Delaware Cooperative Extension

UNIVERSITY OF DELAWARE | DSU DELAWARE STATE UNIVERSITY

This is a section from the

2024/2025
Mid-Atlantic Commercial Vegetable Production Recommendations

The recommendations are **NOT** for home gardener use.

The full recommendations are available online at:
https://www.udel.edu/academics/colleges/canr/cooperative-extension/sustainable-production/commercial-crops/vegetable-crops/midatlantic-vegetable-recommendations/

Printed copies of the recommendations are available for purchase at the New Castle, Kent and Sussex County Extension Offices in Delaware.

This publication will be revised biennially. In January 2025, a Critical Update with important updates for this publication will be communicated through the above website.

These recommendations were prepared and reviewed by individuals from Cornell University, University of Delaware, Delaware State University, University of Maryland, Penn State, Rutgers University, Virginia Tech, and West Virginia University with the purpose of providing up to date information for commercial vegetable growers in the Mid-Atlantic states of **Delaware, Maryland, New Jersey, Pennsylvania, Virginia,** and **West Virginia**.

Disclaimer

- The label is a legally-binding contract between the pesticide user and the manufacturer.
- The user MUST follow all rates and restrictions as per label directions.
- The use of any pesticide inconsistent with the label directions is a violation of Federal law.

F. Commodity Recommendations

Pesticide Use Disclaimer

THE LABEL IS THE LAW

A pesticide applicator is legally bound by the labeling found on and with the pesticide container in their possession. Before using a pesticide, check and always follow the labeling distributed with the product at the point of sale for legally enforceable rates and use restrictions and precautions.
Although labels are available on the Internet from electronic label services such as Proagrica's CDMS (*https://www.cdms.net/*), Greenbook (*https://www.greenbook.net*), or Agworld DBX powered by Agrian (*https://www.agrian.com/labelcenter/results.cfm)* the information contained in these electronic labels may not be identical to the labeling distributed with the product. **Please be advised that these electronic label services provide use disclaimers, and in some cases legally binding *User Agreements* assigning ALL liability to user of service. (**See section D 3.1. Labels and Labeling for more detail.)

Guide to the Recommended Pesticide Tables in the Following Crop Sections:

1. Pesticides are listed by **group number or code based on chemical structure and mechanism of action**, as classified by the Herbicide Resistance Action Committee (**HRAC**, *https://hracglobal.com*) for herbicides, the Insecticide Resistance Action Committee (**IRAC**, *https://irac-online.org*) for insecticides, and the Fungicide Resistance Action Committee (**FRAC,** *https://www.frac.info/*) for fungicides. **In this guide, if the group number or code is in bold font, there are resistance concerns for the product.**
2. **Restricted use pesticides** are marked with a * in the Tables. These products may only be used by certified and/or licensed pesticide applicators, and when stated on the label, those making applications under their direct supervision. Some labels may restrict use solely to certified and/or licensed applicators. (See section D 3.2.1 Restricted Use Classification Statement for more detail).
3. **In addition to the pesticide products listed in the Commodity Recommendations below, other formulations or brands with the same active ingredient(s) may be commercially available. ALWAYS CHECK THE LABELING ON THE PRODUCT CONTAINER ITSELF:**
   a) to ensure a pesticide is labeled for the same intended use,
   b) to ensure the pesticide is labeled for the desired crop,
   c) for differences in application rates and % active ingredient(s), and
   d) additional restrictions.
4. All pesticide recommendations contained in this document are prescribed for spray applications to a **broadcast area of 1 acre** (43,560 square feet). **Adjust the rate accordingly for banded applications** (See section E 1.3. Calibrating Granular Applicators) **or for chemigation** (check labels for amounts per 1,000 feet).
5. Check the physical product label for and do not exceed the maximum amount of pesticide *per application* and the maximum number of applications *per year*.
6. **Bee Toxicity Rating (Bee TR)**: N=nontoxic; L=minimum impact on bees; M=moderately toxic, can be used if dosage, timing, and method of application are correct, but should NOT be applied directly to the crop if bees are present; H=highly toxic, severe losses expected, -- = data not available.
7. In accordance with the USDA National Organic Program, the Organic Materials Research Institute (OMRI) maintains a directory of all products that OMRI has determined are allowed for use in organic production, processing, and handling. These products are catalogued online in the **OMRI Products List** (see *https://www.omri.org/omri-lists*).

Asparagus

Recommended Varieties[1]

Atlas* (RT, FT, CBT, HT)	Millennium* (RT, FT)
Eclipse* (RT, FT)	Purple Passion (RT, FT)
Grande* (RT, FT, HT)	Walker Deluxe* (RT, FT)
Jersey Knight* (RT, FT)	

[1]**Listed alphabetically**. *Indicates hybrid variety. RT = Rust Tolerant; FT = Fusarium Tolerant. CBT = Cercospora Blight Tolerant; HT = Heat Tolerant

Recommended Nutrients Based on Soil Tests

Before using the table below, check the suggestions on rate, timing, and placement of nutrients in your soil test report and Chapter B Soil and Nutrient Management. Your state's soil test report recommendations and/or your farm's nutrient management plan supersede the recommendations found below.

Asparagus[1,2]		**Soil Phosphorus Level**				**Soil Potassium Level**				
		Low	**Med**	**High (Opt)**	**Very High**	**Low**	**Med**	**High (Opt)**	**Very High**	
	N (lb/A)	**P_2O_5 (lb/A)**				**K_2O (lb/A)**				**Nutrient Timing and Method**
Growing Crowns	50	200	100	50	0[3]	200	100	50	0[3]	Total nutrient recommended
	50	200	100	50	0[3]	200	100	50	0[3]	Broadcast and disk-in
New Plantings Crowns and Transplants	75-100	200	100	50	0[3]	200	100	50	0[3]	Total nutrient recommended
	50	200	100	50	0[3]	200	100	50	0[3]	Broadcast and disk-in
	25-50	0	0	0	0	0	0	0	0	Sidedress 4 weeks after planting
Cutting Beds to Maintain	75-100	200	150	100	0[3]	300	225	150	0[3]	Total nutrient recommended
	50	200	150	100	0[3]	150	100	75	0[3]	Apply before cutting season
	25-50	0	0	0	0	150	125	75	0	Sidedress after end of cutting season

[1]Apply 1-2 lb/A of boron (B) every 3 yr on most soils; see also Table B-7. in Chapter B Soil and Nutrient Management.
[2]Apply 25-30 lb/A of sulfur (S) for most soils.
[3]In VA, crop replacement values of 50 lb/A of P_2O_5 and 75 lb/A of K_2O are recommended on soils testing Very High.

Purity of Seed Lots

The varieties listed in the table above are all male hybrids. Male asparagus hybrid varieties are preferred over standard hybrids and open-pollinated populations because male plants are more vigorous and productive. However, some seed lots may contain a significant percentage of female plants. Check with your seed supplier to determine the anticipated proportion of female and/or off-type plants in the lots you procure.

Seed Treatment

Check if seed has been treated; see also Disease Control below.

Growing Crowns and Transplants

Crowns can be purchased or grown from seed. Sow seed 1½ inches deep at a rate of 6-8 lb/A (10-12 seeds per ft) in rows 24-30 inches apart in mid-April in warmer, southern areas to mid-May in cooler areas. Crowns must be grown in an area where asparagus has never been grown.

Grow asparagus transplants in 72-100 cell trays containing artificial growing media formulated for pepper transplants. Grow seedlings for 8-10 weeks in the greenhouse, then harden-off in a protected outdoor area for 2 weeks before transplanting. **Timely irrigation, cultivation and application of herbicides are essential for successful use of seedling transplants**. Contact your County Extension Agent for specific herbicide suggestions.

Planting and Spacing

Plant crowns and transplants April 1 to May 20 when soil conditions are favorable. Early plantings produce more vegetative growth and more vigorous crowns than late plantings. Space 1-year-old crowns and transplants 12 inches apart in rows 4½-5 ft apart. Make furrows 6-8 inches deep, plant crowns 5-7 inches deep. Cover crowns with 1-2 inches of soil. Cultivate and move soil to seedlings carefully to avoid covering foliage with soil. Gradually fill trenches during the growing season and form a 2-inch ridge over the plants after the fern turns brown in the fall.

Harvest and Post-Harvest Considerations

Do not harvest asparagus the year of planting. Harvest for 2 weeks the 2nd year after planting and increase to 6-8 weeks as the planting matures. Stop harvesting by June 15 if fern vigor was good the previous fall. Stop sooner if spear thickness drops. Prolonged cutting increases stress on the plant and can increase root and crown rot. If foliage diseases were severe or fern vigor was low the previous fall, stop harvesting 10 days sooner than normal. Leave soil on young beds unridged for the first 2-3 weeks of harvest. On old beds, and in fields where freezing of early emerged spears occurs frequently, begin ridging at the start of the harvest season. In areas where freeze damage to spears occurs frequently, mulch the beds with straw after herbicide application to delay spear emergence. Remove spears from field promptly after cutting to maintain freshness and a low fiber content. After harvesting, spears should be washed, cooled, trimmed to a uniform length, graded by diameter, and bunched. Spears can be stored for up to 3 weeks at 36°F (2°C) and 95% relative humidity.

Mother Stalk Harvest System for Season Extension

Like many other crop species, asparagus possesses a feedback system for spear/shoot initiation from the underground crown. If a few mature shoots ("fern") exist, the crown perceives reduced phytohormone levels and releases additional spears/shoots for elongation. When a threshold number of mature shoots is reached, no more spears/shoots will elongate thereafter from the crown. It is possible to use this system for spear harvest season extension by limiting the number of mature shoots, known as the "mother stalk harvesting system" (MSHS).

MSHS begins by allowing a fixed number of spears to continue to grow into mature shoots, usually 3 to 4. After these shoots are established, all spears that subsequently emerge from the crown are harvested. Research has shown that spears will appear more or less continuously for several months, as long as the mature shoots remain healthy and adequate soil moisture and nutrient levels are maintained. The dynamics of yield are not consistent, however. Following the expected flush of spears in April-June, the rate of new spear emergence may fluctuate with temperature, soil moisture, and light levels. Yields during the summer period can be extremely low, although spear quality remains acceptable. Spears harvested after the fern canopy is present often appear lighter in color, since chlorophyll deposition is associated with light levels. Summer yields are often insufficient to justify the cost of harvesting, but harvesting must continue since new mature shoots will suppress later spear emergence. Continuous spear emergence may be sustained by MSHS to as late as mid-September in the Mid-Atlantic region, but the degree of season extension varies with weather and management practices.

Successful MSHS usually requires more intensive management than conventional harvesting. Spear yields and quality are promoted by regular irrigation and fertilization, and pest and disease management as needed. Staking of the mature foliage prevents crop damage during violent weather events and renders it easier to harvest young spears. The hope is that favorable market conditions will help to infringe the costs of additional management needs.

There are many variations on specific steps taken in MSHS. For example, research has shown that a period of conventional harvest at the beginning of the season (first 2-3 weeks) followed by the imposition of MSHS has a beneficial impact on cumulative season yield. Although data on the long-term effects of MSHS on crown viability are lacking, it is recommended that a minimum of 2 years of conventional harvest separate a season of MSHS on any given asparagus production block.

It is recommended that MSHS is practiced on a small scale by growers participating in direct marketing.

Brush Removal

For very small plantings remove and properly discard brush if possible. Mow or disk brush in February or March. Avoid damage to spear buds by shallow disking. Burn brush during the winter to destroy fungi that cause diseases, such as rust and purple spot. Obtain a burn permit in areas where required.

Weed Control

THE LABEL IS THE LAW-see the Pesticide Use Disclaimer on the first page of Chapter F.

Recommended Herbicides

1. Identify the weeds in each field and select recommended herbicides. More information is available in the "Herbicide Effectiveness on Common Weeds in Vegetables" (Table E-3) in Chapter E Pest Management.
2. Minimize herbicide resistance development. Identify the herbicide mode of action group number and follow recommended good management practices; **bolded group numbers in tables below are herbicides at higher risk for selecting resistant weed populations.** Include non-chemical weed control whenever possible.

1.a. Seedbeds, Seeded Fields, and Newly Planted Crowns: Preplant or Preemergence

Group	Product Name (*=Restricted Use)	Product Rate	Active Ingredient	Active Ingredient Rate	PHI (d)	REI (h)
3	Prowl H2O 3.8CS	2.4 to 8.2 pt/A	**pendimethalin**	1.14 to 3.9 lb/A	14	24
-Apply only to newly planted crown asparagus. Assure that the crowns are fully covered with 2 to 4 inches of soil. -**Do not** apply to newly seeded asparagus. **Do not** apply more than 2.4 pt/A to sandy soils. **Do not** apply postemergence over the top of emerged spears or severe injury may occur. Maximum for Prowl H2O: 8.2 pt/A per season.						
7	Lorox 50DF	2 to 4 lb/A	**linuron**	1 to 2 lb/A	1	24
-Use lower rate on coarse-textured (sandy) soils low in organic matter, and higher rate on fine-textured (silt and clay) soils. -Make a single application of 2 to 4 lb/A after planting seed ½ inch deep in coarse soil and 1 inch deep in fine soils. -During planting operation, spray activated charcoal as a 1 inch band on soil surface directly over seeded row at rate of 300 lb/A. -Preemergence weed control will be reduced in soils with high organic matter (greater than 5% and peat or muck). -**Do not** use **FLOWABLE** (liquid) formulation, or crop injury may occur. -**Do not** use surfactant or fertilizer solution in spray mixture. -Maximum Lorox 50DF application: 4 lb/A per season.						
9	Roundup PowerMax 4.5L "Generic" glyphosate 3L	16 to 32 fl oz/A 24 to 48 fl oz/A	**glyphosate**	0.75 to 1.1 lb acid equivalent/A	5	4
-Apply before seeding or at least 7 days prior to the emergence of the first asparagus spears. -Some glyphosate formulations may require an adjuvant, refer to label. Tank mix with appropriate herbicides for residual weed control. -Glyphosate controls many perennial weeds as well as annuals if applied when the weed is actively growing and has reached the stage of growth listed on the label. Repeat applications are allowed, with maximum application of 5.3 qt/A per year.						
22	Gramoxone SL 2.0* Gramoxone SL 3.0*	2.5 to 4 pt/A 1.7 to 2.7 pt/A	**paraquat**	0.6 to 1 lb/A	6	24
-Apply before seeding or before spear emergence. Always include an adjuvant (nonionic surfactant or crop oil concentrate). -Tank mix with appropriate herbicides for residual weed control. Paraquat may not control established grasses. -Spray coverage is essential for optimum control. -Rainfastness 30 min. A maximum of 3 applications per year are allowed. -***Restricted-use pesticide***. Only certified applicators, who successfully complete the paraquat-specific training, can mix, load, or apply paraquat. Application of paraquat "under the direct supervision" of a certified applicator is no longer allowed. Required training link (*https://campus.extension.org/enrol/index.php?id=2201*); certified applicators must repeat training every three years.						

1.b. Seedbeds, Seeded Fields, and Newly Planted Crowns: Postemergence

Group	Product Name (*=Restricted Use)	Product Rate	Active Ingredient	Active Ingredient Rate	PHI (d)	REI (h)
1	Shadow 3EC Select 2EC Select Max 0.97EC	4 to 5.33 fl oz/A 6 to 8 fl oz/A 9 to 16 fl oz/A	**clethodim**	0.07 to 0.125 lb/A	1	24
	Poast 1.5EC	1 to 2.5 pt/A	**sethoxydim**	0.2 to 0.5 lb/A	1	12
	Fusilade DX 2EC	8 to 24 fl oz/A	**fluazifop**	0.125 to 0.375 lb/A	1	12
-**Select 2EC**: use crop oil concentrate (COC) at 1% v/v (1 gal/100 gal of spray solution). **Select Max**: use nonionic surfactant (NIS) at 0.25% v/v (1 qt/100 gal of spray solution). **Shadow 3EC**: use crop oil concentrate (COC) at 1% v/v (1 gal/100 gal of spray solution) for large or stressed grasses; use nonionic surfactant (NIS) at 0.25% v/v (1 qt/100 gal of spray solution) when crop safety is a concern. **Poast**: use COC at 1.0% v/v. **Fusilade DX:** use COC at 1.0% v/v or NIS at 0.25% v/v. -**The use of COC may increase the risk of crop injury when hot or humid conditions prevail**. To reduce the risk of crop injury, omit additives or switch to NIS when grasses are small and soil moisture is adequate. -Use lower labeled rates for annual grass control and higher labeled rates for perennial grass control. -Yellow nutsedge, wild onion, wild garlic, and broadleaf weeds will **not** be controlled. -Controls many annual and certain perennial grasses, including annual bluegrass, but Poast is preferred for goosegrass control. For best results, treat annual grasses when they are actively growing and before tillers are present. Control may be reduced if grasses are large or under hot or dry weather conditions. -Repeated applications may be necessary to control certain perennial grasses. If repeated applications are necessary, allow 14 days between applications. Rainfastness is 1 h. -**Do not** tank mix with or apply within 2 to 3 days of any other pesticide, unless labeled, as this may increase the risk of crop injury or reduce the control of grasses. -**Do not** apply more than 8 fl oz/A of Select 2EC in a single application and **do not** exceed 2 pt/A for the season; **Do not** apply more than 16 fl oz/A of Select Max in a single application and **do not** exceed 4 pt/A for the season. -**Do not** apply more than 5.33 fl oz/A of Shadow 3EC in a single application and **do not** exceed 21.33 fl oz/A for the season. -**Do not** apply more than 2.5 pt/A Poast in a single application and **do not** exceed 5 pt/A for the season. -**Do not** apply more than 24 fl oz/A of Fusilade DX in a single application and **do not** exceed 3 pt/A per season.						

2. Cutting Bed

Use a combination of grass and broadleaf weed herbicides to control a wide spectrum of weeds. Identify the weeds in your field. Split the herbicide application. Spray part of your grass herbicide before harvest and the remainder after harvest, or switch to another grass herbicide after harvest. Rotate the use of metribuzin with Karmex or Sinbar

to avoid repeated use of chemically related products. Choose metribuzin or Sinbar when weeds have emerged, unless another effective postemergence herbicide is used.

2.a. Cutting Bed: Before Spear Emergence and/or After Harvest Season

Group	Product Name (*=Restricted Use)	Product Rate	Active Ingredient	Active Ingredient Rate	PHI (d)	REI (h)
3	Prowl H2O 3.8CS	2.4 to 8.2 pt/A	**pendimethalin**	1.14 to 3.9 lb/A	14	24
-Apply only to newly planted crown asparagus. Assure that the crowns are fully covered with 2 to 4 inches of soil. -**Do not** apply to newly seeded asparagus. -**Do not** apply more than 2.4 pt/A to sandy soils. -**Do not** apply postemergence over the top of emerged spears or severe injury may occur. -Maximum for Prowl H2O: 8.2 pt/A per season.						
3	Treflan 4EC	1 to 4 pt/A	**trifluralin**	0.5 to 2 lb/A	--	12
-Apply only to established asparagus as a single or split application. See label for rates and instructions concerning split applications before and after harvest. -Make applications to dormant asparagus in winter or early spring after mature ferns have been removed or post-harvest immediately after harvest in late spring or early summer just before ferns are allowed to develop. -**Do not** apply after new spears begin to emerge. -Maximum use for Treflan: no more than 2 pt/A on coarse soils, 3 pt/A on medium soils, or 4 pt/A on fine soils per calendar year.						
5	Metribuzin 75DF Metribuzin 4L	1.33 to 2 lb/A 2 to 4 pt/A	**metribuzin**	1 to 1.5 lb/A	14	12
-Apply before spears emerge or after final harvest. The maximum rate before spear emergence is 2.67 lb (75DF) and 4 pt (4L); after final harvest is 2 lb (75DF) and 3pt (4L). -Metribuzin primarily controls broadleaf weeds. Tank mix with Devrinol or other residual grass herbicide to control annual grasses. -Use Sinbar or Karmex after harvest when metribuzin is used in the early spring. -For split applications preemergence followed by post-harvest use 0.5 to 1 lb ai/A preemergence followed by 1 to 1.5 lb ai/A post-harvest. For post-harvest applications, apply after last harvest of season but prior to emergence. -Rainfastness is 6 h. -Maximum use for metribuzin 75DF: 2.67 lb/A per season. Maximum use for metribuzin 4L:4 pt/A per season.						
5	Sinbar 80WDG	1.5 to 2.5 lb/A	**terbacil**	1.2 to 2 lb/A	5	12
-Apply prior to spear emergence; application may be made immediately after clean cutting. -Use lower rate on coarse-textured (sandy) soils low in organic matter, and higher rate on fine-textured (silt and clay) soils. -Apply before weeds emerge or to small weeds (1/2 to 2 inches tall). -**Do not** use on areas where subsoil or roots are exposed or on plants that are diseased or lacking in vigor, as crop injury may occur. -Do not use on soils containing less than 1% organic matter. -Not recommended for use at time of planting. -Treated areas may be planted to asparagus 1 year after application. **Do not** replant any other crop within 2 years of last application. -Maximum for Sinbar: 1.5 lb/A per application.						
7	Karmex 80DF	1 to 4 lb/A	**diuron**	0.8 to 3.2 lb/A	--	12
-**Do not** apply to young plants during the first growing season (except as noted below), nor to newly seeded asparagus, nor on plants with exposed roots as severe injury may result. -Apply prior to spear emergence or after harvest when the soil is disked and free of weeds. -Preemergence weed control will be reduced on soils with greater than 5% organic matter. -On light soils and other soils low in clay or organic matter, apply 1 to 2 lb/A. On soils high in clay or organic matter, use 2 to 4 lb/A. -Maximum use for Karmex: 6 lb/A per season, **do not** exceed 3 lb/A per application, no more than 2 applications.						
7	Lorox 50DF	2 to 4 lb/A	**linuron**	1 to 2 lb/A	1	24
-Apply prior to spear emergence, after harvest, or directed postemergence in the fern stage. -Use lower rate on coarse-textured (sandy) soils low in organic matter, and higher rate on fine-textured (silt and clay) soils. -Preemergence weed control will be reduced in soils with high organic matter (greater than 5% and peat or muck). -**Preemergence:** make a single application of 2 to 4 lb/A. -**Postemergence**: make 1 to 3 applications of 1 to 2 lb/A before weeds exceed 4 inches in height. Apply before cutting season or immediately after cutting. -**Directed Postemergence (Fern Stage):** make a single application of 4 lb/A as a directed spray. -**Do not** use **FLOWABLE** (liquid) formulation, or crop injury may occur. -**Do not** use surfactant or fertilizer solution in spray mixture. -Maximum use for Lorox: 4 lb/A per season.						
12	Solicam 80DF	2.5 to 5 lb/A	**norflurazon**	2 to 4 lb/A	14	12
-Apply to asparagus that has been established for at least one growing season. -Apply at the end of the cutting season immediately after the field is cultivated to level the ridges. -Use 2.5 lb/A on sands and loamy sands, 3.75 lb/A on sandy loams, and 3.75 to 5 lb/A on medium and fine textured soils. -Soil should be settled, firm, relatively free of weeds and debris, and free of depressions around asparagus at time of application. -If no rainfall occurs within 4 weeks after application, the product must be incorporated by flood or sprinkler irrigation. -**Do not** plant sensitive crops (see label) for 2 years after application. -Maximum use for Solicam: 5 lb/A per season.						
13	Command 3ME	2.6 pt/A	**clomazone**	1 lb/A	14	12
-Apply prior to spear and weed emergence. If spears have emerged, make an application after a clean harvest. Cover exposed plants with soil prior to application. -Apply to control annual grasses and many broadleaf weeds including common lambsquarters, velvetleaf, spurred anoda, and jimsonweed. Command will not control yellow nutsedge, mustards, morningglory species, or pigweed species. -Use the lower rate on coarse-textured soils low in organic matter and higher rates on fine-textured soils and on soils with high organic matter. -**WARNINGS**: **1**. Command spray *or* vapor drift may injure sensitive crops and other vegetation up to several hundred yards from the point of application. **Do not** apply adjacent to sensitive crops (see label) or vegetation, or under unfavorable wind or weather conditions. **2.** Command may limit subsequent cropping options, see the label. -Maximum use for Command: 2.6 pt/A per application; and 2.6 pt/A per year; no more than 1 application per year.						

2.a. Cutting Bed: Before Spear Emergence and/or After Harvest Season - continued next page

2.a. Cutting Bed: Before Spear Emergence and/or After Harvest Season - continued

15	Devrinol 2-XT 2EC Devrinol DF-XT 50DF	2 gal/A 8 lb/A	**napropamide**	4 lb/A	--	24
-Apply to asparagus that has been established for at least one growing season. Apply before weeds emerge immediately after ridging in the spring. Split the application if ridges are leveled after harvest. Make the second application immediately after leveling the ridge following the harvest season. Incorporation may improve weed control if rainfall does not occur within 24 h of application. -Devrinol primarily controls annual grasses. Tank mix with metribuzin or other broadleaf residual herbicide for broadleaf weed control. -Maximum use for Devrinol: 2 gal/A per season (2-XT) and 8 lb/A per season (DF-XT).						
15	Dual Magnum 7.62E	1.33 to 2 pt/A	***s*-metolachlor**	1.26 to 1.9 lb/A	16	24
-**Special Local Needs Label 24(c) for NJ and DE (DE expires 9/20/2026; NJ expires 1/28/2027). The use of Dual Magnum 7.62E is legal ONLY if a waiver of liability has been completed (see: *https://www.syngenta-us.com/labels/indemnified-label-login*).** -Apply to dormant established asparagus beds in the spring, prior to spear emergence. Use lower rates on coarse-textured soils and higher rates on fine-textured soils. Primarily controls annual grasses, certain broadleaf weeds, and nutsedge. -**Does not** control emerged weeds. Maximum use for Dual Magnum: 2 pt/A per season, no more than 1 application per year.						
22	Gramoxone SL 2.0* Gramoxone SL 3.0*	2.5 to 4 pt/A 1.7 to 2.7 pt/A	**paraquat**	0.6 to 1 lb/A	6	24
-Apply prior to spear emergence or immediately after the last cutting. Emerged spears sprayed after last harvest will be killed but new growth from the crown will not be affected. Always include an adjuvant (nonionic surfactant or crop oil concentrate). -Tank mix with appropriate herbicides for residual weed control. Paraquat may not control established grasses. -Spray coverage is essential for optimum control. -Rainfastness 30 min. A maximum of 3 applications per year are allowed. -***Restricted-use pesticide***. Only certified applicators, who successfully complete the paraquat-specific training, can mix, load, or apply paraquat. Application of paraquat "under the direct supervision" of a certified applicator is no longer allowed. Required training link (*https://campus.extension.org/enrol/index.php?id=2201*); certified applicators must repeat training every three years.						
27	Callisto 4SC	3.0 to 7.7 fl oz/A	**mesotrione**	0.094 to 0.24 lb/A	--	12
-Apply in the spring after fern mowing, disking, or other tillage operations but prior to spear emergence, as a post-harvest application (after final harvest), or both. -Use the 3.0 fl oz/A rate for postemergence control of emerged weeds or the 6.6 to 7.7 fl oz/A rate for preemergence control. -Use the lower rate on coarse-textured (sandy) soils low in organic matter, and the higher rate on fine-textured (silt and clay) soils. -Use crop oil concentrate at 1 gal/100 gal spray solution or nonionic surfactant at 1 qt/100 gal spray solution if target weeds are emerged. A spray grade UAN at 2.5 gal/100 gal spray solution or ammonium sulfate (AMS) at 8.5 lb/100 gal spray solution may be added for improved burndown of emerged weeds. For post-harvest applications, the use of an adjuvant will increase the risk of crop injury. -Till field or tank mix with paraquat to eliminate emerged spears when Callisto is applied after harvest, or crop injury may be observed as bleaching or bleached streaks in the stems and ferns when treated spears grow. -Callisto controls horseweed and common lambsquarters but is weak on annual grasses. Tank mix with a residual annual grass herbicide to control grasses. -Post-harvest applications must be made in a way that minimizes contact with any standing asparagus spears or ferns. -Rainfastness is 1 h. -Maximum use for Callisto: 7.7 fl oz/A per season, no more than 2 applications per year.						

2.b. Cutting Bed: Postemergence

Group	Product Name (*=Restricted Use)	Product Rate	Active Ingredient	Active Ingredient Rate	PHI (d)	REI (h)
1	Shadow 3EC Select 2EC Select Max 0.97EC	4 to 5.33 fl oz/A 6 to 8 fl oz/A 9 to 16 fl oz/A	**clethodim**	0.07 to 0.125 lb/A	1	24
	Poast 1.5EC	1 to 2.5 pt/A	**sethoxydim**	0.2 to 0.5 lb/A	1	12
	Fusilade DX 2EC	8 to 24 fl oz/A	**fluazifop**	0.125 to 0.375	1	12
-**Select 2EC**: use crop oil concentrate (COC) at 1% v/v (1 gal/100 gal of spray solution). **Select Max**: use nonionic surfactant (NIS at 0.25% v/v (1 qt/100 gal of spray solution). **Poast**: use COC at 1.0% v/v. **Shadow 3EC**: use crop oil concentrate (COC) at 1% v/v (1 gal/100 gal of spray solution) for large or stressed grasses; use nonionic surfactant (NIS) at 0.25% v/v (1 qt/100 gal of spray solution) when crop safety is a concern. **Fusilade DX:** use COC at 1.0% v/v or nonionic surfactant at 0.25% v/v. -**The use of COC may increase the risk of crop injury when hot or humid conditions prevail**. To reduce the risk of crop injury, omit additives or switch to NIS when grasses are small and soil moisture is adequate.						
-Use lower labeled rates for annual grass control and higher labeled rates for perennial grass control. -Yellow nutsedge, wild onion, wild garlic, and broadleaf weeds will **not** be controlled. -Controls many annual and certain perennial grasses, including annual bluegrass, but Poast is preferred for goosegrass control. Control may be reduced if grasses are large or under hot or dry weather conditions. -Repeated applications may be necessary to control certain perennial grasses. If repeated applications are necessary, allow 14 days between applications. -**Do not** tank mix with or apply within 2 to 3 days of any other pesticide, unless labeled, as this may increase the risk of crop injury or reduce the control of grasses. -Rainfastness is 1 h. -**Do not** apply more than 8 fl oz/A of Select 2EC in a single application and **do not** exceed 32 fl oz/A for the season; **do not** apply more than 16 fl oz/A of Select Max in a single application and **do not** exceed 64 fl oz/A for the season. -**Do not** apply more than 5.33 fl oz/A of Shadow 3EC in a single application and **do not** exceed 21.33 fl oz/A for the season. -**Do not** apply more than 2.5 pt/A Poast in a single application and **do not** exceed 5 pt/A for the season. -**Do not** apply more than 24 fl oz/A of Fusilade DX in a single application and **do not** exceed 48 fl oz/A per season.						

2.b. Cutting Bed: Postemergence - Shadow, Select, Select Max, Poast, Fusilade - continued next page

2.b. Cutting Bed: Postemergence - Shadow, Select, Select Max, Poast, Fusilade - continued

2	Sandea 75DF	0.5 to 1.5 oz/A	**halosulfuron**	0.024 to 0.07 lb/A	1	12
-Weed control is maximized with the addition of nonionic surfactant at 0.25% v/v (1.0 qt/100 gal of spray solution), however, the addition of surfactants and grass herbicides may enhance crop response. -**Postemergence/Post-transplant:** Apply to asparagus before or during the harvesting season. -**Post-harvest:** Nonionic surfactant should be used post-harvest. Sandea can be applied post-harvest during the fern stage. -**Split application for enhanced control of nutsedge:** Under heavy nutsedge pressure, split applications are recommended. Apply 0.75 to 1 oz/A Sandea during the cutting/harvesting season when the first flush of nutsedge is 3 to 5 leaves, followed by a second application of 0.75 to 1 oz/A at least 21 to 30 days later up to lay-by to control later flushes of nutsedge. -Sandea may cause temporary stunting or twisting of ferns on certain varieties when applied during spear emergence. Contact with ferns may cause temporary yellowing. Crop injury will be minimized and weed control maximized when applications are made with drop nozzles as a directed spray below the ferns to allow for more complete coverage of target weeds. -**Precaution:** For first year transplants, apply no sooner than 6 weeks after fern emergence. -Provides control of yellow nutsedge and certain annual broadleaf weeds. Control of weeds taller than 3 inches may not be adequate. -Sandea is an ALS inhibiting herbicide and resistant weed populations are common in the region. -**Do not** use Group 2 herbicides repeatedly in the same field. **Do not** apply Sandea to crops treated with a soil-applied organophosphate insecticide or use a foliar applied organophosphate insecticide within 21 days before or 7 days after a Sandea application. -Rainfastness is 4 h. -**Do not** apply more than 2 applications, or more than 2 oz/A of product per 12 month period.						
4	Clarity 4SC	8 to 16 fl oz/A	**dicamba**	0.25 to 0.5 lb ae/A	24	24
-May be applied immediately after cutting asparagus but at least 24 h before next cutting. -Controls or suppresses many annual and perennial broadleaf weeds. -Multiple applications can be made per growing season. -If spray contacts emerged spears, crooking (twisting) of some spears may result. If crooking occurs, discard affected spears. -Do not apply Clarity postharvest on spears and young ferns as severe injury may occur. -**Warning: Dicamba spray or vapor drift may injure sensitive crops growing adjacent to treated fields. Do not apply to fields adjacent to sensitive horticultural, fruit, or vegetable crops. Do not apply on days when the temperature is expected to exceed 85 degrees Fahrenheit. Spray residue is difficult to completely remove from sprayers used to apply dicamba. Do not apply dicamba with sprayers which will be used to apply pesticides to sensitive crops.** -Rainfastness is 4 h. Maximum use for Clarity: 16 fl oz/A per season.						
4	Spur 3SL	0.5 to 0.67 pt/A	**clopyralid**	0.188 to 0.25 lb/A	2	12
-Other clopyralid formulations may not be labeled (read the label). -Applications may be made before or during the asparagus cutting season, or after harvest is complete but prior to fern growth. -Apply Spur to control or suppress sensitive annual and perennial broadleaf weeds, including Canada thistle, goldenrod, mugwort, and wild aster species. Apply when majority of weeds' basal leaves have emerged, but before the flower stalk begins to grow. Use the higher rate for more effective control of perennial weeds. -Some crooking or twisting of treated spears may occur. Discard crooked or twisted spears. **Do not** apply if some crooking of emerged spears is not acceptable. Clear-cutting spears just before applying Spur may reduce occurrence of crooking. -Post-harvest layby applications should be made as soon as possible after cutting. Malformed ferns may result from application when spears are longer than 3 inches or with open seed heads. -Spur carryover may affect subsequent crops; observe all plant back restrictions list on label. -Rainfastness is 6 h. Maximum use for Spur: 0.67 pt/A per growing season.						
4	Weedar 64 3.8L	3 to 4 pt/A	**2,4-D**	1.43 to 1.9 lb acid equivalent/A	30	48
-Apply in the spring on actively growing weeds. Use drop nozzles to avoid contact with ferns if applied post-harvest. If asparagus spears are present, treat immediately after cutting. Spears contacted by the spray may be malformed and off-flavored. If spears are malformed by spray, cut immediately and discard. -**Warning: 2,4-D spray or vapor drift may injure sensitive crops growing adjacent to treated fields. Do not apply to fields adjacent to sensitive horticultural, fruit, or vegetable crops. Do not apply on days when the temperature is expected to exceed 85°F. Spray residue is difficult to completely remove from sprayers used to apply 2,4-D. Do not apply 2,4-D with sprayers which will be used to apply pesticides to sensitive crops.** -Minimum of 30 days between applications. -Rainfastness is 6 to 8 h. -Maximum use for Weedar 64 3.8L: 2 applications per crop cycle, 4 pt/A per application, or a combined total of 4.0 lb ai/A 2,4-D per year.						
7	Lorox 50DF	2 to 4 lb/A	**linuron**	1 to 2 lb/A	1	24
-Apply prior to spear emergence, after harvest, or directed postemergence in the fern stage. -Use lower rate on coarse-textured (sandy) soils low in organic matter, and higher rate on fine-textured (silt and clay) soils. Preemergence weed control will be reduced in soils with high organic matter (greater than 5% and peat or muck). -**Preemergence:** make a single application of 2 to 4 lb/A. -**Postemergence**: make 1 to 3 applications of 1 to 2 lb/A before weeds exceed 4 inches in height. Apply before cutting season or immediately after cutting. -**Directed Postemergence (Fern Stage):** make a single application of 4 lb/A as a directed spray. -**Do not** use **FLOWABLE** (liquid) formulation, or crop injury may occur. -**Do not** use surfactant or fertilizer solution in spray mixture. Maximum for Lorox: 4 lb/A per season.						

3. Other Labeled Herbicides These products are labeled but limited local data are available; and/or are labeled but not recommended in our region due to potential crop injury concerns.		
Group	**Product Name (*=Restricted Use)**	**Active Ingredient**
4	Quinstar	**quinclorac**
14	Aim	**carfentrazone**
14	Chateau	**flumioxazin**
14	Zeus	**sulfentrazone**
22	Reglone	**diquat**

Insect Control

THE LABEL IS THE LAW-see the Pesticide Use Disclaimer on the first page of Chapter F. Recommended Insecticides

Asparagus Aphids

Watch for tiny (1/16 inch long), bluish-green aphids building up on brush. Aphids prefer to feed on ferns. Damage is primarily from a toxin that the aphids inject into the plant when feeding, which causes shortening of the internodes and rosette, brush-like or 'witches broom' appearance of the foliage, especially near the tips of the lower branches. Protection may be crucial in newly seeded plantings and young cutting beds. The recommended economic threshold is when 5% of ferns are injured. New plantings and seedbeds can tolerate less foliar injury than established plantings and may require a lower action threshold. The asparagus aphid overwinters in the egg stage on the fern residue left in the field, so mowing, chopping up, and then incorporating ferns during the dormant season may substantially reduce eggs in the area.

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
1B	Malathion 57 EC	1.5 to 2.0 pt/A	malathion	1	12	H
3A	PyGanic Crop protection EC 5.0 II (OMRI)	4.5 to 15.61 fl oz/A	pyrethrins	0	12	H
4A	Assail 30SG Assail 30SC	2.5 to 5.3 oz/A 2.1 to 4.5 fl oz/A	acetamiprid	1	12	M
9B	Fulfill 50WDG	2.75 oz/A	pymetrozine - **apply to ferns after harvest**	170	12	L

Asparagus Beetles

Apply when needed during cutting season and late summer. Prevent large numbers of beetles from overwintering and laying eggs on spears in spring by spraying ferns in early fall. Daily harvest will minimize exposure and reduce damage. The recommended economic threshold is when 10% or more of the spears are infested with beetles (1 or more per plant) or 1-2% have eggs or feeding damage. Treat ferns if 50-75% are infested.

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
1A	Lannate LV*	1.5 to 3.0 pt/A	methomyl	1	48	H
1A	Sevin XLR Plus	1.0 qt/A pre-harvest 2.0 qt/A post-harvest	carbaryl	1	12	H
1B	Dimethoate 400	1.0 pt/ A post harvest	dimethoate -**post-harvest protection of ferns only**	180	48	H
1B	Malathion 57EC	1.5 to 2.0 pt/A	malathion	1	12	H
3A	PyGanic Crop protec-tion EC 5.0 II (OMRI)	4.5 to 15.61 fl oz/A	pyrethrins	0	12	H
3A	Permethrin 3.2EC*, others	2.0 to 4.0 fl oz/A	permethrin	1	12	H
4A	Assail 30SG Assail 30SC	2.5 to 5.3 oz/A 2.1 to 4.5 fl oz/A	acetamiprid	1	12	M
5	Entrust SC (OMRI)	4.0 to 6.0 fl oz/A	spinosad -**post-harvest protection of ferns only**	60	4	M
5	Radiant SC	4.0 to 8.0 fl oz/A	spinetoram -**post-harvest protection of ferns only**	60	4	M

Asparagus Fern Caterpillars (Beet Armyworms and Yellow-Striped Armyworms)

Treat when larvae are visibly present in the ferns. Treatments are most effective when larvae are small. Michigan State uses a threshold of 0.7 yellow-striped armyworm per 4 plants. *(continued next page)*

Asparagus Fern Caterpillars (Beet Armyworms and Yellow-Striped Armyworms) - continued

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
1A	Lannate LV*	1.5 to 3.0 pt/A	methomyl	1	48	H
28	Coragen 1.67SC Coragen eVo	3.5 to 7.5 fl oz/A 1.2 to 2.5 fl oz/A	chlorantraniliprole **- foliar**	1	4	L

Cutworms See also section E 3.1. Soil Pests - Detection and Control.

Note. Early spears are the most heavily damaged because they are first to appear and grow slowest. Dig up to ½ inch deep around crowns and use bait if you find 1 cutworm larva or 1 severely damaged spear per 20 plants.

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
1A	Lannate LV*	1.5 to 3.0 pt/A	methomyl	1	48	H
1A	Sevin XLR Plus	1.0 qt/A pre-harvest 2.0 qt/A post-harvest	carbaryl	1	12	H
3A	Permethrin 3.2EC*, others	2.0 to 4.0 fl oz/A	permethrin	1	12	H
5	Seduce (OMRI)	20 to 44 lb/A	spinosad - **post-harvest protection of ferns only**	60	4	M

Japanese Beetles

Apply to foliage after the cutting season:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
3A	Permethrin 3.2EC*, others	4.0 fl oz/A	permethrin - **post-harvest protection of ferns only**	1	12	H
4A	Assail 30SG Assail 30SC	5.3 oz/A 4.5 fl oz/A	acetamiprid	1	12	M

Thrips

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
1B	Malathion 57EC	1.5 to 2.0 pt/A	malathion	1	12	H
3A[1]	PyGanic Crop protection EC 5.0 II (OMRI)	4.5 to 15.61 fl oz/A	pyrethrins	0	12	H
4A[2]	Assail 30SG Assail 30SC	5.3 oz/A 4.5 fl oz/A	acetamiprid	1	12	M

[1]Resistance concerns with western flower thrips [2]Resistance concerns with tobacco thrips

Disease Control

THE LABEL IS THE LAW-see the Pesticide Use Disclaimer on the first page of Chapter F.

Recommended Fungicides

Seed Treatment, For NJ Only

Dip seed in a solution containing 1.0 pt/gal of Clorox in water for 1-2 minutes with constant agitation. Use 1.0 gal of this diluted Clorox solution per 2 lb of seed. Prepare a fresh solution for each batch of seed. Wash seed for 5 minutes in running water and dry thoroughly at room temperature.

Bacterial and Fungal Diseases

Asparagus Rust

For long-term management of rust, plant resistant varieties; see the Recommended Varieties table above. Control is especially important in 1- or 2-year-old beds, even with the use of resistant varieties. Scout fields, particularly non-cutting beds, for disease beginning in late June. Traditionally, sprays begin in August depending on weather and disease pressure. Rotate between the fungicides in the table below at the first sign of disease or when conditions favor disease development. Use high rates under severe pressure from rust. *(continued next page)*

Code	Product Name (*=Restricted Use)	Product Rate	Active Ingredient(s)	PHI (d)	REI (h)	Bee TR
Rotate or tank mix one of the following protectant fungicides						
M03	mancozeb 75DF	2.0 lb/A	mancozeb	180	24	N
M05	chlorothalonil 6F	2.0 to 4.0 pt/A	chlorothalonil	190	12	N
With one of the following fungicides[1]						
3	Rally 40WSP	5.0 oz/A plus adjuvant	myclobutanil	180	24	N
3	tebuconazole 3.6F	4.0 to 6.0 fl oz/A	tebuconazole	180	12	N
M03 + 11	Dexter Max	2.0 to 2.2 lb/A	mancozeb + azoxystrobin	180	24	--

[1]Rally and tebuconazole 3.6F should not be used consecutively; overuse of FRAC code 3 fungicides could lead to fungicide resistance development.

Fusarium Root Rot The pathogen is ubiquitous in soils and may be present in fields where no asparagus has been grown. Plant varieties with tolerance to Fusarium Root Rot; see the Recommended Varieties table above. Stress caused by heavy insect feeding damage, herbicide injury, overharvesting, low soil pH, or low fertility may predispose crowns to Fusarium infection. For crown production, always plant treated seed and select a site where asparagus has never been grown before. For production fields, always plant disease-free crowns, transplants, or seed and select well-drained sites. If this is not possible, select fields that have not been in asparagus production for at least 8 years.

Leaf Blights Excessive rainfall during the summer months may lead to fungal leaf blights caused by *Alternaria* and *Cercospora* spp. Heavy infections may lead to premature defoliation and poor plant vigor later in the season and the following spring. The most noticeable signs of early leaf blight will be sporadic 'hot spots' of brown, dying ferns. Fields should be scouted regularly, especially during periods of prolonged wet weather. Additional fungicide applications may be necessary beyond those for Purple spot and Rust control. Fungicides used to control Purple Spot and Rust, such as chlorothalonil, tebuconazole 3.6F, or mancozeb will be useful for leaf blight control. Apply and rotate the following fungicides on a 7-14 day schedule as long as weather conditions are favorable for disease development.

Code	Product Name (*=Restricted Use)	Product Rate	Active Ingredient(s)	PHI (d)	REI (h)	Bee TR
M03	mancozeb 75DF	2.0 lb/A	mancozeb	180	24	N
M05	chlorothalonil 6F	2.0 to 4.0 pt/A	chlorothalonil	190	12	N
With one of the following fungicides						
3	tebuconazole 3.6F	4.0 to 6.0 fl oz/A	tebuconazole	180	12	N
M03 + 11	Dexter Max	2.0 to 2.2 lb/A	mancozeb + azoxystrobin	180	24	--

Phytophthora Crown and Spear Rot In fields with poor drainage or low areas, apply one of the following fungicides according to the label. **Cutting fields:** Apply 30-60 days before the first harvest and make a second application prior to first cutting. **Do not** apply Ridomil Gold, Ultra Flourish, MetaStar, or Orondis Gold one day prior to harvest or illegal residues may result. **New plantings:** Apply after planting seedlings or after covering crowns. See labels for specific instructions.

Code	Product Name (*=Restricted Use)	Product Rate	Active Ingredient(s)	PHI (d)	REI (h)	Bee TR
4	Ridomil Gold 4SL	1.0 pt/A	mefenoxam	AP	48	N
4	Ultra Flourish 2E	2.0 pt/A	mefenoxam	AP	48	N
4	MetaStar 2E AG	2 qt/A	metalaxyl	AP	48	N
4 + 49	Orondis Gold	28.0 to 55.0 fl oz/A	mefenoxam + oxathiapiprolin	AP	48	N

Purple Spot Remove, mow, or burn brush (*i.e.*, dead ferns) after frost or during winter months to destroy the overwintering sources of the fungi (see Brush Removal above). Fungicide applications are not practical during the production season, because new spears emerge daily. Once fern stalks are full size, scout on a weekly basis and rotate the fungicides listed below every 2 to 4 weeks as long as conditions favor disease development or until frost.

Code	Product Name (*=Restricted Use)	Product Rate	Active Ingredient(s)	PHI (d)	REI (h)	Bee TR
M05	chlorothalonil 6F	2.0 to 4.0 pt/A	chlorothalonil	190	12	N
11	azoxystrobin 2.08F	6.2 to 15.5 fl oz/A	azoxystrobin	100	4	N
M03+11	Dexter Max	2.0 to 2.2 lb/A	mancozeb + azoxystrobin	180	24	--

If you are having a medical emergency after using pesticides, always call 911 immediately.

POISON Help®
1-800-222-1222

In Case of an Accident

- Remove the person from exposure
- Get away from the treated or contaminated area immediately
- Remove contaminated clothing
- Wash with soap and clean water
- Call a physician and/or the National Poison Control Center (1-800-222-1222). Your call will be routed to your State Poison Control Center.
- Have the pesticide label with you!
- Be prepared to give the EPA registration number to the responding center/agency