



Vegetable Pests

Usually our vegetable gardening enthusiasm is great at soil preparation and planting time, then it slowly wains as various pest/disease problems appear and sap the energy from both plants and the planter. Many pest problems can be decreased or prevented if some simple steps are followed. Below are some preventive ideas that you can try in your garden.

Improving the soil and providing ample nutrients will ensure young plants get a strong start. A vigorously growing crop can tolerate higher levels of pest damage and better compete with weeds than a less healthy one. Changing your soil texture from a sandy clay to a loam is practically impossible, but improvements can be made through the addition of organic matter and fertilizers. Two inches of well rotted compost turned into soil will increase water holding capacity of sandy soils, drainage and aeration of clay soils, add some nutrients and attract beneficial soil organisms such as earthworms and microbes.

Nitrogen and phosphorus are the most critical nutrients needed for annual vegetable crops. Personal preference will determine whether you use organic or inorganic fertilizers. In either case, only a portion of the nitrogen and all of the phosphorus should be added to the soil prior to planting. Organic nitrogen sources include manure, blood meal, hoof and horn meal, fish products, cottonseed meal, and many others. Manures contain varying levels of nitrogen and can contain pests such as root maggots, green fruit beetle, and weed seeds. It is best to apply uncomposted manure to the soil surface a month or so prior to planting (a food safety precaution) and irrigate to begin decomposition. Inorganic nitrogen sources are inexpensive and easy to obtain. Here, care must be taken to avoid over application. Applying organic phosphorus is more difficult. The phosphorus in bone meal and rock phosphate is not readily available to plants. Whether using organic or inorganic sources, phosphorus fertilizers should be placed directly under plants where the roots can grow through them.

Proper irrigation can also reduce pest problems. Too little water will cause slow growth and poor root development. Stunted plants are more susceptible to root knot nematodes and other harmful agents. Excessive irrigation can contribute to root disease problems. Uneven irrigation can encourage weeds and prevent uniform maturing of the crop. Some crops respond to uneven watering by decreasing the edibility of the crop. For example, cucumbers become more bitter when soil is allowed to dry completely between irrigations.

The method used to apply irrigation can also affect the incidence of garden pests. Many commercial producers overhead (sprinkle) irrigate from planting to thinning, then switch to furrow irrigation for the rest of the season. Overhead irrigation is not good for mature plants. Soil can splash onto leaves and the chance of foliar diseases is increased. Drip irrigation products are very efficient and improved products are available from suppliers. Drip systems can be used in combination with row covers to warm the soil and speed early crop establishment.

Pest and/or disease resistant varieties are now available for many crops. If you know of a specific pest in your garden area, look for varieties that are resistant (tolerant). Rotating where certain crops are planted can also reduce pest problems. This is especially critical where root knot nematodes and root diseases are present. Where soil borne diseases persist, soil solarization can reduce or eliminate these pests. To solarize soil, put a clear plastic sheet on the soil surface for four to six weeks during the hottest part of the year. Put a thin layer of soil on the edge of the tarp to prevent it from blowing away.

Some common insects found in vegetable gardens are aphids, caterpillars, flea beetles and grasshoppers.

Aphids tend to be present in the early season, but as the weather warms, their predators (ladybird beetles, syrphid flies, and lacewings) become more numerous and aphid populations naturally decline. In the meantime, their numbers can be reduced by washing them off with a high pressure hose or directly applying insecticidal soap.

Caterpillars are larval stages of moths and butterflies and have chewing mouthparts that create visibly chewed leaves, stems, and fruit. A few tomato hornworms are usually found each year in the garden. When small, they are difficult to locate, but as they grow, they can often be located by looking for damaged foliage and excrement below their feeding areas. Hand picking and destroying is the best control. Cutworms are larvae of several species of night-flying moths in the family Noctuidae. They feed at night and are often present in large numbers. Cardboard collars buried one inch below ground and three inches above create a physical barrier and will protect newly planted or recently germinated seedlings. Cabbage loopers eat leaves of cruciferous crops (broccoli, cabbage, turnips, radish, etc.) and can be managed by applying a biological insecticide containing *Bacillus thuringiensis* (called Bt). Because Bt kills caterpillars but does not kill other insects, it allows natural enemies to survive and contribute to pest suppression.

Flea beetles are small insects that feed on tomato, potato, and eggplant leaving tiny holes in the leaves. You may not observe them directly, but the damage to young plants can slow their growth and subsequent production. A product made from kaolinitic clay called Surround is being used by several local growers to manage a host of foliar feeders. It forms a physical barrier which decreases damage by repelling these insects. Some growers also use rotenone mixed with insecticidal soap when populations are high.

Grasshoppers are often problematic for Yavapai County vegetable gardeners. When grasshoppers arrive in large numbers, it can be difficult to manage them without conventional pesticides. Some strategies include covering or wrapping crops with floating row cover (light, spun fabric designed for horticultural use) and applying a bait which contains *Nosema locustae*: a protozoan microbe that causes disease in grasshoppers. Under the best conditions, these products can provide 30 to 40% mortality of grasshopper populations. However, when grasshoppers are large and temperatures are high, it is not as effective. Poultry can also provide effective grasshopper control, but they will also eat the plants so access should be limited by fencing or individual plant cages.

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