Growing Your Own Food at Home in Salisbury Series

Pack H Notes 1 NATURAL PEST MANAGEMENT

Build biodiverse healthy systems

The aim of natural pest control is to reduce the damage to a minimum whilst maintaining the local ecology; not to eliminate the entire pest population. Building a healthy "system" involves increasing biodiversity, and accepting the ways of nature; some of your plants will be eaten, and there will be an array of critters visiting and residing in your garden

To naturally manage pests and diseases in the home garden build a healthy "system". The "system" includes:

- Your food plants
- A mixture of plants
- The soil and its microbes and small critters
- Fertilisers
- Watering
- Habitat for garden predators- spiders, insects, lizards, frogs and birds.

This will take time to build (especially if your garden is bare/exposed/has few plants) so it's important to start in the early stages of developing your garden to eventually create a system that supports itself. Making changes to an established garden is of course possible. Building biodiversity supports your vegetables (and other plants) by:

- Maximising use of the available space meaning you can grow more food
- Maximising use of the soil which supports the "living" soil and improves plant health
- Providing protection from wind and harsh sun
- Confusing and deterring pests in their search for tasty plants
- Attract pollinating insects such as bees
- Providing habitat and food for predators and parasites of pests

For home food growers growing edible plants may be as simple as starting with a few vegetable crops in between an already established garden you already have some biodiversity. If your garden is bare/exposed/has few plants, or you want separate vegetable beds, then you may need to establish other plants in and around your vegetable patch. Having a good plan for your garden will help you develop an effective system, as will being in your garden to observe events, then adapting gardening practices as necessary.

To provide habitat for 'beneficial' creatures to assist in pest management include adequate biodiversity plantings to attract predators into your garden. This includes flowering plants in and around your vegetable patch to provide food for beneficial insects; plants for shelter; spaces for frogs and lizards such as ponds, rockeries and low ground cover; and water for bees, insects and birds. Always have water available for them low down. Keep water higher up for bees and birds.

1 Ponds provide water, places to hide and cool surrounds

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Healthy soils

Healthy plants are more resistant to most pests and diseases. Improve the health of your plants by improving the health of your soil. This can be achieved by building up the microorganism (bacteria, fungi, small soil critters) levels in the soil by adding compost and/or worm castings, and reducing digging. Digging affects both the soil structure and soil organism biodiversity that feeds the plants. Building healthy soil is long term project- possibly taking 2-3 years before the soil becomes stable. Refer to notes in Pack A and Pack C.

Grow healthy plants

Healthy plants are less susceptible to pest and diseases. To grow healthy plants:

- Select plants for your climate, soil and conditions
- Ensure plants are growing in their preferred conditions, including pH, sunlight
- Select healthy plants when purchasing. Use locally grown seed where possible
- Grow in good "living" soil
- Correct deficiencies in the soil
- Maintain proper distances between plants
- Remove diseased plants
- Protect plants and soil from the wind and harsh sun
- Supply adequate amount of and consistency in watering
- Deep water to develop resistant root systems
- Don't over fertilise, this produces sugary, sappy, soft growth that encourages sap sucking insects
    - Apply composts and fertilisers to the soil surface and cover with a shallow layer of mulch, or dig into the top 5-10cm of soil. Only spot dig when you need to plant seedlings
    - Apply a shallow layer of mulch; only as needed as this is a habitat for pests
- Keep records to learn what grows well in your garden

Watering

Retaining soil moisture and maintaining the life in the soil is vital to healthy soil. How you water is also important. Create channels and furrows to direct water flow. Water "gently" by dripper, furrows or simulate light rain with a sprinkler if rainfall is insufficient. It is better to soak the soil thoroughly when necessary (i.e. when the surface is drying out) than to continually sprinkle the top with a hose/sprinkler. The roots of plants follow the moisture down when you soak soil, opening it up and improving it. With regular shallow watering you keep the surface moist and the plants only develop shallow roots, you lose more water and build up salts at the surface but worse than that you may create a compacted "crusty" layer that doesn't allow the soil to "breathe" and the living things (both the microorganisms and the plant roots) suffer.

Digging soil also opens it up to the air, and if it dries out many of the living things in it die. Therefore reduce digging and apply fertilisers on top.

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Fertilising

Only fertilise as much as you need for good growth. The soft sappy growth that results for over fertilising with Nitrogen also attracts aphids and other sap sicking insects, therefore high nitrogen (N) pelletised fertilisers and blood and bone need to be used sparingly. Young plants do not need a lot of fertiliser to get going. So if you need these fertilisers apply them lightly and evenly from 5-20cm away from the plant, ready for when the plant is larger and requires them for more growth. Too much fertiliser particularly nitrogen (N) will create a huge population explosion of soil organisms which depletes the soil oxygen and produces toxic gasses in the soil-not good for the plant roots and thus the plants. Manures and high nitrogen (N) fertilisers will do this. If you add these to the soil surface or dig them in you may need to wait 6-8 weeks for the soil organisms to settle down before planting. Excess application of fertilisers also can lead to build-up of unused elements which can be detrimental to plants. Use as instructed on the packaging. Some of the best fertilisers for plants are quality compost and worm casts as they build structure and feed a living soil which feeds the plants. Water is necessary for uptake of nutrients so part of fertilising plants. Make sure that is adequate when applying fertiliser and throughout the plant's life.

Plants help maintain the life in the soil through their roots by feeding many of the soil organisms that keep the soil healthy. Select healthy plants, put them in the right conditions and practice good hygiene in the garden to keep them growing well and contributing to soil health.

Plant selection

Plants adapt to their environmental conditions, and seeds from these plants are more robust than those bought in from plants grown in very different circumstances. Therefore, use locally grown seed where possible, or collect and save your own. Buy established plants that are grown locally where possible.
To maximise plant health select plants suited to the climate, soil and conditions they will be growing in, are healthy remove if they are diseased, and remove plants/weeds that harbour pests.

2 Mixed planting of radiccio with curry plant

The spread of a pest or disease is easier in a single crop or monoculture planting than in a mixed or biodiverse planting. Mix up plants in garden beds with veggies and flowers growing together. Also rotating crops over seasons prevents accumulation of disease. Refer to Pack D

Plants that support beneficial insects

Flowering plants

Most flowering plants support the predator critters we want as part of our natural pest management. Growing a mixture of plants which provide shelter, pollen and nectar throughout your garden, and having plants flowering all year round will attract a lot of beneficial insects, spiders, and lizards. Use plants from a wide range of families. Select flowers of different shapes, colours, sizes, flowering seasons to have a

3 Cosmos

mix flowering throughout the year. Allow vegetables and herbs to flower also. It is best to mix all of these plants around and through your vegetable garden. Examples of plants you could use include but are not limited to:

- Vegetables: carrot, rocket, flowering turnip, mizuna, mustard
- Herbs: basil, borage, coriander, dill, fennel, parsley
- Flowers - Annuals: alyssum, asters, cosmos, calendula, hollyhock, marigold, Queen Anne's lace, pansies, petunias, poppies, zinnias
- Flowers - Perennials: chrysanthemums, daisies, geraniums, lavender, rosemary, salvias (sage), thyme
- Succulents can be used for protection also as can agapanthus, philodendron, sedges, bamboos
- Local native plants

There are local native plants that are being used by food producers in Virginia and proven to help with pest management. These plants also attract beneficial predators and have low water requirements and include:

- Fragrant Saltbush (*Rhagodia parabolic*)
- Ruby Saltbush *(Enchylaena tomentosa)*
- Coast Saltbush (*Atriplex cinerea*)
- Sea berry Saltbush (*Rhagodia candolleana*)
- Atriplex semibaccata

4 **Ruby saltbush** **Atriplex semibaccata** **Seaberry saltbush**

Plant guilds

These are plants that support each other in various ways. This may be providing shade or shelter to other plants; or providing support for another plant to lean on or climb up, and contribute to individual plant health. If you look at "layering" your plants position: the toughest on the outside for wind protection; the tallest at the back (south side) for sun; or on the west to protect from scorching summer sun; let low plants ramble through and protect the soil. Guilds may consist of all vegetables or a mix of vegetables, herbs and flowering plants.

Critters

The insect world is a case of eat or be eaten; some insects are eating your plants whilst another insects is eating this one and other insects. Some insects lay their eggs inside other insects and parasitise them. Spiders, birds, frogs and lizards all eat insects. Natural pest management relies on all these animals to eat or be eaten. You can encourage the predatory and parasitic (beneficial) insects by providing them a home or shelter and food usually supplied by plants.

5 Praying mantis eat all types of insect- good and 'bad' but overall they are useful to have around

Don't spray insecticides

By not spraying, even organically, you will allow a few pests to be in the garden as well, thus providing the predators with some food. Therefore, first assess whether the damage is worth doing something about, a minor loss may be fine for you and waiting a few days for natural predators to move in may be a good strategy to avoid spraying.

As adults many of these insects eat pollen and nectar. So they like flowering plants. Spiders also like plant cover. If these plants are close enough to where the pests are then the beneficial insects can prey on them. With healthy soil and healthy plants this can be enough to control pests without sprays or chemicals.

Plants can tolerate a certain degree of nibbling by insects, especially as they are more mature. But younger seedlings are quite susceptible, and taking some preventive measure can ensure you crops survive and you get some produce too!

Identifying pest in the veggie patch

Start by knowing what insects are in your garden. A large percentage of garden pests are most active at night, so go out with a torch and find out who is in your garden, not all will be causing problems. Take a picture, if you can, or write down an accurate description, as a lot look similar to each other, and the bad and good can look alike. Look at books, or on the internet to identify insects sighted. Having identified them, investigate the options for the best way to deal with them.

6 Cabbage moth caterpillars

To help identify the particular type of pest look for signs of their presence such as:

- Shiny, slimy trails left behind by snails and slugs
- Droppings from caterpillars or locust
- Scratching marks of birds (and cats)

Common pest in the veggie patch

Diving pests into groups can help identify them and work out which ones are a problem in your garden. They will fit into multiple groups below.

- Vertebrate/Invertebrate
- Above/Below Ground
- Active at night-nocturnal/Day-diurnal
- Active when wet/dry
- Seasonal summer/winter

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- Chewing/Sucking

Chewing	Sucking
Slugs and snails	Aphids
Weevil	Whitefly
Grasshoppers and Katyids	Mites
Caterpillars	Thrips
Millipedes and slaters	Scale
Earwigs	Leaf and frog hoppers
Pear slug	Nematodes
Rats, birds, possums	

There are two main types of pest you may see, those that c**hew or those that** s**uck**

Pests that chew

The list is long for these pest. Many of them can be picked off, for others traps are useful.

Slugs and snails

Snails like warm moist conditions, hiding in sides of pots and in weeds.
Both leave slime trails, and are noctural.
Hand pick and put in bucket of soapy water, or place environmentally friendly snail bait/beer in a container with 'door' cut in top buried to top of door in garden bed.


7 Slug in nasturtium flower


Snail on red mustard leaf

Weevils

Many native species and they attack all plants.
Fuller's Rose Weevil is a quarantine risk.
Identify by the sawtooth edges on plants.
Nocturnal.
Lavae eat roots-grubs creating tunnels in roots turnip, carrots, radish, or irregular grooves in surface of tuber skins.
Pick off at night. Use plant barriers, or there may be nematodes.


8 Weevil


Lavae


Leaf damage from weevil

Beetles

Pumpkin beetle

Spiny Citrus Bug a "shield beetle" or "stink bug" sucking


9 Pumpkin beetle


Citrus bug

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Larvae Curl Bug
African Black Beetle
Eats dead plant material live root or stems
More active in hot dry


10 Curl bug larvae

Cotton Harlequin Bugs
Attracted to mallow family
Common in summer
Feed mostly on young shoots


11 Cotton harlequin bug

Grasshoppers
Fungal pathogens are spread by
Active spring onwards, into warmer weather
Catch at night. Or use Spinosad- a biological insecticide to control fruit fly, caterpillars and pear and cherry slug.


12 Grasshopper

Katyids and Froghoppers
Grasshopper like
Little damage done
Active with warmth


13 Katyids Spittle bug Frog Hoppers

Caterpillars
Use BT/Dipel. Yate's Success or garlic spray
Netting
Plant patterns
Beneficial Insects - Wasps/Hoverfly


14 Caterpillars

Millipede and Slaters
Mulch when too deep can provide habitat for
Nocturnal
Seedlings- slaters attack young will eat of at base


15 Millipede

Earwigs
Many species
European
Seedlings
Mulch- live in
Trap in paper scrunched up in pvc pipe offcuts or plastic pots


16 Earwig damage by earwig on daisy flower

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Vertebrates - birds, rats and possums

If you find pieces of plants are missing its likely to have been chewed off. Large chunks could be possums, rats or birds. Blood and bone or Dynamic Lifter in the toe of stockings ties to the affected tree or pathway will deter possums. Ratsak bait placed in a T-shaped piece of plastic piping where it is out of reach from pets and protected from the rain could be your solution. Birds will need to be tolerated as they have too many other benefits!

Birds are often seasonal. Some will live in your garden and others will visit. They are helpful in eating insects but can demolish nuts and fruits even before they are ripe. In these instances netting the trees before the fruit is starting to ripen can keep birds out. They are smart and the nets will need to be secured all the way around and be away from the fruit. Chickens and aviaries attract rats, mice and birds. Make sure there are no holes in them.

Pest that suck

17 Aphids en masse

Aphids

Multiple colours, usually there are many
Feed on new growth, like warm environments
Exude honeydew, ants feed on and encourages sooty mould and viruses
Eaten by Ladybirds or Lacewings, Braconid Wasps, Hover Flies or Praying Mantis

18 Whitefly

Whitefly

Leaf underside
Large numbers
Disease spreaders
Spray with-Pest oil, soap sprays, garlic sprays, Spinosad (Success)

19 Mites of different colour mites damage on leaves

Mites ad Thrips

Very small
Leaf undersides
Debilitating
Disease spreader
Use sprays- Pest oils, soap sprays, garlic, moisture
Predators- Persimilis, Lady birds

20 Scale

Scale

Ants transfer/protect
Sooty mould
Crawlers
Sprays- White oil/pest oil, Spinosad (Success)

Methods to deal with pests

Having identified them, investigate the options for the best way to deal with them. There are numerous non-insecticide ways to deal with pests in the average backyard. These require you to spend time in the yard physically managing your garden and include:

Remove habitat Coarse mulch will provide a refuge for many of these pests so removing mulch will help, or having as little as is necessary. For summer try using shade cloth over plants and planting in guilds to reduce water evaporation, and need for as much mulch. Rocks and logs also provide refuge for pests but are good habitat for lizards so check under them and see who the residents are.

Pick off Regularly inspect your garden for caterpillars, snails and slugs and pick them off. Feed them to chooks, or put them in a bucket of salty water or dispose of as you wish.

Physical barriers Physical barriers are a simple method to stop pest and pets (yours and visiting ones) getting into your beds. Wire mesh and netting can exclude even small insects. Placing clear plastic drinking cups, or cut in half drink containers over seedlings buried in the soil a little bit can be a simple and effective barrier. Remove on hot days and when seedlings are touching the edges.

Traps

- For snails bury plastic containers, such as a margarine tub that has a section 3 cm long and 1-2 cm deep cut out of the top long edge, in the garden. Almost fill with beer and place the lid on. Check each morning, empty out the drowned ones and refill.
- For earwigs, slaters and millipedes scrunch some newspaper in small garden pot. Coat with vegetable oil or the oil from tins of fish. Empty out each morning.

Beneficial predator insects

These critters or their young will out right eat the pest species. Predator insects include:
praying mantis, ladybird larvae, lace wings, hover fly, Assassin bugs, robber flies, wasps and are commonly seen in biodiverse gardens.

21 Praying mantis

21 Hover flies

23 Dragon flies

24Parasitic wasp egg capsules

25 Lady bird juvenille Adult

22 Lacewings

23 Hover flies

24 Spiders

29 Wool aphid control by Lady Birds
Lady bird life cycle bottom left

25 Cabbage moth | Parasitic wasp eggs | Caterpillar next to parasitic wasp eggs | Wasp egg capsule

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Recommended books

Denis Crawford, Garden Pest, Diseases and Good Bugs
Tim Marshall, Bugs, The Ultimate gardens Guide to Organic Pest Control
Judy McMaugh, What Garden is Pest or Disease Is That?
Jackie French, Natural Control of Garden Pest
Jane Davenport, Garden Guardians
Kevin Handreck, Gardening Down-Under, A Guide to Healthier Soils and Plants

Organic solutions for common garden pests

- Horticultural oil - 2 cups of vegetable oil + ½ cup of dishwashing detergent. Shake together in a jar, where the mixture will turn a milky colour. Add 2 tablespoons of this concentrate to a litre of water and it's ready to spray. This controls most insect pests, including scale, aphids, white fly, leaf miner, mealy bug and mites.
- Coffee - kills slugs and snails. Add to 10 parts water, one part espresso coffee (not instant). Spray over the surface of leaves and soil where snails and slugs might crawl. Reapply after heavy rain.
- All-round insecticide - chop four large onions, two cloves of garlic, and four hot chillies. Mix them together and cover with warm, soapy water and leave it to stand overnight. Strain off that liquid and add it to five litres of water to create an all-round insecticide.
- Soap spray - add two tablespoons of soap flakes to one litre of water and stir thoroughly until completely dissolved. There is no need to dilute this further, just spray it on as is. This controls aphids, caterpillars.
- First, spray a test patch on the target crop and wait 24 hours before checking the plant for damage before proceeding. Always wear safety gear; store in sealed, labelled containers; keep out of reach of children and pets.

You can also buy:

- *Bacillus thuringiensis* or BT - an organic, bacterial bio-control. Controls codling moth, caterpillars, including lawn grubs, and hard-to-kill furry caterpillars.
- Spinosad - a biological insecticide to control fruit fly, caterpillars and pear and cherry slug.
- Pyrethrum dust or spray - for grasshoppers, ants, aphids, caterpillars and thrips.
- Horticultural glue - for codling moth, tent caterpillars, procession caterpillars and ants.

Adapted from Harry Harrison's Notes from Grow Your Own Food workshop series

Complied by Shannan Davis, November, 2020
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