

WEED CONTROL IN ESTABLISHED STANDS OF ALFALFA

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Management is the key to successful weed control in established alfalfa. No arsenal of herbicides can economically control weeds in an established stand if management favors weed growth. There is no substitute for a thick vigorous stand of alfalfa to suppress weeds.

Among the several operations in alfalfa production, field compaction is a major cause of stand losses. Stand losses cause alfalfa to be replaced by weeds--nature abhors a vacuum; weeds tend to fill the gaps left in alfalfa stands. Indiscriminate driving over an alfalfa field should be avoided, especially when fields are wet.

Cutting alfalfa at the proper time is another measure of weed control. Proper cutting interval results in obtaining a maximum tonnage of alfalfa, while minimizing stand depletion. Again, a good dense stand of vigorous alfalfa is the most economical means of weed control. If alfalfa is improperly cut, i.e. cut too early, the root reserves of the plant are not allowed to rebuild to maintain healthy plants. As a result the alfalfa becomes less vigorous with successive cuttings, stand losses occur, and weeds invade the bare spots and become stronger competitors with the remaining alfalfa plants. If alfalfa is cut too late, quality deterioration and tonnage losses occur, however weeds may not be as much of a problem. Proper balance in cutting frequency is best obtained by cutting at 1/10 bloom or when crown buds have started and no new shoots exceed 2 inches in length.

Removal of the alfalfa from the field as quickly as possible after cutting is highly desirable. Stand losses and weed invasion occur when alfalfa is left too long in the swath. Alfalfa plants under heavy swaths and bales become yellow from lack of sunlight and poor aeration. Also, insects and plant pathogens frequently flourish under swaths and bales and further weaken the alfalfa so it competes poorly with weeds. Failure to remove the cut forage at the shortest time possible puts a restriction on the yields to be obtained.

A combination of poor management practices such as failure to remove the baled hay, planting on poor soils, and poor irrigation management is sure to be disastrous to the producer. Poor irrigation management can deplete an alfalfa stand and replace it with weeds in a single season. Even one single excessive irrigation under certain conditions can cause weeds to become the dominant vegetation in an alfalfa field.

Another management factor to control weeds is proper fertilization of alfalfa. Six tons of alfalfa per acre annually require about 320 pounds per acre of elemental nitrogen (N), 37 pounds of elemental phosphorus (P), and 216 pounds of elemental potassium (K). Alfalfa, once established, produces most of its own nitrogen, if properly nodulated. The addition of excessive nitrogen is both costly and it favors weed invasion by the grassy weeds. The phosphorus is needed to maintain a vigorously growing alfalfa which will compete with weeds. It can be provided by annual applications, if soil tests indicate the need for it. Potassium is generally provided by most California soils in adequate quantities, but some sandy soils tend to be deficient. Soil tests can determine the need for potash. If serious potassium deficiencies exist, alfalfa is a good indicator plant with rather specific deficiency symptoms. Well nodulated vigorous alfalfa plants will compete favorably with weeds.

In addition to the management practices I have cited to favor alfalfa over weeds there are other management practices which may be employed once a weed problem exists. Grazing by sheep and cattle is often done during the winter months to remove the alfalfa aftermath and reduce weed growth. It is sometimes debatable whether or not grazing aggravates or reduces a weed problem. In any event, grazing should be done in such a manner to minimize field compaction and cause little or no damage to alfalfa crowns. The transfer of livestock from weedy ranges or from weedy fields onto alfalfa fields can only increase the risk of weed problems in alfalfa the next year.

Cutting alfalfa whether by rotary blade, flail chopper, or swather to eliminate weed problems can sometimes be beneficial. One must weigh the advantages of an early versus late cutting by considering the uses of the forage, the probable losses to be encountered, and the regrowth potential of both the alfalfa and weeds. I have seen a first cutting taken early, to avoid serious problems with barley foxtail infested hay. The result was disas-

trous in that the foxtail fouled the first cutting, the alfalfa was weakened by the early cut, and the foxtail grew back to infest the second cutting also. If cutting of weeds must be done to minimize losses in established stands, it is best to do it in such a way that the alfalfa stand itself is not seriously weakened by the cutting process. Leaving the weeds and seeds on the field by rotary chopping or by flail chopping and blowing back onto the field only hasten the day when the field will need to be plowed out.

Burning of alfalfa to control weeds can often do the job and have some beneficial side effects. Burning should be done when there is a minimum of cover and crown bud activity. Usually a multiple flame burner adjusted to give a broadcast burning job will result in some weed control. A carefully adjusted flame causes only slight injury to alfalfa crowns, controls some insects, and stimulates a little more rapid growth of the alfalfa in the first cutting. It should be remembered that a burning job that does not injure the alfalfa rarely kills all the weeds. Furthermore, the ash and carbon left on the field after a burn can deactivate some herbicides which may be applied as follow-up treatment behind a burn to control late-germinated weeds.

Winter weeds in established stands can be relatively easily controlled by the herbicides registered and recommended for alfalfa. Chemical control is only as effective as the applicator-grower team makes it. Success is dependent not only on the proper choice of chemical but also on the rates, application, timing, and management of the alfalfa after herbicides are applied.

Dinitro and oil are more selective during the dormant season of alfalfa than during warm or hot weather. The control of grasses is relatively short-lived but most broadleaf control is quite adequate. This combination properly applied has also shown a fringe benefit of reduced alfalfa weevil damage.

In selecting the right herbicide for the job, it is helpful to know which types of herbicides are effective against the problem species and how they act to kill the weeds. An example is the use of Dalapon on winter weeds at the Antelope Valley Field Station. Dalapon is primarily a grass killer, not registered in alfalfa. It does kill winter annual grasses selectively in alfalfa at relatively low rates, but does not take out broadleaf weeds. At higher rates, it reduces the broadleaf population adequately, but loses selectivity on the alfalfa. Dalapon is largely a foliar spray though there may be some root uptake.

IPC is another grass killer. It however, is only effective against winter annual grasses, and most effective during cool weather. It is taken up by the root system and so must enter the soil to be effective. Its solubility and volatility make it a short-lived but effective chemical when properly applied. It must be irrigated or rained into the soil within a few hours or at longest a very few days in order to control weedy grasses. IPC is very effective against most volunteer cereals, the Bromegrasses, wild oats, barley foxtail, and Canarygrass. Its activity against the broadleaf weeds in alfalfa is less than spectacular.

Diuron is an effective broad-spectrum herbicide for alfalfa if properly applied and if management is geared to enhance its activity. Diuron must be applied to well established alfalfa when there is little or no regrowth, or the alfalfa is in a dormant or semidormant condition. Diuron will kill both broadleaf and grassy weeds in the seedling stage or at germination. Large seedling plants and well established weeds are less effectively controlled by Diuron. Since Diuron acts through root uptake, it must be moved into the soil by irrigation or rainfall. Usually the delay between application of the herbicide and getting it into the root zone is not as critical for Diuron from a chemical standpoint, as it is from the weed size standpoint. While Diuron lies on the soil surface, a weed seedling can grow beyond the point where it will be killed when a rain or delayed irrigation takes the herbicide to the zone where it could have been effective earlier.

Summer annual grasses are a serious problem in established alfalfa. The weeds; barnyardgrass, foxtails (Setarias), crabgrass, sprangletop, and some of the lovegrasses and other annuals germinate over such a long period that many chemicals lose their effectiveness before the season ends. The herbicides that could control many of these grasses are registered to be applied when the alfalfa is dormant; e.g. Diuron, Trifluralin, and Planavin. The latter two herbicides require incorporation into the soil by mechanical means. This is a drawback to their widespread acceptance. Furthermore, with Trifluralin and Planavin, germinated or emerged weeds are not controlled by an application of these

herbicides. Current research is under way to solve these problems. It now appears that herbicide combinations may do the job, and there have been cases where timely winter applications have controlled some grass species.

One of the newer herbicides which looks quite effective in some areas is Sumatol. This herbicide gives a wide spectrum of weed control, killing some species, such as groundsel, which have previously not been easily controlled. Its greatest drawbacks are narrow crop tolerance and short life in some areas.

Some of the special weed problems not readily solved are dodder, Johnsongrass, and Bermudagrass in hay fields.

CIPC will control dodder in cooler areas of the state where cuttings are few, temperatures are cool, and irrigations are infrequent. It is not effective in the hot valleys where the season is long and many irrigations are required. The best measures for control of dodder are:

- (1) certified, dodder free planting seed.
- (2) low cutting to reduce the attached areas.
- (3) staking of infested areas at cutting time and immediate burning of spots.

It has been observed that dodder is less of a problem under sprinkler irrigation than where irrigation is by flooding. Furthermore where flood irrigation is practiced, dodder infestations are greatest where the alfalfa stems are longest, i.e. next to the borders.

The author has been told by one grower that his dodder problem was solved by reverting to the mower to the exclusion of the swather. There are new herbicides which may effectively control dodder, but they are not yet registered for alfalfa forage.

Johnsongrass and Bermudagrass are summer-growing perennials for which there is no presently registered chemical control in alfalfa. The control of these persistent grasses must be one of exclusion rather than eradication from an alfalfa field. This requires eradication of the weeds from fields well before the alfalfa is planted. The use of herbicides and/or drying down of rhizomes after severing them from their roots with subsurface blades is the best procedure. Subsequently the alfalfa stand to be established on a known perennial grass area should be treated with herbicides to prevent reinfestations by Johnsongrass and Bermudagrass seedlings.

In summary, weeds in established alfalfa, with few exceptions, can be controlled by mechanical, cultural, and chemical means. As integral parts of a management system, these methods of control work best in harmony with other factors which promote dense, vigorous stands of alfalfa.