Beets (Garden)

Beets are frost tolerant and produce the best commercial quality when grown during cool temperatures (50-65°F, 10-18°C). Lighter color and wider zoning occur during rapid growth in warm temperatures. Beets will form seed stalks if exposed to temperatures below 50°F (10°C) for 2 or 3 weeks after several true leaves have formed. Beets have a high boron requirement - see Plant Nutrient Recommendations below.

Recommended Varieties[1]

Market	Hybrid	Days	Color	Shape	Use
Avalanche	No	50	White	Round	Roots, bunching
Boldor	No	55	Gold	Round	Roots, bunching
Boro	Yes	51	Red	Globe	Roots, tops, bunching, baby beets
Bulls Blood	No	58	Red with White Zones	Globe	Roots, tops (red)
Chioggia Guardsmark	No	60	Purple with White Zones	Globe	Roots
Cylindra	No	54	Red	Cylindrical	Roots, bunching
Eagle	Yes	50	Red	Globe	Roots, bunching
Early Wonder	No	52	Red	Globe	Greens, bunching
Fresh Pak	Yes	40	Green-Red leaves	Long	Greens
Green Top Bunching	No	58	Red	Round	Greens, bunching
Kestrel	Yes	53	Red	Globe	Roots, bunching
Merlin	Yes	55	Red	Globe	Roots
Moneta (monogerm)	Yes	46	Red	Globe	Roots, bunching
Pablo	Yes	60	Red	Round	Roots, baby beets
Red Ace	Yes	53	Red	Globe	Roots, bunching
Red Cloud	Yes	53	Red	Round	Roots, bunching
Subeto	Yes	50	Red	Round	Roots, bunching
Touchstone Gold	No	60	Gold	Round	Roots, bunching
Zeppo	Yes	50	Red	Round	Roots, bunching

[1]**Listed alphabetically**.

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 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.

		Soil Phosphorus Level				Soil Potassium Level				
		Low	Med	High (Opt)	Very High	Low	Med	High (Opt)	Very High	
Beets[1,2]	**N (lb/A)**	**P_2O_5 (lb/A)**				**K_2O (lb/A)**				**Nutrient Timing and Method**
	75-100	150	100	50	0	150	100	50	0	Total nutrient recommended
	50	150	100	50	0	150	100	50	0	Broadcast and disk-in
	25-50	0	0	0	0	0	0	0	0	Sidedress 4-6 weeks after planting

[1]Apply 1.5-3 lb/A of boron (B); see also Table B-7. in Chapter B Soil and Nutrient Management.
[2]Apply 25-30 lb/A of sulfur (S) for most soils.

Boron Deficiency and Black Spot

Boron (B) deficiency can cause black spots inside roots and large black dry rots on root surfaces. B deficiency is most likely to occur in alkaline soils high in calcium and is exacerbated by dry conditions. Apply B at planting according to soil test results.

Seed Treatment

Use treated seed to prevent disease, see Disease Control below for more information.

Seeding and Spacing

Seed from early April to mid-August. Germination temperatures range from 50-85°F (10-29°C). For fresh market beets, sow seeds ½ inch deep at the rate of 12 seeds/ft of row. Space rows 15-20 inches apart; thin plants to 3 inches apart. Narrow row systems with between row spacings of 6-12 inches and in-row seeding rates of 8 seeds per foot

are appropriate for processing beets. Processing beets are precision planted to achieve final stands for intended processing use. Beet "seeds" are dried fruits with 1-3 seeds. Seed companies can provide sprout counts to determine seeding rates more accurately for precision planting.

Harvest and Post-Harvest Considerations

Market beets are harvested when they reach a size of 1.5-3 inches in diameter. Beet tops for greens may be cut and handled like spinach or Swiss chard. For bunching beets, roots are undercut and carefully pulled by the tops. For larger acreages, beets for roots may be topped and machine dug using a modified potato digger.

Store beets at 32°F (0°C) and 98-100% relative humidity. Like other root crops, beets are well adapted to storage. Topped beets stored at 32°F can keep 4-6 months. Cold storage or cool-cellar storage are both suitable, provided the humidity is kept sufficiently high to prevent dehydration. Before storage, beets should be topped and sorted to remove the ones with disease symptoms or mechanical injuries. Beets should not be stored in large bulk. They should be stored in well-ventilated containers such as ventilated bin boxes or slatted crates to help dissipate respiratory heat. Increased carbon dioxide concentrations (5-10%) in beet storage increases fungal spoilage.

Bunched beets and beet greens are much more perishable than topped beets, but they can be stored at 32°F for 10-14 days. A relative humidity of at least 95% is desirable to prevent wilting. Air circulation should be adequate to remove respiration heat but not so rapid that it speeds up transpiration and wilting. Satisfactory precooling is accomplished by vacuum cooling or hydrocooling. Crushed ice helps keep the bunched beets cold, especially if refrigeration is not available. Bunched beets are commonly shipped with package and top ice to maintain freshness.

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. Soil-Applied (Preplant Incorporated)

Group	Product Name (*=Restricted Use)	Product Rate	Active Ingredient	Active Ingredient Rate	PHI (d)	REI (h)
8	Ro-Neet 6E	1.67 to 2 qt/A	**cycloate**	2.5 to 3 lb/A	--	48

-Preplant incorporated only; incorporate into 3 to 4 inches of soil immediately after application. Plant any time after treatment. Use on mineral soils **only**. Use lower rate on sandy soils and higher rate on heavier soils.
-**Do not** apply over 150 lb N/A when applying this herbicide in conjunction with a fluid fertilizer.

2. 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	30	24
	Poast 1.5EC	1 to 2.5 pt/A	**sethoxydim**	0.2 to 0.5 lb/A	60	12

-**Select 2EC**: use crop oil concentrate (COC) at 1% v/v (1 gal/100 gal of spray solution). **Select Max 0.97EC**: 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 1.5EC**: Apply with COC at 1.0% v/v.
-**General comments:**
-The use of COC may increase the risk of crop injury when hot or humid conditions prevail. To reduce the risk of crop injury, 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. For best results, treat annual grasses when they are actively growing and before tillers are present. -Yellow nutsedge, wild onion, wild garlic, and broadleaf weeds will **not** be controlled with these herbicides. -These herbicides control many annual and certain perennial grasses. Clethodim is best on annual bluegrass; while Poast is preferred for goosegrass control.

2. Postemergence - Shadow, Select, Select Max, Poast - continued next page

2. Postemergence - Shadow, Select, Select Max, Poast *- continued*

-Repeated applications may be necessary to control certain perennial grasses. If repeat 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.						
5	Spin-Aid 1.3EC*	1.5 to 3 pt/A	**phenmedipham**	0.244 to 0.488 lb/A	60	12
-**For use in DE, MD, NJ, PA, and VA only. See label for application restrictions, mixing instructions, and weather restriction to prevent crop injury or herbicide failure.** Multiple applications may be applied to ground to control early germinating weeds. Apply 1.5 pt/A after the 2-leaf stage. Increase rate up to 2.3 pt/A after the 4-leaf stage. Increase rate up to 3 pt/A after the 6-leaf stage. Repeat applications may be made 5 to 7 days later, or when another flush of weeds germinates. A maximum of 3 applications is allowed. -Spin-Aid is effective on brassica species including wild mustard, shepherdspurse, and London rocket. Other weeds controlled include common chickweed, common lambsquarters, groundcherry, purslane, common ragweed, and annual sowthistle. -**Do not** apply this product through any type of irrigation system. **Do not** spray when conditions for drift are favorable or while dew is present. Leave a 16 ft buffer from the treated area when the wind direction is toward sensitive plants. -Spin-Aid may cause injury if the crop is under stress as the result of rapid changes in weather from cool, overcast days to hot (>75°F), bright days; windy conditions; drought; use of preplant herbicides, preemergence herbicides, or other chemicals; insect or disease injury; or close cultivation. Rainfastness is 6 h.						

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
2	UpBeet	**triflusulfuron**
4	Stinger	**clopyralid**
14	Vida	**pyraflufen**
14	Aim (hooded or directed application only)	**carfentrazone**

Insect Control

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

Recommended Insecticides

Note: For **premixes**, the group number (representing the mode of action) and active ingredient that contributes the most to control is generally listed first. In some cases, only one ingredient in a premix provides control.

Aphids

Apply one of the following formulations:

Group	Product Name (*=Restricted Use)	Product Rate	Active Ingredient(s)	PHI (d)	REI (h)	Bee TR
4A	Actara 25WDG	1.5 to 3.0 oz/A	thiamethoxam	7	12	H
4A	Admire Pro	4.4 to 10.5 fl oz/A	imidacloprid - **soil**	21	12	H
4A	Admire Pro	1.2 fl oz/A	imidacloprid - **foliar**	7	12	H
4A	Platinum 75SG	1.70 to 4.01 oz/A	thiamethoxam	AP	12	H
4C	Transform WG	0.75 to 1.5 oz/A	sulfoxaflor	7	24	H
4D	Sivanto Prime	7.0 to 14.0 fl oz/A	flupyradifurone	7	4	M
28	Exirel	13.5 to 20.5 fl oz/A	cyantraniliprole	1	12	H
29	Beleaf 50SG	2.0 to 2.8 oz./A	flonicamid	3	12	L

Beet Armyworms and Webworms

Note: Beet armyworm and Hawaiian beet webworm populations may be resistant or less susceptible to pyrethroid insecticides.

Apply one of the following formulations:

Group	Product Name (*=Restricted Use)	Product Rate	Active Ingredient(s)	PHI (d)	REI (h)	Bee TR
5	Blackhawk 36WG	2.25 to 3.5 oz/A	spinosad	3	4	M
5	Entrust SC (OMRI)	3.0 to 6.0 fl oz/A	spinosad	3	4	H
5	Radiant SC	6.0 to 8.0 fl oz/A	spinetoram	7	4	H

Beet Armyworms and Webworms - continued next page

Beet Armyworms and Webworms *- continued*

11A	DiPel DF (OMRI)	05 to 2.0 lb/A	*Bacillus thuringiensis kurstaki*	0	4	N
11A	XenTari (OMRI)	0.5 to 2.0 lb/A	*Bacillus thuringiensis aizawai*	0	4	N
18	Intrepid 2F	8.0 to 16.0 fl oz/A	methoxyfenozide	1	4	L
18 + 5	Intrepid Edge	4.5 to 12.0 fl oz/A	methoxyfenozide + spinetoram	7	4	M
22	Avaunt 30WDG, Avaunt eVo	3.5 to 6.0 oz/A	indoxacarb	7	12	H
28[1]	Coragen 1.67SC, Coragen eVo, Vantacor	3.5 to 7.5 fl oz/A 1.2 to 2.5 fl oz/A	chlorantraniliprole	1	4	L
28[1]	Exirel	13.5 to 20.5 fl oz/A	cyantraniliprole	1	12	H
28[1] + 3A	Elevest*	5.6 to 9.6 fl oz/A	chlorantraniliprole + bifenthrin	21	12	H

[1]Resistance concerns with beet armyworm.

Flea Beetles

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
1A	Sevin XLR Plus	0.5 to 1.0 qt/A	carbaryl	7	12	H
3A	Brigade 2EC*, Brigade eVo	5.12 to 6.40 fl oz/A	bifenthrin	1	12	H
3A	Hero*	2.6 to 6.1 fl oz/A	zeta-cypermethrin + bifenthrin	1	12	H
3A	Fastac CS*	1.8 to 3.8 fl oz/A	alpha-cypermethrin	1	12	H
3A	Mustang Maxx*	1.76 to 4.0 fl oz/A	zeta-cypermethrin	1	12	H
3A + 28	Elevest*	5.6 to 9.6 fl oz/A	bifenthrin + chlorantraniliprole	21	12	H
4A	Actara 25WDG	1.5 to 3.0 oz/A	thiamethoxam	7	12	H
4A	Admire Pro	4.4 to 10.5 fl oz/A	imidacloprid - **soil**	21	12	H
4A	Admire Pro	1.2 fl oz/A	imidacloprid - **foliar**	7	12	H
4A	Platinum 75SG	1.70 to 4.01 oz/A	thiamethoxam	AP	12	H

Leafminers

Apply one of the following formulations:						
Group	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
5	Blackhawk 36WG	2.25 to 3.5 oz/A	spinosad	3	4	M
5	Entrust SC (OMRI)	4.5 to 10.0 fl oz/A	spinosad	3	4	H
5	Radiant SC	6.0 to 8.0 fl oz/A	spinetoram	7	4	H

Disease Control

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Recommended Fungicides

Seed Treatment

Use seed treated with Apron XL (0.085 to 0.64 fl oz/100 lb) or Allegiance FL (0.75 fl oz/100 lb) for *Pythium* damping-off protection *plus* Maxim 4FS (0.08 to 0.16 fl oz/100 lb) for *Rhizoctonia* and *Fusarium* protection. Seed treatments are not a substitute for high quality seed.

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

Code	**Product Name (*=Restricted Use)**	**Product Rate**	**Active Ingredient(s)**	**PHI (d)**	**REI (h)**	**Bee TR**
Apply one of the following preplant incorporated or as a soil-surface spray after planting:						
4	Ridomil Gold 4SL	1.0 to 2.0 pt/A	mefenoxam	0	48	N
4	Ultra Flourish 2E	2.0 to 4.0 pt/A	mefenoxam	0	48	N
4	MetaStar 2E AG (see label)	4.0 to 8.0 pt/A	metalaxyl	14	48	N
Apply the following as an in-furrow spray only for *Pythium* and *Rhizoctonia* control:						
4 + 11	Uniform 3.72SC[1]	0.34 fl oz/1000 ft row	mefenoxam + azoxystrobin	AP	0	N

Bacterial and Fungal Diseases

Leaf Spots (*Cercospora* and *Alternaria*) and other foliar diseases

Allow 2 to 3 years between beet plantings. Thoroughly disc under crop residues as pathogens can overwinter on residues. Warm, wet weather and rainfall favor leaf spot development. Scout plantings regularly, especially if wet weather persists. Apply one of the fungicides listed below preventatively and/or when weather conditions are favorable for disease development. Repeat every 7 to10 days.

Do not make more than 2 sequential applications of Cabrio, or one application of any FRAC code 11 fungicide, before alternating to a non-FRAC code 11 fungicide. **Tank mix fungicides with fixed copper** to help reduce fungicide resistance development. Resistance of Cercospora leaf spot (CLS) to FRAC code 11 has been reported in table beets and sugar beets, and to FRAC code 3 in sugar beets. In cases of suspected resistance, switch to other FRAC codes; or tank mixing a copper-based fungicide with Double Nickel (OMRI), LifeGard (OMRI), or Regalia (OMRI) has provided some suppression of CLS. Repeated scouting is needed during the season to identify potential cases of fungicide resistance development.

Code	Product Name (*=Restricted Use)	Product Rate	Active Ingredient(s)	PHI (d)	REI (h)	Bee TR
M01	copper (OMRI)[1]	at labeled rates	copper	0	48	N
Rotate one of the following FRAC code 11 fungicides plus a fixed copper at labeled rates:						
11	azoxystrobin 2.08F[2,3]	6.0 to 15.5 fl oz/A[2,3]	azoxystrobin	0	4	N
11	Cabrio 20EG	8.0 to 12.0 oz/A	pyraclostrobin	0	12	N
11	Flint Extra 500SC	2.0 to 2.9 fl oz/A	trifloxystrobin (**Do not apply near Concord grapes**, see label)	7	12	N
11	Reason 500SC[4]	8.2 fl oz/A[4]	fenamidone	14	12	--
With one of the following:						
3	tebuconazole 3.6F	4.0 to 6.0 fl oz/A	tebuconazole	7	12	N
3	Tilt 3.6EC[5]	3.0 to 4.0 fl oz/A[5]	propiconazole	14	12	N
7	Fontelis 1.67SC	16.0 to 30.0 fl oz/A	penthiopyrad	0	12	L
7 + 9	Luna Tranquility 4.16SC	8.0 to 11.2 fl oz/A	fluopyram + pyrimethanil	7	12	--
7 + 11	Merivon Xemium	4.0 to 5.5 fl oz/A[6]	fluxapyroxad + pyraclostrobin	7	12	N
7 + 12	Miravis Prime	6.8 fl oz/A	pydiflumetofen + fludioxonil	7	12	--

[1]There are several OMRI listed copper-based products; see labels for specifics. Copper applications may help suppress some fungal pathogens in organic production systems.
[2]Use 9.0 to 15.5 fl oz/A for Cercospora leaf spot
[3]Poor control with azoxystrobin (FRAC code 11) has been reported in southern NJ and across NY
[4]Alternaria leaf spot suppression only
[5]Cercospora leaf spot only
[6]Use 5.5 fl oz/A for Cercospora leaf spot

Pocket Rot, Wirestem, Stem Canker, and Crown Rot (*Rhizoctonia solani*)

Pocket rot and other diseases caused by *Rhizoctonia* are most prevalent in cool, wet soils and especially in plantings showing poor plant vigor. Rotate between fields each year and scout on a regular basis.

Group	Product Name (*=Restricted Use)	Product Rate	Active Ingredient(s)	PHI (d)	REI (h)	Bee TR
11	azoxystrobin 2.08F[1]	0.40 to 0.80 fl oz/1000 ft row, banded or in-furrow	azoxystrobin	0	4	N
4 + 11	Uniform 3.72SC[1,2]	0.34 fl oz/1000 ft row	mefenoxam + azoxystrobin	0	0	N

[1]See label for specific details and timing. [2]Also for *Pythium* damping-off.