

Selecting Herbicides for Cost-Effective Vineyard Weed Management in the Central San Joaquin Valley

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Many factors must be considered to produce wine grapes profitably in the Central San Joaquin Valley of California and elsewhere. Growers are constantly seeking ways of reducing direct input costs, while maintaining production and profits. Herbicides play an integral part of weed management in the Central San Joaquin Valley. Judicious use of herbicides can help to reduce some of the input costs, while maintaining effective control.

One might argue that weeds do not impact vine growth directly (especially older vines), so require only minimal control efforts. However, it is well known that weeds do compete directly for valuable resources like water and fertilizer. It is also understood that weeds reduce irrigation uniformity and efficiency by plugging up emitter heads and altering wetting patterns. Weedy vineyards also make an excellent habitat for numerous types of rodents that damage roots, shoots, and irrigation tubing, increasing production costs. Therefore, adequate weed control is needed for profitable production.

Herbicides play an important role in reducing the impact weeds have on grape production. To help reduce costs, select an herbicide program based on your specific field conditions. Keep in mind that the program you select may need to be occasionally changed over time as conditions warrant. This is true whether preemergence or postemergence herbicides are used. By developing a program and adjusting it as needed, you may be able to reduce use rates, switch to other, less expensive products, reduce the number of trips through the field, and/or eliminate certain treatments all together. There are several important factors to consider when selecting a specific program, including proper weed identification, weed susceptibility to the various herbicides available, availability of equipment and labor, sprayer calibration, physical properties of herbicides, and weed monitoring. Any or all of these factors can influence efficacy and costs associated with herbicide use.

Weed identification is probably the most important factor when selecting herbicides. Identify the weeds ahead of time so you can best select herbicides that are designed to control those weeds. It is also helpful to understand some of the basic growth characteristics of your specific weeds and when they are best controlled. For example, spurge can set seed in as few as 21 days from emergence, so delaying postemergence sprays may not help reduce the future population. Hairy fleabane and maretail begin germinating in February; so preemergence herbicides should be applied prior to that. There are several references available for readily identifying weeds, including *The Grower's Weed Identification Handbook* and *Weeds of the West*. If you are unable to identify them on your own, collect some plants (preferably with flowers) and store them in a sealed container under cool conditions. Farm advisors, PCAs, or industry reps can then identify the samples for you.

Susceptibility of specific weeds are listed on individual herbicide labels. By matching your particular weed complex, with those listed on the label, you can select the most appropriate

herbicide or combinations of herbicides that best meet your needs. Weeds may also have a differing degree of susceptibility based on stage of development or age. This is especially important to know when selecting and using postemergence materials. For example, to effectively manage nutsedge, postemergence sprays should be applied before plants develop five leaves. This will ensure that no new reproductive structures (tubers) are produced and will require multiple treatments for long-term management. Delaying or skipping treatments will not reduce overall populations on nutsedge. Examples of weed susceptibility charts are available in *Grape Pest Management* or *UC IPM Pest Management Guidelines for Grapes*, and other sources.

Availability of equipment and labor can influence whether particular herbicides should be used. Preemergence herbicides remain stable on the soil surface from hours to several weeks (depending on the particular herbicide) before needing to be activated by rainfall, irrigation water, or mechanical means. Napropamide (Devrinol®), for example, needs to be activated within four days of treatment for the best results. In this case, if spray equipment or labor is a limiting factor, it may not be possible to treat large acreage soon enough before a rainfall event for effective control. Whereas, herbicides like thiazopyr (Visor®) can remain stable on the soil surface for several weeks before being activated. An ample supply of spray equipment and labor is especially required when relying on a postemergence program, in order to maintain timely sprays before weeds become too large for control or set seed. Shielded, controlled droplet applicators are an effective means of reducing costs by eliminating the need for heavy equipment and reduced spray volumes. Similarly, “smart spray” technology enables one to treat only where weeds are growing, while avoiding bare soil. Applications of glyphosate (Roundup Ultra®) in this manner can reduce herbicide inputs by 70% or more in many situations where weed cover is sparse, compared to a broadcast application.

Sprayer calibration can go a long way at reducing actual amounts of herbicides used. It is surprising how much the flow rate will change with aging hoses and worn pumps and nozzles. Improperly calibrated spray equipment effects, not only how much herbicide is applied, but how well certain weeds are controlled and whether or not crop injury may occur. It would be ideal to calibrate spray equipment prior to each application, but this is often not possible. If equipment is routinely used, it should be calibrated at least once per season. Repair and replace worn parts and hoses to help reduce the costs associated with wasted product.

Physical properties of herbicides influence the activation, efficacy, and residual nature of herbicides. A basic understanding of some of these physical properties can help in selecting those materials that give you the best control under your specific field conditions. These properties include vapor pressure, volatility, solubility, soil sorption, soil mobility, degradation, and half-life. While these terms appear too “technical” to worry about, they can each influence how a particular herbicide works under given conditions. Herbicides work differently under varied conditions, like soil type, irrigation type and frequency, and incorporation method. For example, oxyfluorfen (Goal®) can provide residual control for several months under drip irrigation, while norflurazon (Solicam®) or diuron (Karmex®/Direx®) are broken down rapidly or leached out of the zone of weed seed germination under the same irrigation regime. Herbicides like oryzalin (Surflan®) can

remain stable on the soil surface for 21 days or more, while trifluralin (Treflan®) is unstable to UV light and breaks down within hours if not activated soon after treatment. Understanding some of these physical properties of herbicides will help you to select the most appropriate herbicides for your conditions. This can often eliminate unnecessary postemergence sprays because the preemergents have “failed”. The physical properties of herbicides can be found in technical bulletins for specific herbicides or in the *Herbicide Handbook*.

Weed monitoring can help reduce long-term weed control costs. By walking the field two or three times a year, you can determine whether the current program is effectively controlling the weeds or if changes should be made. The best long-term control is achieved when herbicides are selected based on changing needs. In many instances, repeated use of preemergence programs reduce the population of weeds so well, a couple of timely spot treatments may be all that is required to achieve adequate control. This can periodically reduce the need for preemergence treatments. Weed monitoring involves five simple steps: (1.) Walk several locations and identify the weeds two or three times per year and record your findings, (2.) Note new weeds and weeds escaping the current treatment, (3.) Map out specific areas where perennial weeds or escaped weeds are a problem, (4.) Adjust the herbicides and rates based on observations made, and (5.) Maintain records and refer to them as needed.

No single herbicide program will work for all fields. Each program should be developed based on individual fields and needs. Achieving cost-effective, long-term control is not an easy task, but can be accomplished if one becomes familiar with the weeds present and the many factors that influence herbicide performance. Reducing inputs associated with weed management also requires routine monitoring and adjusting your program based on changing needs.