

Weed Management Decisions for Field-Grown Flowers

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Weeds are one of the many factors a grower must take into account to grow any flower crop. Weed management becomes an integral part of each management decision before, during and after the crop is grown. Weed seeds are present in the soil (seedbank) at all sites. Also, at many locations, weed seeds can be transported into the field by wind from adjacent areas or with water from off-site. Water pumped from a well does not pose this concern. Thus, weeds will always be present to grow with the crop.

Weeds often suppress crop growth during the early season. In any direct seeded crop, weed competition can be very detrimental during the first 4 to 6 weeks of the crop. In transplanted crops, competition is lessened but can be enough to reduce flowering, or time and uniformity of flowering. When selective herbicides can not be used, most often weeds that emerge with the crop are in the seed line. If selective herbicides can be used it will reduce the amount of hand weeding and allow much of the weed control to be with mechanical cultivation. There are many decisions that must be made as to what type and methods of weed management that is to be employed to successfully grow a profitable crop.

Preplant

Most cultivation is considered to be for weed control. Even the practice of planting in rows has been to facilitate weed removal with equipment. With small seeded flower crops, the soil needs to be mixed to form a good seed bed for planting, however with transplants or with larger seeded crops, a seedbed can be prepared with non-till planting equipment. Thus, if there was an advantage for weed control with one planting method or the other, the equipment is available to plant crops without extensive cultivation. If there are other pest problems such as nematodes or soil pathogens, then preplant soil fumigation needs to be considered and the soil needs to be worked finely (without clods) to allow the fumigant (methyl bromide, chloropicrin or 1,3-D) to move throughout the soil. Soil moisture and preparation is critical for maximum control with fumigation. With fumigants such as methyl bromide, 1,3-D or chloropicrin the soil moisture should be low, but not bone dry (15 to 30%). This allows the fumigant to move through the soil to kill the different organisms. If pesticides such as metam sodium or dazomet are used, they need to be mixed or placed into the soil where the pest organism resides since they do move easily throughout the soil profile, except with water. This placement can be done with the movement of irrigation water or by mechanically placing it at different depths in the soil with blades, sweeps or rotary tillers. If the soil is wet, then sprinkler irrigation over the metam will be helpful to increase control. Dazomet needs to be irrigated lightly

cultivate, a gas flamer is used or a contact herbicide can be used. This keeps the soil from being turned and new weed seed being brought to the surface. If the purpose is to try and reduce the soil seedbank, then repeated cultivation's can be used to germinate and eliminate new seedlings. This is a long-term process and must be combined with eliminating new weed seed from entering the seedbank by stopping all weeds from seeding. Herbicides such as diquat (Reward) or glyphosate (Roundup or others) can be used on young weeds before planting then planting can be done a few days later without further disturbing the soil.

After Planting

After planting there are several weed control options. These depend upon the type of plant material that is planted (seed, propagule or transplant). Direct-seeded plantings needs the cleanest and finest seed bed with no weeds or trash. If weeds are present at seeding, then they will generally have a competitive advantage over the crop. If seeds or propagates are planted, there is a period of time when the weeds may germinate and grow before the crop emerges. This period if timed properly allows for a weed control practice such as flaming or a contact herbicide without soil residual before the crop emerges. This will allow the crop to emerge weed free.

Once a crop is planted there is an opportunity to apply an herbicide before the weeds emerge (preemergence, post plant). There are many flower crops where there is no known selective preemergence herbicide available. Information that is helpful for different crops can be obtained from local farm advisors offices, pest control advisors or from chemical company representatives. A practice that can help individual growers with each of their crops is to develop a spreadsheet program using each crop and indicate the selectivity such as in Table 1. The same type of spreadsheet can be developed for the herbicides and weed species on a particular farm (Table 2).

Preemergence herbicides can be selective on both weeds and crops. Depending upon which herbicide is used, there are certain weeds that will be controlled or weeds that are missed or not controlled. If an herbicide is selective in a crop then there will be certain weeds not controlled. These weeds must then need to be controlled in a different manner. Often this is done with cultivation or hand weeding. In fact, even in a crop where there are lots of control options, there is probably no management system where some hand weeding will not be needed. Selective herbicides will not give season-long control of all weeds. If weeds escape the various control treatments, then they need to be removed so there is no new seed produced to enter the seed bank.

Precision planting and cultivation can make a major difference in the ease of weed management. Setting up equipment so distances are exact such as row width, using guide markers for bed formation, and direction of cultivation can make close cultivation a reality. Since the crop rows are exactly the same distance apart, then cultivator tools such as disks, knives, shovels, duckfeet or even hooded spraying can be close to the crop row, without significant damage to the crop.

Post emergence herbicides

In most flower crops, selective post emergence herbicides are not available. There are exceptions however. For example, in Gypsophila or Limonium the preemergence herbicides Ronstar or Goal can control some broadleaf weeds post emergence and still remain in the soil to control additional weeds as they emerge. There are also herbicides that will selectively control most grass weeds in broadleaf crops. The herbicides sethoxydim and fluazifop do not control annual bluegrass (a common field weed) but clethodim will control it. (see Table 2). These should be used when the weeds and crops are young for the least amount of crop damage from competition or from the herbicide. Weed susceptibility to post emergence herbicides in flower crops are shown in Table 2. There are no selective post emergence herbicides to control broadleaf weeds in most crops after the weeds are beyond the seedling stage. In these crops, hand weeding becomes a greater part of the total weed control program.

Weeds should be removed throughout the growing season to keep them from seeding. If this practice is routinely practiced then there will be a long-term reduction in the seedbank and a reduction in the number of weeds. A practice that is critical for weed management is to control weeds at the end of the cropping season. All too often I have seen fields where it appears that cutting has been completed and weeds are tall and going to seed. These fields should be cultivated or the weeds need to be removed to reduce weeds in following crops. This same practice can be suggested for the field edges as well since the seeds easily are farmed back into the cropping area of the field.

Planning a weed control program for the whole farm as well as each crop can decrease the weed populations over time and reduce the need for extensive weeding costs. The costs for additional weed control are higher in the first years of a program, but will decrease with the years. There are farmers in the San Joaquin valley that have almost quit using herbicides as well as many other weed control practices. Their weeding costs are a minimal part of the overall crop management budget.

Knowing what weeds are to be expected in a particular field can allow plans for control programs that can match the crop and program to reduce control costs. There is no way to eliminate all weed control needs. Only by putting all the potential methods together with all the other crop management needs, can a manageable program be established.

Table 1. Examples of Preemergence Herbicide Registration for California Flower Crops

Crop	Preemergence herbicides											
	Barricade	DCPA	Devrinol	Dimension	Gallery	Goal	Linuron	Pendulum	Pennant	Ronstar	Surflan	Treflan
Achillea				F					F			F
Alstromeria												
Anemone												
Anthirrhinum									F			F
Asparagus												
Aster		F	F									F
Astilbe									F			
Aven (Geum)									F			F
Banksia										F		
Calluna vulgaris	F				F					F		
Callistephus chenisis												
Campanula												
Carnation									F	F		F
Caesalpina												
Columbine									F			
Chrysanthemum		F										F
Daffodil				F								F
Dahlia												F
Delphinium									F			
Erica quadrangularis												
Erica vagens					F							
Gaillardia		F							F			F
Gladiolus	F	F							F			F
Gypsophila		F				F				F		F
Helianthus												F
Helichtysum		F										
Hemerocallis							F		F			
Hosta		F							F			
Hyacinthus					F				F			F
Iris (Dutch)	F	F			F		F		F			F
Liatis spicata												
Limonium perezii					F					F		
Limonium sinuatum										F		
Limonium tartaricum										F		
Narcissus	F		F	F			F	F	F		F	F
Peony												
Protea										F		
Star of Bethlehem									F			
Tulip				F	F				F			F
Zinnia									F			F

F = field planted ornamentals

Table 2. Weed Susceptibility to herbicides that may be used in some flower crops.

	Preemergence herbicides							Post emergence herbicides							
	isoxaben	linuron	metam sodium	oryzalin	oxadiazon	oxyfluorfen	pendimethalin	trifluralin	clethodim	diquat	fluazifop	glyphosate	paraquat	sethoxydim	sulfosate
Annual Grasses															
annual bluegrass	N	C	C	C	C	P	C	C	C	C	N	C	C	N	C
annual ryegrass	N	C	C	C	P	N	C	C	C	P	C	C	C	C	C
barnyardgrass	N	C	C	C	C	P	C	C	C	C	C	C	C	C	C
crabgrass	N	C	C	C	C	P	C	C	C	C	C	C	C	C	C
wild oat	N	C	C	P	N	N	P	P	C	P	C	C	P	C	C
Annual broadleaves															
brass buttons	C	C	C	P	C	C	P	P	N	C	N	C	C	N	C
bur clover	C	C	P	N	C	C	N	N	N	C	N	C	C	N	C
chickweed	C	C	C	C	N	N	C	C	N	C	N	C	C	N	C
corn spurry	C	C	C	C	C	C	C	C	N	C	N	P	C	N	P
filaree	C	C	C	C	C	C	C	C	N	P	N	P	P	N	P
hairy fleabane	P	P	C	N	P	P	N	N	N	P	N	P	P	N	P
horseweed	P	P	C	N	P	P	N	N	N	P	N	C	P	N	C
knotweed	C	C	P	C	C	C	C	C	N	C	N	P	C	N	P
little mallow	C	P	P	P	C	C	P	P	N	P	N	C	P	N	C
mustard	N	C	C	N	C	C	N	N	N	C	N	C	C	N	C
purslane	C	C	C	C	C	C	C	C	N	C	N	C	C	N	C
red maids	C	C	C	C	C	C	C	C	N	C	N	C	C	N	C
stinging nettle	C	C	C	C	C	C	C	C	N	C	N	C	C	N	C
wild radish	N	C	P	N	C	C	N	N	N	P	N	C	C	N	C
C = controlled, P = partially controlled, N = not controlled															