

peppers, and tomatoes, they are not a related species and share few pests.

Grass Weeds Only - Postemergence

Pesticide

Assure II (10.3EC) (quizalofop) | 8-12 oz. per acre. Add 1 qt. COC or 0.5 pt. NIS per 25 gal. of spray solution. Apply to actively growing grass. Do not exceed 2 applications or 24 fl. oz. per acre per season. Applications must be greater than 7 days apart. REI: 12-hour. PHI: 30-day. WSSA 1.

clethodim products (clethodim) | Use 2EC formulations at 6-16 fl. oz. per acre with 1 qt. COC per 25 gals. of spray solution (1% v/v). Do not exceed 32 fl. oz. per acre per season. Use Select Max at 9-16 fl. oz. per acre to control annual grasses and 12-32 fl. oz. per acre to control perennial grasses. Add 1 qt. COC (1% v/v) or 0.5 pt. NIS per 25 gals. of spray solution (0.25% v/v). Do not exceed 64 fl. oz. per acre per season. Spray on actively growing grass. Wait at least 14 days between applications. REI: 24-hour. PHI: 21-day. WSSA 1.

Poast (1.5EC) (sethoxydim) | 1.0-2.5 pts. per acre. Add 1 qt. COC per 25 gal. of spray solution (1% v/v). Spray on actively growing grass. Do not exceed 5 pt. per acre per season. REI: 12-hour. PHI: 20-day. WSSA 1.

Okra - Horticulture

Reviewed by Ben Phillips, Liz Maynard – Oct 2020

Crop Description

Okra (*Abelmoschus esculentus*) is a subtropical plant related to hibiscus that is grown for its young green fruit. Okra requires warm weather for best growth. Some varieties have many small spines, similar to vine crops, which can irritate the skin when harvesting. There are also spineless varieties and red-fruited varieties. Though okra is often listed on pesticide labels along with eggplants,

Planting and Spacing

Seed 12 to 18 inches apart in rows 36 inches apart. Seed only after the soil has warmed to 65° F to 70° F for several days. Black plastic mulch with drip irrigation will increase yields. Transplants can be used for early production.

Fertilizing

pH: Maintain a soil pH of 6.0 to 6.5. Okra is very sensitive to low pH soils.

Before planting, apply 40 pounds N per acre, 0 to 200 pounds P₂O₅ per acre, and 0 to 300 pounds K₂O per acre based on soil test results and recommendations from your state.

Sidedress with 40 pounds N per acre after the first harvest.

Harvesting

Okra should be harvested every 2 to 3 days to maintain optimal market size (2- to 4-inch long pods). Frequent harvesting increases overall yield since the plant will reset pods faster. Okra will yield 8,000 to 10,000 pounds per acre. Time from transplanting to harvest ranges between 50 to 65 days.

Okra - Diseases

Reviewed by Dan Egel – Nov 2020

Recommended Controls

Wilt of Multiple Crops - Fusarium Fungus

Non-Pesticide

Use disease-free seed and transplants. Avoid fields with a history of the disease. Rotate to non-Solanaceous, non-Cucurbit crops for >6 years. Use raised beds and mulch to improve drainage and reduce splashing. Prompt destruction of the finished crop with tillage to rapidly breakdown tissue is an important method to prevent disease build-up.

Okra - Insects

Reviewed by Laura Ingwell, Celeste Welty – Nov 2020

Recommended Controls

Aphids

Pesticide

Admire Pro (4.6SC) (imidacloprid) | 1.3-2.2 fl. oz. per acre foliar application, 7-14 fl. oz. per acre soil application. Do not exceed 6.7 fl. oz. per acre per season. REI: 12-hour. PHI: 0-day for foliar applications, 21-day for soil applications. IRAC 4A.

Assail 30SG (acetamiprid) | 2.0-4.0 oz. per acre. Do not exceed 16 oz. per acre per season. Allow 7 days between applications. REI: 12-hour. PHI: 7-day. IRAC 4A.

Beleaf (50SG) (flonicamid) | 2.8-4.28 oz. per acre. REI: 12-hour. PHI: 0-day. IRAC 29.

Closer SC (2) (sulfoxaflor) | 1.5-2 fl. oz. per acre. REI: 12-hour. PHI: 1-day. IRAC 4C.

Malathion 5EC (malathion) | Use 5EC and 57EC formulations at 1.5-1.9 pts. per acre. Do not exceed 5 applications per season. Allow 7 days between applications. REI: 12 to 24-hour. PHI: 1-day. IRAC 1B.

Movento (2SC) (spirotetramat) | 4-5 fl. oz. per acre. REI: 24-hour. PHI: 1-day. IRAC 23.

PQZ (1.87SC) (pyrifluquinazon) | 2.4-3.2 fl. oz. per acre. REI: 12-hour. PHI: 1-day. IRAC 9B.

Sefina Inscalis (0.43DC) (afidopyropen) | 3 fl. oz. per acre. REI: 12-hour. PHI: 0-day. IRAC 9D.

Sivanto 200 (1.67SL) (flupyradifurone) | 7-12 fl. oz. per acre foliar application, or 21-28 fl. oz. per acre soil application. REI: 4-hour. PHI: 1-day for foliar application, or 45-day for soil application. IRAC 4D.

Torac (1.29SC) (tolfenpyrad) | 17-21 fl. oz. per acre. REI: 12-hour. PHI: 1-day. IRAC 21A, FRAC 39.

Transform WG (50) (sulfoxaflor) | Use Transform 50WG at 0.75-1.0 oz. per acre, or Closer 2SC at 1.5-2.0 fl. oz. per acre. REI: 24-hour. PHI: 1-day. IRAC 4C.

Caterpillars

Pesticide

Bacillus thuringiensis products for caterpillars (Bacillus thuringiensis aizawai strain ABTS-1857, Bacillus thuringiensis aizawai strain GC-91, Bacillus thuringiensis kurstaki strain ABTS-351, Bacillus thuringiensis kurstaki strain EVB-113-19, Bacillus thuringiensis kurstaki strain SA-11) | For armyworms, fruitworms, and loopers. Various Bt products are available for control of young caterpillars (Agree, Biobit, Dipel, Javelin,

etc.) Different Bt subspecies have different control properties. Check labels for rates, timing of application and required safety equipment. REI: 4-hour. PHI: See label. IRAC 11A.

Brigade 2EC (bifenthrin) | For armyworms, fruitworms, and loopers. Use 2EC formulations at 2.1-6.4 fl. oz. per acre and do not exceed 12.8 fl. oz. per acre per season Do not use 10DF, 10WP, or 10WSB formulations as they are not labeled for okra. Allow 7 days between applications. REI: 12-hour. PHI: 7-day. IRAC 3A. *RUP*.

Coragen (1.67SC) (chlorantraniliprole) | 3.5-7.5 fl. oz. per acre. For armyworms, fruitworms, and loopers. Can be applied as either a foliar application or via drip chemigation. Chemigation will provide up to 30 days of control. Do not exceed 15.4 fl. oz. per acre per season. REI: 4-hour. PHI: 1-day. IRAC 28.

Entrust SC (2) (spinosad) | For armyworms, fruitworms, and loopers. Use 2SC formulations at 3.0-8.0 fl. oz. per acre and do not exceed 29 fl. oz. per acre per season. Use 80WP formulations at 1.0-2.5 oz. per acre and do not exceed 9 oz. per acre per season. Allow 4 days between applications. REI: 4-hour. PHI: 1-day. IRAC 5. *OMRI-listed*.

Exirel (0.83SE) (cyantraniliprole) | 7-13.5 fl. oz. per acre. For armyworms, fruitworms, and loopers. Do not exceed 61.7 fl. oz. per acre per season. REI: 12-hour. PHI: 1-day. IRAC 28.

Harvanta (0.42SL) (cyclaniliprole) | 10.9-16.4 fl. oz. per acre. For armyworms, fruitworms, and loopers. Use with adjuvant. Do not exceed 49.2 fl. oz. per acre per season. REI: 4-hour. PHI: 1-day. IRAC 28.

Mustang Maxx (0.8) (zeta-cypermethrin) | 2.24-4.0 fl. oz. per acre. For armyworms, fruitworms, and loopers. REI: 12-hour. PHI: 1-day. IRAC 3A. *RUP*.

Proclaim (5SG) (emamectin benzoate) | 2.4-4.8 oz. per acre. For armyworms, fruitworms, and loopers. REI: 12-hour. PHI: 1-day. IRAC 6. *RUP*.

Radiant 1SC (spinetoram) | 5-10 fl. oz. per acre. For armyworms, fruitworms, and loopers. Do not exceed 34 fl. oz. per acre per season. REI: 4-hour. PHI: 1-day. IRAC 5.

Rimon 0.83EC (novaluron) | 9-12 fl. oz. per acre. For armyworms, fruitworms, and loopers. REI: 12-hour. PHI: 1-day. IRAC 15.

Sevin XLR Plus (4SC) (carbaryl) | 1.0-1.5 qts. per acre. For fruitworms. Do not exceed 6 qts. per acre per season. REI: 12-hour. PHI: 3-day. IRAC 1A.

Japanese Beetle

Pesticide

Brigade 2EC (bifenthrin) | Use 2EC formulations at 2.1-6.4 fl. oz. per acre and do not exceed 12.8 fl. oz. per acre per season Do not use 10DF, 10WP, or 10WSB formulations as they are not labeled for okra. Allow 7 days between applications. REI: 12-hour. PHI: 7-day. IRAC 3A. *RUP*.

EverGreen Pro 60-6 (L) (piperonyl butoxide, pyrethrins) | 2-12.6 fl. oz. per acre. REI: 12-hour. PHI: 0-day. IRAC UN, IRAC 3A.

Malathion 5EC (malathion) | Use 5EC and 57EC formulations at 1.5-1.9 pts. per acre. Do not exceed 5 applications per season. Allow 7 days between applications. REI: 12 to 24-hour. PHI: 1-day. IRAC 1B.

Mites

Pesticide

Acramite 50WS (bifenazate) | 0.75-1.0 lb. per acre. Do not exceed 1 application per season. REI: 12-hour. PHI: 3-day. IRAC UN.

Okra - Weeds

Agri-Mek SC (0.7) (abamectin) | 1.75-3.5 fl. oz. per acre. REI: 12-hour. PHI: 7-day. IRAC 6. *RUP*.

Magister SC (1.7) (fenazaquin) | 24-36 fl. oz. per acre. REI: 12-hour. PHI: 3-day. IRAC 21A, FRAC 39.

Onager Optek (1EC) (hexythiazox) | 12-24 fl. oz. per acre. REI: 12-hour. PHI: 1-day IRAC 10A.

Portal (0.4EC) (fenpyroximate) | 2 pints per acre. REI: 12-hour. PHI: 1-day. IRAC 21A.

Zeal (72WP) (etoxazole) | 2-3 oz. per acre. Do not exceed 1 application per season. REI: 12-hour. PHI: 7-day. IRAC 10B.

Stink Bugs

Pesticide

Brigade 2EC (bifenthrin) | Use 2EC formulations at 2.1-6.4 fl. oz. per acre and do not exceed 12.8 fl. oz. per acre per season Do not use 10DF, 10WP, or 10WSB formulations as they are not labeled for okra. Allow 7 days between applications. REI: 12-hour. PHI: 7-day. IRAC 3A. *RUP*.

Mustang Maxx (0.8) (zeta-cypermethrin) | 2.24-4.0 fl. oz. per acre. REI: 12-hour. PHI: 1-day. IRAC 3A. *RUP*.

Sevin XLR Plus (4SC) (carbaryl) | 1.0-1.5 qts. per acre. Do not exceed 6 qts. per acre per season. REI: 12-hour. PHI: 3-day. IRAC 1A.

Okra - Weeds

Reviewed by Stephen Meyers, Ben Phillips – Nov 2020

Recommended Controls

All Weeds

Okra is a warm-season crop that is nearly always started with transplants. There are several herbicides labeled for the control of weeds preemergence, applied before crops are transplanted, or directed between the rows only after transplanting.

Herbicide choices are limited, and the products that can be broadcast do not control many broadleaf weeds, so it is important to include mechanical control in the weed management plan.

For specific weeds controlled by each herbicide, check Relative Effectiveness of Herbicides for Vegetable Crops table.

Rates provided in the recommendations below are given for overall coverage. For band treatment, reduce amounts according to the portion of acre treated.

Non-Pesticide

Because these are warm-season, transplanted crops, there should be enough time in the spring to prepare a stale seedbed before planting, which should reduce weed pressure in the crop. These crops can also benefit from the soil warming properties of plastic mulch in addition to the in-row weed control. Mulches provide good weed control when planted into, when used for between row spaces, or in combination in-row and between-row. Materials include landscape cloth, plastic, biodegradable plastic. Straw mulch can delay growth by suppressing soil temperatures. Weeds between beds and along the edges of beds can be controlled with a combination of cultivation, mowing, or hand hoeing/pulling. Weeds along the edge of the

mulches can be a particular challenge to avoid ripping the mulch. Some fresh market plantings are often small enough to accommodate some hand hoeing or pulling. For larger plantings it may make more sense to mechanically cultivate with tow-able tools between plastic rows or between bare-soil rows.

Broadleaf and Grass Weeds - Postemergence

Pesticide

Caparol 4L (prometryn) | 1.5 pts. per acre. Apply as a post-directed spray when okra has 7-9 leaves and weeds are less than 2 inches tall. Do not exceed 3 pts. per acre per year. REI: 12-hour. PHI: 14-day. WSSA 5.

glyphosate products (glyphosate) | 0.75-3.75 lbs. acid equivalent (ae) per acre. Use formulations containing 3 lbs. ae per gal. (4 lbs. isopropylamine salt per gal.) at 1-5 qts. per acre, or formulations containing 4.5 lbs. ae per gal. (5 lbs. potassium salt per gal) at 0.66-3.3 qts. per acre. Broadcast at least 3 days before transplanting, or apply between crop rows with hooded or shielded sprayers. Use low rate for annuals and higher rates for perennials. See label for suggested application volume and adjuvants. Remove herbicide residue from plastic mulch prior to transplanting. REI: 4 to 12-hour. PHI: 14-day. WSSA 9.

Broadleaf and Grass Weeds - Preemergence

Pesticide

Caparol 4L (prometryn) | 1.5 pts. per acre. Apply as a post-directed spray when okra has 7-9 leaves and weeds are less than 2 inches tall. Do not exceed 3 pts. per acre per year. REI: 12-hour. PHI: 14-day. WSSA 5.

Dual Magnum (7.62EC) (s-metolachlor) | 1-2 pts. per acre. *Indiana, Michigan, and Ohio only. MI 24c*

exp. 12/31/21. OH 24c exp. 12/31/22. Apply to okra at least 4 inches tall before weeds emerge. Direct the spray to minimize contact with crop foliage, or apply only between crop rows. Do not incorporate. Do not exceed 2 pts. per acre or 1 application per crop per season. REI: 24-hour. PHI: 60-day. WSSA 15.

trifluralin products (trifluralin) | 0.5-1.0 lb. a.i. per acre. Use 4EC formulations at 1-2 pts. per acre. Use 10G formulations at 5-10 lbs. per acre. Use low rate on soils with less than 2% organic matter. Broadcast and incorporate before transplanting. Not effective on muck or high organic matter soils. REI: 12-hour. WSSA 3.

Broadleaf Weeds Only - Postemergence

Pesticide

Aim EC (2) (carfentrazone) | 0.5-2.0 fl. oz. per acre. Apply prior to transplanting or apply between crop rows with hooded sprayer. Do not allow spray to contact crop. Use COC or NIS. Weeds must be actively growing and less than 4 inches tall. Do not exceed 6.1 fl. oz. per acre per season. REI: 12-hour. WSSA 14.

Callisto (40SC) (mesotrione) | 6 fl. oz. per acre. Band to row middles prior to weed emergence. Leave 1 foot over row or 6 inches on each side of row unsprayed. Do not apply directly over the planted okra row or severe injury may occur. Injury risk is greatest on coarse-textured soils (sand, sandy loam, or loamy sands). A postemergence hooded application can be made at 3 oz. per acre when okra is at least 3 inches tall at time of application. Add 0.25% NIS v/v to spray solution. Avoid any contact with okra plant foliage. Do not exceed 1 application and 6 oz. per acre per year. REI: 12-hour. PHI: 28-day. WSSA 27.

Sandea (75) (halosulfuron) | 0.5-1.0 oz. per acre. Apply between rows of transplanted crop. Use lower rates on coarse soils with low organic matter. Add 0.5-1.0 pt. of NIS per 25 gals. of spray solution

Onions and Related Crops - Horticulture

if emerged weeds are present. Avoid contact of the herbicide with the crop. Avoid contact with surface of plastic mulch if present. *Effective against nutsedge*. Do not exceed 2 oz. per acre per 12-month period. REI: 12-hour. PHI: 30-day. WSSA 2.

Broadleaf Weeds Only - Preemergence

Pesticide

Callisto (40SC) (mesotrione) | 6 fl. oz. per acre. Band to row middles prior to weed emergence. Leave 1 foot over row or 6 inches on each side of row unsprayed. Do not apply directly over the planted okra row or severe injury may occur. Injury risk is greatest on coarse-textured soils (sand, sandy loam, or loamy sands). A postemergence hooded application can be made at 3 oz. per acre when okra is at least 3 inches tall at time of application. Add 0.25% NIS v/v to spray solution. Avoid any contact with okra plant foliage. Do not exceed 1 application and 6 oz. per acre per year. REI: 12-hour. PHI: 28-day. WSSA 27.

Sandea (75) (halosulfuron) | 0.5-1.0 oz. per acre. Apply between rows of transplanted crop. Use lower rates on coarse soils with low organic matter. Add 0.5-1.0 pt. of NIS per 25 gals. of spray solution if emerged weeds are present. Avoid contact of the herbicide with the crop. Avoid contact with surface of plastic mulch if present. *Effective against nutsedge*. Do not exceed 2 oz. per acre per 12-month period. REI: 12-hour. PHI: 30-day. WSSA 2.

Grass Weeds Only - Postemergence

Pesticide

Poast (1.5EC) (sethoxydim) | 1.0-1.5 pts. per acre. Use 1.0 qt. of COC per acre. Spray on actively growing grass. Use high rate on quackgrass. Do not exceed 5.5 pts. per acre per season. REI: 12-hour. PHI: 14-day. WSSA 1.

Onions and Related Crops - Horticulture

Reviewed by Ben Phillips, Liz Maynard – Oct 2020

Crop Description

Garlic (*Allium sativum*): There are two main types of garlic: softneck and hardneck. Hardneck types overwinter better in the Midwest, have a stronger flavor, and are easier to peel. Softneck types have a longer shelflife, milder flavor, and smaller cloves. Elephant or great headed garlic (*A. ampeloprasum*) is grown like other garlic, but has a milder flavor.

Leek (*A. porrum*): Leeks do not bulb, but form a straight shank of layered leaves that stay white when buried with soil. They can be planted deeply and hilled to increase the length of the shank. There are nonhardy summer-harvested varieties and frost-tolerant fall-harvest varieties.

Onion (*A. cepa* var. *cepa*): Bulb onions include yellow, red, and white-skinned types, and within each of the colors, there are sweet varieties and pungent storage varieties. Bulb onions are categorized as long-day, intermediate-day, or short-day based on the day-length that stimulates bulbing. Long-day varieties grow best in the Midwest. Some intermediate-day onions can also do well in the Midwest. Sweet onions contain more sugar, and do not keep as well as pungent storage onions. Any onion variety can also be used as a green onion, but *A. fistulosum* is a species that is commonly used for bunching that does not make a large bulb.

Shallot (*A. cepa* var. *aggregatum* or *A. ascalonicum*): Shallots form clusters of bulbs and are very winter hardy, like garlic. The torpedo-shaped bulbs are smaller than onions and have a milder flavor.