

Herbicide Use Constraints in Vegetable Crops

Raymond A. Ratto Jr., Ratto Bros. Inc, 6312 Beckwith Rd, Modesto, CA
Email: rrattojr@RattoBros.com

Production. Ratto Bros is a vertically integrated large scale vegetable and watermelon farming operation with 40 different crops. Planting takes place continuously and an average of three to four crops per year are grown on the same parcel of ground. Weed control is essential in most vegetable crops due to their poor competitive ability with weeds and because weeds can be hosts of insect pests and pathogens affecting the crops.

Weed Management. Weed management is a challenge due to lack of registered herbicides for specialty vegetables. Kerb (pronamide) is an important component of weed control in leafy vegetables and current re-registration and potential loss of its availability is a big concern. For many vegetable crops only one herbicide is available and efficacy is poor (Table 1). Often times hand weeding is done with expenses up to \$1000/acre.

Table 1. Herbicide use for specialty vegetable crops

Vegetable crop	Herbicide availability	Comments
Basil	Devrinol	Poor broadleaf control
Table Beets	Betanex, Dual Magnum	
Celeriac	None	
Daikon	Prefar, Dual Magnum	
Dandelion	Prefar	
Baby Dill	Prometryn	
Leeks	Dacthal	Potential residue issues
Lettuce	Prefar	
Parsley	Prometryn	

In the absence of effective herbicide programs for most crops, Vapam (metam sodium) fumigation has become a primary tool in weed control. After soil pre-irrigation (essential for good fumigant distribution) Vapam can be applied through the bedmulcher, blade, drench, drip, and deep shank chisel. However, restrictions on fumigant use such as increases in buffer zones, administrative requirements (preparation of management and emergency response plans) and applicator training make Vapam use difficult and costly.

IR-4 (minor use crops) Program is an important mechanism of securing herbicides for specialty vegetables and Ratto Bros. have been actively participating in it by conducting field efficacy trials. This helped the establishment of SLN (Special Local Needs) label for Dual Magnum (*S*-metolachlor) for root and tuber crops subgroups. IR-s program is especially important fit to California, since the greatest variety of minor crops is grown in the state, which produces more than 50% of the total specialty crops in the US.

About 30% of requests for IR-4 result in label development and herbicide availability (when registrant adds the material to existing labels). Table 2 provides an overview of herbicides that became available via IR-4 process from 2005 to 2010.

Table 2. Herbicides approved for minor crop use via IR-4 program, 2005-2010.

Herbicide	Crop
2,4-D (<i>Weedar 64</i>)	Wild rice
Clethodim (<i>Select Max</i>)	Asparagus, Bushberry subgroup 13-07B, Caneberry subgroup 13-07A, flax, globe artichoke, herb subgroup, leafy green subgroup, legume vegetable group, peach, safflower
Clopyralid (<i>Stinger</i>)	Bushberry subgroup 13-07B, Swiss chard, annual strawberry (FL)
Clorimuron-ethyl (<i>Classic Herbicide</i>)	Berry, low growing, except strawberry, subgroup 13-07H
Desmedipham (<i>Betanex</i>)	Garden beet (roots and tops), sweet corn, spinach
Dicamba (<i>WeedMaster</i>)	Sweet corn
Dichlobenil (<i>Casoron</i>)	Bushberry subgroup, caneberry subgroup, rhubarb
Dimethenamid-p (<i>Outlook</i>)	Grasses (seed), green onion, leek, pumpkin, radish, rutabaga, shallot (fresh leaves), turnip (roots and tops greens), Welsh onion, winter squash
Diuron (<i>Karmex</i>)	Mint, Prickly per cactus
Endothall (<i>Aquathol, Hydrotholl</i>)	Root and tuber vegetables group 1, Leaves of root and tuber; Bulb vegetables, Leafy vegetable (except Brassica), Legume vegetable, Fruiting vegetables, Cucurbit vegetables, Citrus fruits, Pome fruits, Stone fruits, Berry and small fruit group; Tree nuts group, Cereals grains group, Forage, fodder, and straw of cereal grains group, Grass, forage, fodder, and hay group, Non-grass, animal feed, group, grape, mint and rice
Ethalfuralin (<i>Curbit EC</i>)	Dill, mustard, potato, rapeseed
Ethofumesate (<i>Nortron</i>)	Carrot (PNW), garden beet, dry bulb onion, garlic, shallot (bulb and fresh leaves)
Fluroxypyr (<i>Starane</i>)	Dry bulb onion, millet, Pome fruit group
Fomesafen (<i>Reflex</i>)	Dry bean, snap bean
Flumioxazin (<i>Valor, Chateau</i>)	Asparagus, Bushberry subgroup, Cucurbit vegetable group, dry bean, Fruiting vegetable group, Leaf Petioles subgroup 4B, Melon subgroup, okra, strawberry, Tree nuts group

Herbicide	Crop
Foramsulfuron (<i>Equip, Tribute</i>)	Pop corn, sweet corn
Glyphosate (<i>Roundup</i>)	Dry pea, Indian mulberry, Legume vegetable group, safflower, sunflower
Halosulfuron-methyl (<i>Sandea</i>)	Apple, Bushberry subgroup 13-07B, Dried shelled pea and bean (except soybean) subgroup 6C, Succulent shelled pea and bean subgroup 6, Tuberous and corm vegetable subgroup 1c, okra, rhubarb
Lactofen (<i>Cobra</i>)	Fruiting vegetable group 8, okra
Linuron (<i>Lorox</i>)	Celery, rhubarb
MCPB (<i>Thistrol</i>)	Mint
Paraquat (<i>Gramoxone Inteon</i>)	Cucurbit Vegetable Group, dry bulb onion, ginger, okra
Phenmedipham (<i>Spin-AID</i>)	Spinach
Pendimethalin (<i>Prowl H2O</i>)	Artichoke, asparagus, Carrot, Citrus fruit Group, Fruiting vegetable group, Head and stem Brassica subgroup, grape, grasses (time-limited tolerance), green onion, juneberry, leek, mint, olive, Pome fruit group, pomegranate, shallot (fresh leaves), strawberry (perennial), Tree nut Group, pistachio, Welsh onion
Prometryn (<i>Caparol 4L</i>)	Carrot, celery, cilantro, coriander, Leaf petioles subgroup 4B, okra, parsley
Pronamide (<i>Kerb</i>)	Belgian endive, Berry group chicory, dandelion
Sethoxydim (<i>Poast</i>)	Borage, buckwheat, crambe, cuphea, echium, dill, gold of pleasure, hare's ear mustard, lesquerella, lunaria, meadowfoam, milkweed, mustard, okra, oil radish, poppy, sweet rocket, turnip greens, Root and tuber vegetable group 1.
S-metolachlor (<i>Dual Magnum</i>)	Bushberry subgroup 13-07B, Caneberry subgroup 13-07A, carrot, cucumber, Fruiting vegetables group 8, Head and Stem Brassica subgroup 5A, Leaf Petioles subgroup 4B, Leafy Brassica Greens subgroup 5B, Lowbush blueberry, Melon subgroup 9A, Onion bulb subgroup 3-07A, and Onion Green subgroup 3-07B, pumpkin, okra, Root vegetables (except sugar beet) subgroup 1B, Sesame, sweet sorghum, Tuberous and corm vegetables subgroup 1C, turnip greens, winter squash
Terbacil (<i>Sibar</i>)	Watermelon
Thifensulfuron-methyl (<i>Harmony</i>)	Safflower
Tribenuron-methyl (<i>Ally, Canopy</i>)	Sunflower