

Interior and Exterior Greenhouse Herbicides

This information is intended for use by the Cornell Greenhouse community only. It is provided as a resource for comparison of pesticide label information.

Herbicides listed in the first table are those labeled for use under benches, in walkways or around the interior foundation of the greenhouse and registered for use in New York State at the time of publication, as listed in the 2021-22 Cornell Guide for the Integrated Management of Greenhouse Crops and Herbaceous Ornamentals. Herbicides listed in the second table are those labeled for use around the exterior foundation of the greenhouse and registered for use in New York State at the time of publication.

This information is not a substitute for pesticide labeling. Always read the product label before applying any pesticide.

The information listed here reflects the authors' best effort to interpret a complex body of scientific research and to translate it into practical management options. Following the information given here does not assure compliance with any applicable law, rule, regulation or standard, or the achievement of particular discharge levels from agricultural land.

For current NYS pesticide registrations and labels, check the NYS Pesticide Administration Database (NYSPAD) products list at www.dec.ny.gov/nyspad/products?0

OMRI (Organic Materials Review Institute) listing indicates that these products are allowed for certified organic production.

*Restricted use pesticide

† Not for use in Nassau and Suffolk Counties

Δ Rate or application restrictions apply. See label for more information

Thanks to Andy Senesac, CCE Suffolk County, and Mike Helms, Cornell Pesticide Management Education Program, for assistance.

Pesticides for use inside the greenhouse

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|------------------------------------|------------------------------------|---|---|--|---|---|
| Active ingredient | Clethodim | d-Limonene | Diquat dibromide | Fluazifop-P-butyl | Glufosinate-ammonium | Glyphosate |
| Trade name Selected) | Envoy Plus*Δ | Avenger Weed Killer Concentrate | Diquat SPC | Fusilade II 2EC | Finale† | Roundup Pro, Roundup ProMax |
| Percentage AI | 12.6% | 70.0% | 37.3% | 24.5% | 11.33% | 41.0% |
| EPA Registration # | 59639-132 | 92967-1 (concentrate) | 228-675 | 100-1084 | 432-1229 | 524-475(Roundup Pro) 524-579 (Roundup ProMax) |
| REI | 24 hours | 4 hours | 24 hours | 12 hours | 12 hours | 4 hours |
| Mode of action (WSSA group) | Post-emergence Systemic (1) | Post-emergence contact (not classified) | Post-emergence as directed spray (22) | Systemic (1) | Post-emergence (10) | Post-emergence Systemic (9) |
| Application method | Spray | Spray | Spray | Spray | Directed spray using large droplet and low-pressure type nozzles. | Spray Wipe/ paint on |
| Precautions | Avoid drift | Drift will cause foliar injury Cool weather will slow activity Odor may remain for a long time. | Drift will cause foliar injury, may appear as speckling | Avoid drift Resistance in some weed species | Drift will cause foliar injury | Drift will cause foliar injury and plant death Turn off air circulation fans |
| When to apply | Actively growing grasses | Young, succulent, actively growing weeds | Young, succulent, actively growing weeds | Actively growing grasses no larger than stated growth stages | Actively growing weeds | Actively growing weeds |

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|----------------------------|---|---|---|---|---|---|
| Active ingredient | Clethodim | d-Limonene | Diquat dibromide | Fluazifop-P-butyl | Glufosinate-ammonium | Glyphosate |
| Where to use | **Apply a safe distance from desirable plants | **Apply a safe distance from desirable plants | **Apply a safe distance from desirable plants | **Apply a safe distance from desirable plants | **Apply a safe distance from desirable plants | Empty greenhouses |
| Weed class affected | Annual and perennial grasses | Nonselective | Non-selective | Annual and perennial grasses | Nonselective | Annual and perennial weeds |
| Symptoms | Chlorosis and necrosis of leaves, 7-14 days after treatment | Burndown of contacted tissue within hours | Water soaked appearance on leaves, browning of leaf tissue | Chlorosis and necrosis of leaves, 7-14 days after treatment | Occur 2-4 days after application | Chlorosis, necrosis, wilting and death over 2 to 7 days (or more) |
| Other notes | <p>No residual control</p> <p>Limitations for use on Long Island</p> <p>Treatment of stressed grasses will limit control</p> <p>On Long Island, no more than 32 fl oz per acre per season. Maximum 64 fl oz per year elsewhere in NY.</p> | <p>No residual control</p> <p>OMRI listed organic herbicide</p> | <p>No residual control</p> <p>Special Local Needs (SLN) label must be available and followed for aquatic use in NYS</p> | <p>No residual control</p> | <p>No residual control</p> <p>Not for use in Nassau or Suffolk counties</p> <p>Treatment of stressed weeds will limit control</p> <p>Air circulation fans must be turned off during application. Do not use in greenhouses or shade houses containing edible crops.</p> | <p>No residual control</p> <p>Desirable vegetation must not be present during application. Air circulation must be turned off before application and remain off until solution has dried.</p> |

Pesticides for use inside the greenhouse, continued

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|---------------------------------------|---|--|---|----------------------------|---------------------------------|
| | Ammonium Nonanoate | Indaziflam | Caprylic acid and capric acid | Pelargonic acid | Lemon grass oil |
| Trade name (Selected) | Axxe | Marengo*† , Marengo Herbicide & Marengo G*† | Fireworxx Homeplate Suppress | Scythe | GreenMatch EX |
| Percentage AI | 40.0% | 7.4% (Marengo and Marengo Herbicide) & 0.0224% (Marengo G) | 44% caprylic acid/36% capric acid (Fireworxx, Homeplate); 47% caprylic acid/ 32% capric acid (Suppress) | 57.0% | |
| EPA Registration # | 70299-23 | 432- 1518(Marengo) 432-1607 (Marengo Herbicide) 432-1523 (Marengo G) | 67702-54-59807 (Fireworxx); 67702-54- 70051 (Homeplate); 51517-9 (Suppress) | 10163-325 | Exempt from EPA registration |
| REI | 4 hours | 12 hours | 24 hours | 12 hours | |
| Mode of action (WSSA group) | Post-emergence (27) | Pre-emergence (29) | NA | Post-emergence (27) | Post-emergence |
| Application method | Spray Label limits use to 4 application methods: vegetative burndown; directed and shielded sprays; pre- emergence spray before seeds germinate and emerge and before perennial plants, tubers, bulbs | Spray & Granule | Spray | Spray | Spray |

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| | Ammonium Nonanoate | Indaziflam | Caprylic acid and capric acid | Pelargonic acid | Lemon grass oil |
| | or seed pieces sprout and emerge; and in areas around the structure. | | | | |
| Precautions | Drift will cause foliar injury | | Drift will cause foliar injury | Drift will cause foliar injury | Drift will cause foliar injury Strong lingering odor |
| When to apply | Young, succulent, actively growing weeds | Before weed seeds germinate | Postemergence – weeds up to 6” tall | Young, succulent, actively growing weeds | Young, succulent, actively growing weeds |
| Where to use | **Apply a safe distance from desirable plants | Greenhouse floors and under benches | Under benches and around greenhouses | **Apply a safe distance from desirable plants | **Apply a safe distance from desirable plants |
| Weed class affected | Non-selective | Grasses, sedges and broadleaf weeds | Mostly annual broadleaves and grasses | Non-selective | Non-selective |
| Symptoms | Burndown of contacted tissue within hours | Inhibits establishment after weeds germinate | Rapid leaf necrosis, plants appear to melt | Burndown of contacted tissue within hours | Burndown of contacted tissue within hours |
| Other notes | No residual control | Not for use in Nassau or Suffolk Counties Marengo Herbicide can be used when plants are present Marengo and Marengo G are not for use when ornamental plants | Suppress, Homeplate, and Fireworxx are OMRI approved organic herbicides Ensure adequate ventilation | No residual control | OMRI listed organic herbicide Personal protective equipment still required. |

| | Ammonium Nonanoate | Indaziflam | Caprylic acid and capric acid | Pelargonic acid | Lemon grass oil |
|--|--------------------|--------------------------------|-------------------------------|-----------------|-----------------|
| | | are present in the greenhouse. | | | |

**** From Andy Senesac:** If weeds that are growing on floor surface are separated from desirable plants by a solid bench top then no further precaution for physical separation is needed, as long as the spray pressure is sufficiently low to produce minimal 'spray fines'.

If lateral movement of drift particles is a concern, then separation of 15 to 20 feet should be sufficient to reduce off-target drift if there is **no** air movement or circulation within the greenhouse chamber.

Pesticides for use outside of the greenhouse

The objective of weed management outside the greenhouse is to create a weed seed barrier to prevent weed seeds entering the greenhouse. Mowing to prevent seed set is helpful. A vegetation-free strip is better. After applying a systemic broad spectrum herbicide like glyphosate, landscape fabric covered with gravel or mulch is laid down.

Pre-emergent and soil residual herbicides can be used in place of the barrier or to manage weeds that grow in the mulch. Close windows and vents to prevent drift from entering greenhouse while spraying. Do NOT use phenoxy herbicides or auxin type herbicides, as they are too volatile.

Pesticides for use outside the greenhouse

| Active ingredient | Oryzalin | Trifluralin | Diquat dibromide | Glyphosate | d-Limonene | Flumioxazin | Ammonium Nonanoate |
|----------------------|-------------|---|------------------|---|--|-------------|--------------------|
| Trade name Selected) | Surflan 4AS | Lebanon Treflan 5-G | Diquat SPC* | Roundup Pro, Roundup ProMax | Avenger Weed Killer OMRI listed | Sureguard* | Axxe |
| Percentage AI | 40.4% | 5.0% | 37.3% | 41.0% | 70.0% (concentrate) 17.5% (ready-to-use) | 44.0% | 40.0% |
| EPA Registration # | 70506-44 | 961-405 | 228-675 | 524-475 (Roundup Pro) 524-579 (Roundup ProMax) | 92967-1 (concentrate) 92967-3 (ready-to-use) | 71368-114 | 70299-23 |
| REI | 24 hours | (Product not registered for ag use so doesn't have WPS Agricultural Use wording on label. No REI listed.) | 24 hours | 4 hours | 4 hours for concentrate; (The RTU formulation doesn't list an REI as it's not for crop production.) | 12 hours | 24 hours |

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|------------------------------------|--------------------------------------|----------------------|---|--|---|--|--|
| Active ingredient | Oryzalin | Trifluralin | Diquat dibromide | Glyphosate | d-Limonene | Flumioxazin | Ammonium Nonanoate |
| Mode of action (WSSA group) | Pre-emergence (3) | Pre-emergence (3) | Postemergence as directed spray (22) | Postemergence Systemic (9) | Post-emergence contact (not classified) | Pre-emergence and early post-emergence (14) | Post-emergence (M) |
| Application method | Spray Needs water to activate | granular | Spray | Spray Wipe/paint on | Spray | Spray | Spray Label limits use to 4 application methods: vegetative burndown; directed and shielded sprays; pre-emergence spray before seeds germinate and emerge and before perennial plants, tubers, bulbs or seed pieces sprout and emerge; and in areas around the structure. |
| Precautions | Residual 2-8 months | Residual 2-3 months | Drift will cause foliar injury, may appear as speckling | Drift will cause foliar injury and plant death | Drift will cause foliar injury Cool weather will slow activity | Drift will cause foliar injury and plant death | Drift will cause foliar injury |

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|----------------------------|--|---|---|---|---|---|---|
| Active ingredient | Oryzalin | Trifluralin | Diquat dibromide | Glyphosate | d-Limonene | Flumioxazin | Ammonium Nonanoate |
| | | | | | Odor may remain for a long time. | | |
| When to apply | Pre-emergence | Pre-emergence | Young, succulent, actively growing weeds | Actively growing weeds | Young, succulent, actively growing weeds | Pre-emergence or when weeds are young (less than 2 in high) | Young, succulent, actively growing weeds |
| Where to use | Around greenhouse – weed free barrier | Around greenhouse – weed free barrier | Around greenhouse – weed free barrier | Around greenhouse – weed free barrier | Apply a safe distance from desirable plants | Around greenhouse – weed free barrier | Apply a safe distance from desirable plants |
| Weed class affected | Annual and perennial grasses | Some annual grasses and broadleaves | Nonselective | Annual and perennial weeds | Nonselective | Selected grass and broadleaf weeds | Non-selective |
| Symptoms | Stubby roots | Stubby roots | Water soaked appearance on leaves, browning of leaf tissue | Chlorosis, necrosis, wilting and death over 2 to 7 days (or more) | Burndown of contacted tissue within hours | Affects chlorophyll biosynthesis | Burndown of contacted tissue within hours |
| Other notes | Can be tank mixed with glyphosate or diquat dibromide for pre- and post-emergence of grasses and broadleaves | Do not apply this product in greenhouse or other enclosed structures. | Special Local Needs (SLN) label must be available and followed for aquatic use in NYS | | No residual control Ready-to-use formulation only for use in non-crop areas. | Best when applied in sunny conditions above 65 F | No residual control |