Pesticide	Use Category[1]	Hours to Reentry[2]	Days to Harvest
INSECTICIDE			
acetamiprid	G	12	7
Bacillus thuringiensis	G	4	0
beta-cyfluthrin	R	12	0
bifenthrin + imidacloprid	R	12	7
carbaryl	G	12	14
Chenopodium extract	G	4	0
chlorantraniliprole (soil or drip/foliar)	G	4	10/3
dimethoate	R	48	14
emamectin benzoate	R	48	14
endosulfan	R	24	21
flonicamid	G	12	0
flubendiamide	G	12	1
imidacloprid (soil/foliar)	G	12	21/7
imidacloprid + cyfluthrin	R	12	7
indoxacarb	G	12	3
methomyl	R	48	10
methoxyfenozide	G	4	1
spinetoram	G	4	1
spinosad	G	4	1
tebufenozide	G	4	7
thiamethoxam	G	12	7
thiamethoxam + chlorantraniliprole (soil or drip/foliar)	G	12	30/7
FUNGICIDE (FRAC code)			
Aliette (Group 33)	G	12,24	3
Cabrio (Group 11)	G	12	0
copper, fixed (Group M1)	G	24	0
Folicur (Group 3)	G	12	7
Forum (Group 40)	G	12	0
Quadris (Group 11)	G	4	0
Ridomil Gold (Group 4)	G	12	0
Switch (Group 9 + 12)	G	12	7

See Table D-6.

[1] G = general, R = restricted

[2] Chemicals with multiple designations are based on product and/or formulation differences. CONSULT LABEL.

Disease Control

Damping-Off (caused by Pythium, Rhizoctonia or Phytophthora spp.).

Apply the following preplant incorporated or as a soil-surface spray after planting:

Ridomil Gold--1.0-2.0 pt 4SL/A (turnip greens only), or
Quadris--0.40-0.80 floz 2.08SC/1,000 row ft.

Downy Mildew

Apply the following during periods of high moisture and moderate temperatures (for disease suppression) and continue every 14 days.

Forum--6.0 fl oz 4.18SC/A *plus* fixed copper, or
Aliette--3.0 lb 80WDG/A (for mustard greens only)

Leaf Spot

Practice good crop rotation with crops other than crucifers. When conditions favor disease development, alternate the following every 7 to 10 days:

Quadris--6.0-15.5 oz 2.08SC/A, or
Cabrio--8.0-16.0 oz 20EG/A, or

with

Folicur--3.0-4.0 fl oz 3.6F/A or OLF, or

with

Switch--11.0-14.0 oz 62.5WG/A or
copper, fixed--0.75-1.5 lb 53.8DF/A or OLF

HORSERADISH

Horseradish is a hardy perennial belonging to the mustard family. The fleshy, white root roughly resembles the parsnip in shape. Use local selected strains that are adapted to the area.

Recommended Nutrients Based on Soil Tests

Before using the table below, refer to important notes in Plant Nutrient Recommendations in Section B, Soil And Nutrient Information. These notes provide additional suggestions to adjust rate, timing and placement of nutrients depending on soil type cation exchange capacity and existing fertility levels.

Horseradish	Pounds N per Acre	Soil Phosphorus Level Low Pounds P_2O_5 per Acre	Med	Opt.	Soil Potassium Level Low Pounds K_2O per Acre	Med	Opt.
	150-200[1]	200[1]	150[1]	100[1]	200[1]	150[1]	100[1]
Loamy sands and	50[2]	200[2]	150[2]	100[2]	200[2]	150[2]	100[2]
Sandy loams	50-100[3]	0[3]	0[3]	0[3]	0[3]	0[3]	0[3]
	50[4]	0[4]	0[4]	0[4]	0[4]	0[4]	0[4]
Loams and silt	100-150[1]	200[1]	150[1]	100[1]	200[1]	150[1]	100[1]
loams	100[2]	200[2]	150[2]	100[2]	200[2]	150[2]	100[2]
	50[5]	0[5]	0[5]	0[5]	0[5]	0[5]	0[5]

Apply 1 - 2 pounds of boron (B) per acre with broadcast fertilizer. See Table B-10 for more specific boron recommendations.

[1] Total amount nutrient recommended; growers producing vegetables on soils with high clay contents should reduce the recommended nitrogen and potassium rates by 20% and increase the phosphorus rate by 25%.

[2] Suggested method of application broadcast and disk-in

[3] Sidedress 3-5 weeks after planting

[4] Sidedress later in season if needed

[5] Sidedress 4-6 weeks after planting if needed

Sets for Planting

Sets are selected roots from the previous crop. They should be 10 to 12 inches long and 1/4 to 5/8 inch in diameter. To ensure proper orientation of roots at planting, make a square cut at the end of the root nearest the main root, and at the other end make a slanting cut.

Planting and Spacing

Plant in late April to early May. Place sets at an angle in a furrow so the top end will be 1 inch deep and the bottom 2 inches deep. Sets should point in the same direction that the cultivator will go, e.g., for two-row cultivator, two rows in one direction and the next two rows in the opposite direction. Space rows 34 to 36 inches apart with 18 inches between sets in the row.

Weed Control

Identify the weeds in each field and select recommended herbicides that control those weeds. See Tables E-2 and E-3.

Match preplant incorporated and preemergence herbicide rates to soil types and percent organic matter in each field.

Find the herbicides you plan to use in the Herbicide Resistance Action Committee's (HRAC) **Herbicide Site of Action Table E-7** and follow the recommended good management practices to minimize the risk of herbicide resistance development by weeds in your fields.

Preemergence

DCPA--6-10.5 lb/A. Apply 8 to 14 pints per acre Dacthal 6F immediately after planting to control annual grasses and some broadleaf weeds.

Oxyfluorfen--0.5 lb/A. Apply 2.0 pints per acre Goal 2XL or 1 pint of GoalTender 4F immediately after planting to control certain broadleaf weeds. Emerged plants which receive direct or indirect (drift) spray contact will be injured. It may be desirable to cultivate immediately prior to application to remove germinated weeds. Delay cultivation after Goal application, when possible, to reduce deactivation of Goal by incorporation. Do not use Goal herbicide on horseradish plantings which are weak or under stress due to temperature, disease, fertilizer, nematodes, insects, pesticides, drought, or excessive moisture.

S-metolachlor--0.95-1.9 lb/A. **A Special Local-Needs Label 24(c) has been approved for the use of Dual Magnum 7.62E in New Jersey. The use of this product is legal ONLY if a waiver of liability provided by the local growers' association has been signed by the grower, all fees have been paid, and a label has been provided by the association.** Apply 1 to 2 pints per acre Dual Magnum 7.62E after planting, but before weeds or crop emerge to control annual grasses, yellow nutsedge, and certain broadleaf weeds, including galinsoga. Dual Magnum will NOT control emerged weeds. Use the lower rate on coarse textured soils low in organic matter, and the higher rate on fine textured soils and soils high in organic matter. Read and follow all notes and precautions on the label. DO NOT incorporate Dual Magnum prior to planting. Make only one application per crop. Observe a minimum preharvest interval of 64 days after application. **Other generic versions of metolachlor and s-metolachlor may be available, and may or may not be labeled for use in the crop.**

Postemergence

Clethodim--0.094-0.125 lb/A. Apply 6 to 8 fluid ounces per acre Select 2EC with oil concentrate to be 1 percent of the spray solution (1 gallon per 100 gallons of spray solution) or 12 to 16 fluid ounces of Select Max 0.97EC with nonionic surfactant to be 0.25% of the spray solution (1 quart per 100 gallons of spray solution) postemergence to control many annual and certain perennial grasses, including annual bluegrass. Select will not consistently control goosegrass. The use of oil concentrate with Select 2EC 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. For best results, treat annual grasses when they are actively growing and before tillers are present. Repeated applications may be needed to control certain perennial grasses. Yellow nutsedge, wild onion, or broadleaf weeds will not be controlled. Do not tank-mix with or apply within 2 to 3 days of any other pesticide unless labeled, as the risk of crop injury may be increased, or reduced control of grasses may result. Observe a minimum preharvest interval of 30 days.

Sethoxydim--0.2-0.5 lb/A. Apply 1 to 2.5 pints per acre Poast 1.5EC with oil concentrate to be 1 percent of the spray solution (1 gallon per 100 gallons of spray solution) postemergence to control annual grasses and certain perennial grasses. **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. For best results, treat annual grasses when they are actively growing and before tillers are present. Repeated applications may be needed to control certain perennial grasses. Yellow nutsedge, wild onion, and broadleaf weeds will not be controlled. Do not tank-mix with or apply within 2 to 3 days of any other pesticide unless labeled, as the risk of crop injury may be increased, or reduced control of grasses may result. Observe a minimum preharvest interval of 60 days and apply no more than 5 pints per acre in one season.

Postharvest

Paraquat--0.6 lb/A. **A Special Local-Needs 24(c) label has been approved for the use of Gramoxone Inteon 2SC** or OLF **for postharvest desiccation of the crop in Delaware, New Jersey and Virginia.** Apply 2.4 pints per acre Gramoxone Inteon 2SC or OLF as a broadcast spray after the last harvest. Add nonionic surfactant according to the labeled instructions. See the label for additional information and warnings.

Insect Control

NOTE: Copies of specific insecticide product labels can be downloaded by visiting the websites www.CDMS.net or www.Greenbook.org. Also, specific labels can be obtained via web search engines.

Aphids

malathion (Malathion 57EC or OLF)
methomyl (Lannate LV or OLF)

Cutworms

carbaryl (Sevin 5%Bait or OLF)

Flea Beetles (FB), Harlequin Bugs

imidacloprid (**FB only**) (soil-Admire PRO; foliar-Nuprid 1.6F, Provado 1.6F or OLF)
carbaryl (Sevin 80S or OLF)#

Imported Cabbageworm

Bacillus thuringiensis (Biobit, Dipel, Dipel 2X, Javelin, XenTari or OLF)

Leafhoppers

imidacloprid (soil–Admire PRO; foliar–Nuprid 1.6F, Provado 1.6F or OLF)

carbaryl (Sevin 80S or OLF)

Note. Some species of leafhopper are known to transmit brittleroot disease of horseradish.

Thrips

methomyl (Lannate LV 0r OLF)
spinetoram (Radiant 2SC)
spinosad (Entrust 80W, SpinTor 2SC or OLF)

Pesticide	Use Category[1]	Hours to Reentry	Days to Harvest
INSECTICIDE			
Bacillus thuringiensis	G	4	0
carbaryl/carbaryl bait	G	12	7
imidacloprid (soil/foliar)	G	12	21/7
malathion	G	12	7
methomyl (Lannate or OLF)	R	48	65
spinetoram	G	4	3
FUNGICIDE (FRAC code)			
Cabrio (Group 11)	G	12	0
chlorothalonil	G	12	14
Quadris (Group 11)	G	4	0
Ridomil Gold (Group 4)	G	12	0

See Table D-6.

[1] G = general, R = restricted

Disease Control

Damping-Off (caused by Pythium and Phytophthora)

Apply one of the following in a 7" wide band at planting:

mefenoxam (Ridomil Gold--1.0-2.0 pt 4SL/A or Ultra Flourish--2.0-4.0 pt 2E/A), or
metalaxyl (MetaStar)--4.0-8.0 pt 2EAG/A

Bacterial Leaf Spot

Rotate to allow 2 years between horseradish plantings. Avoid cultivation or other activity when foliage is wet to minimize spread of the disease.

Cercospora Leafspot, Downy Mildew, Ramularia Leafspot, and White Rust

Practice good crop rotation with crops other than crucifers. When conditions favor disease development, apply the following and repeat every 7 to 14 days.

Quadris--6.2-15.5 fl oz 2.08SC/A, or
Cabrio--8.0-16.0 oz 20EG/A, or
chlorothalonil--3.0 pts 6F/A (Ramularia leafspot)

LEEKS

Varieties

Varieties[1]	
Arkansas	
Carina	
King Richard	
Lancelot	These varieties are recommended in areas of DE, MD, NJ, PA, VA, WV where climatic conditions are favorable for leek production.
Leefall	
Leekool	
Leekwik	
Upton	
Pandora	
Tadorna	

[1] Varieties listed alphabetically.

Recommended Nutrients Based on Soil Tests

Before using the table below, refer to important notes in Plant Nutrient Recommendations in Section B, Soil And Nutrient Information. These notes provide additional suggestions to adjust rate, timing and placement of nutrients depending on soil type cation exchange capacity and existing fertility levels.

		Soil Phosphorus Level			Soil Potassium Level		
	Pounds N per Acre	Low	Med	Opt.	Low	Med	Opt.
Leeks		Pounds $P_2 0_5$ per Acre			Pounds $K_2 0$ per Acre		
	100-125[1]	200[1]	150[1]	100[1]	200[1]	150[1]	100[1]
	50-75[2]	200[2]	150[2]	100[2]	200[2]	150[2]	100[2]
	25-50[3]	0	0	0	0	0	0

[1] Total amount nutrient recommended; growers producing vegetables on soils with high clay contents should reduce the recommended nitrogen and potassium rates by 20% and increase the phosphorus rate by 25%.

[2] Broadcast and disk-in

[3] Sidedress 3-4 weeks after planting if needed

Apply 3 - 4 pounds of boron (B) per acre with broadcast fertilizer. See Table B-10 for more specific boron recommendations.

Transplants

Southern transplants are used for early spring plantings. For summer planting, sow in seedbeds from early April to mid-May. About 2 pounds of seed are required to provide enough plants to set an acre. Seed should be planted 1/3 to 1/2 inch deep 12 to 16 weeks before field setting. Plants will be ready to set in early August.

Field Spacing

Rows: 20 to 30 inches apart; *plants*: 4 to 6 inches apart in the row. Set plants in trenches 3 to 4 inches 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.