ROOT PLOWING AND SEEDING ... is the return as high as the price?

J.E. Huston, B.S. Rector and Randy Bredemeyer

Mesquite trees may be admired and cherished on some city lots, even half-acres spreads, but on Texas rangeland and in the minds of many a rancher, mesquite encroachment ranks number one, that is, number one problem. Whether a result of excessive grazing pressure over too long a time or of mistakes in cultivation, thicket now cover vast areas that were once highly productive rangeland. Furthermore, intense, positive management will not significantly reduce mesquite density unless some kind of control measure is included.

Root plowing and seeding is a method for quick recovery of mesquite infested sites to highly productive rangeland. Although it involves a substantial risk and success requires a definite luck-of-the-draw in climatic conditions, most transformations are quite impressive to the eye.

But in cold economic facts, what do you get out of it compared with what it costs? The question involves more than vegetation, but vegetation is where the answer begins.

Data were collected at the Texas A&M University Agricultural Research and Extension Center at San Angelo, Texas, to determine the cost of controlling mesquite by root plowing compared with increased forage production.

The study site was a 430-acre tract that once had been cultivated, then abandoned. Mesquite canopy covered approximately 30% of the area. The soil is Angelo clay loam, characterized by more than 20 inches of top soil over a calcic subsurface layer. Slope is less than 1%. The area was root plowed during February, 1974. In March, the seedbed was prepared with a roller chopper and a seed mixture was broadcast seeded at that time. Untreated strips (approximately 80 acres), left intermittently across the area for wildlife cover, also served as treatment control. A seed mixture was used that contained Kleingrass-75 and several native species.

Spring precipitation in 1974 was below normal but was sufficient for seedling establishment. Considerable growth of most seeded species occurred with good fall rains. One hundred sheep were placed on the area in October, 1974, and 50 were added in May, 1975. Beginning in September, 1975, an average of 45 animal units (18 cows and 135 sheep) were grazed on the area continuously.

Results

The root plowing and seeding operations really changed the forage production and species composition. The 3-year average standing crop (excluding mesquite) in the untreated areas was 2,111 lb/acre, compared with 4,124 lb/acre in the treated area. After the useless weeds are subtracted (broomweed and ragweed), the production values become 1,416 and 3,332 lb/acre, respectively. In other words, root plowing and seeding resulted in an increase in the August standing forage crop of 1,916 lb/acre, a 135% increase, during the first 4 years. Most of this increase, 1,370 lb, was kleingrass. Sideoats grama increased from 16.7 to 75 lb/acre from the untreated to the treated areas.

A closer look at the plant composition shows at least three categories in plant establishment. (1) Some plants become quickly established in disturbed soil, but because of high palatability and/or need for ground disturbance, also decrease rapidly. These include sorghum alaimum and green sprangletop. (2) Some plants become quickly established and remain in the composition until they are reduced or forced out because of selective grazing and competition. These include plains bristlegrass and perhaps kleingrass. (3) Some plants are slow to become established but increase with good management as the other plants are reduced. These include sideoats grama, K.R. bluestem and buffalograss. To our surprise, the weeds of the area were approximately the same on the treated and untreated areas.

Economic Analysis

The total cost of root plowing, rolling chopping, and seeding in 1974 was $32.25 per acre. If this cost were amortized over a 15-year expected effective life of the practice at 8% interest, an annual payment would be $3.77 per acre. At a 100% increase in cost, the annual payment would be $7.54 per acre. According to the data, this annual payment would return 1,916 pounds of available forage. Assuming that 40% of the August standing crop is harvestable by livestock, approximately 750 pounds consumed forage would be produced, enough to support one extra animal unit for each 12 to 15 treated acres.

The break-even would depend on the prices of calves, lambs, wool, etc. For comparison, assume that calves are worth an average of $.60/pound. The variable cost of production (inventory costs, feed, equipment, etc.) is about $.30/pound of calf produced. Therefore, the net price of a $.60/pound calf is $.30/pound. Then the amount of increased calf production necessary to pay for the amortized cost is $3.77 divided by $.30 or 12.57 lb/acre. At an amortized cost of $7.54 (a 100% increase over the 1974 cost), the break-even production is about a 25 pound/acre increase. A conservative estimate of an increased stocking rate of one animal unit for each 15 acres, a 90% calf crop and a 400 pound weaning weight is that the upper limit cost to allow break-even would be an annual cost of $7.20 or an initial investment of approximately $60/acre. If calves were $.90/pound, the initial investment could bulge to over $100/acre.

This report is not meant to be an endorsement of this or other management practices. It is an attempt to present figures to assist land owners or ranchers who lease land for livestock production who must decide if and how much range restoration will be profitable. Observations of this study area will be made at 3-year intervals to monitor vegetation changes in composition and production. Land managers should consider also the real possibility of declining forage production on highly improved pastures after a few years and plan livestock and range management systems to favor plant vigor and to guard against brush reinfestation.

The authors are associate professor, technician, and former research assistant, respectively, at Texas A&M University Agricultural Research and Extension Center, San Angelo, Texas.