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COMMENTS PERTAINING TO THE NEED FOR CONTROL OF WINTER WEEDS IN CALIFORNIA ALFALFA FIELDS

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To: Ann Hanger, DPR Pesticide Registration and Evaluation Committee.

I am writing as state-wide Cooperative Extension Specialist at UC Davis, with primary responsibility for alfalfa and forage crops. These comments pertain to the control of winter weeds in alfalfa, the importance to the markets, to growers, and to buyers and consumers of alfalfa forage crops, and the role of the herbicide hexazinone (Velpar) in CA alfalfa.

There are approximately 3,500 farms that grow alfalfa hay on nearly 1 million acres in California (USDA-NASS 2007 Census of Agriculture)—it is the state's largest acreage crop, and California leads the nation in alfalfa hay production. Additionally, California produces over 20% of the nation's milk supply, which is highly dependent upon alfalfa. Alfalfa hay is the principle forage and feed for the 1.7 million dairy cows, in addition to hundreds of thousands of horses, beef cows, sheep, and goats. The dairy-livestock-forage system in California is worth approximately 29% of the agricultural revenue in California in direct returns, and millions more in associated jobs and income of associated industries (e.g. food distribution, trucking). In this food production system, alfalfa plays the role of 'basic resource' much akin to steel in the auto industry.

Weeds have multiple effects on alfalfa. They can reduce alfalfa plant density, eventually taking over fields. They rob the crop of valuable water and nutrients. They can shade out plants. They can lower yields, but more importantly, they can reduce alfalfa feeding quality, affecting animal health and milk production, and significantly lowering the value to both the hay farmer and the dairy producer. In some cases poisonous weeds threaten health of the animals and noxious weeds invade new areas when hay is transported. Alfalfa is a perennial, and although

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weeds can occur at any point during the growing season, there are several key ‘choke points’ for weed infestations in alfalfa:

Stand Establishment—One of the most critical time periods to control weeds, since alfalfa seedlings are young and weak and do not compete well with aggressive weeds.

Spring-Summer Weed Flush—Competition from aggressive heat-tolerant grassy and broadleaf weeds can lower crop quality from spring and summer through early fall.

Winter Weed Flush—Since alfalfa is largely dormant in the winter (alive, but not growing), many cold-tolerant weeds such as mustards, filaree, red maids, chickweed, groundsel, and winter annual grasses can take hold in alfalfa, and since they grow much more aggressively, can overtake alfalfa stands and significantly reduce quality.

Thus, growers can use herbicides to control weeds during all three of these time periods (see Canevari et al. ‘Weed Management in Alfalfa’, http://alfalfa.ucdavis.edu/IrrigatedAlfalfa/pdfs/UCAlfalfa8294Weeds_free.pdf). Growers may sometimes not apply as many herbicides to very well-established stands, since those compete successfully with these weed flushes – but apply when it is apparent that weed competition will be a significant factor. Alfalfa, according to the Pesticide Use Reporting Database, has one of the lowest pesticide intensities of California crops, but herbicides are often necessary for successful crop production.

Hexazinone (Velpar) has long been considered a ‘mainstay’ of an effective strategy for winter weed control in alfalfa. CA had 2,160 applications in 2009 on 124,568 acres (CDFA PUR database), as a winter-applied residual herbicide. The majority of these applications were in the San Joaquin and Sacramento Valleys. This region consists of nearly 70% of the CA alfalfa acreage. Velpar is also important in the Intermountain regions (which has colder winter conditions). It is used less in the Imperial Valley, since alfalfa is essentially grows year-round at this location, and is not sufficiently dormant.

Velpar is typically applied with another herbicide, most typically Diuron (Karmex), or Paraquat (Gramoxone). Chateau is another important newer option. The reason for combination of herbicides is that 1) Velpar controls a broader spectrum of weeds, 2) paraquat is only a contact herbicide, whereas Velpar provides residual effect on new weed emergence in addition to its effects on existing plants, 3) Karmex does not provide as broad a spectrum of weed control as does Velpar (especially some important weeds like common groundsel).

Perennial weeds are particularly difficult to manage in alfalfa. While perfect control is rarely achieved, Velpar is typically the most effective of these herbicides on perennial weeds and on groundsel. A key issue here is common groundsel (*Senecio vulgaris*), a common weed that is highly toxic to animals, and both commonly found in California’s Central Valley and desert regions. Velpar plays an especially critical role with groundsel control which should be carefully considered.

Impacts on Quality. Groundsel is truly a nightmare weed for both growers and dairy producers. This is a difficult weed to control. It germinates over periods of time, not all at once, so some sort of ongoing residual controls are necessary. It is not only aggressive during the winter months, but it provides a very large risk to animal health. It contains pyrrolizidine alkaloids which are a potent liver toxin. Moderate to large amounts in hay can kill animals and smaller amounts are thought to sicken animal and give sub-clinical symptoms to several different types of livestock, particularly cows and horses. Each year, the UC Davis Veterinary Diagnostic Lab receives cases of animal poisoning from this weed. Thus alfalfa forage or hay with any amount

of groundsel is punished severely in the marketplace, reducing the value from 20-50% on the low end to 100% (non-salable) depending upon the severity of the infestation. Growers have learned that they MUST control this weed to be able to sell dairy quality hay or horse hay. However, it is difficult to control.

Economic Impacts. Forage quality normally accounts for an average of \$48 per ton of hay, or 50% of the value of the crop in California markets (Table 1). Differences due to quality are largest in low-price years, and least in high-price years. Forage quality in California markets is a complex determination based upon lab analyses (such as Crude Protein and Fiber), condition of hay (e.g. moldiness), and presence of weeds. The definitions of Supreme and Premium quality hays require that the alfalfa hay be free of weeds. ‘Good’ hay may contain some other forage crops, such as forage grasses, or a few weeds, but cannot contain poisonous or noxious weeds. ‘Fair’ hay is often used for weedy hay, but alfalfa hay with groundsel is most often categorized below ‘fair’ categories, often called ‘utility’ grade, or ‘low’ quality. This is not listed on Table 1, since the price is so variable, and sometimes these types of hays cannot be sold at all, at any price.

Table 1. Price Differences based upon quality, California markets (USDA-Market News Reports).

Year	Supreme	Premium	Good	Fair	Top-Bottom	Difference (%)
1999	\$129	\$114	\$91	\$69	\$60	89%
2000	\$127	\$111	\$93	\$77	\$50	65%
2001	\$147	\$137	\$124	\$111	\$37	33%
2002	\$142	\$125	\$107	\$89	\$52	60%
2003	\$130	\$116	\$97	\$78	\$52	68%
2004	\$148	\$135	\$119	\$101	\$47	47%
2005	\$179	\$166	\$146	\$125	\$54	43%
2006	\$165	\$149	\$130	\$104	\$62	60%
2007	\$186	\$175	\$166	\$156	\$31	20%
2008	\$238	\$229	\$218	\$206	\$32	15%
2009	\$140	\$131	\$113	\$95	\$45	48%
2010	\$164	\$150	\$134	\$110	\$54	50%
Average	\$158	\$145	\$128	\$110	\$48	50%

Source: USDA-Market News Summaries

Marketers of hay will tell you that the presence of significant groundsel or other poisonous or harmful weeds in an otherwise high quality (Supreme or Premium) hay is sufficient to knock the price down at least to the ‘Fair’ category, and more frequently to the ‘utility’ grade. Thus the penalty for significant groundsel weed infestation in alfalfa is likely to be a minimum of 50% of the value of the crop.

Water Quality Concerns. I understand that there are issues with the detection of the herbicide Velpar in groundwater at low levels at sites in the Central Valley. Although the levels are low, and the detections few in relationship to the application frequency, this is certainly something to be concerned with. A number of grower practices to lower the chances of off-site movement have been discussed (Prichard, et al. 2007).

In short, there is an important economic need for this compound in alfalfa production systems currently. This detection of Velpar in water should be balanced with the value of this herbicide in alfalfa production systems. The economic impacts of inadequate weed management should be considered. Velpar currently controls many important weeds that are not adequately controlled by other herbicides, particularly for control groundsel in alfalfa hay.

Please let me know if I can be of assistance in the future.

Sincerely,



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