RUTGERS
New Jersey Agricultural Experiment Station

This is a section from the

2018 Mid-Atlantic Commercial Vegetable Production Recommendations

The manual, which is published annually, is **NOT** for home gardener use.

The **full manual**, containing recommendations specific to New Jersey, can be found on the Rutgers NJAES website in the Publications section:
http://njaes.rutgers.edu/pubs/publication.asp?pid=E001.

The **label** is a legally-binding contract between the 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.

Cooperating Agencies: Rutgers, The State University of New Jersey, U.S. Department of Agriculture, and County Boards of Chosen Freeholders. Rutgers Cooperative Extension, a unit of the Rutgers New Jersey Agricultural Experiment Station, is an equal opportunity program provider and employer.

F. Commodity Recommendations

Pesticide Use Disclaimer

THE LABEL IS THE LAW
Before using a pesticide, check the label for up to date rates and restrictions.

Labels can be downloaded from: *http://www.cdms.net/, http://www.greenbook.net/* or *http://www.agrian.com/labelcenter/results.cfm*

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

1. Pesticides are listed by **group or code number based on chemical structure and mode of action**, as classified by the Weed Science Society of America (WSSA) for herbicides, the Insecticide Resistance Action Committee (IRAC) for insecticides, and the Fungicide Resistance Action Committee (FRAC) for fungicides.
   If the number is in bold font, the product may have resistance concerns.

2. For **restricted use pesticides**, the restricted active ingredients are labeled with a *****. See the Pesticide Safety chapter for more information.

3. **In addition to the pesticides listed below, other formulations or brands with the same active ingredient(s) may be available. ALWAYS CHECK THE LABEL:**

a) to ensure a pesticide is labeled for the same use,
b) to ensure the pesticide is labeled for the desired crop, and
c) for additional restrictions.

4. All pesticide recommendations are made for spraying a **broadcast area of 1 acre** (43,560 square feet). **Adjust the rate for banded applications** (for more information, see the Pest Management chapter, Calibrating Granular Applicators section).

5. Check the label for 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 crop if bees are present; H=highly toxic, severe losses expected, -- = data not available.

Leeks

Recommended Varieties[1]

Belton* (summer/fall)[2]	Matejho RZ (summer/fall)	Rally* (summer)
Lancelot (fall/overwinter)	Megaton* (summer/fall)	Runner* (summer)
Lexton (overwinter)	Pandora (summer/fall)	Tadorna (fall/overwinter)

[1]Varieties listed in alphabetical order; [2]Harvest period in parentheses; *Indicates F1 hybrid varieties.

Recommended Nutrients Based on Soil Tests

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

Leeks[1]		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
	100-125	200	150	100	0	200	150	100	0	Total nutrient recommended
	50-75	200	150	100	0	200	150	100	0	Broadcast and disk-in
	25-50	0	0	0	0	0	0	0	0	Sidedress 3-4 weeks after planting if needed

[1]Apply 3-4 lb/A of boron (B) with broadcast fertilizer; see also Table B-7 in the Soil and Nutrient Management chapter.

Seeding and Transplanting

For early spring plantings, southern transplants are used. For summer plantings, sow in seedbeds from early March to mid-May. About 2 lb of seed are required to provide enough plants to set an acre. Plant seed 1/3 to ½ inch deep 12-16 weeks before field setting. Transplants can be produced in 200-288 deep cell trays. Plants will be ready to set in early August. Spring leeks should be seeded approximately the third week of December and the fall crop approximately the first week of June.

Field Spacing

Rows 20-30 in. apart; plants 4-6 in. apart in the row. Set plants in trenches 3-4 in. deep using celery-type planter.

Culture

Leeks grow slowly for the first 2 or 3 months. To develop a long white stem, start to gradually fill in trenches and then hill soil around stems to 3 or 4 inches.

Harvest and Post Harvest Considerations

Spring-transplanted leeks are ready for harvest in July. August-planted leeks are ready for harvest by November or can be overwintered. Half-mature leeks of the hardy varieties will stand winter freezing with some protection such as salt hay or straw if planted in very cold areas. In mild winter areas no protection is required and leeks will be ready for harvesting early in the spring. Undercut the leeks with a bar on a tractor or for smaller plantings dig with a spading fork.

After digging, leeks can be left in the field to dry for a short period. Leeks are bunched with 3-4 leeks per bunch. If soil sticks to the leeks, power wash the bunches before packing. If necessary, leeks can be cooled by icing in the box, hydrocooling or vacuum cooling with a water spray. Store leeks at 32-36°F and 95-100% relative humidity. Typical storage time is 7-21 days, but up to 2 months is possible.

Weed Control

THE LABEL IS THE LAW - See the Pesticide Use Disclaimer on page F 1.

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-2) in the Pest Management chapter.

2. Minimize herbicide resistance development. Identify the herbicide site mode of action group and follow recommended good management practices. Include non-chemical weed control whenever possible.

1. Soil-Applied (Preemergence)

Group	Product Name	Product Rate	Active Ingredient (*=Restricted Use)	Active Ingredient Rate	PHI (d)	REI (h)
3	Dacthal 6F Dacthal W-75	8.0 to 14.0 pt/A 6.0 to 14 lb/A	**DCPA**	6.0 to 10.5 lb/A	--	12
-Labeled for both bulb onions and green onions. Apply at time of seeding or immediately after planting sets. -Labeled for applications directly over transplants without crop damage. -A second application may be needed for longer season seed onions; but will not control emerged weeds. -Primarily controls annual grasses and a few broadleaf weeds, including common purslane. -Results have been most consistent when used in fields with coarse -textured soils low in organic matter, and when the application are followed by rainfall or irrigation. Maximum application not addressed on label.						
3	Prowl H2O 3.8CS	2 pt/A	**pendimethalin**	0.5 lb/A	30	24
-Apply at time of seeding or postemergence; **do not** mechanically incorporate. **Do not** apply preemergence to onions planted on mineral soils with less than 3% organic matter or injury may occur. Onion seed must be fully covered by soil, injury may occur if seed is exposed. Prowl H2O can be applied directly over emerged plants with 2 to 3 true leaves without crop damage. -If sequential applications are made, allow 30 days between applications -Primarily controls annual grasses and certain broadleaf weeds. -**Do not** apply more than 2 pt/A per application; and **do not** apply more than 4 pt/A per season.						

2. Postemergence

Group	Product Name	Product Rate	Active Ingredient (*=Restricted Use)	Active Ingredient Rate	PHI (d)	REI (h)
1	Poast 1.5EC	1.0 to 1.5 pt/A	**sethoxydim**	0.2 to 0.3 lb/A	30	12
-Apply with crop oil concentrate at 1.0% v/v (1.0 gal/100 gal of spray solution). **The use of oil concentrate 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 nonionic surfactant when grasses are small and soil moisture is adequate. -Control may be reduced if grasses are large or if hot, dry weather or drought conditions occur. -Yellow nutsedge, wild onion, or broadleaf weeds will not be controlled. -Repeated applications may be needed to control certain perennial grasses. -**Do not** tank-mix with or apply within 1 week before or any other pesticide unless labeled. The risk of crop injury may be increased, or reduced control of grasses may result. -Rainfastness 1 hr. **Do not** apply more than 1.5 pt/A in single application and maximum Poast application per season is 4.5 pt/A.						
15	Dual Magnum	0.67 to 1.33 pt/A	**s-metolachlor**	0.64 to 1.27 lb/A	21	24
-**A special Local-Needs 24© Label has been approved for the use of Dual Magnum in leeks in NJ.** -The use of Dual Magnum is legal ONLY if a waiver of liability has been completed (see *http://www.farmassist.com/*). -Apply after leeks have reached the 2 true leaf stage of growth; Dual Magnum will not control weeds that have emerged at time of application. -Use lower rate on lighter coarse-textured sandy soils and the higher rate on heavier fine-textured soils. **Do not** use on coarse textured soils with less than 1% organic matter. -Follow with overhead irrigation if rainfall does not occur. -Primarily controls annual grass and certain broadleaf weeds, including galinsoga preemergence. -**Do not** apply more than once per crop season; and **do not** exceed 1.33 pt/A per crop season.						

3. Postharvest

22	Gramoxone SL 2.0	2.25-3 pt/A	**paraquat***	0.56-0.75 lb/A	--	24
-**For post-harvest desiccation of vegetable vines. A Special Local-Needs 24© label has been approved for the use of Gramoxone SL 2.0 for postharvest desiccation of the crop in DE, NJ and VA.** Apply after the last harvest. Always include an adjuvant. -Spray coverage is essential for optimum effectiveness. Rainfastness 30 minutes. -A maximum of 2 applications for crop dessication are allowed.						

Insect Control

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Recommended Insecticides

Allium Leafminers

This new pest to the mid-Atlantic area is a long grey-black fly with a distinctive yellow or orange patch on the top of its head, yellow sides and "knees" (femur-tibia junction), and white halteres (knobs as second pair of wings). The larvae are a typical whitish maggot. Leek (*A. porrum*) tends to be the most damaged Allium species. Females repeatedly puncture leaves with their ovipositor, resulting in a line of small white dots near the tip. Leaves can be wavy, curled and distorted. Larvae mine leaves, and move into bulbs and leaf sheathes where they pupate. Covering plants in February, prior to the emergence of adults, and keeping plants covered during spring emergence, can exclude the pest. Avoid the adult oviposition period by delaying planting, cover fall plantings during the 2nd generation flight and grow leeks as far as possible from chives. Systemic and contact insecticides can be effective.

Apply one of the following formulations:						
Group	**Product Name**	**Product Rate**	**Active Ingredient(s) (*=Restricted Use)**	**PHI (d)**	**REI (h)**	**Bee TR**
3A	Mustang Maxx	2.88 to 4.0 fl oz/A	zeta-cypermethrin*	7	12	H
4A	Scorpion 35SL	8.75 to 10.5 fl oz/A	dinotefuran - **soil**	1	12	H
4A	Scorpion 35SL	5.25 to 7.0 fl oz/A	dinotefuran - **foliar**	1	12	H
4A	Venom 70SG	5.0 to 6.0 fl oz/A	dinotefuran - **soil**	1	12	H
4A	Venom 70SG	3.0 to 4.0 fl oz/A	dinotefuran - **foliar**	1	12	H
5	Entrust SC (OMRI)	3.0 to 6.0 fl oz/A	spinosad	1	4	M
5	Radiant SC	6.0 to 10.0 fl oz/A	spinatoram	1	4	H
17	Trigard WSP	2.66 oz/A	cyromazine	0	12	L
28 + 6	Minecto Pro	7.0 to 10.0 fl oz/A	cyantraniliprole + abamectin*	30	12	H

Aphids

Aphids found on leeks and other related vegetables are usually dark red or black. They are attracted to the compounds in Allium species that give them their distinctive smell. They walk short distances between plants and spread over long distances via air currents. They can survive on volunteer plants or on bulbs in storage. Aphids suck the sap of leek plants which can cause them to collapse. Look for aphids on leaves in the early to mid-season.

Apply one of the following formulations:						
Group	**Product Name**	**Product Rate**	**Active Ingredient(s) (*=Restricted Use)**	**PHI (d)**	**REI (h)**	**Bee TR**
1B	Malathion 57EC	1.5 to 2.0 pt/A	malathion	3	24	H
3A	Mustang Maxx	2.24 to 4.00 fl oz/A	zeta-cypermethrin*	7	12	H
4A	Assail 30SG	5.0 to 8.0 oz/A	acetamiprid	7	12	H
28 + 6	Minecto Pro	10 fl oz/A	cyantraniliprole + abamectin*	30	12	H

Armyworms (AW), Cutworms (CW), Cabbage Loopers (CL)

These lepidopteran pests (caterpillars) come in various colors and shapes and can be found from the beginning till the end of the season. Cutworms are found very early in the season. They are immigrants from southern regions, or have passed the winter in the area as pupae. Lepidopteran pest infestations are sporadic; no reliable methods have been found for predicting their occurrence. Plants should be scouted from planting until harvest for foliar feeding.

Apply one of the following formulations:						
Group	**Product Name**	**Product Rate**	**Active Ingredient(s) (*=Restricted Use)**	**PHI (d)**	**REI (h)**	**Bee TR**
3A	Mustang Maxx	2.24 to 4.00 fl oz/A	zeta-cypermethrin*	7	12	H
5	Entrust SC (OMRI)	3.0 to 6.0 fl oz/A (AW and CL)	spinosad	1	4	M
5	Radiant SC	5.0 to 10.0 fl oz/A (AW and CL)	spinetoram	1	4	H
11A	Dipel (OMRI)	0.5 to 2.0 lb/A (CW and CL); 1.0 to 2.0 lb/A (AW)	*Bacillus thuringiensis kurstaki*	0	4	N
18	Intrepid 2F	4.0 to 8.0 fl oz/A (AW)	methoxyfenozide	1	4	L
28 + 6	Minecto Pro	7.0 to 10.0 fl oz/A	cyantraniliprole + abamectin*	30	12	H

Onion Maggots

This pest is more important in onions, but it can also be a problem in leeks. Planting successive crops of any Allium species in the same field increases the likelihood of maggot damage. Adults resemble small, slender house flies. There are 3 generations each year, but the spring generation is generally most damaging. Flies live for 2-4 weeks and are capable of migrating about a mile in search of suitable hosts. Females oviposit on the soil near the plants or occasionally on the young leaves or plant necks. Maggot feeding causes wilting of foliage, after which it collapses. Larger leeks may survive, but have distorted growth.

Apply one of the following formulations:						
Group	**Product Name**	**Product Rate**	**Active Ingredient(s) (*=Restricted Use)**	**PHI (d)**	**REI (h)**	**Bee TR**
1B	Malathion 57EC	1.5 to 2.0 pt/A (adults only)	malathion	3	24	H
3A	Mustang Maxx	2.24 to 4.00 fl oz/A (adults only)	zeta-cypermethrin*	7	12	H

Thrips

Thrips pierce plant tissue and remove liquids. Immature thrips often feed on young tissue between the leaf sheaths and the stem; adults feed on more mature tissue. Feeding injury results in whitish or chlorotic blotches. Extended feeding can reduce bulb size and increase leaf and bulb rots. Effective management relies on high pressure, high gallonage sprays for thorough coverage and penetration into the foliage.

Apply one of the following formulations:						
Group	**Product Name**	**Product Rate**	**Active Ingredient(s) (*=Restricted Use)**	**PHI (d)**	**REI (h)**	**Bee TR**
1B	Malathion 57EC	1.5 to 2.0 pt/A	malathion	3	24	H
3A	Mustang Maxx	2.88 to 4.00 fl oz/A	zeta-cypermethrin*	7	12	H
4A	Assail 30SG	5.0 to 8.0 oz/A	acetamiprid	7	12	H
4A	Scorpion 35SL	8.75 to 10.5 fl oz/A	dinotefuran - **soil**	1	12	H
4A	Scorpion 35SL	5.25 to 7.0 fl oz/A	dinotefuran - **foliar**	1	12	H
4A	Venom 70SG	5.0 to 6.0 fl oz/A	dinotefuran - **soil**	1	12	H
4A	Venom 70SG	3.0 to 4.0 fl oz/A	dinotefuran - **foliar**	1	12	H
5	Entrust SC (OMRI)	3.0 to 6.0 fl oz/A	spinosad	1	4	M
5	Radiant SC	6.0 to 10.0 fl oz/A	spinetoram	1	4	H
28 + 6	Minecto Pro	7.0 to 10.0 fl oz/A	cyantraniliprole + abamectin*	30	12	H

Disease Control

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Recommended Fungicides

Damping-Off caused by *Phytophthora, Pythium*, and *Rhizoctonia*

Code	**Product Name**	**Product Rate**	**Active Ingredient(s) (*=Restricted Use)**	**PHI (d)**	**REI (h)**	**Bee TR**
FOR SEEDED BEDS: (Note: Apron XL LS and Maxim 4FS can be combined**).**						
For Pythium and Phytophthora control, use a seed treatment such as:						
4	Apron XL LS	0.085 to 0.64 fl oz/100 lb seed	mefenoxam	NA	NA	NA
For control of other root rots apply:						
4	Maxim 4FS	0.08 to 0.16 fl oz/100 lb seed	fludioxonil	NA	NA	NA
FOR TRANSPLANTED BEDS:						
For Pythium root rot control apply one of the following as a banded spray:						
4	Ridomil Gold 4SL	0.5 to 1.0 pt/A	mefenoxam	AP	48	N
4	MetaStar 2E AG	2.0 to 4.0 pt/A	metalaxyl	AP	48	N
For Rhizoctonia root rot control apply as in-furrow application:						
11	azoxystrobin 2.08F	0.40 to 0.80 fl oz/1000 ft row	azoxystrobin	0	4	N
For Pythium and Rhizoctonia root rot control apply as banded spray application:						
4 + 11	Uniform 3.66SC	0.34 fl oz/1000 ft row (see label)	mefenoxam + azoxystrobin	AP	0	N

Downy Mildew (*Peronospora destructor*)

Downy mildew on leeks is caused by the same pathogen as for onion and garlic. Its development is promoted by cool, moist conditions. Management begins with planting pathogen-free seed or sets and crop rotations of at least 3 years without related crops. Be sure to eliminate culls and volunteers from the field.

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
Apply one of the following preventatively prior to the onset of disease. Notes: 1) Do not apply chlorothalonil more than 3 times per season. 2) Forum 4.18SC must be tank mixed with another fungicide effective for downy mildew.						
M5	chlorothalonil 6F	1.5 to 3.0 pt/A	chlorothalonil	14	12	L
40	Forum 4.18SC	6.0 fl oz/A	dimethomorph	0	12	N
Rotate one of the following FRAC code 7 or 11 fungicides every 7 d when conditions favor disease development or when symptoms are present in the field:						
7	Fontelis 1.67SC	16.0 to 24.0 fl oz/A	penthiopyrad	0	12	L
7 + 11	Merivon 2.09SC	8.0 to 11.0 fl oz/A (for suppression)	fluxapyroxad + pyraclostrobin	7	12	N
7 + 11	Pristine 38WP	18.5 oz/A (for suppression)	boscalid + pyraclostrobin	7	12	--
11	azoxystrobin 2.08F	9.0 to 15.5 fl oz/A	azoxystrobin	0	4	N
11	Cabrio 20EG	12.0 oz/A	pyraclostrobin	7	12	N
Rotate one of the above with the following every 7 d as long as weather conditions favor disease development:						
3	Folicur 480SC	4.0 to 6.0 fl oz/A	tebuconazole	7	12	N

Fusarium Basil Rot

Leaf tips of infected plants will turn yellow and curl and eventually entire leaves will become chlorotic, turn brown and decay. Infected roots will turn dark brown. The outermost layers of infected bulbs will have a watery, brown discoloration. White mycelium may be present. The pathogen can survive in the soil for many years. Rotate away from leeks, garlic or onions for 4-5 years minimum. Avoid excess fertility. Insect feeding damage can increase basil rot; control onion maggot and other insects that may feed on bulbs.

Purple Blotch

Begin preventative applications in the fall as soon as transplants are set out especially in fields with a history of the disease. Rotate the following at 7-10 d intervals as long as night temperatures remain warm and there are extended periods of leaf wetness.

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
Apply the following preventatively prior to the onset of disease. Do not apply chlorothalonil more than 3 times per season.						
M5	chlorothalonil 6F	1.5 to 3.0 pt/A	chlorothalonil	14	12	L
Tank mix or rotate the above with one of the following FRAC code 3, 7 or 11 fungicides when conditions favor disease development or when symptoms are present in the field. Rotate fungicides with different modes of action.						
3	Folicur 480SC	4.0 to 6.0 fl oz/A	tebuconazole	7	12	N
3 + 9	Inspire Super 2.82 SC	16.0 to 20.0 fl oz/A	difenoconazole + cyprodinil	7	12	--
7	Endura 70WG	6.8 oz/A	boscalid	7	12	--
7	Fontelis 1.67SC	16.0 to 24.0 fl oz/A	penthiopyrad	0	12	L
7 + 11	Pristine 38WP	10.5 to 18.5 oz/A	boscalid + pyraclostrobin	7	12	--
11	Cabrio 20EG	8.0 to 12.0 oz/A	pyraclostrobin	7	12	N
11	azoxystrobin 2.08F	6.0 to 12 fl oz/A	azoxystrobin	4	0	N

White Rot (*Sclerotium cepivorum*)

White Rot is severe only on overwintered leeks. Cool, moist soil conditions that are favorable for the growth of leek, garlic and onion are also ideal for white rot. Infection occurs at soil temperatures between 50-75°F (60-65°F optimum). The disease is greatly inhibited above 78°F. Sclerotia can survive for over 20 yr, even in the absence of a host plant. In treated fields, do not grow crops other than leek and leafy vegetables during the harvest year, and do not grow leeks, garlic, leafy vegetables, tomatoes, root crops, cereal grains or soybeans the following year.

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
Apply the following fungicide at 10-14 d intervals (for suppression only):						
3	Folicur 480SC	4.0 to 6.0 fl oz/A	tebuconazole	7	12	N

For Immediate Medical Attention

Call 911

For a Pesticide Exposure Poisoning Emergency Call

For All States

This number will automatically connect you to the poison center nearest you.
Anyone with a poisoning emergency can call the toll-free telephone number for help. Personnel at the Center will give you frst-aid information and direct you to local treatment centers if necessary.

For Pesticide Spills

Small Spills: See the product label for cleanup advice.
Large spills: Call the National Response Center at 1-800-424-8802 or CHEMTREC at 800-424-9300 (24 hours) - Industry assistance with emergency response cleanup procedures for large, dangerous spills.
Be aware of your responsibility to report spills to the proper state agency.