balance specific dietary needs of each class of livestock. Also, livestock should be moved, when possible, to pastures where they can better utilize the available browse, dry grass, mesquite beans and pricklypear.

There are several ways to feed pricklypear, depending on the availability of labor, the supply of cactus and the cost of fuel. Pricklypear can be fed in place by singeing off the spines with a pear burner and letting livestock eat what they desire (Figure 4). Or, it can be fed in troughs after chopping, windrowing and singeing the spines. Non-singed pricklypear also can be cut and stock-

piled for several weeks before chopping.

Considerably less fuel is used when chopped cactus is fed because burning in windrows is more fuel efficient than walking from plant to plant. A given acreage of pear can feed twice as many cattle when chopped and fed in troughs because there is less pad waste and better utilization of the plant



Figure 4. Spines are singed off the pricklypear (top) so cattle can use it as a supplemental emergency feed (bottom).

crown. However, much of the singed cactus not eaten by cattle on pear grounds is consumed by wildlife.

Harvested pricklypear also can be fed in dry lots or to supplement pastures with insufficient cactus. Harvesting scatters many pads that may later root. Trimming older plants also causes stronger regrowth from the stump, which is a useful method of rejuvenating plants.

To be sure harvested plants recover, at least one joint (pad) above the main trunk should be left. Over-use will slow regrowth or kill the plant. Five- to 8-year-old cactus or 4- to 7-year-old regrowth from good stumps is usually prime pricklypear.

Cattle

Cattle should be carefully managed when pricklypear is fed. For best results, cattle should stay in a small, fenced area of pricklypear and reduce their movements to conserve energy. The pricklypear should be burned every day. Burning every other day encourages cattle to gorge themselves, which causes scouring; then cattle wander in search of other forage. If cattle are not fenced they have to go where the pricklypear is singed. Therefore, ranchers should control cattle movement through proper burning. This will also prevent overeating and reduce scouring.

Equipment

A pear burner is a type of flame thrower that consists of a fuel tank (usually 5-gallon), a hose, a wand and a burner. The fuel flow is controlled with valves so that the burner can be directed at specific targets. Good hoses and valves are necessary to prevent leaks that can be costly and dangerous to the operator. With good valves an employee can regulate the flow and save fuel, thus money, when walking between pear plants. A second pear burner, held in reserve, is always recommended because an employee cannot afford to waste time repairing a burner on the spot when hungry cattle are waiting.

Burning

Safety is a primary concern when working in isolated areas. The operator should begin burning at the front base of a pricklypear plant and move up the plant with the flame. This will help drive rattlesnakes from beneath the pricklypear plant and away from the person doing the burning. Grass beneath the cactus plant will also ignite and help singe the spines.

Overburning is just as detrimental as not burning the spines off completely. All the thorns on both sides of the pad should be removed without cooking the pad. Cooked pricklypear is even more apt to cause scouring.

Pricklypear can be burned by an individual carrying a pear burner and moving from plant to plant. Or, a propane tank in the back of a pickup can be equipped with a long hose; one person moves the hose and one burns the plants. A third method is to pull a tank with several burners behind a farm tractor or some other special equipment.

A 5-gallon pear burner will hold about 4 gallons of propane. This is enough to provide 1 day's feed for about 14 cows in dense pricklypear. A gallon of propane will normally feed from 3 to 5 cows, but this depends upon the weather and size of the animals. In warm, dry weather an experienced person can readily burn enough pear for 200 cows or more in a day. Burning the same amount of cactus on a cold, wet day will take more time and propane.

More pricklypear should be burned daily than the herd will consume before the next feeding. This keeps the supply ahead of their needs, which is important because, with pricklypear's high moisture content, cattle must eat forage throughout most of the day and night. The producer should check old burn sites. If the cattle are wasting too much cactus then less can be burned the next time. If too much of the stump is being eaten by cattle and wildlife, greater quantities should be burned.

When cold, wet weather is forecast the producer should try to fill the cattle and burn an excess to sustain them in case

daily burning must be stopped for a short period. Also, protein and energy supplements should be increased before extremely cold weather. Pricklypear can freeze solid, making it hard to burn. When it thaws, it will rot quickly.

Labor

Fatigue, smoke inhalation and sore shoulders are the most common complaints of those who burn pear. Moving from plant to plant carrying the burner is a physical challenge. Adequate drinking water and rest periods are important.

Supplements

As discussed earlier, pricklypear is not a complete feed. It is low in protein and phosphorous but high in vitamin A, some minerals and energy. Range managers should evaluate their pastures and begin burning pear as grasses become depleted. Dry periods often last until all the grass has been consumed and pricklypear has become a primary source of nutrition instead of a supplement. When that occurs, a rancher can help meet the nutritional requirements of his cows by feeding a supplement mixture consisting of 2/3 (41 percent) cottonseed meal and 1/3 salt (3 pounds per cow per day) along with burned pricklypear. Cottonseed meal's high protein and phosphorous content complements pricklypear's highly digestible carbohydrates (energy), vitamins and water. Another complementary supplement is a non-protein nitrogen source such as broiler litter.

Costs

A producer can expect to use about 1/4 gallon of propane/butane per head per day. The cost of labor and supplement should be added to estimate the cost of feeding pricklypear, which usually compares favorably with the cost of feeding grain or hay. Moreover, as a drought continues, grain and hay become more scarce and expensive while the cost of burning pricklypear stays virtually the same.

Pricklypear Management

Cultural Practices

Where there is little pricklypear, a producer may want to encourage it to grow, within reasonable limits, in selected areas or traps. Mechanical methods such as railing or discing will scatter pads and encourage rooting. Some producers plant pricklypear in rows in small cattle holding traps to facilitate singeing the spines and to control the amount fed to livestock. Some also experiment with fertilizer regimes to encourage optimum production. Recent research has indicated that fertilization can increase total biomass production five-fold and boost nutrient quality significantly.

Planting spineless pricklypear makes singeing unnecessary. However, efforts to cultivate spineless pricklypear on rangelands have been largely unsuccessful because they are relatively susceptible to freeze damage and the lack of spine protection causes animals to overuse the plants very quickly.

Pricklypear Control

Of the 90 million acres of rangeland in Texas, about 25 million (25 percent) have some pricklypear according to a 1980 survey. More than half of the rangeland in the Edwards Plateau has pricklypear, and much of it is in moderate to dense stands. According to the survey, pricklypear is not a major livestock health problem in any region except the Edwards Plateau, where 45 percent of the counties have moderate to serious problems, especially with sheep. In most regions a 50 to 75 percent reduction in pricklypear would either have a positive effect or no effect on range livestock production. A large reduction would have a negative effect on wildlife and livestock in South Texas, however.

Each rancher must decide whether it is desirable to control pricklypear on rangeland. During prolonged droughts pricklypear can increase at the rate of 25 to 33 percent per year. If pricklypear control is necessary, the method chosen will depend on the size and density of pricklypear plants, the availability of

hand labor, the other vegetation on the range and the financial resources available.

Pricklypear on rangeland can be controlled with prescribed burning, aerial or ground broadcast spraying with picloram (Grazon® PC) (Figure 4, top), hand grubbing (Figure 4, bottom), mechanical chaining, railing, root plowing or individual plant treatments with picloram using backpack or wheeled

sprayers. The combination of prescribed burning followed by aerial spraying of a reduced rate of picloram is the most effective method. However, other combinations of methods may be just as effective in special situations. Picloram can be mixed with clopyralid, triclopyr and other herbicides to control other brush, such as mesquite, mixed with the pricklypear.



Figure 5. Pricklypear can be controlled by ground spraying with picloram (foreground, top) and handgrubbing (bottom).

The variable response of pricklypear to herbicide applications may be caused by weather conditions following treatment or by differences in pricklypear populations. The soil should be moist when picloram is applied. Aerial application of 1/2 pound ae (acid equivalent) of picloram (2 pints Grazon[®] PC) per acre in the autumn usually controls pricklypear. In some areas, applications of 3/8 pound ae or 1/4 pound ae yields similar results. The most effective treatment, however, is prescribed burning in winter followed by aerial application of 1/8 to 1/4 pound ae of picloram per acre in April or May. Burning under very hot conditions or with abundant fine fuel loads may provide sufficient control to meet management objectives in some situations (Figure 5). However, it is often difficult to accumulate adequate fuel to do this. Burning alone usually kills the pads, with most of the clumps resprouting and regrowing to the original size in 3 to 5 years. Burning 1 to 3 years after picloram spraying also has been effective.

Mechanical chaining or root plowing, usually to control an associated species such as mesquite or cedar, may aggravate a pricklypear problem. However, good control has been obtained when mechanical treatment was followed by picloram sprays or a dry, cold winter. Severe hailstorms or wildfires make pricklypear more susceptible to picloram.

Individual plant treatment has become popular where there are fewer than 200 clumps per acre. Spraying with picloram (1 percent Grazon[®] PC) in water or water-oil emulsion is effective. Cattle sprayers, backpack sprayers, and sprayers on all-terrain vehicles and other conveyances can be used. Pads do not have to be sprayed until they drip, nor on both sides, for the plant to be killed. Adding a dye to the spray helps mark plants that have been sprayed. Bits of flagging tape or paper also can be used to mark treated areas.

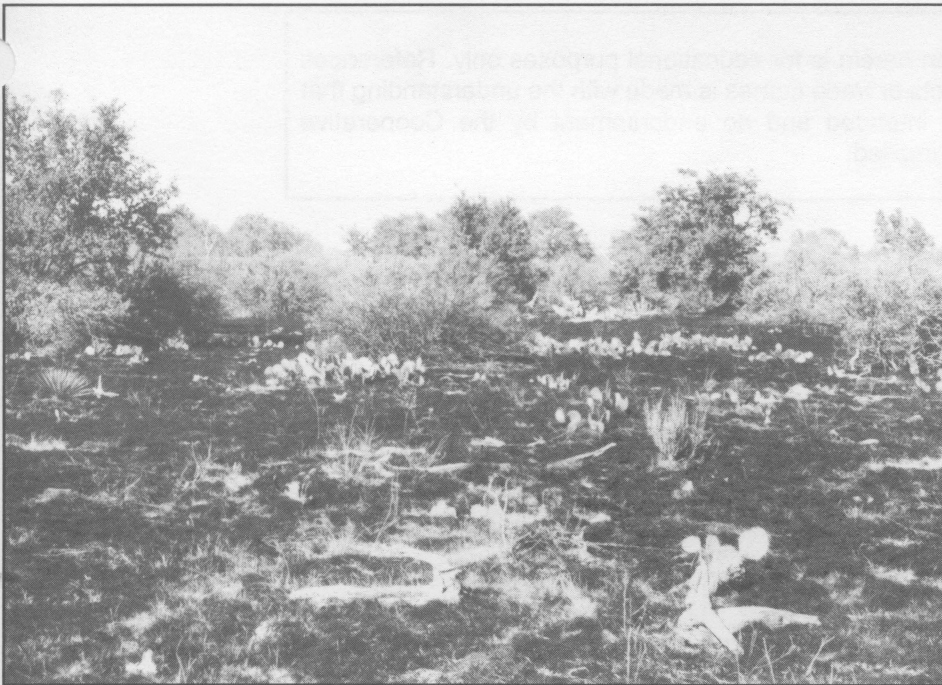


Figure 6. This Edward's Plateau ranch has just been treated with a prescribed burn. Pricklypear can be kept under control with repeat burnings every 5 to 8 years.

Summary

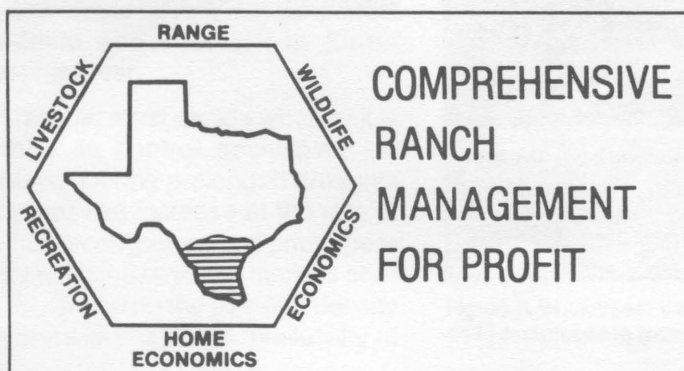
Whether you consider pricklypear a benefit or a detriment on rangeland largely depends on where you live and what you produce. Ranchers in South Texas look more kindly on pricklypear than those in the Edwards Plateau and Rolling Plains. Ranchers who raise cattle and manage deer may tolerate or even encourage pricklypear, while those who raise sheep and goats may consider it a problem. Pricklypear can be an effective emergency feed supplement for beef cattle. It is low in protein and phosphorus yet high in energy, water, vitamin A, fiber and ash. Pricklypear can reduce the costs of emergency feeding during droughts and severe winters. Many kinds of wildlife use pricklypear for food and cover. In dense colonies, pricklypear suppresses more desirable forage and inhibits the movement of livestock and ranch workers. Some livestock suffer damage from pricklypear spines, and some tend to keep eating it, to their detriment, after the feeding period is past. Each individual who manages rangeland must decide whether pricklypear's good points counterbalance its bad ones.

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