WEED BIOLOGY AND VEGETATION MANAGEMENT IN ALFALFA HAY PRODUCTION

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To begin with, it may be desirable to define the subjects of my discussion. Weed biology deals with the study of the growth, life or living processes of unwanted plants. Vegetation management is a system of husbandry utilizing all available knowledge and tools to produce a crop free of unwanted competing vegetation.

Only through an effective vegetation management system can we produce alfalfa hay profitably. In this system selective herbicides play an important role. To use them effectively and economically some knowledge of weed biology is essential.

The detrimental effects of weeds in newly planted and in established alfalfa have been demonstrated by many agronomists and weed scientists. But I don't believe it has been sufficiently emphasized that weed control in alfalfa production has to be an integral part of the total farming operation. It encompasses proper field selection, intelligent rotation, proper land and seed-bed preparation, sanitation around the field, knowledge of the weed infestations, timely irrigations and effective insect and disease control to insure a vigorously growing crop.

It warrants repeated emphasis that a vigorously growing alfalfa is the most effective and least expensive method of weed control.

In the past you have heard me elaborate on the importance of knowing the weed infestation before we can use selective herbicides effectively. Without knowledge of the weed infestation no one can use or make intelligent recommendations for the use of selective herbicides.

To help growers and pest control advisors learn to identify weeds we have produced colored pictures of them in their seedling and mature stage of growth. These pictures are published as The Growers Weed Identification Handbook and can be purchased from the University of California. We are also accumulating information about the susceptibility of weeds to herbicides that are registered for use in the production of alfalfa hay. (See attached chart)

Being able to identify weeds is very important, but it is only the first step. Effective economical use of selective herbicides hinges on their timely and accurate application.

Most of us who used or recommended the use of selective herbicides experienced poor weed control and not infrequently, complete failure. I submit that 99% of the time erratic weed control could be attributed to poor selection of herbicides, and more importantly to improper timing of the application relative to the biological development of the weed.

It has been clearly demonstrated that certain species of weeds are very susceptible to an herbicide in their seedling stage but they become tolerant as they grow and mature. To illustrate: shepherds purse can be effectively controlled with 2,4-DB ester from its seedling to 4 to 5 true leaf stage of growth. Once beyond the 6 to 8 true leaf stage and/or when its stem starts elongating it is not controlled. Fiddleneck is susceptible to 2,4-DB ester in its seedling stage but when it has more than 3 to 4 true leaves it is not controlled effectively. Dinitro selective with 1 or 2 pounds of ammonium sulfate per acre would control it more effectively. Knotweed is susceptible to dinitro selective and 2,4-DB ester in its seedling stage, but once its stem starts elongating, it develops tolerance to both herbicides.

Very often the size of the weed is erroneously used as a criterion for the timing of herbicide application. Environmental conditions greatly influence the growth of weeds; therefore, the size should not be used for timing of the application of selective herbicides.

Soil salinity, nutritional and moisture level of the soil affect the rate of growth thickness of the outer layer of cells, and other physiological processes of the weed. A weed growing in saline soil or under moisture stress may not be effectively controlled with postemergence selective herbicides even though applied at the proper time. A vigorously growing weed is more susceptible and can be more effectively controlled. Conversely, vigorously growing alfalfa is more tolerant to selective herbicides than those growing under adverse conditions.

So far I have stressed the importance of weed biology in relation to the use of postemergence selective herbicides. Some knowledge of weed biology is equally important in timing the use of preplant incorporated or preemergence herbicides. It is important to know when weed seeds, that infest the field, germinate. Perhaps I can best illustrate this with a couple of examples.

Balan and Tolban are recommended as preplant incorporated herbicides in newly planted alfalfa. If the alfalfa is planted in October or November and the anticipated weed problems are foxtail (SETARIA), black mustard, sowthistle and pineapple weed, these herbicides will not solve the problem. They are not effective on the broadleaf weeds anticipated and they may not last long enough to control the late spring and summer germinating foxtail seeds.

In established alfalfa if we wait and apply Eptam after the first cutting to control summer annual grasses, effective control may not be obtained. Seeds of foxtail (bristlegrass) and crabgrass often germinate prior to the first cutting, and we all know that Eptam does not control established weeds. However, if Karmex is used to control the winter annual weeds, it has sufficiently long residual activity to control the early germinating grass seeds through the first cutting or until Eptam is applied. Perennial weeds spread and multiply by rhizomes, stolons as well as seeds. In their seedling stage of growth perennial weeds are susceptible to several postemergence herbicides, but field bindweed, whitehorse nettle and hoarycress become perennials within 14 to 20 days after germination. Therefore, close monitoring of fields is essential in areas where these perennials are prevalent.

Certain perennial weeds like dallisgrass, nutsedge and dock thrive in moist, poorly drained areas. Killing them with herbicides will be but a temporary remedy. Only by changing the environmental conditions favoring their growth (biology) can they be eradicated.

We need to have some knowledge of the biology of dodder, the most troublesome parasitic weed in alfalfa, to control it effectively. Dodder is an annual plant that has to reproduce from seed every year. Unless it becomes attached to its host (alfalfa or weeds) within a short time following germination, it will not survive. Once it becomes attached its host must be destroyed as well as the dodder. There are herbicides available that will prevent it from becoming attached, therefore it is essential to know when dodder seeds germinate, what conditions favor its growth and when it flowers and sets seed.

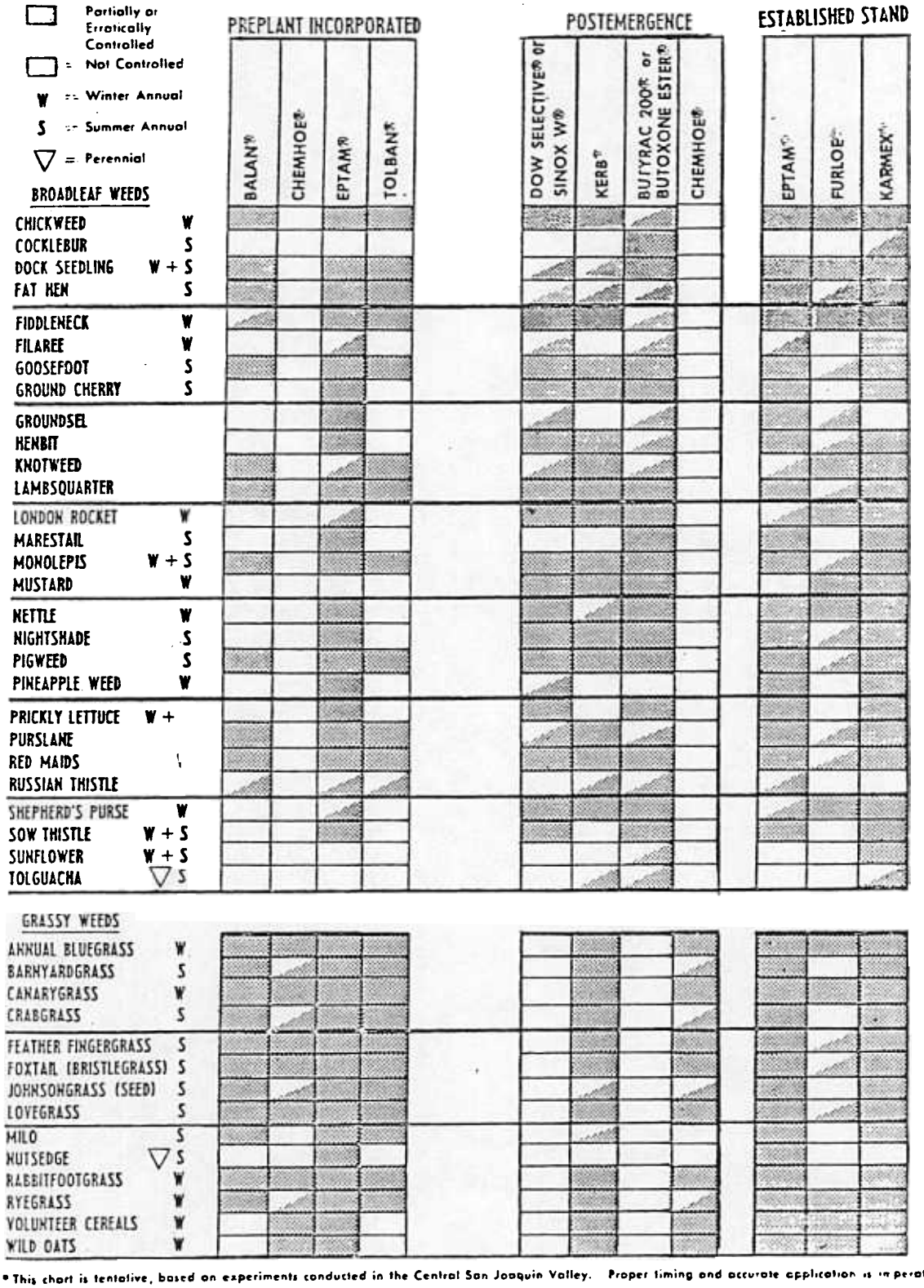
It is not necessary for us to become taxonomists or plant physiologists to control weeds in alfalfa. But I have had sufficient experience in observing and diagnosing the causes of poor performance of herbicides to emphatically state that without knowledge of the weed infestation and a limited knowledge of weed biology we cannot use selective herbicides effectively and economically.

Alfalfa hay growers have a large number of tools mechanical and chemical to enable them to produce alfalfa free of unwanted competing vegetation. These tools are expensive to buy and to use, but they can be very effective if used intelligently in a vegetation management system.

SUSCEPTIBILITY OF WEEDS TO HERBICIDES USED FOR THE SELECTIVE CONTROL OF WEEDS IN ALFALFA HAY PRODUCTION

KEY

- Effectively Controlled
- Partially or Erratically Controlled
- = Not Controlled
- W = Winter Annual
- S = Summer Annual
- ▽ = Perennial



* This chart is tentative, based on experiments conducted in the Central San Joaquin Valley. Proper timing and accurate application is imperative. Additional information may warrant changes.