GRASSHOPPER CONTROL

Effects of the weather

Temperature and rainfall play a major role in determining the severity of a grasshopper outbreak.

Temperature is the most important factor determining the size of the spring grasshopper population.
Warm days of the previous spring and summer determine how quickly the parents of the following year's grasshoppers develop and begin to lay eggs. Climatic conditions in the fall are the limiting factors of successful egg laying and thus influence the number of eggs laid. Temperatures will also determine the extent of embryonic development, thereby affecting the time of hatching the following spring.

The effect of cold winter temperatures on grasshopper egg survival is minimal.
Experiments conducted at the Lethbridge Research Centre have demonstrated that eggs can survive at -15°C. Soil temperatures in the field rarely fall below -10°C. Any effect on reducing egg survival would require conditions of wind, no snow cover and temperatures of -40°C for a number of days.

Spring temperatures have only a minimal effect on the survival of the grasshoppers that hatch. Young grasshoppers are hardy enough to survive low, even below freezing spring temperatures, providing these temperatures do not persist for several days. The most important aspect of spring temperature is its effect on the grasshopper development and plant growth. If the spring is hot, grasshoppers will hatch early and develop quickly. Cool spring temperatures will slow development. Crop development is also affected by less than ideal temperatures.

The relationship between temperature and rainfall controls the amount of crop damaged by grasshoppers. Under hot, dry conditions, a small grasshopper population may do as much damage as a large grasshopper population will under cool, wet conditions.

Moisture may also influence the size of the grasshopper population. During an extended drought, lack of water may slow the development of many eggs and can destroy eggs, especially during certain embryonic stages and just before hatching. However, it has to be extremely dry before the grasshopper embryo begins to die under drought conditions.

Rainfall may affect a localized grasshopper population to a lesser extent. Rainfall will only have an effect if a heavy downpour occurs immediately after an extensive hatch.

The main effect of cool, wet weather is twofold: to reduce crop losses by hindering grasshopper development and to increase the possibility of disease in the grasshopper population, thereby helping to reduce next year's grasshopper population.

Biological control

Wild birds

The most important natural enemies of grasshoppers are birds.

You can attract birds to your garden by providing a **source of water and safe nesting sites**, free from predators and with privacy. Many small, insect-eating birds nest in the shrub layer rather than the tops of trees. Preferred nesting sites are dense plantings of native shrubs, especially prickly ones, in out-of-the-way corners of the garden.

Insect-eating birds are especially active in early summer when they must gather high-protein food for their young. Many bug-eating birds like to hunt by watching for movement from a perch, so **studding your garden with trellises, posts and other upright structures can help birds feed more efficiently**.

Chickens and guinea fowls

Chickens not only like eating grasshoppers, but seem to get a lot of entertainment catching them too! Keen gardeners in inland areas should consider designing a chicken run with a shared fence between the chook run and vegetable garden for as much of the garden perimeter as possible. This can reduce the fencing needed and create a 'Fort Knox' style vegetable or flower garden as far as grasshoppers are concerned.

Guinea fowl are hardy birds which eat large numbers of grasshoppers and ticks.

Chickens, ducks, guineas and other fowl eagerly snap up grasshoppers, but they can also damage garden plants. Ideally, you might let grassy pathways in your garden grow up a bit, and then move in a group of birds in a moveable pen.

Allow the birds to run around your farm freely before you plant your garden in order to eliminate the grasshoppers in the environment. Then when your garden is planted and growing, you keep these fowls in a **"moat"** built around your garden so that they can eat any grasshopper that wants to get across this moat to your garden.

To build a "moat", you first surround your garden with one row of fencing such as chicken wire then put a second row of fencing parallel to but about 6 inches or more away from the first row depending on the land available. Then keep the fowl in this alleyway between the two rows of fence so that they can catch the grasshoppers coming through as they try to get to your garden.

See Figures 2. and 3. for chiken moat examples.

Other useful creatures

Other creatures that prey on grasshoppers include **lizards**, **spiders** and **predatory carabid** and **rove beetles**. These can be encouraged by providing shelter such as rocks and hollow logs.

Baby grasshoppers hatch in spring and early summer from eggs hidden just beneath the surface in soil. Young grasshoppers hide out in sheltered spots that are dense with vegetation, where most of them are eaten by spiders, ground beetles, frogs and other predators. Thus, islands of dense mixed herbs, grasses and flowers located in or near your

garden can serve as early-season traps for young grasshoppers.

Beneficial insects such as paper wasps, tachnid flies and parasitic wasps prey on grasshoppers. Robber flies are a major predator of grasshoppers, (up to a third of their diet). Habitat, such as a border of perennial plants, needs to be available all year round as a refuge for these predators. Growing flowering plants in the garden or orchard as a pollen and nectar source helps to maintain a population of these beneficial insects. Suitable insectary plants include **clover, buckwheat, mustard, Queen Anne's lace, parsnip, daikon, alyssum, dill, coriander, cosmos** and **phacelia**.

Water is an essential element to improve biological control. **Small ponds** encourage useful predators such as frogs and dragonflies, which need water to breed. **Frogs** are very active nocturnal animals that devour large numbers of pests.

Physical and cultural control

Border of tall grass

Some gardeners use a border of tall, green grass around the outside of the garden to trap grasshoppers and (hopefully) divert them from vegetables or flowers. It only works if the trap crop is left un-mowed and doesn't dry out. Grasshoppers would rather live in a tall stand of grass and weeds than in your garden, so you may want to let a hedge of tall grass grow up near your garden's edge in late summer. If you keep your garden weeded, grasshoppers will naturally gravitate toward the grassy patch.

Leave the soil exposed

Digging or cultivating in spring, and leaving the soil exposed, can expose the eggs to predators.

Physical barriers

Physical barriers such as floating row covers, mosquito netting or lightweight cloth work very well for early-season protection. This will also protect your plants from other pests like fruit flies and caterpillars. Be sure to hold the covers above plants with hoops or stakes, because grasshoppers are more likely to eat their way inside if leaves are pushing against the fabric.

Figure 1. Floating row cover

The color yellow

The color yellow is meant to be attractive to grasshoppers, so there are various ways this can be used to trap them. Long sticky tape traps are commercially available. Dams, ponds, or children's paddling pools can be used to drown grasshoppers by **floating pieces of yellow plastic in the water**, or suspending it from bamboo just above the

water. Fish will happily eat the grasshoppers, or they could be collected and fed to chooks.

You can try 'planting' a **yellow bucket in the garden**. Leave around 6 cm of yellow plastic showing above the mulch. The grasshoppers are attracted to the color and will jump in but can't climb back out. Fill the bucket with water and a 10% molasses solution, cover the water with a film of canola oil to deter bees and mosquitoes.

Garlic and other useful plants

Garlic is not the only thing that grasshoppers hate when it comes to smell and taste. Consider other natural alternatives such as **cilantro, peas** and **sweet clover**. Instead of applying them as spray, you might want to even consider growing these plants as barriers around your valuable gardening crops. Depending on the severity of the grasshopper infestation, the width of the barrier you create with these plants and herbs may have to from a centimeters to a few inches thick, and would also need to be placed across the whole garden to leave no wiggle room for the grasshoppers.

Ordinary all-purpose flour

When grasshoppers (or any other chewing insects such as blister beetles) feed on foliage that have been dusted with flour, their mouths get all gummed up, and the grasshopper cannot eat any more. Furthermore, when they swallow a whole lot of this flour, they get sick and stop eating all together.

(NOTE: You must be careful, though. To get rid of grasshoppers the eco-friendly, use ONLY the old-fashion all-purpose type of flour because the self-rising flour has salts in it. These salts may ruin your plants, and salt is not good for the soil.)

You can buy a commercial garden duster to use this method which will get rid of grasshoppers the eco-friendly way, but why not save money and make your own duster.

1. You can punch a dozen or so holes in the bottom and lower sides of a brown paper lunch size bag with an ice pick or a carving fork and use it to dust flour onto the foliage in your garden.

2. Other types of containers might be salt or pepper shakers, empty spice containers which have perforated lids, grated cheese jars, or any other container which has a shaker top or which has a cover through which you can punch holes by using a tiny nail and hammer.

You can find the description of the „flour method" in text box 1.

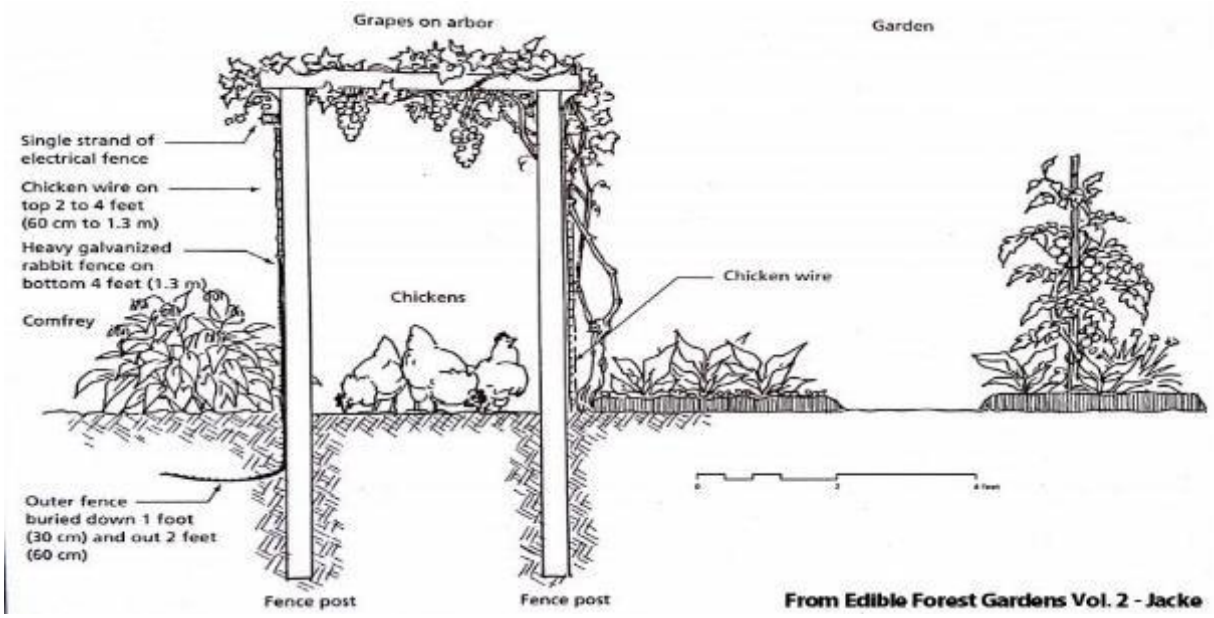

Figure 2. Example of a chicken moat

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Figure 3. Example of a chicken moat

TEXT BOX

1. FLOUR RECIPE

TEXT BOX 1. FLOUR RECIPE

First you must gather the following items: 3 cups of plain all-purpose flour, a garden duster or salt shaker or any container with a shaker cover, and a garden hose.

1. The best time to use this method in order to get rid of grasshoppers the eco-friendly is early in the morning when there is no wind and there is still dew on the plants.
It's important that there be no wind so that the flour will end up on your plants and not scattered all over your neighborhood.

The dew will help the flour stay on your plant and not be blown away. You could also use this method after a rain as long as there is no wind.

2. Pour the flour into a container with a shaker top or the perforated paper bag. If you have only a small garden, use less flour.

3. Before dusting the flour on the plants in your garden, give the foliage a shake in order to get the grasshoppers to move off them.
Dust the leaves AND the insects with the flour.

4. After 2 days, rinse off the flour from your plants. Use a fine spray in order not to damage your leave. If the leaves are hairy (such as tomato leaves), you may need to rinse twice.

Get rid of grasshoppers with flour you need to repeat this method to get rid of grasshoppers the eco-friendly, wait about a week before you dust your leaves again. As long as you don't leave the flour on for more than 2 days the flour will not damage your plants.

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