STAND ESTABLISMENT-ROUNDUP AND OTHER HERBICES: HOW DO THEY FIT?

Mick Canevari, S. Orloff, R. Vargas, K. Hembre[1]

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.
Herbicides are applied to 75% of newly planted alfalfa in California[2] and considered an integral part of a weed manage system that compliment cultural practices. In the last decade several new post emergence herbicides, *imazethapyr*- Pursuit, i*mazamox*-Raptor, *clethodim, and sethoxydim* Prism and Poast have significantly changed weed management systems from preplant applied herbicides to post emergence herbicides expanding control of many broadleaf weeds and grasses. Roundup Ready alfalfa became commercially available in 2005 offering a new weed control system using genetically engineered glyphosate tolerant alfalfa. The impact that herbicide tolerant crops have had on other commodities is remarkable. In 2004, an estimated 70 percent of the cotton acreage, 90 percent of the soybean acreage, 65 percent of the canola acreage, and 40 percent of the corn acreage in the United States were planted with varieties genetically altered for herbicide tolerance.

Weed Management Practices in new plantings.

Post applied herbicides have changed the way growers approach weed control in new alfalfa plantings. Pursuit, Raptor, *2,4D-B*- Butyrac, *paraquat*-Gramoxone, Poast and Prism are effective on the majority of weeds problematic in new alfalfa plantings. Post emergence systems allow the weeds to germinate and be identified before choosing the type of herbicide and rate. This provides the grower better options to control cost, decide herbicide and crop rotation planning. Winter or summer weeds are more manageable from plantings made from September to May since most are adequately controlled. Growers have the flexibility to flood or sprinkler irrigate to a stand with less concern to weeds germinating with alfalfa. Selective herbicides, Pursuit or Raptor have broaden the window of control on many broadleaf's and grasses at a very early growth stage with less injury to alfalfa than those herbicides of the past. Today, one can achieve dairy quality hay that brings $80- 100 / ton increase over weedy alfalfa is the rule rather than the exception.

---

[1] Mick Canevari, UCCE, San Joaquin County; Steve Orloff, UCCE Siskiyou County; Ron Vargas, UCCE Madera County and Kurt Hembre, UCCE Fresno County. **In**: Proceedings, California Alfalfa and Forage Symposium, 12-14 December, 2005, Visalia, CA., UC Cooperative Extension, University of California, Davis 95616. (See http://alfalfa.ucdavis.edu).

[2] California Department of Pesticide Regulation Data Summary 2001

Weed Control limitations still exist

No system is without drawbacks. Our current weed management program has made tremendous strides but still has defined requirements and restriction as to application timing, temperature, and environmental influence.

There are instances were these restrictions impose delays or changes so that the best results are not always achieved. Compromised decisions usually results; in more injury to alfalfa with poor results and higher cost. There are weeds not effectively controlled by any one herbicide program. Uncontrolled species can result in population explosions that suggest total herbicide failure rather than success. In more cases, without combing multi targeted herbicides that expand the spectrum of control is becoming more difficult to achieve desirable results.
Perennial and parasitic weeds include some of the most challenging issues. Control of difficult weeds in the California's Central Valley of Bermudagrass, nutsedge, and Johnsongrass and Dodder needs to be improved. There are no effective weed control programs for some of the most difficult-to-control perennial weeds common in intermountain alfalfa stands. (dandelion and quackgrass) Controlling these tough perennials will help extend stand life and improve hay quality.
Dodder continues to be problematic in both alfalfa hay and seed production throughout the central valley and desert locations. Spring plantings in areas where dodder has historically been a problem usually results in dodder populations developing with few options for control. Once dodder has attached to alfalfa stems, only radical and yield reducing control methods of burning or mowing alfalfa plants down to the soil surface offer any reprieve.
During cutting season summer weeds can populate a field quickly especially where alfalfa stands have diminished from harvest traffic damage, poor irrigation drainage or soil pest and diseases. Grasses are more common than broadleaf weeds in summer cuttings but either can be difficult to control once well established.
Other issues are using long lived soil herbicides when replanting a poor seedling stand or last year stands when crop rotations are being considered.
Drift onto neighboring crops, lands or waterways has heighten our awareness to the potential of injury that new herbicides chemistries are capable of doing in such small concentrations. Many of our alfalfa herbicides face these issues.

Roundup Ready System

Roundup Ready alfalfa as a weed management system has shown significant merit for alfalfa producers. Control costs could potentially be reduced while improving the level of weed control. Most alfalfa herbicides show some degree of injury to the crop but less is has shown from glyphosate tolerant varieties. In addition, Roundup can be an effective means of weed control for some of the most difficult-to-control perennial weeds, dandelion, quackgrass, bermudagrass, nutsedge, and Johnsongrass. Adequate control of these tough perennials will extend stand life while assist in the long term permanent removal. It is also anticipated that Dodder for the first time can be managed with multiple applications of glyphosate.
Glyphosate is arguably the most effective non-selective foliar herbicide on the market today. It controls a broader spectrum of weeds, both annuals and perennials, than other herbicide. It has

no soil residual properties at normal use rates which can be important. It has few environmental and aquatic restrictions and very safe to human and wildlife.
Uniform weed control trials conducted throughout production areas of California and the United States have demonstrated excellent weed control averaging 90% or greater for most common annual weeds. Although the spectrum of weeds controlled by Roundup is impressive, certain weeds are not completely controlled. These include cheese weed *Malva*, burning nettle *Urtica*, and filaree *Erodium* at lower use rates. Table 1.
An obvious and well publicized concern about RR technology is the development of herbicide resistance in resident weed populations. Ryegrass *Lolium spp* and horseweed *Conyza* have shown evidence of resistance and increasingly more difficult to control. This becomes a real concern as Roundup Ready crop acres increase. With more RR crops grown and year around glyphosate applications the potential for weed resistance significantly increases.

Combing Roundup and Other Herbicides.

During the phase in period of Roundup Ready alfalfa little consideration will probably be given to other herbicides into the management system, particularly during the stand establishment phase. Farm Advisors testing did not demonstrate a need to combine other herbicides since all the weeds were controlled with glyphosate. But not exclusive of any herbicide, tolerant weeds exist and with thousands of acres of Roundup Ready alfalfa being planted situations will arise that require combining other herbicides into the system. Depending on the weed specie, its density and the impact on quality, combining herbicides will probably be necessary. This is not likely in the first year but probably in subsequent years. It is spelled out in the purchase tech agreement that the initial application must be made with Roundup at the 3 to 4 leaf stage to eliminate “nulls”. (Plants without the resistant gene.) A practice designed to insure transgenic plants will fill in to a uniform stand. This time would be appropriate for a weed survey to determine if other strategies are necessary.
Glyphosate tolerant weeds left to survive will eventually dominate the population. One of the Roundup Ready alfalfa test sites located in the San Joaquin Delta demonstrated such a shift with burning nettle where the Roundup only treatment was used for three years. During the initial stand establishment phase, the nettle population in this site was so few it was deemed negligible for evaluation purposes. By the following year, the nettle population had flourished in the area as other weeds were removed. In 2004, the alfalfa yield at first harvest exceeded 50% nettle in the hay. Table 3.
Roundup Ready alfalfa offers a technology that will benefit alfalfa producers if not over used! Unlike annual crops of Roundup Ready cotton or corn which are usually rotated annually, we are dealing with a long lived perennial crop and need to think about herbicide rotations and tank mis combinations to avoid weed shifts and herbicide resistance developing. A balanced weed management approach on summer and winter weeds will insure the reliability of this technology for years to come.

Table 1

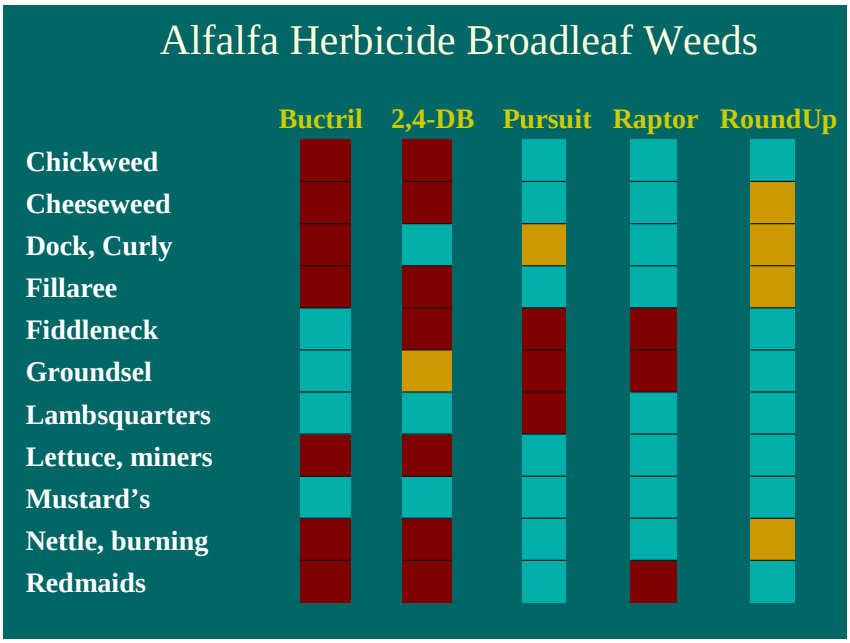

Table 2

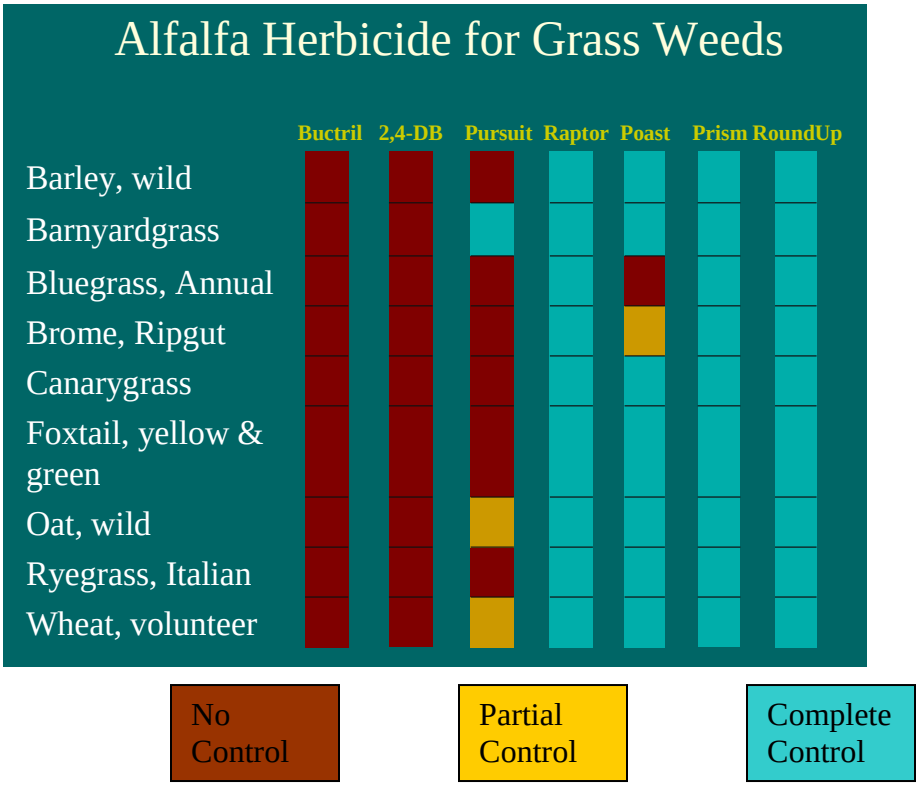

Table 3. Weed control in Roundup Ready Alfalfa. San Joaquin Delta, Stockton Ca 2005

	% Crop Injury and Weed Control[1]											
	Rate	Alfalfa		Burning Nettle		Chickweed		Annual Bluegrass		Sowthistle	Yield % Biomass 115 DAT	
		DAT[2]										
Treatments	LbA.I./Acre	41	62	41	62	41	62	41	62	62	Alfalfa	Weeds
Roundup Ultra Max 4SL	2.0	0	0	12	73	92	95	98	93	48	53	47
Roundup Ultra Max 4SL	1.0	0	0	7	30	88	87	99	90	52	23	77
Roundup Ultra Max 4SL	0.5	0	0	3	0	82	72	97	85	43	18	82
Velpar 2EC + Gramoxone Max 3EC	0.5 + 0.375	0	0	100	95	97	95	97	93	60	74	26
Roundup Ultra Max 4SL + Velpar 2EC	1.0 + 0.5	0	0	100	95	90	88	93	76	73	73	27
Untreated		0	0	0	0	0	0	0	0	0	11	89
	LSD (0.05)									13	48	

1 0 = No weed control or crop injury, 100 = Complete weed control; crop dead

2 DAT = Days After Treatment

Treatment 12/4/2004

Trial Established 10/2001