

# NEW HERBICIDE TOOLS IN ALFALFA STAND ESTABLISHMENT

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## INTRODUCTION

Weed control is generally the first major decision to be made once alfalfa has germinated. Managing weeds in a timely manner is necessary to provide maximum production of high quality alfalfa hay. A poor weed management decision can lead to stand loss, poor quality hay, unacceptable weed control, alfalfa injury and a loss of money.

Weeds compete with alfalfa seedlings for water, nutrients, and light. They retard seedling growth, impede root development, lower hay quality, and reduce the alfalfa yield. Weed free alfalfa improves quality, improves harvest efficiency by speeding the drying and baling time, expands marketing opportunities and commands higher prices. The presence of poisonous weeds such as Common groundsel *Senecio vulgaris*, Coast fiddleneck *Amsinckia intermedia*, Nightshade *Solanum*, and Poison hemlock *Conium maculatum* further reduce the value or make it completely unmarketable. Today, the economic incentive to produce supreme quality hay is substantial; weed free alfalfa is one important step to insure that profitability. Developing a new alfalfa field without pays dividends from the beginning and continues throughout the life of the stand.

Controlling weeds effectively begins well in advance of herbicide use. To minimize weed problems requires an integrated approach of crop rotations to reduce weeds and diseases, properly leveled fields to avoid standing water and drainage problems, soil amendments and a balanced fertilizer program will promote vigorous growth; together these are all important in maintaining a weed free field. Selecting a variety with good pest resistance will also ensure a stronger alfalfa plant to compete with weeds. Once weeds are present, proper identification of seedling weeds is essential for choosing the correct herbicide. The "Growers Weed Identification Handbook" is a good resource to identify the agricultural weeds of California. It is a university publication available through county cooperative extension offices, or online at: <http://anrcatalog.ucdavis.edu>.

## CHEMICAL WEED CONTROL

Herbicides are applied to 75% of newly planted alfalfa in California.<sup>2</sup> Herbicides are considered an integral part of a total weed manage system that compliment cultural approaches. Herbicides used in alfalfa establishment can be grouped into categories based on their timing of application.

<sup>2</sup>California Department of Pesticide Regulation Data Summary 2001

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### **Pre plant herbicides**

Preplant herbicides are applied ahead of planting and incorporated into the soil. They control weeds by killing the germinated seed before it emerges. Most of the herbicide activity is accomplished underground in the soil medium. In recent years, there have been few breakthroughs in developing new preplant herbicides for the alfalfa market. The current preplant herbicides include benefin, Balan® and EPTC, Eptam® which have been around for decades but are being used less each year as new selective post emergence herbicides become available.

### **Post emergence herbicides**

Post emergence foliar applied herbicides are used more often than pre emergence types because they allow the choice of herbicide to be made after the weed has emerge and been identified.

#### *Non-selective*

These herbicides eg glyphosate, paraquat and acid based fertilizers, are applied onto weeds that have emerged prior to alfalfa emergence or planting. At rates used for controlling weeds serious alfalfa injury will occur. Paraquat however, has a dual purpose since it can also be applied once alfalfa has developed 3 to 5 leaves but only at very low rates. This practice requires extreme caution.

#### *Selective*

This category of herbicides is applied to weeds and alfalfa when both have emerged and selectively kills the weed without causing damage to alfalfa. This type of herbicide has gained popularity since it allows time to accurately assess the weed population and choose the best herbicide for the weed spectrum. In some cases, only areas with heavy weed pressure can be targeted for treatment reducing the amount of pesticide applied and costs.

## **NEW HERBICIDES**

*Imazamox* is a new herbicide marketed by BASF Corporation under the name of Raptor® that is registered for use in alfalfa to control broadleaf and grassy weeds. Raptor is in the same chemical family as Pursuit and will become a primary herbicide choice for alfalfa growers in years to come.

Raptor is a *Selective* postemergence herbicide that can be applied to seedling alfalfa, which has reached the two trifoliolate leaf stage, and weeds 1-3” in size. It can also be applied to established alfalfa at any time for postemergence control. Between cuttings applications, harvest must be delayed for 20 days. When used in alfalfa seed production the pre-harvest interval is 70 days.

Many growers are familiar with Pursuit® herbicide for seedling alfalfa weed control. Successful techniques learned using Pursuit would also apply to Raptor insuring consistent results.

***Comparisons between Pursuit and Raptor:***

1. Raptor has a shorter soil life approximately half of Pursuit. Even though applied post emergence to weeds, both herbicides enter the soil and can persist for months. Raptor with a shorter plant back interval is important in areas with multiple cropping patterns.
2. The ai (*active ingredient*) rate per acre of Raptor ranges from .024-.047 Lb/A and is half that of Pursuit .047-.094 Lb/A. Under cold and foggy conditions when weeds are growing slowly, higher rates are generally needed. When temperatures are warmer and favorable for vigorous growth, lower rates are successful.
3. Raptor controls a similar spectrum of broadleaf weeds as Pursuit but many more grass weeds. Controlling a broader spectrum of weeds can eliminate the need for combining two herbicides together. However, when necessary certain tank mixes are allowed. Pursuit being weak on grasses may be the choice when keeping a nurse crop of grasses in a seedling stand is desired.

***Suggestions for obtaining best results with Raptor:***

1. **Spray weeds at the smallest size allowable.** At the 1-3” height, 95 to 100% control can be achieved. Delaying applications beyond this growth stage generally lowers the overall control.
2. **Applications should be targeted when all alfalfa has reached the two trifoliolate leaf size.** Generally, the smaller the alfalfa the younger the weeds. Weeds generally grow faster than alfalfa so delaying applications usually favors the weeds. Lower rates are also effective and cost reducing on smaller weeds.
3. **Avoid spraying plants under stress.** Stress is often related to conditions of low soil moisture or environmental conditions that slow a plants metabolism. Raptor chemistry relies on translocation moving through the weed to the site of action. Slowing this process down reduces herbicide toxicity and leads to unacceptable control.
4. **Adjuvants are always needed.** Raptor needs to be combined with an oil adjuvant or non-ionic surfactant. In addition to the adjuvant, a nitrogen fertilizer (ammonium sulfate, UAN) added to the spray solution will enhance results particularly when conditions are less than ideal.

Raptor will also have a fit in established alfalfa weed control. This is especially important since the industry is limited in what is available for use between cuttings to control broadleaf weeds. The use of 2,4-DB *Butyrac*® is restricted in many locations especially where sensitive crops such as cotton and grapes are grown. Bromoxynil *Buctril*® is restricted to use on seedling alfalfa. Paraquat *Gramoxone*® has a 60-day pre-harvest interval that is too long between cuttings. Raptor can be an option for those unforeseen weed problems that occur between cuttings. More information on seedling alfalfa weed control, herbicide/weed susceptibility charts and pictures of herbicide symptoms on alfalfa can be found in the New UC Publication #21615 “*Postemergence Weed Control in Seedling Alfalfa and Phytotoxicity Symptoms*”.

### ***Managing Herbicide Resistance***

Each year more “ALS” (*Aceto lactate Synthase*) inhibiting herbicides are being registered in the western states across many crops. This chemistry, which includes Raptor and Pursuit, is highly vulnerable to developing weed resistance when used repeatedly. The reality is that once the problem is identified it is usually too late and takes too long to turn the problem around. We not only lose the effectiveness of Pursuit and Raptor but other herbicides in this chemistry maybe come ineffective for use on other crops. (cross resistance) There is not a set number of applications known to develop the problem. However, to avoid developing resistance a good rule of thumb (as with all pesticides) is to rotate and combine chemistries when possible and use the lowest rate recommended by the label.

## **FUTURE WEED CONTROL**

Roundup Ready alfalfa is a few years from registration. (estimated 2004). The Roundup Ready® system will allow the use of glyphosate herbicide to be applied over the top of growing alfalfa without having injurious effects on growth and quality. Most states have research underway evaluating cultivar adaptation, yield and quality studies, and identifying weed control systems. The weed management research studies being conducted are designed to evaluate several scenarios for weed control in stand establishment and in established alfalfa during the life of the stand.

### *Stand establishment scenarios include:*

1. Roundup applications comparing various rates from 0.5, 1.0, 2.0 Lb/A.
2. Roundup applications made at different alfalfa growth stages beginning at cotyledon leaf to 9 trifoliolate leaves.
3. Single and sequential applications made several weeks apart.
4. Roundup tank mixes with other herbicides.

### *Established alfalfa scenarios include:*

1. Roundup only used comparing three rates from 0.5, 1.0, 2.0 Lb/A.
2. Conventional herbicide system. This is the growers management system, which will utilize any combination of standard alfalfa herbicides depending on weed species.

3. Roundup plus conventional herbicides used alternately. This system compares the flexibility-using Roundup in conjunction with other herbicides on an as needed basis. This might include sequential and tank mixes of herbicides: Velar, Karmex, Prism, and Raptor etc as the weed population dictates.

### ***Review***

The 2002 season will conclude the first year of the Roundup alfalfa weed management trials. The preliminary results over four state wide locations ( Fresno<sup>1</sup>, Siskiyou<sup>2</sup>, San Joaquin <sup>3</sup>) have demonstrated excellent weed control. During the stand establishment phase of the trials, all three rates of Roundup provided excellent weed control (95-100%) with little affect to seedling alfalfa plants in three of the four locations. In one location, approximately 25% of the alfalfa seedlings were killed with a Roundup application. This was present in only one experimental line that contained a higher than normal susceptible population to Roundup. Monsanto and participating seed companies are screening for these problems and insuring that the percentage of Roundup tolerant plants in released varieties will be above 95%.

Roundup treatments have demonstrated excellent weed control across the board in seedling stands. The best treatment was an application when alfalfa had reached the two-three leaf stage and weeds very small. This allowed for most of the weeds to have germinated but small enough for easy control with low rates and having little competition on the alfalfa. The very early timing sprayed at the cotyledon stage was safe and effective but in some cases allowed a later second flush of weeds. The late application timing when alfalfa had reached the 6-9 leaf stage and weeds larger required a longer time to kill weeds, this may also need a higher rate of Roundup depending on species and allowing more competition on the alfalfa.

The long term established alfalfa studies now in progress have completed the first growing season in most locations. Having excellent stands of alfalfa absent of weeds did not require any herbicide treatments during the growing season. In the coming years, when alfalfa stand populations decline and weed numbers increase, strength and weaknesses of the Roundup system will become apparent.

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