

KEY STRATEGIES FOR WEED MANAGEMENT

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ABSTRACT

Controlling weeds is necessary in alfalfa production to extend life of the stand and produce high quality hay. Weeds rob alfalfa of water, nutrients and forage yield. They impact growth, impede root development, lower the quality, and reduce the alfalfa yield. Weed free alfalfa improves harvest efficiency by speeding the drying time, and expands marketing opportunities therefore, bringing higher prices. The presence of poisonous weeds: common groundsel *Senecio vulgaris*, coast fiddleneck *Amsinckia intermedia* and poison hemlock *Conium maculatum* are just a few that reduce hay value or make it completely unmarketable. The economic return to produce clean hay will justify the moderate input of herbicides together with sound management practices.

Weeds are opportunistic pest, seizing opportunities to gain a foothold from weak plants due to unfavorable growing conditions. The importance of crop rotations to reduce soil borne diseases; laser leveled fields for uniform irrigation and to provide tailwater drainage; soil amendments and fertilizers to promote health plant; selecting a variety with multiple pest resistance will extend stand life and prevent early weed invasion into a field.

Cultural Practices can reduce weed problems.

An integrated approach that employs' cultural, mechanical, and chemical practices is the most effective method for controlling weeds in alfalfa. Land leveling, fertility and proper seedbed preparation are also important steps to achieve a healthy population of alfalfa which directly affects its ability to compete against weeds.

Crop rotation can be effective for reducing large weed seed populations before alfalfa planting. Many weeds are better controlled in the preceding crop than in alfalfa. For example, many winter weeds can be controlled in wheat or oat crop with a phenoxy herbicide or conversely summer weeds are reduced by growing corn, beans, tomatoes by using herbicides and cultivations together.

Preirrigation can reduce weed populations enough so alfalfa will have less impact from weeds. Not only does this method help for weed control but will fill the deep soil profile so important for a deep rooted crop.

Summer fallow before a fall planting will minimize the development and spread of weeds and allow soil preparation for planting. This practice also reduces soil pathogens that favor a high moisture environment and are problems in alfalfa. For example, Pythium, Phytophthora and Rhizoctonia are common soil fungi that feed on alfalfa roots. Crop rotation and or summer fallowing will minimize these pest issues later on.

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Time of Planting

Warm soils favor rapid germination and growth of alfalfa. The optimum soil temperatures for alfalfa germination ranges from 69° to 76° F. When alfalfa is planted under these conditions, it will grow faster and be more competitive with weeds. Avoid planting alfalfa when temperatures are less favorable (<50° or >90° F) for optimum growth, since this allows weeds to flourish over the slower establishing alfalfa. Herbicides also do a better job when applied to weeds vigorously growing and are less injurious to the alfalfa.

Seeding in November or December in the San Joaquin Valley was the standard practice and relying on rainfall for germination. The problem with this method is twofold: alfalfa grows slow in cold temperatures and needed rainfall for moisture for germination is unpredictable. This can result in a variable stand, different size alfalfa, with a non-uniform population. Colder temperatures favor winter weeds especially mustards, shepherds purse, chickweed and certain grasses that compete with the slower growing alfalfa seedlings.

The suggested planting time for the San Joaquin Valley is September and October. By this time, summer weeds have finished germinating and not as serious a problem. Fall temperatures are also more favorable for alfalfa growth to get a head start on the winter weeds that germinate later. Usually winter weeds reach peak germination in December, by then the alfalfa is fairly well established.

Fall seeding can also manage perennial weed problems from nutsedge, bermuda grass and summer annuals; pigweed, lambsquarter, yellow foxtail and barnyardgrass.

Timing the Herbicide Application

Weed size and species

Small weeds are easier to control and have less impact on the developing crop. Generally, it takes less herbicide (active ingredient per acre) to control a smaller immature weed than a weed that is older, larger, and has a “hardened cuticle”. Tender tissue allows herbicides to penetrate quickly and effectively. Immature weeds also have a smaller root system that is less apt to recover from an herbicide application. The smaller or less mature the weed the better the control.

Dozens of different weeds can occupy alfalfa at all times of the year. Most weeds are annuals but perennials and biennials can also be a serious problem. Some are parasitic and only survive on alfalfa as a host. There are poisonous weeds toxic to animals, and aromatic weeds that animals will not eat or may contribute off flavors to the milk.

Identifying the weed and understanding the biology is important in selecting the correct control measure.

For example; Curly dock grows like a biennial or act as a perennial depending on the environment. The most effective control is using a systemic translocating herbicide, which moves into the root system. To accomplish this, treating in the fall before a freeze when carbohydrates are moving downward into root storage was most effective.

Yellow or green foxtail (*Setaria*) is arguably the most serious summer weed problem in alfalfa. Being a grass, the vegetative growing point is below the cutting bar. It has adapted to the

Treating smaller weeds is cost effective because:

- 1. Smaller weeds are controlled easier. Lower herbicide rates can be effective.*
- 2. Reducing spray volumes require less fill ups and cover more acres per tank load.*
- 3. Competition from small weeds is minimal and does not impact yield.*

multiple harvest by producing viable seeds within a 30 day cutting cycle during the summer. The best system to control foxtail grasses can be handled in several different ways. Extending the alfalfa harvest interval will promote a larger alfalfa plant to compete against weeds. Although this practice will decrease TDN hay quality, it is an excellent tool for alfalfa longevity and weed control. Delaying the irrigation after bale removal until alfalfa regrowth is 6-10 inches tall and shaded the soil surface will also slow weed germination.

In addition to using cultural practices to manage weeds, the need for herbicides is necessary. Timing the herbicide application, the appropriate rate to a small weeds when immature has been discussed. Another important choice to understand is the physiological condition of a weed due to environmental or soil moisture conditions.

In a study conducted in 2001, where two herbicide timings were compared on yellow foxtail at different application timings and soil moisture levels. The experiment was set up following the third harvest of alfalfa in June on foxtail grass beginning to form seed heads. The first application of Poast® and Select® herbicide treatments were applied following bale removal when alfalfa and grass stubble was short and low soil moisture. The second application was made using the same herbicides and applied three days following irrigation. The alfalfa and weeds with the added moisture had begun to grow. Evaluations were made several times the next two months. The results were dramatic and showed a significant increase in weed control when herbicides were applied after irrigation under desirable growing conditions.

Roundup Ready alfalfa has returned and clearly improves our weed control options. It has proven an effective means of annual weed control and control for some of the most difficult perennial weeds; dandelion, quackgrass, bermudagrass, nutsedge, and Johnsongrass. Many alfalfa herbicides run the risk of some injury to the crop but glyphosate tolerant varieties have demonstrated safe with Roundup. In addition, being able to stop the invasion of tough perennial weeds any time during the season, will benefit the life of an alfalfa stand for years. And now for the first time, Dodder and yellow nutsedge and other weeds can be controlled on demand with post emergent use of glyphosate.

An obvious and well publicized concern about RR technology is the development of herbicide resistance in resident weed populations. Ryegrass *Lolium spp* and horseweed, fleabane *Conyza sp* have developed resistance in California and increasingly more difficult to control. The glyphosate weed resistant issue is taking hold across the U.S. in soybean and corn crops. This becomes a real concern as Roundup Ready alfalfa acres are on the increase. Not exclusive of any herbicide, tolerant and resistant weeds do exist so combining multiple herbicides is necessary. After five years of commercial RR alfalfa, it is clear that combining a tank mix of soil residual herbicides such as Velpar, Chateau, Prowl with glyphosate is needed for residual weed control and preventing resistant weeds from occurring in RR alfalfa.

Weeds are a continuous battle from planting through the final year of the stand. Weed control will depend on many factors, which include weed type and population, soil type, remaining life of the alfalfa stand and the strength of the hay market. A combination of good cultural practices and staying atop of weed management will provide a longer lasting and production of higher quality hay.