Prescribed burning accomplishes this goal in several ways. It removes old, dead material and increases the palatability of forages. It also reduces the size of undergrazed areas. By decreasing the amount of brush, prescribed burning improves the access and availability of forage to grazing animals. Also, the total amount of forage is increased. In a study done by Biswell, brushlands will only produce from 13 to 106 pounds of browse per acre before burning, whereas after burning these same communities produce from 750 to 3,000 pounds per acre. Often times dramatic increases in grazing capacity are realized when prescribed burning is combined with other management practices, such as reseeding to annual or perennial grasses to increase forage production. The end result is more productive rangeland, producing a larger number of lambs and steers for an ever increasing population.

For millions of years, fire has been an important part of California's brushland communities. Due to fire's presence in the ecosystem, from naturally occurring and man caused, brush communities have evolved with fire being an important factor in maintaining the balance of the climax system. This balance was upset with the fire exclusion practices of the 1950's. As a result, the brushlands grew unchecked and accumulated vast amounts of highly combustible fuel which contributed to wildfires that were extremely expensive and hard to stop. So man, with his advanced technology and expensive machinery, went back to one of the oldest tools known to man, fire. Through the use of prescribed fire, man has decreased this fuel accumulation and lessened the severity of wildfires. Stockmen have used this tool, the prescribed burn, to open up previously unproductive brushlands to be used for the grazing of sheep and cattle. Whether by helitorch or with a simple match, prescribed fires are an important management tool utilized in California's brushlands.

The Methuselah Bush

Sarah Steinberg Gustafson

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When Frank Vasek first encountered the ring of scrubby-looking plants, he didn't know he might be looking at the oldest thing alive. At that time scientists believed that a 4,900-year-old-bristlecone pine was the modern-day Methuselah. But after studying circular clumps of creosote bushes, Vasek, a botanist at the University of California at Riverside, discovered that one such creosote clump began growing in the Mojave Desert northeast of Los Angeles almost 12,000 years ago. If Vasek's arithmetic is right, this ring, dubbed King Clone, may be the oldest living plant on Earth and may help explain how desert vegetation rebounded after the last ice age.

A creosote ring begins with a single seed. The seedling's lower stems send out new branches that develop their own roots. The original seedling diets and decays, and the process repeats itself. Over thousands of years, the ring expands like ripples in a pond—leaving a middle area of bare soil surrounded by a ring of genetically identical bushes.

Such propagation can creep over a large area. Vasek has found hundreds of creosote rings exceeding 30 feet in diameter. King Clone, a rough ellipse, spans 70 feet across its longest dimension. As a rings spreads, it breaks the soil into fine sand, which stores water more efficiently than the coarser soil outside the ring, thereby helping the clone weather droughts. "Although each bush in the ring can survive on its own," says Vasek, "the entire clone functions as a unit."

Vasek first became interested in the clones' age a decade ago when he was on an archeological tour. After noticing a number of creosote bushes that had been crushed by motorcycles, a tour member asked Vasek how old the destroyed bushes were. "I started to answer 300 or 400 years when it dawned on me that I simply did not know," says Vasek. That's when I decided to look into it."

Like trees, young creosote bushes can be dated by counting their annual growth rings. But after 100 years or so, a creosote clone grows by making more bushes rather than by adding bulk to a single bush. Rooting around in the sandy center of older clones, Vasek uncovered chunks of dead wood, which he radiocarbon dated. Dividing a chunk's age by its distance from living bushes yielded a rate of growth for each clone. Averaging the growth rates from a number of clones and applying the result, Vasek estimated King Clone to be 11,700 years old. "This is the oldest living clone we know of," he says. "There may be older ones, but nobody's made the case for them."

Because of its age, King Clone offers clues about how today's Mojave Desert evolved. The highest and northernmost desert of the American Southwest, the Mojave was slow to recover after each ice age. During the last major freeze, which ended about 10,000 years ago, ice covered the mountains of southern California, forcing piñon and junipers to migrate down onto the Mojave plateau. When the Earth warmed, the conifers returned to the hills, and desert plants reclaimed the plateau.

Now the dominant plant of the Southwestern deserts, creosote bushes originated in South America. For years botanists have wondered how long the ubiquitous bushes have been in the Mojave Desert. If they arrived before the last glaciation, did they retreat to a warmer desert when the climate cooled? Or did some, perhaps King Clone's predecessors, remain in the Mojave during the last advance of cold, ready to spread when conditions improved?

Until now pack rats provided most of the answers. Based on examination of seeds and other fossils found—or not found—in pack rat nests, some scientists believe creosote bushes didn't reach the Mojave until 9,000 years ago. "When you deal with fossils," says Vasek, "you take your chances on what you find where. King Clone shows that creosote bushes may have been in the desert area sooner than we thought, probably even during the last stages of the last ice age."

Researchers may quibble with Vasek over a few thousand years, but they all agree King Clone is ancient. Because the seedling it spread from was probably one of the first desert plants in the state, it deserves further study.

Fortunately for King Clone, the Nature Conservancy agrees. In March it bought a 17-acre parcel on which King Clone resides—none too soon, with a house going up less than a mile away. 'We're preserving King Clone because of its scientific value," says Lester Olmstead-Rose, the Conservancy's land protection assistant. "Besides being the oldest plant alive, King Clone represents an important genetic link to life during the last ice age."

Grass—the Next Cinderella Crop

H. Allan Nation

Agronomists all over the United States are scanning the horizon for the next Cinderella crop to hit American agriculture. In the 1970's the Cinderella crop in much of the U.S. was soybean, but today with fearsome competition arising in the Southern Hemisphere the soybean looks more and more like the Wicked Stepmother to farmers who grow it. Corn, wheat, cotton, and rice are all in gross oversupply in the United States, and few expect a dramatic turn-around in the demand for any of those U.S. crops in the remainder of this decade.

I hope to be able to make a credible case that America's Cinderella crop for the remainder of this century is all around you. It is here and has always been here and that crop is grass.

The Good Lord in his magnificent plan for the universe has deemed grass to be the ultimate climax crop in his universe. He absolutely will not allow a bare piece of ground. Grass cools the soil, tempers the fall of the raindrop, and heals and rebuilds the soil organic matter and nitrogen. Grass is the only crop we can grow that puts *more* into the soil than it takes out of it.

The stirring and tilling of the soil and the planting of monocultures is not found naturally anywhere on earth. These activities eventually destroy the organic matter God's grass crop carefully built in the soil and will economically destroy the farmer eventually. Without organic matter, the soil's life-force of microbes dies, and when the life dies in the soil, crop residues will no longer recycle. Herbicides will no longer work and can actually do more damage than good. The soil has no water holding ability and the soil will eventually literally blow in the wind.

In the Mississippi Delta, farmers are having to almost continuously run center pivot irrigators to grow cotton in a 60 inch rainfall area! The soil has so little organic matter than it can only hold one-half an inch of water in an area where the summer daily evaporative rate is one-third of an inch. The only thing that can break the death spiral for these farmers is to put this land back to grass for four or five years and heal the soil. Unfortunately, many of these farmers were able to get a degree in agriculture with virtually no understanding of soil science or ecology. They, in their ignorance, still believe that cotton is king and grass is something you try to kill.

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These farmers, who are going broke by the bushel basket, will tell you that their land is too good for grass and yet any soil scientist can tell them that their land has been rendered virtually worthless by their continuous cropping. Research in Georgia shows a virtual doubling combinations of species and classes of animals offer a much better harvest than any one species or class. All of our grasses have seasonal protein requirements high enough to allow our grazing animals to breed and our breeding seasons must mesh with these periods.

We have placed entirely too much emphasis on weaning weights and not nearly enough emphasis on genetically matching animals and their environments. For example, much of the Southwest is covered with brush and yet there are cattle in Africa who can make up 90% of their diet from brush. It would be much more cost-effective to genetically adapt the cattle to the brush than to chemically adapt the environment to our present breeds of cattle.

There will never be one "ideal" steer in the United States. Genetics will have to be altered to allow the animals to maximize the harvest of the existing environments. The correct emphasis for any cowman is not on the steer calf but on the replacment heifers he is carefully adapting to his specific environment. Genetic adaptation comes not so much from the bull we buy, but the cow we cull. The more ruthless we cull, the faster we adapt our herd. A 75% calf crop indicates that we are three-quarters of the way there in getting rid of cows who can't hack it under our environment.

Our customers, the American consumers, are telling us to route fewer animals to the feedlot and more to the hamburger stand. We need to allow every heifer we produce to have a chance to make it as a productive breeding animal that is better adapted to our environment than her mother. If she, in fact, proves she is so adapted, Momma goes to McDonald's and daughter takes her place. Those who say we have too many cattle in the United States totally overlook the fact that we import one billion pounds of hamburger grade beef a year. That's the slaughter equivalent of the entire cowherd of Missouri, our second largest cow-calf state.

Our post-weaning steer programs need to be regeared for producing animals in the 850 to 1,000-pound weight category prior to being placed in the feedlot for a quick finish. Our critics point out that cattle are wasteful users of the grain resources of the world. Economists point out that cattle will