

Cranberry weed control 2012 – Oregon

Curio Quinstar Results & recommendations

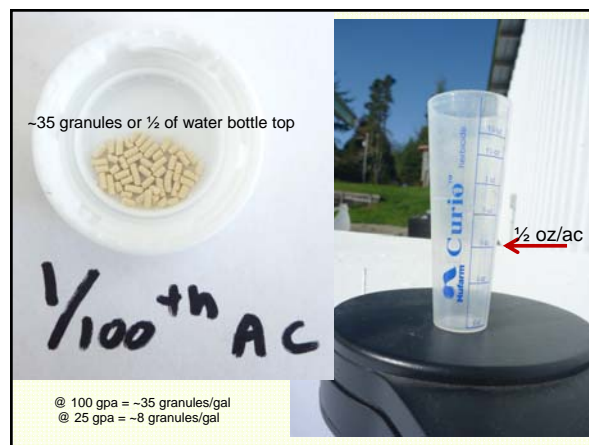
Kim Patten



Warning: Do not over-apply. Over-application will likely cause damage. It is recommended that spot or small area applications be made using a calibrated boom to prevent misapplication, rather than a backpack sprayer.

- 0.5 oz/ac is very little material. Especially when spot-treated. Don't even think about double dipping. It is too easy to make a mistake.

Curio – Label (24C – approved Feb 2012)



APPLICATION DIRECTIONS

Apply Curio herbicide as a spot or small area treatment, or as a broadcast at the rate of 0.5 oz./ acre in 20 to 40 gallons of water/acre. Do not make more than two applications per year.

- This is in contrast to WA label – one 1 oz/ac application
- I have revised recommendations after two years of use in WA.
- I have noticed crop damage when 1 oz is used during active growing periods.
- Damage is subtle, yellowing – reddening of tip (new growth)
- In many cases it grows out of it and there is no effect, in others cases could decrease crop or next year's fruit bud formation.
- For this reason
 - Calibrate carefully, especially with hand spraying
 - Avoid applying during peak growth (May to early July)
 - Application during this window is OK w/spot treatments but I am leery of whole bed boom spraying.
 - Treatment before or after – this timing window has not been problematic.
 - We got 50% reduction in yield with 2 applications of 1 oz in June on 300 bbl/ac Stevens in OR. Buds looks great at harvest, but yield decreases (4 x recommended rate).

For optimum control of creeping buttercup, it is recommended that Curio be applied March to April. Other weeds controlled by Curio may germinate or emerge later in the season (May to July). Do not apply within 60 days of harvest.

- Best control of buttercup March to April, but control occurs any time of year.
- New seedlings emerging post-treatment won't be controlled.
- For other weeds timing will vary. Clover and lotus – try early spring – spot treatment.
- PHI= 60 days, no MRI issues.

Curio is a water-dispersible granule that does not include a spray adjuvant.

- Tends to settle out with time - agitation is important

ENVIRONMENTAL CONDITIONS AND BIOLOGICAL ACTIVITY

This product will provide best results when applied to young, actively growing weeds. Degree of control depends on: rate used; weed spectrum; weed size; growing conditions at and following treatment; soil moisture; precipitation; and spray adjuvants.

- Works best on young plants with active growth

Applications must include one of the following adjuvants: a nonionic surfactant at the rate of 2 pints per 100 gallons of spray solution (0.25% v/v) or a crop oil concentrate at the rate of 2 pints per 100 gallons of spray solution (0.25%).

- Two teaspoons per gallon = 0.25%
- One tablespoon (1/2 oz) per 3 gallons = 0.25%
- NIS like X77 and R11 are safer to crops than COC
- The crop label recommends "Do not use a crop oil concentrate (either vegetable- or petroleum-based), as crop injury will result."

ENVIRONMENTAL CONDITIONS AND BIOLOGICAL ACTIVITY

Treating weeds under stress or large weeds may result in only partial control. Delay application until stress passes and weeds start to grow again. Severe stress (drought, hot or cold weather, low fertility, disease or insect damage) following application may also result in crop injury and/or poor weed control.

- Avoid treating stressed weak vines if possible

ENVIRONMENTAL CONDITIONS AND BIOLOGICAL ACTIVITY

This product rapidly inhibits the growth of susceptible weeds. Leaves of susceptible plants yellow 3 to 5 days after application. Curio provides complete control of susceptible weeds in 7 to 21 days. Suppressed plants may remain green but will be stunted and noncompetitive.

- Typically – treated buttercup sit there for a month or two and then melt away. For yellow weed – they stop growing and wilt up, but stalks remain and / or look sick.

RESTRICTIONS/PRECAUTIONS

The NPDES Pesticide General Permit (PGP) is not required for waters that are irrigation return flow. For additional information regarding the Oregon PGP, contact Oregon Department of Environmental Quality, <http://www.deq.state.or.us/wq/wqpermit/pesticides.htm>

- Part of all new labels

RESTRICTIONS/PRECAUTIONS

Do not apply directly to water, or to areas where surface water is present. If using a boom sprayer, do not apply within 5 feet of any water moving off or through the cranberry field, unless the water in the ditches surrounding treated beds is held for 2 days after application.

Do not mix/load, or use within 50 feet of all wells including abandoned wells, drainage wells, and sink holes. Do not apply this product if rain is expected within 1 hour or weed control may decrease.

- Product is soluble and will move in water. Avoid the risk.

- Curio
 - Waiver of Liability – required
 - Very inexpensive

RESTRICTIONS/PRECAUTIONS

Do not enter or allow worker entry into treated areas during the restricted-entry interval (REI) of 12 hours.

- Very safe

Do not apply more than two applications per year. Wait at least 1 month between applications.

- 1 oz/yr max

Do not apply within 60 days of harvest.

- Residue (MRL) has not been an issue since using such a low rate.

Use ground equipment only, do not apply by air. Do not apply this product through any type of irrigation system.

- Will it work with chemigation? Don't know, but not too likely!

Mode of action - Curio

- The sulfonylureas are meristematic inhibitors with both foliar and soil activity which control broadleaf weeds better than grasses.
- They have very specific activity at very low application rates, often being less than one-fourth ounce per acre.
- They range in persistence from very long to moderate, and have very low mammalian toxicity (short soil persistence if pH is low).
- The mode of action for the sulfonylureas is the inhibition of branched chain amino acid biosynthesis through the inhibition of an enzyme called acetolactate synthetase (ALS). These amino acids are not synthesized by mammals.
- These herbicides have a single site mode of action and are thus sensitive to resistance.

RESTRICTIONS/PRECAUTIONS

Do not mix with organophosphate insecticides, or apply within 14 days before or after an application of an organophosphate insecticide as severe crop injury may occur.

- *Wording is from Classic label - Why?*
- Both insecticides and herbicides are foreign compounds. When foreign compounds enter the plant, the plant responds in a defensive manner and attempts to render the foreign compounds inert so they cannot cause any phytotoxic effects.
- A plant has several pathways that can metabolize different foreign compounds, but certain organophosphate insecticides and ALS-inhibiting herbicides share a common metabolic pathway. When one or the other is present in the plant, the pathway is able to metabolize the compound before it can cause much harm, but, when both are present, the metabolism pathway is "overloaded" and cannot effectively process both compounds. When this happens, the plant injury may become evident.
- Have I ever seen this in cranberries? – no, but best not risk it.

The label for OR-120001 is similar, but not identical to WA-100004. One of the differences is that OR-120001 allows two applications at a 0.5 oz/acre rate, and the Washington label allows one application at 1.0 oz/acre. Both have a 60-day PHI. The reason that the Oregon label has a lower rate is because of concerns related to phytotoxicity.

Special considerations

- Tank mix with Callisto?
 - WA growers have done so.
 - Will provide greater activity on some weeds, but not others.
 - Not on label.
 - Proceed with caution – don't go whole hog with tank mixes.
 - We don't really have a good database yet.
 - Commercial formulation of these are available – but at lower rates of both.
- Tank mix Quinstar?
 - Don't know – therefore don't recommend
- Adjust usage timing depending on weed and if you use Quinstar
 - We will need to find an ideal window for both Quinstar and Curio for efficacy and residue.
 - Not there yet.

Method of application: Apply using ground spray equipment as a post-emergence application (broadcast or spot-treatment). Ensure that spray equipment is properly calibrated.

- Standard stuff, nothing special

Quinstar Section 18 Label

- Submitted to EPA for Section 18 renewal- March 5, 2012.
- Should not be a problem.
- Should have by end of April.
- At this moment in time – no label and not legal.

RESTRICTIONS / PRECAUTIONS

- Do not enter or allow worker entry into treated areas during the restricted-entry interval (REI) of 12 hours.
- Do not apply Quinstar 4L within 60 days of harvest.
- Do not apply by air or through any type of irrigation system.
- Use only nozzles that will produce uniform spray patterns and thorough spray coverage, spaced up to 20 inches apart. Select nozzles designed to produce minimal amounts of fine spray particles. Use of drift reduction nozzles is recommended.
- Do not make spray applications when wind speed is greater than 10 mph, when air temperatures exceed 90°F, or when environmental conditions exist for temperature inversions.
- Drift Control Products: Drift control products should always be added to the spray solution to affect spray droplet size and other characteristics, reducing the potential of off-target accidental spray drift.

- Standard stuff, nothing special

Rate of application: A maximum of 8 fluid ounces of product (0.25 lb. a.i.) per acre per application, not to exceed 16 fluid ounces of product (0.5 lb. a.i.) per acre per season. A maximum of two applications is allowed, with a minimum of a 30-day interval between applications. Apply in 10-40 gallons of water per acre. Use either a crop oil concentrate at the rate of 1 quart per acre, or a nonionic surfactant at the rate of 1 quart per 100 gallons (0.25% vol./vol.).

- Standard stuff, nothing special

• Sensitive areas: Quinstar 4L may only be applied when the potential for drift to adjacent sensitive areas (e.g., residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g., when wind is blowing away from the sensitive areas).

• This chemical has properties and characteristics associated with chemicals detected in groundwater. The use of this chemical where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination. Keep out of lakes, ponds, and streams. Do not apply directly to water, areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water by cleaning of equipment or disposal of rinsate.

- Standard stuff, nothing special

Proposed Section 3 label for cranberries

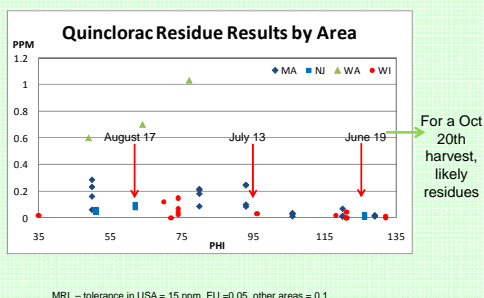
Visual symptoms of weed control include twisting, stunting, reddening, and chlorosis followed by necrosis and death. Visual symptoms of weed control may take more than 3 weeks following application to develop on perennial weeds. The full effect of quinclorac on perennial weeds may not be evident for 3 to 6 months after application.

- This is new and will be on the Section 3 label in 2013 or 2014.

• Recommendations – Quinstar 4I (Section 18-Spring 2012)

- Yellow Weed
 - 1st application early May to early June @ 8 oz/ac
 - 2nd application 30 Days after 1st application @ 8 oz/ac
 - Some control year one, expect best control 1 yr after treatment
- Potential for other weeds (early post-emergence)
 - Decent control of spike rush, louse grass and yellow weed
 - Label includes: barnyard grass, bedstraw, clovers, bindweed, sowthistle, violet, cudweed
- Safe herbicide in regards to crop damage
- MRL issue (consult your handler for implications)

Timing based on residue data (2010 research data from Ocean Spray)



• Curio and Quinstar

- Data from 2010 and 2011
- What we know and don't know
- Herbicide (type, rate & timing) vs. yield
- Recommendation for yellow weed
- Recommendation for other weeds

Quinstar Primer

- It is a post-emergence herbicide effective in controlling some grasses and some broadleaf weeds.
- Commonly used on turf and rice.
- It is a systemic herbicide with plant uptake occurring through both foliage and roots.
- It is translocated in the plant both acropetally and basipetally.
- Foliar uptake is critical for optimal control. When making post-emergence applications, weeds must be thoroughly covered with spray.
- Optimum control is achieved when quinclorac is applied to actively growing weeds in the early growth stage.
- Requires surfactant.
- It also has some pre-emergent activity

Yield effect of herbicide

- Curio timing
 - Curio applied during late hook – bloom will cause mild tip-reddening or yellowing.
 - Plants recover in 1 month – can't tell the difference
 - Usually mild effect on yield (can increase in sections of thick weeds, but decrease where no weeds)
 - Curio applied after fruit set and bud set – usually does not cause any tip damage.
 - Curio applied pre-hook – no effect on the crop.
 - Curio applied early hook, mild reddening and plants grow out of it fast. Doesn't seem to affect bloom.
- Curio rate
 - Tip effects at 1 oz. rate, especially with two applications.
 - At ½ oz. rate, usually don't see any effects, regardless of timing
- Quinstar timing
 - Quinstar – applied from spring to mid-summer – does not seem to have any effect on crop or tips (even at 2x rate applied twice).

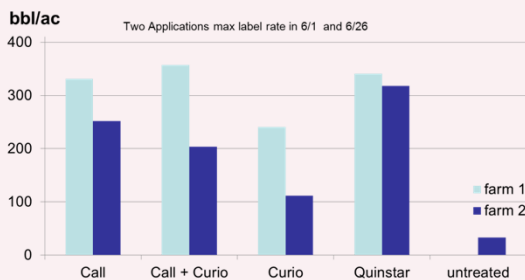
Yield effect of herbicide

- Not entirely confident in best recommendation that will not affect yield, control weeds and result in residue problems.
- Timing is key to suppressing yield – could be weed related or crop stage of development?
- Quinstar – no effect on yield or increase
- Improved yield Curio + Callisto ??

Weed Control – Yellow weed

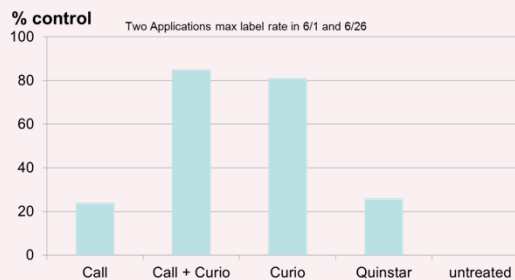
- Callisto + Curio not better than Curio alone
- Callisto + Quinstar not better than Quinstar alone
- Quinstar + Curio – not enough data yet
- Curio really stunts yellow weed in year 1, not sure about long-term control
- Quinstar (2 applications) moderately effective Year 1 ~ 50%, year two better
- Treatments applied after the weed canopy is high above the crop are too late

Herbicides vs. yield: Bandon OR 2011



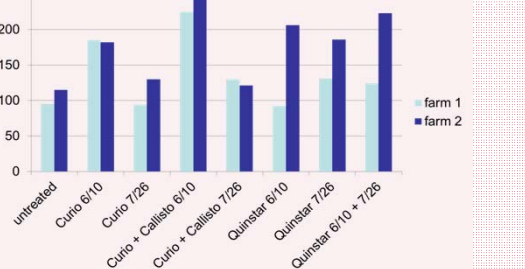
Best yields with Quinstar
 Curio (full rate – twice) during bloom suppressed yield
 Yield with herbicides > untreated
 Less Curio damage when mixed Callisto??? Doubt it.

Yellow Loosestrife Control: Bandon OR 2011



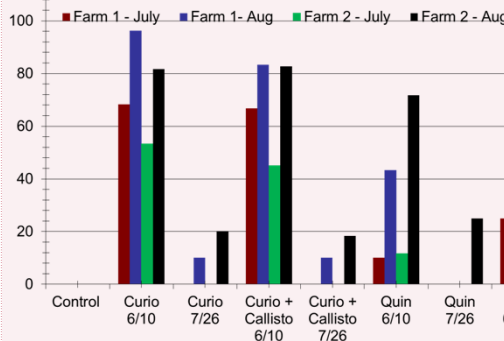
Callisto +Curio – not better than Curio alone
 Quinstar only moderately effective Year 1

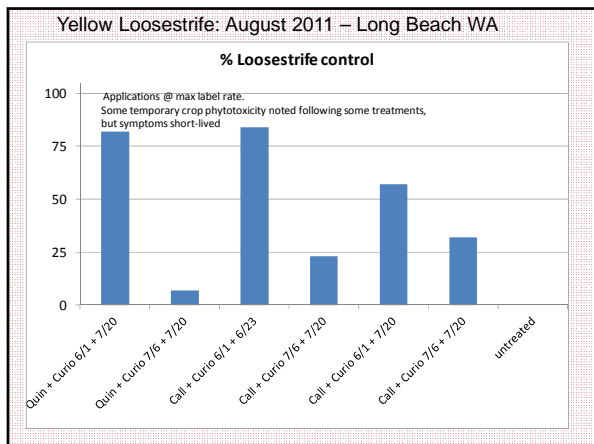
Yield bbl/ac – Long Beach 2011



- Timing is key to suppressing yield – could be weed related or crop stage of development?
- Quinstar – no effect on yield or increase
- Improved yield Curio + Callisto ??

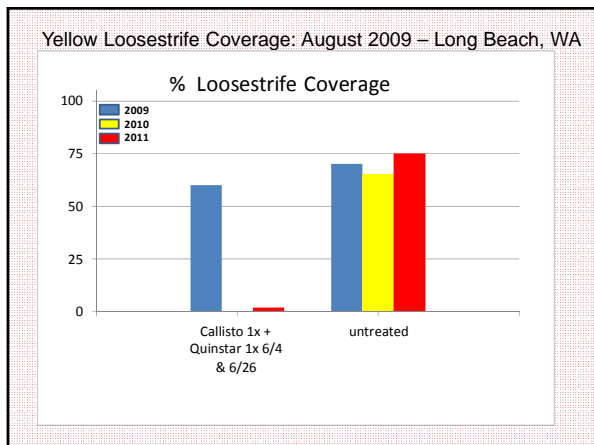
% yellow weed control





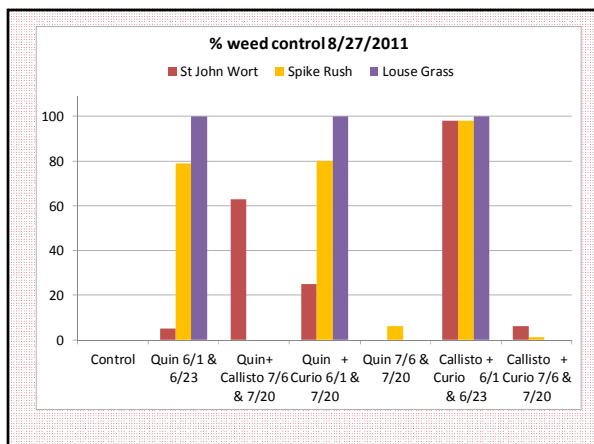
Yellow loosestrife herbicide timing with Curio

Condition	April	May	June	July	August
Lotus & clover, thin YW	Curio			Curio	
Lotus & clover, thick YW	Curio		Curio		
Thin YW			Callisto	Curio	Curio
Thick YW- broadcast		Curio	Callisto	Curio	Callisto
Thick YW –spot treating		Curio Callisto	Curio Callisto		



Yellow loosestrife herbicide timing with just Quinstar

Condition	April	May	June	July	August
Lotus & Clover, thin YW	Quinstar		Quinstar		
Lotus & Clover, thick YW	Quinstar		Quinstar		
Thin YW		Quinstar	Quinstar		
Thick YW- broadcast		Quinstar Callisto	Quinstar		
Thick YW –spot treating		Quinstar Callisto	Quinstar Callisto		



Yellow Loosestrife herbicide timing with Quinstar & Curio

Condition	April	May	June	July	August
Lotus & Clover, thin YW	Curio	Quinstar	Quinstar	Curio	
Lotus & Clover, thick YW	Curio	Quinstar	Quinstar Curio	Callisto	
Thin YW		Quinstar	Quinstar	Curio Callisto	
Thick YW- broadcast		Quinstar	Quinstar	Curio Callisto	
Thick YW –spot treating		Quinstar Curio	Quinstar Curio	Callisto	

Recommendations for yellow weed

- Treatment choice will depend on other weed species.
 - Clover, lotus, buttercup – want early Curio (March – April)
 - Grasses, St. John's wort, louse grass, spike rush – treat w/ Quinstar early post-emergent.
- Treatment choice will depend on your willingness to get a reduced \$/bbl – use Quinstar w/ or w/o Curio.
- Exact timing of Quinstar – treat when yellow weed is 2-6" high and then re-treat in a month (early May and early June).
- Other thoughts on Curio timing for yellow weed
 - Take a close look at your bed. Is yellow weed moving(1-3") before cranberries? If so, it may be worth treating in April. Consider a follow-up in July or August if required.
 - To avoid any damage mid-season, wait until after fruit and bud set.

Herbicide Resistance

Herbicide	Likelihood of resistance
Curio*	Medium to High
Casoron	Low
Callisto*	Medium to High
Select	Medium
Devrinol	Low
Evital	Low
Stinger	Low
Quinstar	Low to Medium

* Single site of action

Avoiding Herbicide Resistance

Don't have an over-reliance on herbicide chemistries like Callisto or Curio that have medium to high likelihood for resistance.

In agronomic crops – resistance to Callisto and Curio is becoming more common.

Alternate chemistries from time to time. Have a herbicide rotation design.