THE PRODUCTION AND MANAGEMENT OF ALFALFA GROWN UNDER SPRINKLER IRRIGATION ON SANDY SOILS

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The soil conditions on the Yuma mesa consist of approximately 92% sand and the water infiltration rate is in excess of 1 1/2 inches per hour. This type of soil yields itself very well to the use of sprinklers. Alfalfa appears to provide the greatest potential for this area.

First and foremost in alfalfa production, whether it be in Arizona or California, is, of course, water. The consumptive use for alfalfa in Arizona peaks at approximately .40 inches per day between June 15 and July 15. Assuming an 85% efficiency of sprinkler application, a grower needs to be able to deliver a minimum of .50 inches of water per acre per day.

The water source for our ranch is supplied by wells which are drilled to 400 feet. The static water level is 100 feet and the pumping level is 125 feet at 1500 gpm. We are currently using electric service. However, rapidly accelerating electric rates necessitate the need to explore alternate energy sources for new developments. The water quality of our wells contains higher amounts of soluble salts than does Colorado River water. This condition does not create any problems in sandy soil conditions.

As stated previously, a minimum of .50 inches of water is necessary for alfalfa production. Therefore, we design our systems to produce 1500 gpm for our 125 net acre fields. Mechanical breakdowns, power outages, and adverse weather conditions at harvest create a need to be able to deliver in excess of growth requirements. The low water-holding capacity of these soils creates a demand to be capable of rapid water replenishment following summer harvest.

The use of a neutron probe is also very beneficial and cost effective. The probe measures hydrogen atoms in the soil and then interprets this information into water molecules. The probe is highly accurate in sandy soils. However, the consistency of the soil profile is critical to maintain accurate data.

Originally, we began utilizing a probe to enable correct water application during the peak growing months of March thru July. However, the value was found to be higher from August to February. During the period of March to July, the plant growth is very rapid and water usage is high. In this period, it is difficult to measure and record often enough to modify schedules without suffering losses. Therefore, in the high growth months, we simply monitor to insure the root zone is kept stable.

The August-September time period is very different. Even though the temperatures are high, the alfalfa stalls in its production and actual water consumption drops dramatically. The use of a probe enables us to monitor moisture levels and cut water at a time when instincts indicate water is needed.

I feel the winter months are the most difficult to manage from a water standpoint. As the weather cools, daylight shortens, rain occurs occasionally, and hay growth is retarded. Accurate irrigation management is almost impossible. The neutron probe allows us to follow the moisture levels down accurately and determine the correct time to irrigate. When water costs are high due to the use of electricity, an opportunity to shut down is very important economically.

Two basic types of sprinkler systems are used on the Yuma mesa: the center pivot and the lateral move system. The center pivot is able to cover approximately 125 acres of a 160 acre quarter section while the lateral system will irrigate the entire acreage.

Choosing the correct system is mainly a matter of economics. The lateral system complete will cost in excess of 3 times the cost of a center pivot. In terms of cost, the lateral is approximately $2,600 per acre for each additional acre over 125. If the land is extremely valuable or the crop potential is high, I suppose justification can be obtained.

However, on the Yuma mesa with alfalfa, the lateral is not feasible. Some manufacturers have also designed cornering units to bring acreage utilization up to 150 acres, but at this time none have proven successful in the Yuma area.

In addition to cost, the center pivot is also more efficient. The unit travels in a circle, thereby always irrigating the driest ground. The lateral unit either must be dead-headed back or re-irrigation of the same area occurs. The lateral would probably work in areas with heavier soils but on sand with low water-holding capacity, the lateral's efficiency is low.

Another area of concern with sprinkler irrigation is sprinkler efficiency. Most pivot irrigation companies are located in the Midwest where growing conditions are vastly different. The machines are designed to supplement rainfall and are expected to run 1,000 hours per year at 600-800 gpm. In the desert areas, the systems run 3,500 hours per year at 1500 gpm. In some areas, the sprinkler nozzles are not capable of distributing the amount of water required. On sandy soils, sprinkler damage patterns appear rapidly. In many cases, the plants have been severely damaged before corrective actions can be completed. I would recommend for anyone using sprinkler irrigation to run an irrigation can test on his units.

Growing alfalfa with sprinklers develops several problems unique to the area. Probably the number one problem which develops when the desert is placed into alfalfa production is rodent damage, primarily that done by pocket gophers. When land is cleared, there is no way to comprehend the problems which will result from gophers. The sandy soil, plenty of water, and the alfalfa provide ideal conditions for rodent infestations.

Over the years, we have used strychnine, zinc phosphide, rozol and several other baits with almost no success. The availability of green alfalfa removes any desire for the gophers to eat bait. Gopher traps work on a small scale for localized areas and for preventative measures. However, the cost of traps and manpower limits the success.

There is one method which has yielded virtually 100% success. Following the third or fourth year, when the stand is weak and gophers have become a problem, we turn off the water on approximately August 10th. The soil is then allowed to dry down to the 2 1/2 to 3 foot level. Experience has shown that the gophers will burrow as deep as necessary to stay in moisture, therefore leaving themselves a great distance from the soil surface. Approximately September 10th, the soil is ripped to around 24 to 26 inches, followed by a discing at maximum depth. Obviously, the rippers destroy the runs and the disc eliminates exit holes. Any gophers located in shallow runs immediately surface but are not able to dig back into the hot, dry sand. Those located 18 inches and lower are not able to reach the surface. Fields we have which were totally infested have now been 95% clean for more than four years.

Insects are also somewhat unique under sprinklers in that a different environment is created which allows insects, especially cutworms, to create severe problems. Most other insect pests are consistent with other growing areas and in many instances, insect problems are less severe. With the exception of cutworm baits, most insecticides are applied through the sprinkler system with excellent results.

The alfalfa production and quality are probably the most important factors in growing sprinkler alfalfa. Fall and spring hay maintain high protein and palatability with excellent color. By utilizing irrigation wells instead of river water, we are also able to maintain excellent weed control throughout the summer.

The summer hay we produce is the key to economic results in our area. While the protein goes down, as it does in all areas, the fine stem, good leaf pattern, and very high color are maintained into mid-August. The hay is then utilized in horse, retail and export markets. As all growers know, prices from October through May 15th are almost always good. June through September prices are the problems. By maintaining high quality, weed-free alfalfa during the summer months, we are able to achieve results not normally available on flood irrigated alfalfa.

In summary, producing alfalfa on marginal soil can be effective with quantity and quality excellent. Management of these farming areas, however, is very critical and even small mistakes are very unforgiving and costly.