ALFALFA ON BEDS A STATUS REPORT

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The bedding of an alfalfa crop is not a new idea. It has been practiced in this state as well as others, for many years for various reasons. The size and shape of the beds vary greatly from area to area and soil to soil.

The reasons behind the practice of bedding, as I will describe it, can be drawn from the conclusions of this statement: what do we desire from a field of alfalfa. Most any grower will say, high yields of high quality hay over a reasonable period of time--4 or 5 years. In San Joaquin County the average yield is now 6.5 ton/acre/year. Old timers often recall times when yields were 10 tons or more and speak of long stand life. The "common" alfalfa, they say, were better than those alfalfas now available. In actuality, today's alfalfas are vastly supeior to those available in past years, but yields have decreased, and stand life has been shortened.

New insect pests, diseases, weeds and some changes in cultural practices have all combined to decrease production and stand life.

Insects--Beginning in the early 50's the Spotted Alfalfa Aphid, then the Green Pea Aphid, alfalfa caterpillars, army worms, stem nematodes, Egyptian Alfalfa Weevil, and the Blue Alfalfa Aphid have each contributed to decreased yields.

Diseases--Phytophthora, Rhizoctonia, and Stagnospora root rots along with a whole host of other fungal and bacterial diseases which attach seedling, as well as established stands, have been shown to lower yields and thin stands.

Weeds--As stand counts decline, both winter and summer weeds move in. The summer grasses yellow foxtail (Setaria lutescens) and watergrass (Echinochloa crusgalli) are the most severe.

Cultural practices--Heavier equipment used in alfalfa culture and in the culture of rotation crops such as sugar beets, tomatoes, and dry beans have caused increased compaction and general deterioration of soil structural qualities. Large heavy equipment has caused increased destruction of crowns and regrowth buds. Cubers and pickup equipment top the list of offenders.

The key to higher yields of high quality hay and longer stand persistance is a dense vigorously growing alfalfa stand. It is the best method for combating loss in yields.

Irrigation, or more properly termed the soil-water relationship, is our greatest limiting factor to both stand establishment, stand vigor and stand persistance. Water excesses or deficiencies are compounded by soil problems. Shallow soils with depth limiting layers, sandy soils with low water holding capacities, and clay soils which crack when dry, exposing roots, and once wet do not provide adequate drainage.

In San Joaquin County we have large areas of problem soils, as far as afalfa production is concerned. Two of our most frequently encountered "problem soils" are the San Joaquin and Stockton Clay Adobe series. The San Joaquin series which is typlified by a shallow sandy loam soil with a limiting hardpan layer at or near 30 inches. Water permeability is moderate in the surface layer and slow in the subsurface layer until the hardpan layer is reached. The Stockton series is typlified by a clay texture with a thin silica cemented hardpan at 30-54 inches. Water permeability is slow in the surface layer and very slow in the subsurface layer. Runoff is very slow. Stand life on these soils is two to three years, under conditions of excess moisture. Scald, or the lack of oxygen in the root zone, Phytophthora and Rhizoctonia root rots all combine together to kill plants and reduce yields, when high moisture levels are maintained.

How do we improve these "non-alfalfa" soils? One solution that seems to be working in San Joaquin County is bed planting. All of us have seen alfalfa plantings on these poor soils with excellent vigorously growing stands on the borders and poor weedy stands in the checks. A bedding system is an attempt to grow alfalfa on the borders--an entire

field of borders

A few Northern California growers are trying this concept and have experienced good results. The beds are formed with a series of shovels interconnected by pieces of channel iron. The idea behind the use of channel iron is to leave a level bed surface. Basically the beds are suited to the ability of the soil to sub water to the center of the bed during an irrigation. The bed width is also adjusted to give a realistic irrigation time and provide for ease of harvest. Currently, the widest beds are 81 inches in the Stockton series soils. The furrows are initially an approximate 12-14 inches wide at the top and 8 inches deep. Soil settling of the bed does occur but no problems have been noted. Most fields have been aerially seeded and rolled with a cultipacker. Water was applied down the furrows and allowed to sub to the center of the bed. Excellent results have been obtained with very little soil crusting on the bed surface. As with any alfalfa planting, land leveling is critical. Slope of the field must be adequate to allow drainage of furrows while side fall should be at a minimum to maintain water control throughout the life of the stand.

Advantages of Bedding Alfalfa

Drainage
Bedding improves water drainage. The raised bed provides an area from which water can drain. The crown and many roots inhabit this area. External drainage is also provided by the furrows to move excess water quickly out of the field avoiding saturated conditions.

2 Irrigation
Fall or spring plantings can be irrigated up without fear of serious soi surface crusting decreasing the stand.

Fertilization
The bedding operation provides for fertilizer injection into the bed at depths and concentrations to get maximum utilization of the nutrient applied.

4 Faster Curing
If windrows are placed over the tal stubble of the furrow, the increased air flow can speed curing.

Quick Establishment
In our area it is a common practice to plant in October or November and rely on rains to germinate the seed. Generally, by the time rains arrive temperatures are too cool for active growth. In this situation, weeds are more competitive, resulting in a weedy stand which is usually too young for the application of control materials. Irrigation of dry planted alfalfa in mid-October results in a vigorous stand insuring less weed problems and high yields the following spring.

6 Reduced Compaction and Crown Damage
Arrangement of bed width and traffic patterns can reduce both compaction and crown damage. A possible solution would be to run the wheels down the furrows.

Disadvantages and Possible Problems

Loss of Effective Producing Area
It is possible that the furrow area may be lost, but reductions in yields, as compared to conventional fields, have not been noted. Alfalfa on the shoulder of the beds rapidly closes across the furrow during the regrowth period, effectively utilizing all available area.

2 Loss of Water Control Over the Years
The answer to the possible problem is proper land leveling and to initially make the furrows deep enough to stand some soil settling and traffic wear. The alternative, is to clean out the furrow with the use of a sweep. This practice has been used successfully.

Equipment Damage
Harvesting equipment life can be shortened due to the necessity of crossing the furrows at the head and the bottom of the field. No damage has been found to occur

but it is a factor to be aware of. A solution to the problem is to allow an area containing no furrows (about 20 feet) at the ends of the field. Water would be directed to the furrows by a conventionally spaced border system. In some cases the drain ditch at the end of the field is eliminated during harvest to provide equipment turning space.

4 Weed Control

Possible weed control problems can occur in the furrow where the alfalfa has declined. In established fields weed problems have ranged from about equal to much less than a conventional border check system. Summer grasses were controlled with water run Eptam in the furrow and most of the bed. Weed control diminished towards the center of the bed in a water run application. Granular applications may offer increased control.

5. Bed Width Decision

Bed width is critical, if too wide the center of the bed may not be thoroughly wetted. If too narrow the chance of having weed control and other problems is increased. Bed width is also determined by length of irrigation set to sub the bed. If the time required to wet the bed is overly long many of the advantages of a bedding system are lost.

Bedding provides many advantages over a conventional border check system. It is not for all soils, but has a place on shallow and clay soils, especially on those with depth limiting layers or slow internal drainage. There are many other methods which may work as good or better than the system outlined here, however, this is the method currently being used with good results.