

Blackberry Weed Management

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Weed control is an essential part of a healthy and high-yielding blackberry orchard. Weeds will compete throughout the life of a blackberry plant for water, light and essential nutrients. **Start clean, end clean** is possibly the best strategy for reducing the impact weeds will have on blackberry. An effective weed control program will utilize many different strategies to reduce and prevent weed interference within the orchard. The use of multiple strategies for management is known as an integrated weed management (IWM) program. Instituting an IWM program must begin at the time of planning a new blackberry field and be maintained throughout the life of the orchard.



Identification of the problematic weed species is the first step in developing a weed management plan. Without proper identification, effective management recommendations cannot be made and misapplication or reduced weed control is possible. Strategies for IWM include **site selection, cultural practices** (non-chemical) and **chemical weed control** for effective and sustained weed management. Herbicides with different modes of action, or mechanisms by which they interfere with plant processes,

are included to reduce the evolution of herbicide-resistant weed populations. Planning and instituting a program are the most effective ways to reduce the impact of weeds on blackberry. These same techniques can be modified and extended for use in organic production systems and in the home garden.

Site Selection

Site selection is just as important from a weed management perspective as it is for plant health. Well-drained areas with adequate soil pH (5.5 to 7.0) give the young blackberries an advantage over weeds. Areas with poor drainage tend to result in the buildup of nutsedge species that can become a problem later in production. Soils with less than optimal pH can also increase the incidence of some weed species that proliferate better at high or low pH.

Approximately one year prior to planting, all perennial and grass weed species should be removed; this includes native/wild blackberries that may be growing in the area. Both perennial and grass species tend to produce underground survival structures that must be removed. The best way to remove these species is through repeated tillage and deep plowing to expose and destroy these structures. If resources are available, planting a summer or winter cover crop the year before planting blackberry is also suggested. This not only improves soil health but will also suppress some problematic weeds that could encroach into the field following preplant tillage.

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Early Plant Establishment

It is preferable to plant new, virus-free blackberries about 1.5 months before the last winter frost, when the transplants are still dormant. This could be the last week of February to the first week of March in some areas in Arkansas.

Blackberries should be planted into either a row or a raised bed with at least a 4-foot-wide, weed-free strip that will be kept throughout the life of the orchard. This strip will ensure reduced weed competition and allow for healthy plant growth. This strip can be maintained through cultural or herbicide management. Black plastic mulch or fabric (landscape) cloth over the top of a raised bed is a good option to help maintain the weed-free strip (Figure 1). Plastic or fabric bed coverings act as a physical barrier to prevent weed emergence and growth. Initial costs for using mulches may be high; however, the benefit of reduced weed growth and reduced herbicide use will reduce long-term management costs. Fumigation of the rows prior to planting will help reduce disease and weed pressure. Fumigants are often more effective when used with mulches. Telone II is a fumigant that will help with soil pests, diseases and some weed species.

Apply fertilizer to the new transplants according to soil test analysis. A granular fertilizer should be applied prior to laying down the mulch. Alternatively, fertilizer can be applied through drip irrigation. Drip tapes should be laid before laying down the plastic mulch. A good soil, optimum pH, proper fertilizer and adequate water ensure that plants are healthy and fast growing. This is the best first line of defense against weed competition.

Weed Control for New Orchards

The blackberry bed should be weed-free at planting. Glyphosate (various formulations and brands) can be applied 30 days prior to planting to remove grass and broadleaf weeds. Alleys between the blackberry rows should also be maintained. Unmanaged alleys result in weeds moving into the

weed-free strip and causing yield loss. Growers are encouraged to allow for natural grass growth or to seed grass or plant sod to suppress weed infestation. Grass in the alleys should be mowed regularly, and the weeds should be managed (Figure 2). Growers should recognize that this is **NOT** a noncrop or turf area, and only herbicides registered for use in blackberry should be used in the alleys.

Following planting, there should be no weeds to compete with the blackberry. After the soil has settled following transplanting, a residual or preemergence herbicide should be used to prevent weed emergence on bare ground. Preemergence (PRE) herbicides suppress weed germination and have little to no activity on emerged weeds, so it is important to apply these to bare ground for effective control. Approximately 1/2 to 1 inch of irrigation or rainfall will be required following a PRE herbicide application for herbicide activation. If weeds have emerged at the time of application, tank mix the residual herbicide with a postemergence (POST) herbicide such as paraquat (Firestorm 3 SL or Gramoxone SL). Paraquat will burn down any emerged weeds, and the PRE herbicide will provide residual control. Note that paraquat is a contact herbicide, so avoid or minimize contact with green tissue. Use shielded nozzles or direct the herbicide application to the base of blackberry. A list of PRE herbicides and recommendations for their use can be found in Table 1. Some POST herbicides cannot be used in orchards with plants that are less than one year from establishment. Consult the herbicide label or the University of Arkansas Extension Service prior to use.

Herbicide applications should be made to the weed-free strip but away from the developing plant and all green tissues. In the first two years, tillage of the weed-free areas around the plants will also help to maintain a weed-free zone and reduce weed competition. It is important to restrict tillage to the outer areas of the strip to prevent root damage. If a PRE application herbicide was applied prior to tillage, the tillage event will remove the treated soil layer and reduce herbicide activity. New weeds will emerge after tillage; therefore, apply a PRE herbicide following tillage to suppress new weed emergence.



FIGURE 1. New blackberry mulch-covered bed



FIGURE 2. Mulch-covered strip and grass middles

Table 1. Blackberry Herbicide Recommendations

Growth Stage	Active Ingredient Per Broadcast Acre	Mode of Action (WSSA)	Formulated Material Per Broadcast Acre	Weeds Controlled	Method of Application and Precautions
Preplant					
30 days prior to planting	glyphosate	9	Various formulations (see label)	Annual and perennial weed control	Apply directly to emerged weeds. Provides only postemergence control.
Preemergence					
Newly planted and established plants	napropamide @ 4 lb/A	15	Devrinol 50 DF @ 8 lbs/A	Annual grasses and small-seeded broadleaf weeds	Apply to a weed-free surface or tank mix with a POST herbicide. Must be incorporated with irrigation or rainfall within 24 hours. Do not exceed 8 lb/A per crop cycle.
Early spring or after harvest					
New planting (<6 months)	simazine @ 1 to 2 lb/A	5	Princep 4L @ 1 to 2 qt/A	Annual broadleaf and grass weeds	Split applications with half the recommendation in the fall and half in the spring. Do not apply when fruit is present.
Established plants	@ 2 to 4 lb/A		@ 2 to 4 qt/A		
Spring before bud break and fall after harvest					
Established plants (>1 year)	dichlobenil @ 4 to 6 lb/A	20	Casoron 4G @ 100 lb/A	Annual broadleaf and grass weeds	Shallow incorporation or irrigation of 1/2 to 1 inch recommended. Apply to bearing and nonbearing plants.
Early winter and not later than mid-February	@ 2 to 4 lb /A		Casoron CS @ 1.4 to 2.8 gal/A		
Established plants (>1 year)	diuron @ 1.2 to 1.6 lb/A	7	Karmex 80DF @ 1.5 to 2 lb/A	Annual broadleaf and grass weeds	Apply as a band treatment to the base of the canes. Use low rate on sandy or gravelly soils with low organic matter. May cause injury.
Early spring and again in the fall					
Established plants (>1 year)	terbacil @ 0.4 to 1.6 lb/A	5	Sinbar 80W 0.5 to 2 lb/A	Annuals and some perennials	Use low rates on coarse/sandy soils and/or soils with less than 3% organic matter. Avoid contact with foliage.
In spring before fruit set or after harvest in the fall					
Established plants (>18 months)	norflurazon @ 2 to 4 lb/A	12	Solicam 80DF @ 2.5 to 5 lb/A	Annual grasses and small-seeded broadleaves and some seedling perennials	Apply while plants are dormant. Limit to one application per year. Do not apply within 60 days of harvest. Use higher rates on soils with higher clay content. May cause some bleaching or yellowing.
Apply from fall to early spring while plants are dormant					
Established plants	mesotrione @ 0.1 to 0.2 lb/A	27	Callisto @ 3 to 6 fl oz/A	Broadleaves	Callisto has some POST activity. Add 1% v/v crop oil concentrate. No more than two applications at 2 fl oz 14 days apart per season. May cause bleaching.
Pre-bloom					
Any growth stage	oryzalin @ 2 to 6 lb/A	3	Surflan 4AS @ 2 to 6 qt/A	Annual grasses and small-seeded broadleaf weeds	Irrigation or rainfall of 1/2 to 1 inch needed for proper activation. Sequential applications on 2 1/2-month intervals. No more than 12 qt/A per year.
Sequential applications throughout the year					
Any growth stage (nonbearing)	isoxaben @ 0.5 to 1 lb/A	21	Gallery 75DF 0.66 to 1.33 lb/A	Annual broadleaf weeds	Apply to crops that will not be harvested for one year. Apply sequential applications no sooner than 60 days apart and no more than 4 lb/A per year.
Sequential applications throughout the year					

Table 1. Blackberry Herbicide Recommendations (continued)

Growth Stage	Active Ingredient Per Broadcast Acre	Mode of Action (WSSA)	Formulated Material Per Broadcast Acre	Weeds Controlled	Method of Application and Precautions
Preemergence (cont.)					
Any growth stage (nonbearing)	isoxaben + trifluralin @ 2.5 to 5 lb/A	21 + 3	SnapShot 2.5TG @ 100 to 200 lb/A	Annual broadleaves and grasses	Apply to crops that will not be harvested for one year. Irrigation or rainfall of 1/2 to 1 inch needed within 3 days of application. Make applications no sooner than 60 days apart. Apply no more than 600 lb/A per year.
Sequential applications throughout the year					
Postemergence					
Any growth stage	sethoxydim @ 0.2 to 0.5 lb/A	1	PoaSt 1.5EC @ 1 to 2.5 pt/A	Annual and perennial grasses ONLY	Do not apply within 45 days of harvest. Use a crop oil concentrate at 1% v/v. Apply no more than 5 pt/A per year.
Apply to emerged and actively growing weeds					
Any growth stage (nonbearing)	clethodim @ 0.09 to 0.125 lb/A	1	Select 2EC @ 6 to 8 fl oz/A	Annual and perennial grasses ONLY	Use only on nonbearing crop. Do not apply within one year of harvest. Multiple applications are required for perennial grass control. Repeat application on 14- to 21-day intervals. Add a nonionic surfactant at 0.25% v/v.
Apply to emerged and actively growing weeds					
Any growth stage (nonbearing)	fluzifop @ 0.19 to 0.38 lb/A	1	Fusilade DX 2EC @ 12 to 24 fl oz/A	Annual and perennial grasses ONLY	Use only on a nonbearing crop that will not be harvested for one year. Use a crop oil concentrate at 1% v/v or nonionic surfactant at 0.25%. Apply no more than 72 fl oz/A per year. Use 14-day intervals for sequential applications.
Apply to emerged and actively growing weeds					
Any growth stage	pelargonic acid		Scythe @ 3% -10% v/v	Annual weeds and foliage of perennials	This is the only herbicide recommended for weed control in organic production systems. Herbicide must have direct contact and adequate coverage with the foliage of young weeds for activity.
Apply to emerged and actively growing weeds					
Any growth stage	glyphosate	9	various formulations (see label)	Annual and perennial weed control	Apply directly to emerged weeds; provides only postemergence control. Consult label for proper restrictions and rates.
Apply to emerged and actively growing weeds					
Any growth stage	paraquat @ 0.5 to 1 lb/A	22	Gramoxone SL @ 2 to 4 pt/A	Annual weeds and foliage of perennials	Direct spray to weed foliage and avoid any green or exposed tissues on the blackberry. Make no more than 5 applications per year. Use a crop oil concentrate at 1% v/v or nonionic surfactant at 0.25%. Can be tank mixed with PRE herbicides for residual activity. Contact with blackberry will cause necrotic lesions, but the canes should grow through it.
Apply to emerged and actively growing weeds					
Any growth stage	carfentrazone @ 0.016 to 0.031 lb/A for weed control @ 0.1 lb/A for primocane control	14	Aim 2EC @ 1 to 2 fl oz/A for weed control @ 6.4 fl oz/A for primocane control	Annual broadleaves	Apply as post-directed spray to primocanes when approximately 6 inches tall. Use a crop oil concentrate at 1% v/v or nonionic surfactant at 0.25%. Avoid contact with green tissues or foliage. Sequential application should not be made sooner than 14 days. Do not apply within 15 days of harvest.
Apply to emerged and actively growing weeds					
Established plants (>1 year)	halosulfuron @ 0.667 to 1.33 oz/A	2	Sandea @ 0.5 to 1 oz/A	Sedge and broadleaf control; should be mixed with other herbicides to enhance grass activity	Do not apply more than 2 oz/A per year, and sequential applications should not be made more than 45 days apart. Does have some residual control. Can be tank mixed with paraquat or glyphosate.
Apply to emerged and actively growing weeds					

Weed Control for Mature Orchards

Weed management in mature orchards is just as important as in new plantings. The weed-free strip must be maintained and the alleys must be managed to reduce interference from the blackberry vines or the weeds within the alley. Shallow tillage of the edges of the weed-free strip should be performed during the late fall to early winter when plants are dormant, around the same time as winter pruning. The blackberry will not be growing during this time, which prevents possible root pruning and injury. Damage to the roots from tillage is more of a problem in older orchards, as the roots have more than likely spread toward the alleys. Tillage should occur within the top 2 to 3 inches of soil to prevent damage and to reduce weed competition. Herbicide programs are also recommended with tillage to manage weeds. Herbicide programs should consist of different modes of action applied year round at the proper time. Older plants are able to tolerate herbicides better than young plants. As a result, some herbicides can only be applied at least a year after plant establishment (see Table 1). Consult the label for recommended timing.

Weed management in blackberry orchards is a year-round task, and timely application of herbicides will prevent yield loss (Table 2). Any significant competition throughout the year, even when the plants are not actively producing fruit, has the potential to reduce yield. Weeds grow year round and are generally classified as summer weeds or winter weeds. It is important to prevent weed seed production to minimize weed problems. Apply PRE herbicides before weed emergence in early spring. Follow this with a second PRE herbicide application in late spring, before the residual effect of the first application dissipates. If weeds escape this application, they can be more easily managed during the rest of the season with targeted herbicides or control strategies than if there were many different weeds. Herbicide applications should be directed toward the base of the plant and low enough to prevent contact with green tissues. If the plant has small suckers or is sprouting at the base, care should be taken to prevent herbicide contact to reduce injury.



FIGURE 3. Weed-free strip next to blackberries maintained using herbicides

Organic Weed Management

Organic weed management for blackberry orchards is very similar to conventional production, with many of the same principal components and strategies. Producers with organic orchards must first be aware of the criteria they must meet for certification of their crop. Site selection is even more important for organic producers. Locations chosen for organic production must be free from restricted substances, including synthetic pesticides and fertilizers, for at least three years (1). Due to the limited availability of control methods, locations with the least weed pressure must be selected. It is strongly advised that producers allow at least a full season to a year for site preparation before planting, especially when planning to be in organic production (2). During this time, tillage/cultivation of the field will be critical for management of some hard-to-control species. A fallow season, a season where a cover crop is used prior to planting, will also be very helpful in maintaining a clean field and improving soil health. Cover crops compete with weeds before planting blackberries and reduce future weed problems in the orchard. Proper removal or destruction of the cover crop is also important, or the cover crop itself could become a problem.

At the time of bed formation and planting, emerged weeds can be burned down using herbicides registered for organic production, the most notable being Scythe (pelargonic acid). For proper control, weeds must be small (2 to 3 inches) and healthy when treated. It may take two or more weeks to see herbicide activity, and this should be taken into consideration. Also consider that organic herbicides are generally not as effective as synthetic herbicides, and so far none of them have residual activity.

Organic producers should also consider some form of row cover such as plastic or landscape fabric. The initial cost for these covers may be high, but the return on investment for organic systems should help offset the cost. Row middles must also be maintained either through hand weeding, light tillage, organic herbicides or even using planted grass in the alley. Planted grass in the alleys will be very useful in reducing the need for labor for weeding and reducing weed competition.

References

1. USDA National Organic Program – Agricultural Marketing Service (2014): <http://www.ams.usda.gov/AMSv1.0/ams.fetchTemplateData.do?template=TemplateA&navID=NationalOrganicProgram&page=NOPNationalOrganicProgramHome&resultType=&topNav=&leftNav=NationalOrganicProgram&acct=nop>.
2. *Organic Blackberries and Raspberries* (May 2010). University of Kentucky Cooperative Extension Service. <http://www.uky.edu/Ag/CCD/introsheets/organicbrambles.pdf>.

Table 2. Blackberry Weed Management Scheduling

Timing	Management	Herbicide Recommendation	Comments
Before Planting			
Summer	Cover crop	Consult herbicide labels for recommendations based on the cover crop used.	Cover crops should be chosen based on the needs of the grower and should be managed according to the available resources.
Fall	Tillage + Burndown	Glyphosate* or paraquat	Both surface and deep tillage should be used depending on the problematic weed species. Following tillage, a burndown herbicide should be used on any small emerging weeds.
Winter (Dec-Feb)	- - -	- - -	Try to prevent weed growth as much as possible, but check herbicide labels on preplant intervals.
Spring	Burndown	Paraquat/glyphosate*	Prior to bed formation, a burndown herbicide should be applied to ensure the beds are clean from weeds.
	PRE	Devrinol 50DF or Princep 4L	After planting, a PRE should be put down to reduce weed emergence early in establishment.
New Orchard (<2 years)			
Summer	Maintenance	Recommendation based on problematic weeds	Light tillage can be used, but try to avoid getting too close to the young bushes to prevent any harm to the roots.
	PRE + POST	Devrinol 50DF or Surflan + paraquat or glyphosate* or grass herbicide (i.e., Poast, Select, Fusilade DX)	Only apply grass herbicides to actively growing grasses. Surflan can be used multiple times throughout the year. Higher rates with adequate rainfall will provide longer residual activity.
Fall	Maintenance	Recommendation based on problematic weeds	For sedges, apply Sandea to emerged plants; a follow-up application 45 days after may be needed. Avoid contact with foliage. Bushes must be established for more than a year.
Winter (Dec-Feb)	PRE + POST	Glyphosate*+ various PRE herbicides	Choose a PRE herbicide labeled for young blackberries.
Spring	Pre-bloom	Callisto	Callisto can be applied as a PRE for residual activity, but will also have activity on some emerged weeds. Pre-bloom applications will reduce the impact of weeds while the fruit develops.
Mature Orchard (>2 years)			
Summer	Maintenance	Recommendation based on problematic weeds	Tillage may be used, but care should be taken to avoid injury to the roots.
Fall	Maintenance	Solicam + paraquat or glyphosate* or grass herbicides	Solicam will provide excellent preemergence control, but a POST should be included to prevent any emerged weeds from setting seed.
Winter (Dec-Feb)	PRE + POST	Surflan + paraquat or glyphosate*	
Spring	Pre-bloom	Callisto	Do not use Callisto more than two years in a row. Rotate with other residual herbicides.

*To prevent herbicide resistance evolution, glyphosate should not be the only herbicide used and it should be rotated with residual herbicides and other broad spectrum herbicides throughout the season.

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