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38. Squash vine attacked by squash vine borer—note yellow discharge at base.



39. Squash vine borer and yellow discharge



40. Squash vine split to reveal borer for control



41. Stalk borer in stem



42. Colorado potato beetle adult



43. Colorado potato beetle larvae



44. White grub attacking potato



45. Wireworm affecting germinating corn



Extension Folder 593—1981

Controlling Insects in the Home Vegetable Garden



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46. Slug attacking tomato fruit



48. Hornworm larva



47. Whitefly on underside of leaf



With proper planning, maintenance, weather—and a little luck—the home vegetable garden can provide a valuable supply of produce. Insect damage can be discouraging but cultural control methods and properly-timed insecticide applications can overcome such problems.

A thorough knowledge of gardening and garden insects is beneficial when selecting methods for insect management. There are several nonchemical ways to limit insect damage by preventing sudden population increases, for example: (1) identify beneficial insects and leave them alone; (2) avoid planting in newly broken sod sites; (3) rotate crops; (4) grow healthy, vigorous plants; (5) control weeds and moisture; and (6) cultivate the soil.

Do not apply insecticides as an overall preventive measure; use them only after a problem has been diagnosed and a need indicated. In the home garden, some crop loss to insects may be expected and tolerated. In many situations, low numbers of insects on a plant will not decrease the yield or quality of the vegetable; thus, control is not needed.

An insect problem last year is no guarantee that it will re-occur this year; populations vary from year to year depending on temperature, humidity, rainfall, food availability, and natural enemies. Stopping a pest before it causes significant damage should be your goal. In most cases, this is based on early symptoms or the presence of a damaging insect. Check your plants often, especially the undersides of leaves. Once found, a problem insect should be identified. This allows for the selection of the most efficient control technique since certain insects require specialized treatment, and not all insects found in the home garden need to be controlled.

The following insects are among those most commonly found in vegetable gardens. Except for soil insects and slugs, which are listed separately, all are listed alphabetically by crop. The importance of each insect and possible nonchemical controls are discussed. Chemicals are listed in table 1.

CROP	PEST	IMPORTANCE/CONTROL
Asparagus	Asparagus Beetle (figures 1,2)	Adult beetles chew tender buds and tips as soon as asparagus shoots appear in spring. This may cause the shoot to bend into a "shepherd's crook." Chemical control is generally necessary. In small gardens, gathering and burning asparagus berries may provide control.
Bean	Bean Leaf Beetle (figures 3,4)	Adults chew holes in the leaves, feeding from the underside. Later in the season they also can damage pods. Chemical control is suggested only in years they are abundant.
	Spider Mites (figures 5,6)	Spider mites reduce plant vigor and can cause yellowing of leaves. They are most troublesome during hot, dry periods. Control generally is not necessary.
Beet	Spinach Leafminer (figures 7,9)	The spinach leafminer causes mines and brown blotches on leaves. Chemical control is necessary when tops are used for greens. Apply when mines FIRST appear in early summer.

CROP	PEST	IMPORTANCE/CONTROL
Carrot	Aster Leafhopper (figures 10,11)	This insect carries the aster yellows disease. It normally does not overwinter in Minnesota but migrates from the South each spring. Chemical control, as leafhoppers appear, is necessary for a quality crop.
Corn	Cutworms (figure 13)	Cutworms cut off plants at or near the ground. They can be a problem for developing corn plants. An insecticide bait is suggested if plants are being cut off.
	Rootworms (figures 17,18)	Corn rootworm larvae feed on roots and cause corn plants to fall over. They generally are not a problem in home gardens. Crop rotation often is sufficient to avoid problems. Adult control is not suggested.
	European Corn Borer (figure 19)	The European corn borer will damage ears as well as stalks. Late-maturing corn is most likely to be damaged. Chemical control aimed at the ear zone is suggested when fresh silk and pollen appear. Reapply weekly until silks dry and become brown. Treatment for European corn borer also will control corn earworm.
	Corn Earworm (figure 20)	The corn earworm is not as common as the European corn borer. However, it may be a problem in ears of late-planted corn. Apply a chemical to the fresh silks of late-planted corn if you had corn earworm in previous years. Repeat treatments may be necessary until silks dry and become brown. This also will control European corn borer if the ear zone is treated.
	Aphids (figure 21)	Aphids on corn are rarely a problem regardless of numbers. Control is not suggested.
	Sap/Picnic Beetles (figure 24)	Sap or picnic beetles enter ears at points of damage caused by other things. Chemical control is not effective or suggested; however, treatments for European corn borer or corn earworm may help reduce picnic beetles.
Crucifers	Cabbage (cabbage), Broccoli, Brussels sprouts, cauliflower Maggot (figures 25,26)	Cabbage maggots feeding on roots can cause wilting, reduced plant vigor, and death. They are a common problem that should be controlled each year. A preplant, in-furrow application followed by an over-the-row insecticide drench in 4 to 6 weeks is suggested.
	Cutworms (figures 14,15)	Cutworms cut plants at the soil and occasionally are a problem. Card-board plant collars for transplants generally are sufficient for control. Insecticide bait applications also can be made.

CROP	PEST	IMPORTANCE/CONTROL	CROP	PEST	IMPORTANCE/CONTROL
	Cabbage Looper/ Imported Cabbageworm <i>(figures 30,31,32)</i>	These two caterpillars chew holes in the leaves. They occur each season with potential for damage. Hand picking or chemical application when small worms or holes first are noted (late June) is suggested.	Potato	Flea Beetles <i>(figures 33,34)</i>	Flea beetles produce holes in the leaves. Early season control often is required. Weed control can help to reduce the problem. Multiple dustings or sprayings with an insecticide until plants become well established is suggested.
	Aphids <i>(figures 21,22,23)</i>	Aphids on crucifers are of minor concern. Control seldom is needed.		Colorado Potato Beetle <i>(figures 42,43)</i>	These beetles eat the leaves of potato plants and can be abundant locally. Control is necessary only when abundant. Hand pick or apply an insecticide.
Cucumber	Flea beetles <i>(figures 33,34)</i>	Flea beetles produce BB-sized holes in leaves. They are a common early season pest. Weed control will help avoid them. Insecticides dust applications may be necessary, but only until plants become established.		Stalk Borer <i>(figure 41)</i>	Stalk borers enter the stem and cause breakage. Weed control is most important. Chemical control is not effective or suggested. Sometimes it is possible to save a plant by slitting the stem, removing the borer, and then binding the stem together.
	Striped/ Spotted Cucumber Beetles <i>(figures 35,36,37)</i>	A common pest that often occurs in low numbers, the cucumber beetle can carry bacterial wilt disease. The need for control varies from year to year. Use insecticides in dust or wettable powder form when control is necessary. Weed control may help to reduce the number of overwintering beetles.		White Grub <i>(figure 44)</i>	They can cause tuber damage, particularly in weedy fields. A preplant soil insecticide is suggested.
Lettuce, leaf	No serious pests		Radish	Cabbage Maggot <i>(figures 26,27)</i>	Cabbage maggots cause radish tops to wilt and underground stems to rot. Chemical control is necessary in most cases. A preplant in-the-furrow insecticide application is suggested, especially for early plantings.
Lettuce, head	Cabbage Looper/ Imported Cabbageworm <i>(figures 30,31,32)</i>	These caterpillars chew lettuce leaves and may become a problem. Hand pick or apply an insecticide when worms or damage first appear.		Flea Beetle <i>(figures 33,34)</i>	Flea beetles chew small holes in the leaves. They are a common early season pest. Weed control and insecticide dust or spray application until the plants are established is suggested.
	Aster Leafhopper <i>(figures 10,12)</i>	They transmit aster yellows disease. Insecticide control may be necessary.	Spinach	Spinach Leafminer <i>(figures 8,9)</i>	The spinach leafminer produces mines and brown blotches on the leaves. It is a common problem requiring insecticide treatment. Apply when mines first appear in June. Repeat treatments may be necessary. Late season plantings generally are not damaged.
Melons	See squash			Aphids <i>(figures 21,22,23)</i>	High populations early in the season may retard development and cause leaves to curl and become distorted. Control may be necessary. Dislodge frequently with a water spray or apply an insecticide.
Onion	Onion Maggot <i>(figures 28,29)</i>	Onion maggots enter the onion and cause the bulb to rot and the plant to wilt. They are a serious pest that needs to be controlled each year. A preplant in-the-furrow chemical application is suggested.			
Pea	Aphids <i>(figures 21,23)</i>	Aphids reduce plant vigor. They should be controlled when abundant. Dislodge frequently with water spray or apply an insecticide.	Squash (also pumpkins, melons)	Flea Beetles <i>(figures 33,34)</i>	Flea beetles produce BB-sized holes in the leaves. They are common early season pests. Weed control will help avoid them. Insecticide dust applications may be necessary until plants become established.
Pepper	Stalk Borer <i>(figure 41)</i>	Stalk borers enter the stem and cause it to break. Weed control is most important, particularly along garden margins. Chemical control is not effective or suggested. Sometimes it is possible to save a plant by slitting the stem, removing the borer, and then binding the stem together.		Striped/Spotted Cucumber Beetles <i>(figures 35,36,37)</i>	A common pest that often occurs in low numbers, the cucumber beetle can carry bacterial wilt disease. The need for control varies from year to year. Use insecticides in dust or wettable powder form when control is necessary. Weed control may help to reduce the number of overwintering beetles.
	Aphids <i>(figures 21,22,23)</i>	Control is suggested only when aphids are numerous. Dislodge frequently with a water spray or apply an insecticide.			

CROP	PEST	IMPORTANCE/CONTROL	CROP	PEST	IMPORTANCE/CONTROL
	Squash Vine Borer (figures 37,38, 39,40)	It is a common but difficult to control pest that causes vines to wilt. Elimination of squash debris after harvest is suggested. If insecticides are used, apply every 5 to 7 days starting when vines begin to run. For vines already infested, slit vine lengthwise at point of attack, kill larvae, and heap moist soil over the wound.		Whitefly (figure 47)	Whiteflies often are noticed on tomatoes later in the season. They rarely cause damage. Control is difficult and not suggested.
				Hornworms (figure 48)	Although large and conspicuous, hornworms occur in low numbers. Chemical control is not necessary. Hand pick those that are found.
Tomato	Flea Beetles (figures 33,34)	Flea beetles produce small holes in the leaves. Only early season control is needed and only when populations are large. An insecticide dust or spray is suggested.	Soil Insects	Wireworms, White Grubs (figures 44,45)	These insects feed on the roots of many different vegetables. They are most common in weedy gardens or sod areas converted to gardens in the last 2 years. An insecticide incorporated into the soil during garden preparation is suggested.
	Cutworms (figures 14, 15,16)	Cutworms cut off plants at the soil. Occasionally they can climb and damage the fruit. They are a common problem that should be prevented by use of cardboard plant collars. An insecticide bait treatment also can be used, particularly if fruit damage is noted.		Slugs (figure 46)	Slugs eat holes in leaves and fruit of many plants. They also can feed on tubers. They may become a problem in moist seasons or when the garden is heavily mulched. Moisture control by watering in the morning and only when necessary, or by removing the mulch, is suggested when slugs are abundant. Chemical baits around garden margins may be needed.
	Aphids (figures 21, 22, 23)	A common insect that rarely causes damage to tomato. Control is not suggested.			

Table 1. Insecticide for Home Garden Use

Chemical	Pest Controlled	Formulations and Mixing					
		% Concentration *		Wettable Powder		Emulsifiable Concentrate	
		Dusts	Granular	% Concen.	Amount/gal. water	% Concen.	Amount/gal. water
Methoxychlor	Squash vine borer	5-10%		50%	2 tbsp.	--	--
Malathion	Aphids, spinach leafminer	4%		25%	2 tbsp.	50-57%	2 tsp.
Diazinon	Aphids, aster leafhopper, spinach leafminer, cabbage maggot, onion maggot, white grubs, wireworms, corn rootworm	4%	2-14% (Soil application only)	50%	1 tbsp.	25%	1/2 tsp.
Carbaryl (Sevin)	Asparagus beetle, bean leaf beetle, spinach leafminer, cutworms, European corn borer, corn earworm, cabbage looper, imported cabbageworm, flea beetles, Colorado potato beetle, striped/spotted cucumber beetle	4-5%	5%-bait	50-80%	1 tbsp.	80%	1 tsp.
Bacillus thuringiensis (Dipel, Biotrol, Thuricide)	European corn borer, corn earworm, cabbage looper, imported cabbageworm			2-3%	1/2-2 tsp.		
Dicofol (Kelthane)	Spider mites			35%	1-1 1/3 tbsp.	18.5%	2 tsp.
Mesurool Metaldehyde	Slugs	As directed on label					

*No mixing is needed for either dust or granular formulation.

When purchasing insecticides, buy only enough for one season's use. If they are not around the home between growing seasons, youngsters and pets cannot get into them. Also, insecticides sometimes deteriorate when held through winter.

Always handle all insecticides with respect and care. Wait the required number of days between treatment and harvest, and follow other limitations listed on labels. Wash treated vegetables before using them.

Avoid spilling insecticides on your skin or clothing. If you spill them on your skin, wash with warm water and soap; don't use kerosene, turpentine, or other solvents. Wash thoroughly and change clothes after using insecticides.

Always store chemicals where children or pets cannot reach them. A locked cabinet or locker is the best place. If insecticides are accidentally swallowed, call a physician immediately, giving the name of the insecticide or taking the container or package label along.

1. Asparagus beetle causing Shepherd's crook



2. Spotted asparagus beetle and damage



3. Bean leaf beetle and leaf damage



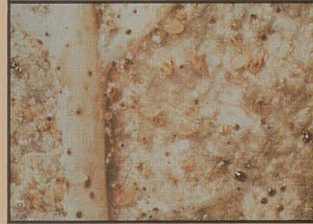
4. Bean leaf beetle feeding on bean pod



5. Yellowing caused by spider mites



6. Spider mites on underside of leaf



7. Spinach leafminer damage on beet



8. Spinach leafminer damage on spinach



9. Beginning mine of spinach leafminer—apply chemical at this stage.



10. Aster leafhopper



11. Aster yellows in carrot carried by aster leafhopper



12. Aster yellows in lettuce carried by aster leafhopper



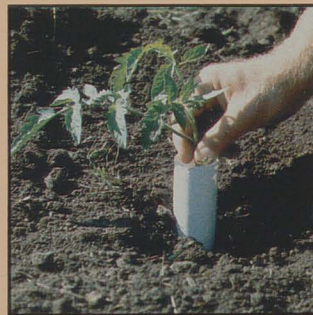
13. Cutworm damage to corn



14. Cutworm and damage to transplant



15. Use of cardboard collar to protect transplants from cutworms



16. Cutworm and damage to fruit



17. Fallen corn plants caused by corn rootworm damage



18. Adult corn rootworm



19. European corn borer in corn stalk



20. Corn earworm feeding at tip of corn ear



21. Close-up of typical garden aphids



22. Moderate population of green peach aphids



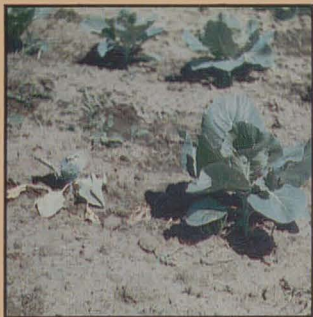
23. Cabbage heavily infested with aphids



24. Sap or picnic beetle



25. Cabbage damaged by cabbage root maggot



26. Maggots on cabbage roots



27. Radish attacked by cabbage root maggot



28. Onions wilting from attack by onion root maggot



29. Onion bulb attacked by onion root maggot



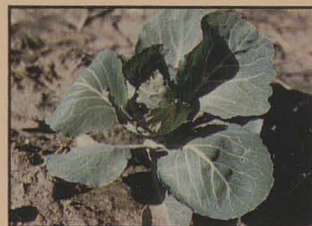
30. Cabbage looper



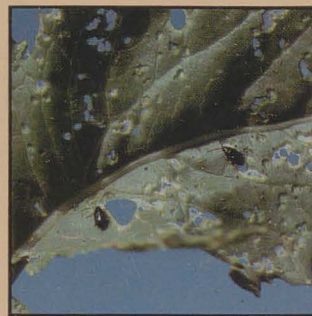
31. Imported cabbageworm



32. Control should begin when small holes caused by young cabbage loopers or imported cabbageworms are seen.



33. Flea beetles and typical damage



34. BB-sized holes caused by flea beetles



35. Striped cucumber beetles and feeding damage



36. Spotted cucumber beetle



37. Wilted vine—this can be caused by bacterial wilt disease or squash vine borer attack.



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