

WEED CONTROL IN ESTABLISHED ALFALFA

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Management is the key to controlling weeds in established alfalfa. All good management practices must be put into practice to obtain adequate weed control. One of the most important items in any management program for weed control is knowing the different types of weeds which invade established stands of alfalfa.

TYPES OF WEEDS

Weeds can be classified into 2 general groups: Winter Weeds and Summer Weeds. This is an important item to remember when considering weed control in alfalfa. In southwestern Arizona, troublesome winter weeds usually start germinating in late summer and can continue to do so until February or early March. Summer type weeds can germinate from late February through September. The 12 month growing season in the lower elevations of Arizona and Southern California, provide opportunities for weed problems year around. For this reason, any time of the year an alfalfa grower makes a management error, he may face a serious weed problem. Figure 1 summarizes these thoughts diagrammatically. From Figure 1, we can recognize some periods which are critical for preventing weed infestations. These periods immediately precede periods of poor growth of alfalfa. December, January, and February are months when alfalfa growth is slow because of cold temperatures. Winter weeds may grow more rapidly than alfalfa during this cool period. These weeds are more readily controlled in early fall when they are seedlings.

During July, August and early September, high summer temperature surpress alfalfa growth and encourage summer weeds. If weeds have become well established before this period it will be difficult if not impossible to control them. After the alfalfa stand is established, these 2 growth periods are the most critical for controlling weeds. Weed control measures directed to these critical periods can be an effective tool for management of alfalfa. The winter and summer weeds should be further divided into broadleaf and grass weeds.

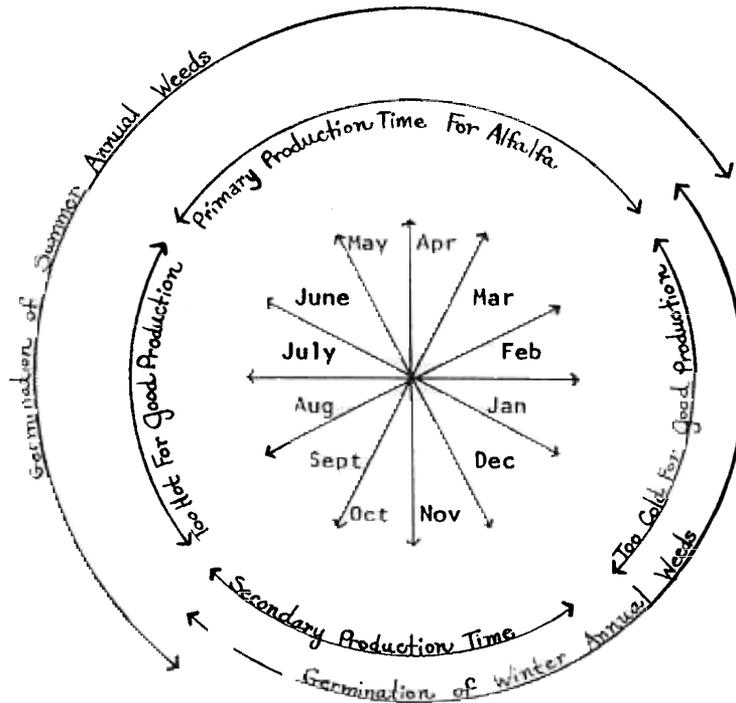


Fig. 1 Diagrammatic representation of optimum production time, and time when winter and summer weeds germinate at Yuma, Arizona.

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Summer Weeds

The most important and most troublesome are the summer annual grass weeds. Watergrass Echinochloa colonum (L.) Link, and Barnyard grass, Echinochloa crusgalli (L.) Beauv. are probably the worst summer annual grass weeds. Southwest cupgrass, Eriochloa gracilis (Fourn.) Hitchc., seems to be an increasing problem. Sandbur, Cenchrus echinatus L., is very serious where it occurs. Sprangletop both Red, Leptochloa filiformis (Lam.) Beauv., an annual species and Mexican, Leptochloa uninervia (Presl.) Hitchc. & Chase, an annual and sometimes a biennial species, seem to be more prevalent. Most difficult to control summer grass is bermudagrass, Cynodon dactylon (L.) Pers., a perennial. Where bermudagrass becomes established, it tends to become an increasing problem each year the stand is maintained. Johnsongrass, Sorghum halepense (L.) Pers., another perennial, is a problem in some areas. Nutsedge or nutgrass (not a grass weed) both purple and yellow, Cyperus sp., is another perennial which, when present, increases dramatically during the life of an alfalfa stand.

Summer Broadleaf weeds can be a problem at times but usually aren't as widespread as grasses. Carelessweed, Amaranthus palmeri Wats., Jimson weed, Datura stramonium L., Purslane, Portulaca oleracea L., and Groundcherry, Physalis wrightii Gray, have been observed as summer weed problems. One of the summer annual broadleaf weeds, that can be troublesome is Dodder, Cuscuta Sp., a parasitic plant.

Winter Weeds

Most winter weeds in alfalfa are broadleaf, while in the summer, grass weeds are the most serious. Cheeseweed, Malva parviflora L., is an important annual winter weed and is most difficult to control. The mustards such as London Rocket, Sisymbrium irrio L., and Sheperdspurse, Capsella bursa-pastoris (L.) Medic., are troublesome but a little easier to control. Goosefoot species such as Nettleleaf, Chenopodium murale L., Narrowleaf, Chenopodium desiccatum A. Nels. (C. pratericola Rydb.) and Lambsquarters, Chenopodium album L., are abundant and widely distributed winter annual weeds. Sowthistle, Sonchus asper (L.) Hill, can also be a problem. Other broadleaves have been observed but are usually less troublesome.

Winter annual grasses such as Canarygrass, Phalaris minor Retz., Rabbitfootgrass, Polypogon monspeliensis (L.) Desf., Cheat or Bromegrass, Bromus catharticus Vahl., which may also be biennial and Annual Bluegrass, Poa annua L., are often problems during cold weather. Some will compete vigorously as late as April and May. Small grains can also be a problem in alfalfa but usually only in stand establishment.

WEED CONTROL

Control of weeds in established stands can be categorized into 2 broad categories, Cultural and Chemical. Growers with successful alfalfa weed control programs may need to employ both methods. Cultural practices must be the foundation for any successful weed control program. The best weed control program is a vigorous stand of alfalfa.

Cultural Control

The control of weeds by Cultural practices would include harvesting and irrigation management, disease and insect control and fertilization. Selection of a well adapted variety is also a cultural method of weed control.

Proper harvesting management can go a long way in controlling weeds. Cutting alfalfa too frequently can cause the alfalfa stands to become weakened and thus weeds are able to move in. Cutting of alfalfa should be so timed that root reserves remain at a level high enough to allow speedy regrowth and prompt shading of the ground following cutting. This sometimes makes it difficult to schedule cuttings since alfalfa does not grow at the same rate all year. Times when alfalfa is growing slow or producing low quality forage can be utilized to extend cutting time to build up root reserves of carbohydrates. These times coincide with the hot summer months and cold winter months. Clipping or early mowing of alfalfa can help in control of weeds, but can also backfire by depleting root reserves, and weakening alfalfa plants. Clipping to control weeds should be practiced carefully just as pasturing should.

Clipping or pasturing should also be done before weeds have a chance to produce viable seeds. Clipping and pasturing can essentially accomplish the same objective as far as weed control is concerned, but pasturing will return something to the grower. Pasturing may present a problem of spreading weeds from a weedy field to a clean one. Pasturing wet fields can also create compaction problems as can harvesting mechanically on wet soil. Injury to alfalfa crowns is more pronounced under wet harvest conditions. Compaction of soil and injury to crowns of alfalfa are a major problem, to which there is no easy solution, since larger and heavier equipment is continually becoming necessary to cut costs of production. Harvest hay when soil is not too wet and if possible do not run in the same wheel tracks continually. These well traveled areas will eventually die, leaving a streak in the field where weeds can become established.

Irrigation management probably can go further in preventing weed problems than any other cultural practice. First and foremost in irrigation management is properly leveled, well drained soil. If water is allowed to stand for periods over 24 hours, particularly in the summer, serious stand deterioration occurs. Weeds will grow wherever alfalfa is not growing. Alfalfa is a crop which will remain in a field for several years so adequate land preparation should be a common practice.

Frequent light irrigations tend to cause alfalfa to be shallow rooted and also keeps soil surface moisture levels ideal for germination of weeds for longer periods of time. Studies in California have shown that about 4" of regrowth should be present after a cutting before an irrigation is applied. This allows the alfalfa to shade the ground somewhat before water is applied. This is particularly true during the hot summer months when standing water aggravates scald and death of alfalfa stands. Where this happens, weeds certainly will become established.

Applying too much water too frequently during winter can germinate a multitude of weeds. This happened in the winter of 72-73 when frequent rains resulted in widespread weed problems. The consumptive use of water is much less during the winter than the summer so irrigation schedules must be modified to take this into account.

Proper water management helps reduce the incidence of Phytothora Root Rot which kills and weakens plants during the Spring and Fall. Texas Root Rot which kills alfalfa during the summer cannot be controlled and areas which are killed should be replanted at the proper time to prevent build up of weeds in these barren areas.

Insect pests uncontrolled can weaken the alfalfa so that sunlight reaches the ground and weeds will be able to germinate.

Phosphate fertilizer should be applied to alfalfa prior to planting since phosphate is immobile and moves only after it is converted to organic forms. If the alfalfa is to be left in a field for 3 years, much of the fertilizer can be applied before planting with additional amounts topdressed during fall or winter as needed. Nitrogen fertilizers can increase weed problems. Alfalfa, once established, produces its own nitrogen when properly nodulated. Excess nitrogen applications are costly and may promote weed growth.

Burning is a method of cultural control of weeds which has not been thoroughly investigated in Southern California and Arizona non dormant alfalfa growing areas. It may have promise if the proper techniques can be worked out.

Chemical Weed Control

As alfalfa stands are reduced by the passing of time, weeds, particularly grassweeds, tend to grow in the areas where alfalfa has disappeared. These weeds may reduce the quality of the forage and sometimes the price received for it. Where the alfalfa is cubed, the presence of grass may inhibit the formation of an acceptable cube. Particularly objectionable weeds such as sandbur must be controlled if the hay is to be marketable.

The economic cost of weeds in older stands of alfalfa is not always clear. When the weeds are controlled, new alfalfa plants do not voluntarily appear in their place. Therefore, when weeds are controlled, total yields of forage (alfalfa plus weeds) may be reduced.

It does not appear that annual weeds will crowd out vigorously growing alfalfa that is properly managed. Weeds are a problem in weak stands of alfalfa. When alfalfa stands decline to an unacceptable level, the only recourse is to renovate the field, or establish a new stand of alfalfa. Herbicides should be used only to keep the invasion of particularly undesirable weeds in check. Herbicides will not necessarily prolong the life of an alfalfa stand.

Weed control practices which work on dormant varieties may injure non-dormant alfalfa. Treatment with the herbicide Diuron (Karmex^R) is an example of a herbicide which works effectively on dormant varieties in colder areas for good winter weed control.

Most herbicides currently registered for use on alfalfa particularly for control of summer weeds have a shortcoming. A grower must anticipate his weed problem and apply the herbicide before the weeds emerge. This is not easy to do. In tests and demonstrations observed in the last 5 years with the herbicide Eptam (EPTC) excellent weed control was obtained in 4 out of 15 trials when compared to untreated checks. The trials were all conducted in areas and during periods where and when growers had anticipated weed infestations. Weeds simply did not become a problem in 11 out of 15 of these trials. The herbicide is effective in controlling weeds when they are present, but how can we anticipate when they will become a problem? This is the decision the grower faces.

The ideal herbicide would be one that kills all emerged weeds without damaging the alfalfa. Such a herbicide does not yet exist so we have to use the ones available and understand their good points and weaknesses.

Herbicides

The herbicides currently registered for use in Arizona and Southern California are tabulated in Table 1 along with their ability to control some important weeds.

EPTC (Eptam)

Eptam will control many annual grass and broadleaf weeds if applied to the soil prior to their germination. Water runs of Eptam, during the spring and summer months, have become increasingly popular in Arizona and Southern California. Application rates of 1.5 to 3 lb/A are used about every 30 days from April through July and August. Less frequent applications can be effective as long as they are applied before germination of the weeds. These treatments will control most annual weeds throughout the summer months. For best results, the crop should be basin irrigated and even distribution of the irrigation water is required. Where weed infestations are controlled, a higher quality hay crop may be harvested. If the alfalfa hay is sold on a quality basis and a premium is paid for this quality, an economic return for the investment in herbicide may be realized. If the alfalfa is not sold on a quality basis, this practice may not be profitable.

Trifluralin (Treflan)

Treflan, a chemical relative of Balan, is a soil applied herbicide. It controls annual grass weeds and many summer annual broadleaf weeds. Treflan must be applied before the weed seeds germinate. This herbicide must be incorporated into the soil. Control of weeds with Treflan can be expected for 3 or more months.

Where Treflan has been applied in the irrigation water, the results have not always been satisfactory. The label suggests that Treflan be applied to the soil and incorporated mechanically. A granule or liquid formulation is available. It is difficult to achieve acceptable mechanical incorporation in established alfalfa without injury to the alfalfa stand. While Treflan would give excellent control of many summer annual weeds, it is apparent that proper application is a serious difficulty.

Propham (IPC)

IPC is a herbicide which has been used effectively on winter annual grasses during cool weather. It can control small seedling grasses and stunt larger established grasses. It is available as a granule and should be irrigated shortly after application. IPC has a short residual life of 2 or 3 weeks.

2,4-DB (Butoxone Amine, Butyrac)

This herbicide is quite effective on seedling stands of alfalfa for control of broad-leaf weeds during cool weather. It has less application on established stands because of possible injury to the alfalfa and the difficulty in contacting small weeds in vigorous growing established stands. Do not confuse this herbicide with 2,4-D or disastrous injury may occur. This herbicide can also be metabolized in the soil to 2,4-D which can injure alfalfa. Care should therefore be taken to contact as little soil as possible.

Dinoseb or DNBP (Dow Selective, Sinox W)

This material has some selectivity on alfalfa in cool weather. It is widely used in dormant alfalfa growing areas. Control of broadleaf weeds is superior to grass control.

New Herbicides

There are some herbicides which are not fully developed and are not available for use on alfalfa. CIPC (Chlorpropham) is not a new herbicide but deserves mention. It does an effective job of controlling dodder (*Cuscuta* sp.) in alfalfa in areas where the season is shorter and cooler. We have not been able to duplicate these results, probably because the herbicide is shortlived and we may have dodder germinating over a longer period of time. A new additive may prolong the life of this chemical so that it will be more acceptable. Devrinol (R7465) is another compound which is long lasting and may have applications for alfalfa weed control. Surflan (Oryzalin), a Treflan like compound, is another product which may be easier to incorporate. Sumitol (GS14260), has shown great promise in other areas, but like Karmex, may be too phytotoxic in this area. Probe (Methazole) is another product with a broad weed spectrum which may have possibilities. Kerb (Pronamide) may also find a use for winter grass control and preemergence control of mustards. All of these have been tested on a limited scale and show some promise, but no major breakthrough is foreseen yet.

Perennial Weed Control

Bermuda grass, Johnsongrass and Nutsedge are weeds which are most difficult to control. Bermudagrass and Johnsongrass can be controlled from seed with EPTC or Trifluralin, but once established are almost impossible to control. Recent work has indicated that Nutsedge may be controlled or at least substantially reduced by multiple applications of EPTC without harming alfalfa. Bermuda and Johnsongrass do not appear to be as susceptible to this treatment.

SUMMARY

There is nothing new and spectacular in weed control in established alfalfa. Older cultural type control methods will still have to be used along with judicious use of the few registered herbicides which all have strong and weak points. Much more work will have to be done by alfalfa growers, herbicide manufacturers and public agencies before we can have a solution for all weed problems in established alfalfa.

HERBICIDE	GRASSES				BROADLEAF			
	Annual		Perennial Bermuda		Summer	Winter		
	Summer	Winter	Seed	Estab- lished	Careless- weed	Mus- tard	Cheno- pods	Malva
2,4-DB	P	P	P	P	G	G	G	F
Dinoseb (DNBP)	P	P	P	P	G	G	G	F
Eptam (EPTC)*	G	G	G	F	F	P	G	P
Treflan (trifluralin)*	G	G	G	P	G	P	G	P
IPC (propham)*	P	G	P	P	P	F	G	P

Table 1 Herbicides registered for use on established alfalfa and weed reactions to them. The herbicides should be applied according to directions on the label. Herbicides marked with an asterisk* are most effective when applied preemergence to the weeds. DNBP and 2,4-DB are applied to the foliage of seedling weeds. Letter designations in the table have the following meanings:

G = Good weed control when used correctly should provide 85% control or better of susceptible weeds.

F = Fair weed control - sometimes provides partial weed control.

P = Poor weed control - seldom provides control.