

Dry Bean and Safflower Weed Management in California

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Dry beans and safflower contribute significantly to the health and welfare of people worldwide. Dry beans are an excellent source of protein and fiber and low in fat and sodium, while safflower seed is important for the cooking oil industry. From 2006 to 2008 dry bean acreage in California has remained mostly stable, while safflower production has about doubled (table 1). A recent decline in milk, alfalfa, and cotton prices has contributed to the increase in safflower production as growers look for alternative agronomic crops to plant. Dry beans are legumes, so they add nitrogen to the soil and are a good rotational crop. Safflower is deep-rooted, more drought tolerant than cereals, tolerates saline conditions, and economic yields can be achieved with as few as 20 acre-inches of water.

Table 1. Harvested acres of dry beans and safflower in California

Bean Type	2006	2007	2008
Baby lima	13,000	15,600	11,700
Blackeye	12,500	12,500	7,100
Garbanzo	15,300	6,000	6,300
Kidney	2,300	2,000	2,600
Large lima	13,000	15,600	11,700
Other	8,900	6,300	12,500
Total	65,000	58,000	51,900
Safflower	55,000	48,500	104,000

Source: USDA NASS

While dry bean and safflower production can be profitable, pest management (particularly weed control) can be very challenging. Dry beans, depending on type, are planted from winter thru spring, so can be exposed to a wide-array of winter and summer weeds, including prickly lettuce, burning nettle, volunteer cereals, black nightshade, annual morningglory, and nutsedge. Since safflower is planted in spring, fields are usually infested with summer weeds like wild sunflower, annual sowthistle, pigweed, and barnyardgrass. Weeds left uncontrolled will reduce stand development and delay crop maturity. In dry beans, the juice from black nightshade berries can result in the staining of mature beans, reducing seed quality and price. In safflower, harvest efficiency is reduced as green weeds become entangled in combine equipment.

Although several herbicides are registered for use in dry beans and safflower in California (table 2), most of the products used at the time of planting have similar modes of action, so control similar weeds. Also, herbicides available after planting dry beans are limited to garbanzo beans only. Furthermore, products registered for use following crop establishment only provide postemergent control of grassy weeds. No products are labeled for use at lay-by, before row

closure, for late-season preemergent weed control. Consequently, one to two early-season cultivations and mid- to late-season hand weeding is often required for complete weed control, increasing the cost of production. Late-season hand removal of weeds in dry beans is not encouraged because bean pods can be shattered, while in safflower is not possible because the spiny flower bracts of the plants inhibit physical entrance into the field.

Due to herbicide limitations, selecting a field with an historically low weed population should be an important consideration when deciding if and where to plant dry beans or safflower. Equally important is to consider the specific weeds that are known to be present and whether or not the labeled herbicide products are effective on those particular weeds. Efforts should be made to control weeds during the fallow period and before planting to help reduce the impact of weed competition on early crop stand development. Until new and effective herbicides become available, particularly for mid- to late-season applications, weed control in dry bean and safflower production will continue to be a challenge.

Table 2. Herbicides registered for use in dry beans and safflower in California

Herbicide	Dry beans – registered use notes	Safflower – registered use notes
	Applied to fallow ground or preformed beds	
carfentrazone	up to 1 day after planting	up to 30 days before planting
glyphosate	up to before crop emergence	up to 30 days before planting
oxyfluorfen	up to 60 days before planting	up to 60 days before planting
paraquat	anytime before planting	anytime before planting
pyraflufen	up to 30 days before planting	up to 30 days before planting
	Applied before planting and mechanically incorporated	
EPTC	not for blackeye, garbanzo, or limas	registered
ethafluralin	crop injury if deep seed, overlaps, and stress	registered
metribuzin	registered for garbanzos only	not registered
pendimethalin	registered for garbanzos only	not registered
s-metolachlor	registered for all bean types	registered
trifluralin	registered for all bean types	registered
	Applied after planting and before crop and weed emergence	
flumioxazin	registered for garbanzos only	not registered
imazethapyr	up to 3 days after planting garbanzos only	not registered
metribuzin	registered for garbanzos only	not registered
oxyfluorfen	registered for garbanzos only	not registered
pendimethalin	registered for garbanzos only	not registered
s-metolachlor	not registered	registered
	Applied after crop and weed emergence	
carfentrazone	hooded sprayer only for row middles	not registered
clethodim	registered, controls grasses only, 30-day PHI	registered, controls grasses only, 70-day PHI
sethoxydim	registered, controls grasses only, 30-day PHI	not registered
	Applied as a pre-harvest aid	
carfentrazone	registered, 0-day PHI	not registered

Sources: UC IPM Guidelines and CDMS.net