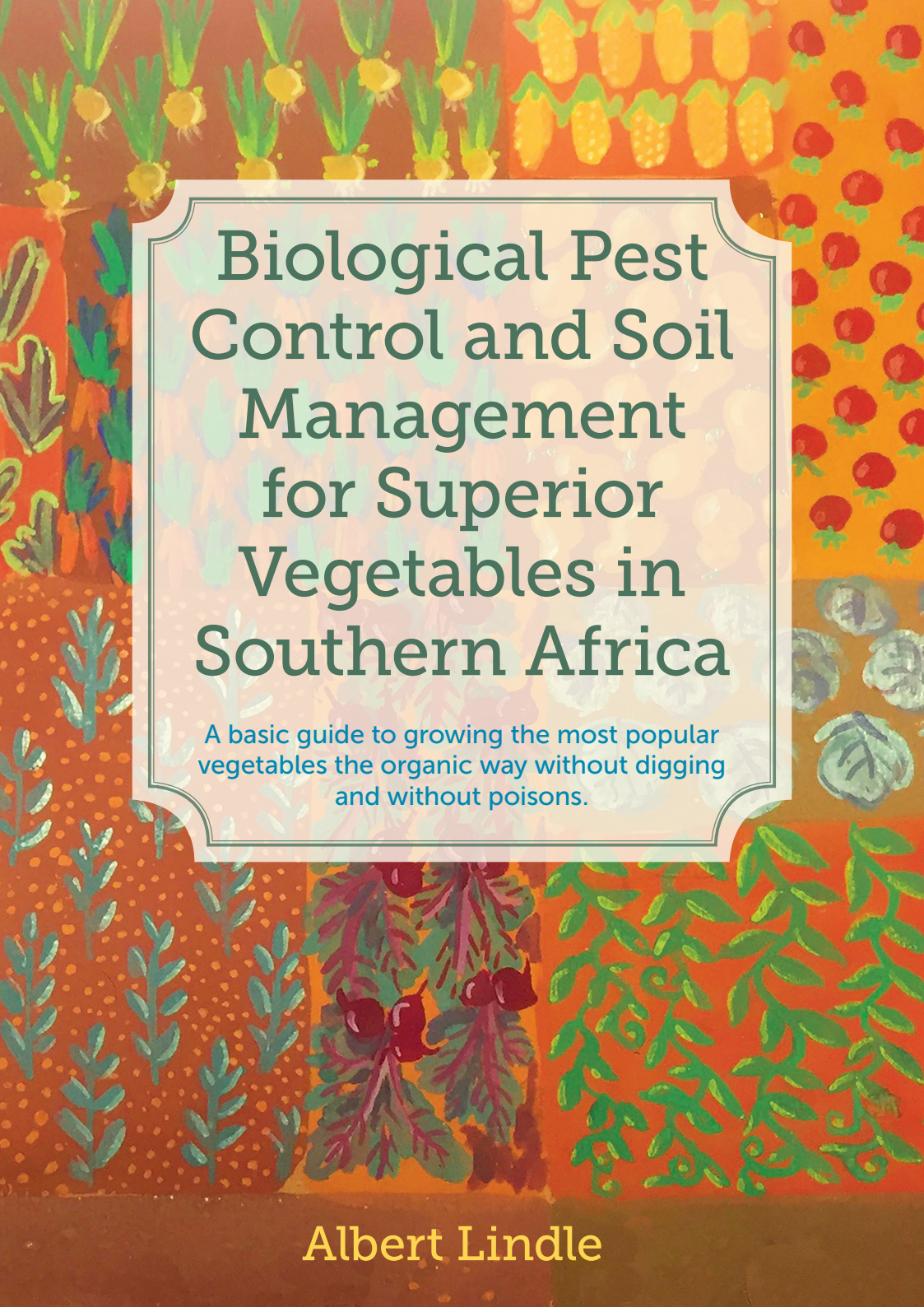




Biological Pest Control and Soil Management for Superior Vegetables in Southern Africa

A basic guide to growing the most popular
vegetables the organic way without digging
and without poisons.

Albert Lindle

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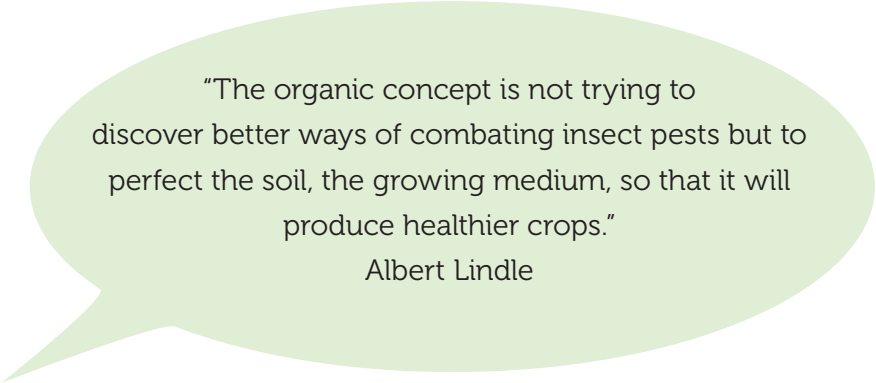
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'Biological Pest Control and Soil Management for Superior Vegetables in Southern Africa', is the third section, Vol. II of 'Let's Start Organic Gardening in Southern Africa', by Albert Lindle, and is issued as a separate volume for the convenience of owners of Vol. I which contains sections one and two.

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"The organic concept is not trying to discover better ways of combating insect pests but to perfect the soil, the growing medium, so that it will produce healthier crops."

Albert Lindle

FOREWORD

I met Albert Lindle and his wife in the early '70s when they ran the Organic Soil Association shop (organic fresh produce) in 4th avenue just off 6th street Parkhurst. They were two inspiring persons for those of us who were still youthful at the time. Some 5 decades later I find myself reminded of the Lindles through this booklet which was first printed in September 1976.

We at SAOSO are grateful for the pioneering work done by both the Lindles and the other members of the then Organic Soil Association. The booklet "Biological Pest Control" was published by the LinPrint Press and was authored by Albert Lindle.

I have approached CIPRO to see if the publishers "Linprint Press" still exists. The company *CIPROZA* allows the public to retrieve registered company and director information as housed at the CIPC (Companies and Intellectual Property Commission) office, which previously was known as the CIPRO (Companies and Intellectual Property Registration Office). Linprint does not exist on their data base.

I did also try www.govchain.co.za who register companies as well, and they said the name Linprint Press is available, confirmation that the company does not exist.

Based on not being able to access copies of the booklet "Biological Pest Control" we have decided to print copies and make these available to organic growers in Southern Africa. All credit going to the author Mr. Albert Lindle.

I extend sincere gratitude to Mr. Lindle for the work he did to get the booklet printed, published and distributed by the Linprint Press of Honeydew. Our action was also motivated by the fact that we wanted Mr. Lindle's legacy to live on through the copies that are printed and will be used by producers in their promotion of organic agriculture.

Sincerely

Alan Rosenberg

Chairman: South African Organic Sector Organisation (SAOSO)

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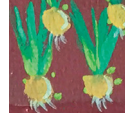
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Definitions

Organic vegetable gardening can be started any time of the year. With good compost, healthier and more nutritious vegetables can be produced. It is the cheapest way, making a much lesser demand on our energy resources, than the conventional way. There is no substitute for good compost - you cannot gild the sun!

ALGINIC ACID

Sea weeds supply several polysaccharides which are said to reduce certain virus infections in plants. One of these is alginic acid, which is found in brown seaweeds. It is well worth knowing that alginic acid is formed in a healthy soil by *Azotobacter vinelandii*, which is a very common soil bacterium. The presence of alginic acid increases the germination rate of seeds. It was discovered by Quatsel & Webley in 1947.

CLAYEY SOIL

Clayey soil can be loosened up and made friable by working in compost and green manures.

COMPOST-GROWN SEEDS

It should be the aim of every compost gardener to produce his own compost grown seeds. According to Sir Albert Howard composted, living soil provides the conditions where really healthy plants can concentrate on producing healthier seeds. That means, the new generation seeds are of a better quality than the mother seeds were, and this process of improvement goes on generation after generation under the right conditions. That is yet another proof of how important organic methods are, since under orthodox cultivation we are constantly hearing about varieties 'running out'...

CROP ROTATION

By crop rotation is meant a three or more year system of relocating garden crops. The principle being not to grow the same crop in the same place year after year, but to rotate them in order to control disease manifestations. It follows that when your soil has developed so much 'life' that your crops are immune to disease, in other words stay healthy, this practice need no longer be applied.



DRAINAGE

Where the instructions read "... needs a well-drained soil" and if you have difficulties with a damp or wet soil, grow your plants on ridges or in raised beds.

FERTILITY

Most advice in general horticultural literature on fertilising the soil presupposes that the soil is infertile, whereas composted, living soil is highly fertile.

GREEN MANURING

The term 'green manuring' implies growing a crop rich in organic matter i.e. rye grass, soya beans, rape, mustard, etc. for the sole purpose of providing organic, fibrous material with which to feed the micro population of the soil.

LIMING

The general advice given to gardeners on liming is that certain plants need lime. Therefore, one is urged to lime the soil before planting those seedlings, but I think it is always advisable to ascertain the present state of acidity or alkalinity before any adjustments are made.

As Albert Einstein said, 'we must endeavour to understand what we are doing'. And that is what Sir Albert Howard means when he urges us to learn how to grow crops that are disease free and naturally healthy. He has given us the basic material - Indore compost. Now it is up to us gardeners to put the organic methods into practice.

NO - DIGGING

Briefly, it has the following advantages:

- a) it eliminates inverting the top soil and this gives plants greater powers of resistance to attacks by insect pests and diseases,
- b) it saves compost,
- c) it saves water,
- d) it saves energy,
- e) it eliminates the labour of digging - the drudgery of gardening,
- f) the permanent deep mulch reduces the need for weeding.



However, although digging is unnecessary for experienced organic gardeners, it is still necessary for new organic gardeners during the transition period until such time as their soils become sufficiently alive.

MONOCULTURE

The organic school has often warned about the dangers inherent in monoculture as this practice increases the menace from pests and diseases. One should avoid planting large areas to one single crop. In nature, mixed farming is the rule and a great many different plants and animals are usually found living harmoniously together. Mixtures of grains and pulses generally give good results - the combined crop being larger than two separate crops. In orchards, different species of fruit trees should be interplanted. The vegetable crops in our gardens also have a need of herb plants as companions.

PESTS

Pests and diseases are discussed in this book at great length and experienced organic gardeners might wonder why all these details are necessary when I am advocating organic methods. However, these instructions are for the benefit of beginners who still have to transform their ground into that 'living soil'. This is usually achieved during the transition period.

RICH SOIL

Rich soil means a well composted soil which soon develops into a dynamic, living soil. This kind of growing medium is most fertile, even if judged by the highest standards. Until this stage is reached liquid manure (compost tea) is applied to a deep mulch which has been placed around your plants to protect the layer of compost which was previously used to cover the soil.

SANDY SOIL

Sandy soil can be made very fertile by the addition of well-made compost and organic materials.

TRANSITION PERIOD

During the transition period, some gardeners like to use extra nitrogen, phosphates and potassium, by administering blood meal, hoof and horn meal, etc., rock phosphates, wood ashes and seaweed preparations or fish meal, etc.



Beans, green

Soil requirements

Beans green (*Phaseolus vulgaris*) also called dwarf, French, snap or bush beans.

Prefer a rich soil with good drainage. Their rooting system is shallow. Use land that has carried cabbages or potatoes and enrich with liberal amounts of compost. Beans are legumes and make their own nitrogen with which they improve the soil.

Sowing

Sow after danger of frost has gone, every four weeks to provide a succession. Make a drill 5cm deep and set the seeds 10cm apart all along the row. Cover with 5cm of compost and firm. Draw the next drill at a distance of 60cm.

Harvesting

Pick regularly each week whilst still tender, starting about two and a half months from sowing. Never pick when foliage is wet. If pods are not picked regularly, they develop their seeds and stop cropping. However, the seeds make kidney beans and if thoroughly dried will store well.

Pests: aphids, bean beetles, cutworms, caterpillars, red spider mites, thrips.

Diseases: anthracnose, bacterial blight, rust.

Remedies are listed at the end of section.

Beans, broad

Soil requirements

Beans, broad (*Vicia faba*) are now becoming more popular in South Africa as a source of good protein food.

They need cool conditions, but will thrive on light as well as clayey soils. As they are heavy feeders, they need lots of compost. Their residue enriches the soil. The stems contain lots of potash.

Sowing

In autumn and winter sow at four weekly intervals. Make a drill at least 5cm deep and set seeds 25cm apart. Cover with compost and firm. The next row should be 90cm apart. Need lots of water when flowering. Keep well mulched.



Harvesting

Ready for use about three months after sowing. Take bean seeds out of pods and cook. Cut down the stems of the plants and compost, but leave the roots in the soil as they provide it with free nitrogen.

Pests: Usually troubled by black fly (aphids), but the better the quality of your soil the less trouble they will be. Spray with pyrethrum if fermented nettle spray is not available. Among the natural predators the chief one is the ladybird beetle.

Diseases: Black blight and rust are troublesome in wet weather; best protection is a well composted soil.

Remedies are listed at the end of section.

Beans, lima

Soil requirements

Lima beans (*Phaseolus limensis*) grow best in the hotter areas of the country. They are frost tender. They prefer a light soil enriched with plenty of compost. It is advantageous to maintain a good mulch and to provide extra water at the flowering stage.

Sowing

In the warmer areas sow from early to late summer in a drill 5cm deep and 10cm apart along the row. Cover with compost and firm. Distance between rows should be 60cm. They take two to three months to mature.

In the colder areas the skilful organic gardener can sow seeds in pots in his cold frame and plant them out when the soil conditions as well as the weather are more favourable. This will make possible an early crop of these delicious beans.

Harvesting

Pick pods when beans are visible but do not let them get tough. Use green or dried. They need to be cooked. Pick regularly.

The beans intended for storage and winter consumption should be left on the plants to mature fully and to dry naturally and thoroughly before they are gathered. This will enhance their keeping qualities.

Pests and diseases: see green beans.



Beans, runner

Beans, runner, climbing or pole. Similar to green beans, but require some kind of support which they eagerly climb.

Pests and diseases: see green beans.

Beans, soya

Soil requirements

Soya beans (*Glycine max.*) are a boon to all organic gardeners as they will grow well in all regions of Southern Africa, although the plants are frost tender. They are a rich source of protein. The soil should be well drained, but only slightly acid, therefore most soils need liming. These plants are shallow rooted, but will thrive in most soil types. Can be grown for use as green manure and as material for the compost heap. They are a source of organic nitrogen.

Sowing

Sow seeds after frost danger has passed in spring in drills 3cm deep and 10cm apart in the drill. Cover with compost and move the line 90cm for the next drill. Cover the soil between the rows with 15cm of mulch as the plants grow larger.

Harvesting

Soya beans can be harvested either green or dry. If you want green soya beans pick the pods before they are fully mature, while still green. For easy shelling, parboil for five minutes in the pods.

For dry beans for storage let them mature fully on the vines. They go yellow, but must be picked before the pods shatter. Dry well before storing.

Pests: beetles, caterpillars.

Diseases: bacterial blight, brown spot, downy mildew.

Remedies are listed at the end of section.

Beetroot

Soil requirements

Beetroot (*Beta vulgaris*) prefers a light and fertile soil, rich in organic compost, but dislikes fresh manure. Does not like to follow other root crops.



Sowing

In most areas sow every four weeks from August to April in drills 3cm deep. Set the seeds 7 ½cm apart in the row. Cover the seeds with 3cm of fine compost and firm with a short board. The next row should be 45cm distant. After germination thin out to one plant per every 15cm. Later when plants are 8cm tall a further thinning is required to 30cm between plants. This is easily accomplished by taking out every second plant.

Harvesting

Firstly, the thinnings can be used in salads. The mature beets should be ready in two to three months. The tops should also be used for the salad bowl. Compost grown beetroot can be eaten raw, grated, or cooked in the conventional way.

If your beetroot has blackened, corklike areas and shows cracks, this indicates that your soil is severely unbalanced. The only cure is to revitalise your soil with organic compost.

Pests: cutworms, aphids, beetles, caterpillars, leaf miners.

Diseases: leaf spot, corky lesions.

Remedies listed at the end of section.

Broccoli

Soil requirements

Sprouting broccoli (*Brassica oleracea* it.) prefers cool conditions, but needs a well composted soil as we demand abundant growth. If they are mulched well, they will be found to be an easy subject to grow.

Sowing

Sow seeds at four weekly intervals in a nursery bed in shallow drills from November to January. Transplant when large enough to handle (four to five weeks) into rows 60cm apart each way. Apply liquid manure (compost tea) every other week.

Harvesting

Harvest the central head first. It should be ready from four to five months onwards when the buds are fully developed and the head still compact. If left too long the buds will open up. After the head has been used, other smaller heads will appear and should be used. Once the plant ceases to produce further heads it should be removed to the compost heap.



Pests: aphids, caterpillars, beetles, bagrada bug, red spider mites.

Diseases: downy mildew, bacterial wilt, soft rot, clubroot.

Remedies listed at end of section.

Carrots

Soil requirements

Carrots (*Daucus carota*) prefer cool conditions, but will grow in all areas of Southern Africa if sufficient moisture can be provided. They need a fertile, composted soil, but dislike fresh manure. Carrots do well in a sandy soil. If your soil is clayey use the short 'Oxheart' variety and endeavour to improve the soil conditions with compost, so that the longer types of carrots may be grown eventually.

Sowing

Sow seeds at four weekly intervals in rows. Make the drill 1cm deep and spread the seed thinly, cover with finely sieved compost and firm well. Draw the next row at a distance of 25cm. Must be thinned, as seeds are usually sown too thickly. Thin to 3cm apart in the row. If you see any shoulders above ground, cover with soil, compost or mulch otherwise they will turn green.

Harvesting

Use thinnings for salad bowl. Carrot tops are good to eat if you get used to the taste. Carrots should be ready in two to four months. Best eaten raw - grated or juiced, but can be cooked.

Pests: aphids, carrot rust fly, caterpillars, beetles, thrips.

Diseases: soft rot, leaf blight.

Remedies listed at end of section.

Cabbage

Soil requirements

Cabbage (*Brassica oleracea capitata*) is a hardy biennial, fairly easy to grow in most soils, but really needs lots of good compost and a sprinkling of lime as soils generally speaking are too acid for cabbage. The best growing medium is slightly alkaline i.e., above neutral on the pH scale. Early varieties need even more compost than the late maturing ones. Plant them in full sun.



Sowing

Can be sown practically throughout the year, using different varieties, in nursery bed in drills about 1cm deep. When 8cm high, transplant in rows 60cm to 1m apart, depending on the variety. Shade for a few days, if necessary. Mulch well to keep roots cool and to conserve water.

Harvesting

Ready after three to five months. Cut heads when firm. If heads fail to form this is an indication that the soil is not rich enough; help out with liquid manure (compost tea). Don't leave stumps in the ground for second growth, better to sow at four weekly intervals.

Pests: aphids, caterpillars, beetles, red spider mites, bagrada bug, cabbage butterflies, cabbage root fly.

Diseases: soft rot, downy mildew, club root.

Remedies listed at end of section.

Cauliflower

Soil requirements

Cauliflower (*Brassica oleracea botrytis*) prefers to grow in the cooler areas and needs plenty of special attention. Must grow quickly and therefore needs very rich and fertile soil with plenty of moisture. Is never to follow cabbage, but should rather follow on after peas or beans.

Sowing

Sow in nursery bed or better still in individual pots. Will suffer less when being transplanted from pots. Sow in autumn or winter period. When large enough, plant out 60cm apart in rows 90cm apart. When heads start forming, tie outer leaves together to protect head from sun. Apply liquid manure weekly. If they are neglected, they will not form good heads. Provide them with plenty of mulch to keep their roots cool and moist.

Harvesting

Harvest the white heads after four to eight months according to variety. If not cut at the right time they will lose quality, colour and flavour. Can be eaten raw or cooked. Use your own unsprayed outer leaves in same way as cabbage.



Pests: aphids, caterpillars, red spider mites, bagrada bug, cabbage moths.

Diseases: downy mildew, club root, black rot.

Remedies listed at end of section.

Celery

Soil requirements

Celery (*Apium graveolens*) requires a rich soil and prefers cool and moist conditions; mulch well and shade in very hot periods, as the rooting system is rather shallow. Liquid manure applications are greatly appreciated.

Sowing

Get blight resistant seeds and sow in spring or autumn in drill ½cm deep, previously watered, as seed is very fine. Cover with sifted compost; keep shaded. Better still, sow in trays which can be watered from the bottom by standing them in a shallow basin containing about 3cm of water. When the plants are 6 to 8cm high transplant them into single pots. When they have developed a good root ball and are between 12 to 14cm high, they can be transferred to permanent positions at least 20cm apart in rows 1m apart. Green celery does not need to be earthed up or planted into a trench, however for white (blanched) celery sticks this is necessary.

Harvesting

Celery is ready when stalks are large enough for the table. Should mature in four to five months. Eat raw. Leaves can also be added to salad bowl. Very useful for flavouring soups and stews.

Pests: aphids, leaf miner, cutworms, slugs, snails.

Diseases: leaf spot, early blight.

Remedies listed at end of section.

Comfrey

Soil requirements

Comfrey is the widely acknowledged wonder plant. It is very easy to grow and will thrive almost anywhere, however it is frost tender. It is a perennial. Its roots go deep into the sub soil and the green leaves are therefore a rich source of minerals.



Planting

Comfrey is propagated by root cuttings and off-sets, usually in spring. It may be planted in odd corners in the garden or 60cm apart in rows which are 1m apart. Water well at planting time and keep free of weeds. Nipping out the flowering stalk promotes leaf-growth.

Harvesting

The leaves may be picked as soon as they have reached a fair size, but they will grow to quite a good length and healthy plants have wide, succulent, dark green leaves, which grow even more prolifically if cut or pulled regularly. Use them raw in salads or cook as you would spinach, in very little water.

They contain a lot of potassium, vitamin B12 - the antianaemia vitamin which is usually only found in liver - vitamins A, C, E and the B complex, as well as allantoin. Its protein is said to contain a high percentage of methionine, tryptophan, isoleucine and lysine, according to the latest research findings and widely propagated by the Henry Doubleday Research Association's Lawrence D. Hills.

If you don't like the prickles, you simply let the leaves wilt before eating them in salads. Comfrey leaves can be gathered several times a year and when dried make the famous comfrey tea. In the garden use the leaves as a potash manure and in the compost heap they act as a compost accelerator.

Pests & diseases: absolutely minimal if grown in well composted living soil.

Cucumber

Soil requirements

Cucumber (*Cucumis sativus*) requires full sun, as it is a warm season crop and prefers an enriched sandy soil. It grows rapidly and requires plenty of water, especially in the early stages. Compost and mulch well to keep soil moist. Needs good drainage so planting on a mound will help the shallow root system.

Sowing

After danger of frost has passed sow 3-4 seeds about 2cm deep in previously prepared stations which are 1¼m apart each way. Sow a second crop when first plants show four true leaves. Must be thinned to only one plant per station. Can also be trained up a fence or trellis. Interplant chives.



Harvesting

After two to three months growth, some cucumbers should be ready for gathering. Cut the stems, do not pull. Collect them daily, for if left on the vine too long the plant will stop producing.

Pests: beetles, aphids, red spider mites, fruit fly, caterpillars, thrips.

Diseases: downy mildew, anthracnose, powdery mildew.

Remedies are listed at the end of section.

Eggplant

Soil requirements

Eggplant (*Solanum melongena*) is a warm area crop and very tender to frost. Needs a fertile, compost-rich soil. If it is to be grown in poor soil, concentrate plenty of compost in and around the planting stations.

Sowing

Sow after all danger of frost is over in spring, in frost-free areas, sow in spring and autumn in specially prepared stations one metre apart both ways, for vigorous plants, or sow in pots in cold frame for early plants. They take about 10 days to germinate and need five to six weeks growth before they are ready to plant out. Keep them well mulched.

Harvesting

Harvest as soon as fruit turns glossy or while still glossy. They need 4 ¼ to 5 months to mature. The stems should be cut as pulling might damage the plant. The fruits do not store well and should therefore be eaten soon after harvesting.

Pests: beetles, caterpillars.

Diseases: bacterial wilt, fungal rot.

Remedies are listed at the end of section.

Leeks

Soil requirements

Leeks (*Allium porrum*) like to grow in cold climates and can even withstand frost. Need a rich, composted soil and plenty of moisture for rapid growth. The soil must be well drained.



Sowing

Sow during July to October and again from January to April in drills 1cm deep in nursery bed. Transplant into trench 8cm deep when seedlings are 15cm high, 15cm apart in rows 60cm apart. Trim leaves and roots before planting. Earth up as they grow. Alternatively, plant without trench and build up mulch as they grow.

Harvesting

Use in soups and salads; can be enjoyed all the year round, as leeks can be harvested at any stage of their growth. They normally take four to five months to mature. They do not deteriorate in winter if left in the ground.

Pests: usually immune; very few insects attack these plants.

Diseases: if soil conditions are too wet rot sets in.

Lettuce

Soil requirements

Lettuce (*Lactuca sativa*) need protection from the extremes of weather but can be grown in all areas, all the year round with suitable arrangements to keep them cool where it is too hot and adequately protected from frost where it occurs. Must grow quickly to avoid becoming bitter. Needs plenty of compost and moisture. Will grow best in undug, firm soil; mulch with ripe compost.

Sowing

Sow in ½cm deep drills and cover lightly with fine, sifted compost; firm with board and keep moist. Sow at 30cm apart both ways and thin out all but one at each station. To maintain a constant supply sow every four weeks. There are four types of lettuce, a) the non-heading varieties, b) butter lettuce (soft leaved), c) cabbage type (crispy with white hearts, and d) cos lettuce. Try several varieties of each group in order to ascertain which suits your circumstances and taste.

Harvesting

They take from 10 to 12 weeks to mature, but one need not wait that long as they can be added to the salad bowl even before hearts have formed. It is best to eat the green leaves as the white ones are vitamin poor.

Pests: cut worms, aphids, caterpillars, slugs & snails.

Diseases: leaf spot, soft rot, grey mould.

Remedies are listed at the end of section.



Mealies

Soil requirements

Mealies, green, or sweet corn (*Zea mays*) need a rich, well composted soil and plenty of mulch and moisture. Likes full sun. The roots go deep, but there is no tap root. Interplant with peas or beans.

Sowing

Sow disease resistant seeds from September onwards in drills up to 10cm deep and 15cm apart in rows which are one metre apart. Thin out seedlings to stand 45cm apart. When planting, rather make 'block' of shorter rows than one or two long rows. This ensures better pollination. Sow at four weekly intervals for an abundant supply over a longer than usual period.

Harvesting

Pick cobs when plump. They should still be 'milky' when tested with the nail or the thumb. They need 2 ½ to 3 months to mature and should be eaten fresh as soon as possible after picking.

Pests: black maize beetle, chafer beetle, cutworms, caterpillars, aphids, corn ear worm, stalk borer.

Diseases: not much trouble in organic gardens.

Remedies are listed at the end of section.

Onions

Soil requirements

Onions (*Allium capa*) like sandy soil which should be firm. The top seven to eight cm should be liberally enriched with compost, as they have a shallow root system. Some growers think that additional potash and phosphorus are necessary to obtain perfect onions; this is true if your soil is less than fertile.

Sowing

Sow fresh seeds only, as they don't remain viable for very long. Sow during February to March, 1cm deep in a nursery bed or seed boxes. Transplant when big enough to handle comfortably. Place them 10cm apart in rows which are 45cm apart. Don't plant too deeply. When transplanting, discard those plantlets which have already formed small bulbs as experience has shown that they will not grow into good bulbs.



Salad onions (also called spring onions) can be sown in spring and autumn in all areas. Place seeds in 1cm deep drills. Rows should be 30cm apart.

Harvesting

Salad onions can be harvested any time they are big enough for the salad bowl. Storage onions take from four to seven months to mature. Must be well dried before storing away. The usual method is to spread them out in a dry airy shelter on wire racks.

Pests: thrips, onion fly.

Diseases: downy mildew.

Remedies are listed at the end of section.

Parsley

Soil requirements

Parsley (*Petroselinum crispum*) is a widely used herb which needs a well-drained, richly composted soil, and will grow in all areas. Needs regular watering.

Sowing

Sow in spring and autumn in a drill ½cm deep. As parsley seeds are very slow to germinate soak, in water for at least 24 hours before sowing.

Harvesting

Pick as required; eat some raw every day. A very valuable protective food, not just a decoration.

Pests and diseases don't trouble parsley if grown in fertile, well composted soil.

Peas

Soil requirements

Peas (*Pisum sativum*) if compost grown just cannot be compared for flavour and quality with the commercially available product. They like to grow in the cool areas and need a well-drained soil. A very rich soil is best. Some gardeners believe deep trenches are necessary, but organic gardeners find that peas will even grow well if the seeds are laid on hard soil, given a 5cm layer of compost and another 5cm of mulch.



Young plants are frost hardy, but flowers and pods are frost tender and get damaged. Don't like acid conditions, therefore lime well if necessary and supply extra phosphorus in the form of rock phosphate. Can follow on after celery which was heavily composted.

Sowing

Sow seeds at four weekly intervals in drill alongside a wire netting support, or on both sides of this support, during autumn and winter period. Make the drill 5cm deep and cover with compost after dropping the seeds into the drill at 5cm intervals.

If no support is provided, plant in double rows, so that the peas can climb up on each other. The distance between the double rows should be 1 metre. The double rows themselves are 20cm apart and in this space sticks or brushwood would provide a practical solution to the support problem.

As the plants grow taller, increase the mulch. When flowering commences, give liquid manure to assist the setting of the pods.

Harvesting

Harvesting can begin 2 ½ to 3 months after sowing. Pick the pods regularly every day, otherwise they might get too mature (hard and dry).

Pests: caterpillars, red spider mite, thrips.

Diseases: leaf spot, powdery mildew.

Remedies are listed at the end of section.

Peppers

Soil requirements

Peppers (*Capsicum annuum* var.) usually known as 'sweet' peppers do not produce the black or white pepper corns, but are valuable as a natural source of vitamin C. They like the warm areas and are very frost tender. Will grow well in most soil types. Water well and supply plenty of compost, mulch and liquid manure.

Sowing

Sow after frost danger has passed in spring and mid-summer (October to December). Make a hole 15cm deep and about 20cm in diameter. Fill with compost and tamp lightly. One only requires relatively few plants as with good treatment they produce



abundantly. In order to encourage them to grow vigorously plant 1m apart each way. This is achieved by placing 3 to 4 seeds in each planting hole, ½cm deep, and later thinning out to one plant per station.

Peppers mature in 2 to 3 months. Harvest carefully so as not to damage the plants; pick the ripe fruits regularly.

Pests: fairly free from insect attacks.

Diseases: bacterial wilt, mosaic.

Remedies are listed at the end of section.

Potatoes

Soil requirements

Potatoes (*Solanum tuberosum*) are shallow rooted plants. The edible portion of the plants are not roots, but tubers. This is a good subject for compost gardeners who have sufficiently large gardens to demonstrate how good quality potatoes can be produced. They don't like very clayey soils, but if this kind of soil is improved with compost, one can get a good crop. Sandy soils too, must be enriched with ample supplies of compost for good results. Do not lime the soil as this causes scab.

Sowing

Usually trenches or furrows are made 15cm wide and 10cm deep and 60cm or more apart. The "seeds", which should be government certified (but can also be your own compost grown ones) are spaced at 30cm in the furrows and are covered with as much compost as you have available. As the plants start to grow the tops are ridged (soil is drawn up towards them). Any cracks in these ridges must be plugged, preferably with compost.

It is also of great benefit to line the trenches with comfrey leaves before planting the seeds. These comfrey leaves decay quickly and feed potassium to the growing tubers.

Harvesting

Harvest with great care, use the garden fork rather than the spade. Storage potatoes must be fully matured. Test by rubbing the skin (it should not come off). Harvest in dry weather and store them in a dark, dry situation.

Pests: caterpillars, aphids, cutworms, snails and slugs, leaf beetles, tuber moth.



Diseases: early blight, late blight, virus afflictions like mosaic, common scab.

Remedies are listed at the end of section.

Pumpkins

Soil requirements

Pumpkins (*Cucurbita var.*) cannot withstand frost. They need very rich, composted soil. They are not suitable for small gardens as they need much space, but they can be trained up a fence or special frame. Water well but do not wet the foliage.

Sowing

Sow seeds during September to November in most areas, in prepared positions 2½cm apart. Make a hole about 40cm in diameter and 20cm deep and fill with compost mixed with the previously removed garden soil to form a mound. Sow four seeds after danger of frost has passed in each mound. If you sow individual seeds in pots and protect them from frost in the greenhouse or cold frame you can plant out your seedling plants when other gardeners sow the seeds. As soon as flowers appear give the plants liquid manure.

Harvesting

About 3 to 4 ½ months from sowing harvesting can begin. Cut the stems about 3cm from the fruit; this provides a handle and also prevents rotting. When mature the skins become hard and lose their glossiness. Take care to dry your pumpkins thoroughly before storing them.

Pests: pumpkin fly, aphids, leaf beetles, vine borers.

Diseases: powdery mildew, downy mildew, anthracnose.

Remedies are listed at the end of section.

Radishes

Soil requirements

Radishes (*Raphanus sativus*) can be round or long, red or white or black. They must grow quickly in order to be tender. They like a rich, light soil and need ample water. Do not apply fresh manure, only ripe compost. Don't plant after cabbage tribe.



Sowing

Sow 1cm deep in rows 20cm apart; thin to 5cm apart. Repeat sowing every other week or at four weekly intervals.

Harvesting

Harvest by pulling out of the earth. Every part of the plant may be eaten raw.

Pests: flea beetle, aphids.

Diseases: hardly ever attacked when grown in fertile, composted soil.

Remedies are listed at the end of section.

Spinach

Soil requirements

Spinach (*Spinacia oleracea*) prefers to grow in the cooler areas and easily bolts in hot weather. Needs a fertile soil, well composted and mulched.

Sowing

Sow where intended to grow as it does not like to be transplanted. Make shallow drills 30cm apart and space the seeds about 15cm apart, or thin to that distance later. Cover all soil around the plants with compost and mulch and water during dry spells to assist constant growth.

Harvesting

Ready for picking in two months or sooner, as you can use the green leaves at any stage and size. Spinach is rich in vitamins and minerals, but also contains oxalic acid. Cook in as little water as possible.

Pests: aphids

Diseases: leaf spot

Remedies are listed at the end of section.

Squashes

Soil requirements

Squashes (*Cucurbita var.*) vary greatly in shape and habit, however they all need similar conditions. These are mainly a well-drained, richly composted soil. They like warm locations and are frost tender.



Sowing

Use individually prepared stations or hills about 1m apart each way. Sow in September to November after all danger of frost is over. Place several seeds per station about 3cm deep and thin out to one later. They need lots of water and must be well mulched. Never sprinkle water on leaves, but keep root area moist at all times. Applications of liquid manure are needed frequently to encourage vigorous growth. Give special attention when flowers appear.

Harvesting

Harvest by cutting stalk about 5cm from fruit. They need about 60 days to reach maturity. The smaller varieties need a longer growing period. Zucchini marrow is picked in the baby stage when only about 15cm long.

Pests and diseases similar to pumpkins.

Sweet potato

Soil requirements

Sweet potatoes (*Ipomea batatus*) are usually only grown in the larger garden as they require lots of space. They grow eagerly, need little attention and therefore should be tried even if your space is limited. Light sandy soil is most suitable. Let them follow cabbage or cauliflowers. They love plenty of compost. Do not use fresh manure as this will cause too much top growth at the expense of the crop.

Sowing

Set your rooted shoots about 40cm apart in rows which are 1m apart from October onwards when frost danger is passed and the temperatures are rising.

If you cannot buy the slips, you can produce your own. Cover one or two sweet potato tubers with sandy soil and keep in a warm sheltered position, and within about eight weeks plenty of planting material should be available.

Harvesting

Sweet potatoes should be ready for lifting in from 3 to 5 months' time after planting. Use a fork for this operation. As they do not store well only lift as required.

Pests: caterpillars, leaf miner.

Diseases: leaf spot.

Remedies are listed at the end of section.



Swiss chard

Soil requirements

Swiss chard (*Beta vulgaris* variety *cicla*) also known as spinach beet, silver beet, sea kale, etc., or even “spinach” will grow well in moist soils and liberal quantities of ripe compost are necessary to produce luxuriant growth.

Sowing

The seeds are really clusters of seeds, similar to beetroot seeds, and should be sown in situ, sparingly. Sow in shallow drills 2cm deep and 30cm apart and cover with compost. Make the rows 60cm apart. Can be sown from spring onwards until autumn at four weekly intervals in most areas. Keep watered and maintain a deep mulch.

Harvesting

Harvest the first leaves within about 2 months from sowing. Once the leaves are full size keep picking or they will get tough and lose nutritional quality. The best plan is to take only one or two leaves from each plant at one picking. This can be kept up for several months by which time the succession crop should be ready for picking.

Pests: caterpillars, aphids.

Diseases: leaf spot.

Remedies are listed at the end of section.

Tomatoes

Soil requirements

Tomatoes (*Lycopersicon esculentum*) are very frost sensitive. They require very rich soil as they are gross feeders and can produce a heavy crop. It is best to provide strong supports and some gardeners recommend extra phosphates and potassium in the form of rock phosphate and wood ashes, comfrey compost, etc. They develop an extensive root system, equal to the top growth in all directions. If seeds are sown in situ the plants develop a deep going tap root. They need lots of water, regularly. A deep mulch is most beneficial as a good proportion of the feeder roots are near the surface.



Sowing

Always use disease resistant seeds and sow in trays. Place the individual seeds about 3cm apart each way, and transplant to individual pots when large enough to handle. Sow monthly for succession. When planting out space at least 1 ¼ m apart each way. As they grow keep tying the branches and especially the main stem to the supports to keep them off the ground.

The whole area should be well composted and enriched with rock phosphate, bonemeal, wood ashes, seaweed and comfrey. Also apply liquid manure regularly every week if you are still in the transition period and your soil has not yet reached optimum fertility.

The soil should be slightly acid to neutral. Do not give extra nitrogenous plant foods. Do not plant where potatoes, peppers or eggplants have grown.

Harvesting

Ripe tomatoes should be available 65 to 100 days after planting. It is an advantage to let them ripen on the vine and to pick them in the afternoon for consumption the same day. This way you get the greatest benefit from the vitamin content of this fruit.

Pests: erinose mite, cutworms, red spider mite, rust mite, caterpillars, root knot eelworms, aphids.

Diseases: fusarium wilt, bacterial wilt, bacterial canker, bacterial spot, mosaic, leaf spot diseases i.e. early blight, late blight, septoria leaf spot, grey mould, blossom end rot.

Present day tomato plants are very much liable to all or most of the above mentioned diseases. Once the symptoms have developed to the stage at which they can easily be recognised it is already too late to effect a cure. The plants should be uprooted and placed in the centre of the compost heap. And now, the soil should be rejuvenated with lots of compost and treated the organic way in future.

Turnips

Soil requirements

Turnips (*Brassica rapa*) prefer cool conditions, but will grow satisfactorily in all but the hottest areas. They need a well composted soil and a deep mulch to keep the soil moist and cool.



Sowing

Sow in situ at four weekly intervals in shallow drills, 1cm deep and cover with compost. Rows should be 30cm apart. Seedlings should be thinned out to stand 10cm apart.

Harvesting

If tender roots are desired pull them up before they get too large. Harvest by pulling them as required after about two months from sowing. The tops can be used as a welcome addition to the salad bowl.

Pests and diseases similar to cabbages.



Biological insect and disease control measures and non-poisonous spray recipes

Biological pest control in the minds of the general public means searching in far off countries for some insect predator and then releasing it in our own country to destroy some pest.

Then there is a system known as integrated biological pest and disease control, which means a combination of chemical poison sprays plus natural predators. This is done chiefly to reduce the number of chemical sprayings recommended, and to off-set the high cost of these materials.

Biological pest control, including the protection of natural predators and parasites during the transition period, can be wholly recommended but - improving soil health by organic methods must also be practised. Merely spraying, even non-poisonous preparations, will only mask the symptoms, but will not remove the causes.

In organic gardening we are mainly concerned with producing healthy, disease resistant food crops and we seek the help of our indigenous insect predators to help our plants to overcome severe attacks by pests. At the same time, realising that only sickly plants attract insects in pest proportions, we devote most of our energies to producing a healthy, living soil for our plants to grow in.

Insects

ANTS

Ants don't cause much trouble in organic gardens; the conditions are not right for them. But in less fertile soils they loosen up the earth around the roots of plants; this spells trouble.

To discourage their activities:

- a) sprinkle steamed bonemeal around the plants,
- b) pepper or mustard in powder form can be applied,
- c) spray ants with diluted glue,
- d) spread molasses on paper or cardboard; place near ants; when sufficient ants have been caught transfer to compost heap,



- e) if you can locate their nest, pour boiling water on it,
- f) above all, apply organic methods to improve the quality of your soil,
- g) eliminate aphids and scale insects and you will find that the ants also disappear.

APHIDS

Aphids or plant lice are well-known, small, soft bodied insects which can be green, black or brown. They suck the sap from leaves and tender stems. They are all female and constantly reproduce live young, which in turn reproduce without being fertilised. When overcrowding develops, specimens with wings are produced which are able to spread further afield. Males are produced which in late summer mate with the females. This results in eggs being laid, which can more easily over-winter in the colder areas.

Generally speaking, aphids do not like the sap of plants growing in well composted, living soils. If, however, they are present in great numbers and are harming your plants, you will have to conclude that your soil is still somewhat unbalanced and you should try one or more of the following non-poisonous control measures until such time as your plants become non-attractive to this pest.

- a) let natural predators such as ladybird beetles, praying mantis, etc., clean them up by not using poisonous sprays on the aphids, as these sprays are bound to kill the predators too,
- b) wash them off the plants with plain water,
- c) spray them with soapy water, or apply soapy suds with a sponge,
- d) make soapy water spray stronger by adding pyrethrum in liquid form,
- e) use fermented nettle spray,
- f) use a quassia tea spray,
- g) use a spray made with the juice from minced turnips and sunflower oil,
- h) dust with pepper, or mustard flour, or white flour, before dew has evaporated,
- i) spray with tea made with surplus tomato seedlings or tomato plant leaves,
- j) interplant with nasturtiums,
- k) strengthen your attacked plants by watering them with liquid manure tea or a seaweed preparation.



ASPARAGUS BEETLE

The eggs, which are laid in spring, are little black specks, visible on the shoots.

The dark coloured grubs, as well as the adults, feed on the young shoots and should be sprayed with a soapy water spray, reinforced if necessary, with pyrethrum.

If the pest is troublesome after the cutting stage is over, that is when the ferns are growing, use the nicotine wash.

But this is also the time of year when bantams can be made use of in cleaning up this pest.

The tomato tea spray is another way of combating the condition. It enables the plants to lose their 'attractiveness' to these insects.

Let the natural predators help you against these beetles by refraining from using poisons.

BEAN BEETLE (MEXICAN)

The Mexican bean beetles (*Epilachna*) look like large size ladybird beetles but have a dull reddish coat and are vegetarian. The real ladybird beetle is smaller, has a bright red, glossy outer set of wings and feeds voraciously on live aphids and so do their larvae.

These Mexican bean beetles on beans, potatoes, tomatoes, etc. are best hand-picked in the early stages, when there are only a few about; this saves an enormous lot of trouble later. When inspecting your plants for the presence of these insects remember that their larvae are hiding on the underside of the leaves. These must also be eliminated. Look for yellow, bristly creatures and knock them into a tin containing water topped with paraffin.

Natural predators will also help to eliminate them if poison sprays are not used. A harmless spray can be made of turnip skin juice and olive or sunflower oil.

BEETLES

The different kinds of beetles are numberless. If they are large enough, pick off by hand early in the season, as this prevents their multiplication.

Smaller species of beetles can be sprayed; use turnip or parsnip juice tea at an effective strength. Quassia tea spray makes the leaves less desirable and they go elsewhere.



BLACKFLY

See under aphids.

BLACK MAIZE BEETLE

This is a small shiny black insect which eats its way into the young plantlet by burrowing underground at germination time. Use pyrethrum powder to dust around the seed at planting time and also apply to the soil after seed has been covered.

BAGRADA BUG

These beetles are about a quarter inch long; they have an orange coloured cross on their backs; they normally attack young plants of the Cruciferae family i.e., cabbage, cauliflower, broccoli, etc., cress, horseradish, kale, mustard, radish, rape, turnips, etc., and overwinter on cruciferous weeds or old cabbage stumps, etc.

Pick them off the plants as soon as observed or shake them into a tin containing a water and paraffin mixture. The best way to combat these insects is by prevention. The Bagrada bugs, stink bugs, and similar kinds of sucking insects will by-pass your plants if they are growing in quality, living soil, and if this soil is looked after and maintained by the organic method.

CABBAGE LOOPER

See under caterpillars.

CABBAGE MOTH

Or cabbage butterfly: see caterpillars.

CABBAGE ROOT FLY

To prevent the cabbage root fly from laying its eggs near the stem of the cabbage seedlings, cut a 15cm square of malthoid or roofing felt; make a hole in the centre and fit it around the stem of the seedling snugly and flush on the ground. Also interplant the cabbage rows with thyme.

If the malthoid idea is not favoured, use a 6 to 8cm deep undecayed mulch consisting of very short strawy material and place this around the base.



CARROT RUST FLY

This fly finds its target by its acute sense of smell and lays its eggs in the soil near the young carrots. The larvae are yellowish white grubs which burrow into the carrots and also affect celery, parsnips, etc.

To repel use nettle tea spray and interplant with garlic or onions. Another way is to grow carrots and onions in alternate rows if this pest is causing trouble.

Late sowings are less prone to these attacks.

CATERPILLARS

There are many different kinds of caterpillars. They eat holes in leaves, flowers, seed pods and fruits. They are usually the larvae of moths or butterflies and at this stage in their development have enormous appetites eating each day many times their own weight.

The cabbage looper deserves special mention as it 'loops' as it moves forward. It is a light green caterpillar specialising on the cabbage tribe of plants and can easily be recognised.

Although the *Trichogramma* wasp parasitises caterpillars as well as other insects and their eggs, and although the *Bacillus thuringiensis* will infect and wipe out whole colonies of caterpillars without causing any 'side effects', until they are commercially available in this country we will have to fall back on our harmless remedies such as sprinkling sour milk with a brush over the plants, or applying a salt and flour mixture to the affected subjects, or salt only while the dew is still present, or pyrethrum powder or liquid, or nicotine spray. Whichever method you choose, apply the remedy at weekly intervals until your plants are clean again.

Another alternative is to spray the cabbage or cauliflower patch with the tomato tea spray or use an aromatic herb spray.

CMR BEETLES

The CMR beetle (*Mylabris oculata*) is a large beetle with yellow and black bands, buzzes around slowly, cleaning up over ripe fruit but also attacks fruit in the ripening stage. Best picked off by hand; drop in a tin or bucket containing water and paraffin mixture.



CHAFER BEETLE

The garden chafer beetle (*Phyllopertha horticola*) is a voracious, brown beetle about a centimetre long and they appear in great numbers feeding on the leaves of vegetables and many other plants such as mealies and roses, etc. The damage they cause is however soon overcome by the plants if they get organic treatment. Quite a lot of damage can be caused to lawn by the larvae of these beetles as they live on the roots of the grass.

The beetles are nocturnal feeders; collect them with the aid of a torch and destroy them before they lay their eggs in the lawn or near bulbs and tubers.

CORN EAR WORM

See mealie stalk borer

CUCUMBER BEETLE

The striped cucumber beetle has yellow and black bands. It attacks cucumbers, melons, squash, pumpkins, etc. In the early stages the seed leaves and tender stems are damaged and this should be counteracted with a heavy mulch.

Later on, the flowers and leaves come under attack and if this happens to your plants spray both sides of the leaves, after sunset, with plain water and dust with fine wood ashes and lime.

Another approach is to interplant with radishes, marigolds or nasturtiums at planting time.

CUTWORMS

Cutworms are fat, grey, caterpillars you find in the soil curled up near the plants that have been 'felled'.

Control the damage they can do by fitting a cardboard collar around the stem of the plant when planting out. The collar can also be made of plastic or tin. Push it into the soil about 3cm deep and leave about 6cm above ground.

Another way is to wrap two or three thicknesses of newspaper around the stem at planting time.

Bait can also be used. Take some bran and mix with molasses and pyrethrum powder. Add a little water to make it pliable. Roll into balls 1cm diameter and place near the vulnerable seedlings. Repeat nightly until danger has passed, i.e. until the plants have grown strong enough to become unpalatable to cutworms.



ERINOSE MITE

This is a microscopic, whitish mite that causes swellings in upper side of leaves, but is rarely encountered in well-run organic gardens. Sulphur is usually recommended and might be helpful during the transition period in extreme cases.

FLEA BEETLES

There are several species of flea beetles in Southern Africa and they may be black, brown or striped. They attack various vegetables and their presence can be detected by the numerous round holes they make in leaves. They prefer plants that grow in hard, crusted, infertile soil, hence our defence is compost and mulch.

Interplanting with butter lettuce discourages the attackers. Spray the affected plants with wormwood tea or other aromatic herb tea or use pyrethrum.

FRUIT FLY

Fruit flies are brown with yellow markings. They sting fruit to insert eggs which hatch into white maggots. They attack cucumbers, pumpkins, squashes, etc. in the vegetable garden.

Trap them with molasses water in jars strategically placed. If dead flies are left to decay in the jars other fruit flies will be deterred by the smell. Jars will have to be topped up from time to time. Only keep about 2cm of liquid in the bottom of the jars.

JAPANESE BEETLE

Japanese beetles are about 12 to 13mm in length and are a metallic green with bronze wings. They appear in swarms and damage grapes, plums, peaches, asparagus, mealies, soya beans etc. They devour flowers and the leaves of plants. They lay their eggs near grass and other roots in order to provide their larvae with plenty of food.

Collect and destroy them as soon as seen or shake plant or branch so that they fall into a tin containing water and paraffin, which you are holding in your other hand.

LEAF MINER

Leaf miners are the larval stage of certain moth species and are the cause of those curious white, twisted trails which are visible in green leaves. They are the tunnels the leaf miners make as they eat away the chlorophyll between the upper and



lower surfaces of the leaves of celery, sweet potatoes, lettuce, etc. These leaves then turn yellow and eventually drop to the ground.

At the end of the tunnel you can find the miner; squash it. The best spray to use is the nicotine soap spray. If possible, dip the whole plant (before transplanting) or leaf in this solution.

Healthy growing plants are not damaged by such attacks.

MEALIE STALK BORER

This pest is known by various names such as mealie stalk borer, or corn ear worm, or top grub. This larval stage in the life cycle of the pest causes the greatest damage as the larvae bore or tunnel into stems and cobs. When they are fully grown, they lower themselves to the ground and hide in the soil to pupate. They overwinter in the soil and emerge in spring as moths. Each one of these moths is capable of laying over 1000 eggs and they can distribute them over a great area. These eggs are also deposited on tomatoes.

To control it, it is suggested that one apply a small quantity of a tasteless mineral oil, such as liquid paraffin, to each cob, but not before silks have wilted, or use pyrethrum in liquid form, suitably diluted, or pyrethrum powder.

In the home garden, the best protection is the organic gardener's eye. Inspect every cob as often as possible (yes, daily if you can manage). Look for droopy tassels. Those are the ones which have been attacked. Search for the hole by which the culprit entered and slit open with a pocket knife, locate the borer and destroy.

If you are troubled with this pest, take it as an indication that the quality of your soil needs improving and also plant a variety suitable for your area and do it as late as allowable.

A light trap (which can be home-made) would catch a lot of the moths and ladybird beetles can clean up a large number of eggs. When we can get the *Trichogramma* wasps they will parasitise the worms and when we can buy *Bacillus thuringiensis*, they will infect those that are still around.

Clearing up old mealie stalks and burying them in the centre of compost heaps will destroy any pupae which are hibernating in or on them and those that are hiding in the soil can be gobbled up by chickens or birds when you plough or hoe the mealie patch.

That programme should account for most of them!



MEALYBUGS

The mealybug is a small red insect covered in waxy, white threads. It remains stationary and sucks plant juice. It likes damp conditions. Ants are attracted by its sweet secretions and sooty mould develops on this.

In organically managed gardens only very few mealybugs have to be dealt with. Kill them individually by dabbing with cotton wool pad dipped in methylated spirits.

MILLIPEDES

Millipedes are dark brown, many legged creatures that are technically classified as *Diplopoda*. They are not serious pests and usually do little harm in organic gardens.

Pieces of potato or carrot can be used as traps and are quite successful, as the millipedes burrow into these vegetables and by inspecting the traps daily, the culprits can be caught and destroyed.

ONION FLY

The damage is caused by the larvae tunnelling into and feeding on young plants chiefly, but they can attack at any stage of growth.

Use camomile interplanted or camomile tea spray as a defence. Alternate rows of onions and carrots seem to protect each other from onion fly and carrot rust fly. But the fundamental deterrent is a well composted living soil, since the larvae can travel from one seedling or plant to the next one in an onion row, so it is better not to plant onions in rows, but to disperse them all over the garden if this pest is very troublesome in your area.

PUMPKIN FLY

See Fruit fly.

RED SPIDER MITES

Red spider mites are microscopic insects that suck plant juices. They thrive in still humid air. They cover the underside of leaves with a fine, silky web and are particularly active in Highveld gardens

To combat:

- a) wash them off the leaves with the hose pipe; they won't climb back up again, but in case some mites are left on the leaves, repeat the operation every week until the plants are clean,



- b) spray with a mixture of chives juice and pyrethrum,
- c) spray with plain water and then dust with flour,
- d) don't use strong poisons; let the natural predators help you,
- e) the organic gardener will provide for a good air circulation around his plants, as prevention is better than having to cure.

ROOT KNOT EELWORMS

Root knot eelworms (nematodes) are microscopically minute worms which invade plant roots. These then swell up, form nodules and the flow of the sap is disturbed. The plants become stunted and die. Meanwhile hundreds of eggs develop in the nodules and re-infect the soil.

To counter this evil, compost is the only real answer. Build up the organic content and beneficial predatory fungi will multiply to the detriment of the eelworms.

Another proven method is to interplant with Mexican marigold (*Tagetes minuta*), which incidentally is the local kakiebos, and use as green manure.

SLUGS & SNAILS

There are many kinds of slugs and snails, but they all have one thing in common: they enjoy acid soils and damp conditions.

Therefore, sprinkle the area with agricultural lime and clear away all rubbish so that air may circulate freely around the plants.

Slugs can also be trapped with short pieces of board, bricks, grapefruit halves, cabbage leaves, etc. as they hide away under these objects during the day. Inspect your traps daily, preferably each morning, and collect and destroy the culprits.

Toads are natural predators of slugs. Bantams or even chickens and ducks will eagerly help you to clean them up.

SQUASH BEETLES

Squash beetles are sap suckers and they attack squash, pumpkins and similar plants, destroying the leaves and sometimes the whole plant.

They can be repelled by interplanting radish, marigold, nasturtium, etc. But if immediate action is called for try picking them by hand.

If this proves unsatisfactory try trapping them with short pieces of boards, as they



like to hide away in these shelters if provided. Inspect the traps regularly and destroy those caught in this manner.

SQUASH VINE BORER

It is the larvae that bore into stems generally and sometimes into the fruit itself. Deter the egg laying beetles by sprinkling the area near the tender stems with black pepper or pyrethrum powder. If the vine is already wilting, locate the borer and extract it after slitting the stem. Then cover injured part with compost and compress with a brick or a stone placed in position over the wound.

THRIPS

Thrips are tiny winged insects which attack onions chiefly, but also damage almost all other plants. They manage to reproduce themselves about half a dozen times per year. The larvae are so small that one needs a magnifying glass to detect them. Thrips cause small whitish blotches to appear where ever they suck plant juices.

Spraying with pyrethrum helps a bad infestation, but the real answer is to buy only resistant seeds and concentrate on improving your soil conditions so that really healthy plants can be raised.

TUBER MOTH

The tuber moth is a small brownish moth. Its larvae tunnel into the stems and tubers of potatoes. The normal defence is to draw up sufficient soil to keep the plants well protected. Make sure that your potato plot is well composted and covered with a deep mulch.

WEEVILS

The grubs of weevils feed on the vine as well as the tubers of sweet potatoes.

Crop rotation is important, but the real cure is a healthy composted soil full of worms and micro- organic life.

WIREWORMS

Wireworms are golden-yellow larvae of the click beetle, are about 12 or more mm long and have three pairs of legs at the front end of the body.

Pieces of potato buried in the ground will 'catch' them like traps. Inspect these traps daily and destroy the feasting wireworms.



These insects are not usually very plentiful in organic gardens as their allotted task is to be performed in meadow lands.

WOODLICE

Woodlice are really compost makers and should be left to get on with their task.

If you find them troublesome, however, use the soapy water spray reinforced with pyrethrum or trap them in old flower pots partly filled with damp moss or half rotted compost. They will hide and work in these traps and on inspection can be destroyed by dropping in boiling water or into a tin containing a water-paraffin emulsion.

Appendix

As most aspiring organic vegetable gardeners also boast a few fruit trees the following information on fruit tree pests is appended:

CODLING MOTH

The codling moth is one of the most destructive and persistent pests and a determined approach is necessary to combat this evil in all its stages i.e., we must trap and destroy it in the moth stage, the larval stage, as well as in the cocoon and egg stages.

1) MOTH STAGE

- a) The moths can be trapped with a small quantity of molasses (1 part) dissolved in water (10 parts) as the moths normally feed on the nectar from apple blossom. Therefore take several jam jars or tins (cans) and pour enough of the molasses solution into each jar to cover the bottom about 3cm deep. Suspend about 4 jars or more per tree on the branches and inspect them at weekly intervals. If the liquid has evaporated, top it up, but leave the dead moths in the jars as the scent will induce others to leave the area.
- b) Another way of destroying the moths is with a light trap. These gadgets can be bought or homemade. To devise one yourself you need a light (electric, paraffin, etc.) which is suspended over a bath of water which is covered with a film of paraffin. The moths are attracted by the light and drop into the bath and drown.

2) EGG STAGE

Apart from apple trees, peaches, pears, quinces, walnuts, etc. are also attacked and



hence need protection. The small grey moths appear about the same time as the flower buds burst open. The aim of the codling moth is to deposit her eggs on the leaves and fruit spurs, etc. and she does this at dusk every evening.

In the home garden, close inspection will reveal the presence of these eggs and enable you to destroy them without the aid of poison sprays. Simply remove or squash them!

3) LARVAL STAGE

As the larvae hatch out, they crawl around and find the fruitlets and lose no time in boring their way into the fruit. They are pinkish white grubs with a brown head and eat their way towards the core. When fully grown they either crawl out of the fruit or drop to the ground inside the infested fruit. That is why the organic gardener is keen to pick up and destroy all dropped fruit. If you keep poultry, you feed this fruit to your hens.

On leaving the fruit, the codling moth larvae look for a safe place to hibernate and this presents us with another opportunity to destroy them.

They either emerge from the fruit which is still on the tree or crawl out of the fruit that has dropped to the ground. In either event they now seek the protection loose bark on the tree trunk can offer them. Whilst en route they are vulnerable to birds or bantams.

4) COCOON STAGE

Our job is to remove all loose bark from our trees and to provide artificial hiding places where they can spin their cocoons. Make a trap on each tree trunk by wrapping a piece of sacking about 15cm wide around the tree trunk and tying it securely in the middle; then fold top half of the material down to provide the shelter they are looking for. These traps must be inspected frequently and the cocoon destroyed.

SCALE INSECTS

Scales, or scale insects, look like domes, that are either round or oval shaped, which are firmly fastened on the bark of fruit trees. The females may be yellow, green or brown. They suck sap and can do great harm to trees and bushes. They excrete honeydew which attracts ants and these in turn help to distribute them.

Ladybirds and other natural predators usually keep their numbers down, but only if you refrain from spraying poisons over your trees. If you have only a few scales here

and there, destroy them individually as you discover them, by touching each one with a cotton wool swab dipped in methylated spirits, but avoid touching the bark.

If the infestation is bad, a winter wash which contains oil must be used after leaves have dropped. Lime-sulphur is very poisonous and should only be used in extreme cases. And then - start using organic methods to improve soil conditions.

SLUGWORM

The slugworm is also known as the pear-slug, and resembles an ordinary garden slug feeding on the upper sides of fruit tree leaves. It is actually the larva of the sawfly. It can move around well in wet weather and in great numbers they can destroy most of the foliage of our fruit trees. In hot dry conditions they soon dehydrate. Our best defence is to dust with pyrethrum powder or spray with liquid pyrethrum or permanganate of potassium.

Another way to dry them up is to sprinkle them with dry sand, white flour, or similar substance and it is astonishing to experience the difference well composted soil accomplishes.

When the slug is fully developed it drops to the ground to pupate. This is when bantams or ducks can destroy them and reduce next year's infestation.

WOOLLY APHIDS

Woolly aphids, also known as American blight, have a covering of white waxy material that looks like cotton wool. Chiefly attack vines, apple and other trees. They infest root and branch.

The best defence is to buy only 'blight-proof' stock and grow in well composted soil. The shiny black ladybird is one of the main natural predators in South Africa.





Diseases

In organic gardening the various kinds of diseases are only of secondary importance; we stress the value of a healthy soil. We acknowledge the existence of disease as such, but what particular form it takes in our plants does not matter very much as thorough-going organic methods reduce to a minimum the causes of, or the need for diseases.

However, the beginner requires certain information to give him the necessary confidence to carry out our methods. Therefore, I have listed some of the diseases which are generally encountered in gardeners' conversations and have tried to explain them in simple terms under the following headings:

ANTHRACNOSE

Ominous looking black or brown spots on leaves or pods of beans, on melons, etc. are designated anthracnose. It is considered to be a fungus disease and as it spreads in wet weather one is advised not to work among the plants in wet conditions.

To prevent its occurrence, employ crop rotation and buy only disease resistant seeds. It is not frequent in plants grown in composted soils, but if encountered spray with garlic extract suitably diluted and made from organically grown garlic bulbs.

BACTERIAL CANKER

Bacterial canker or bacterial spot is said to afflict tomato plants and to avoid this trouble, tomato seeds should be treated with hot water before sowing. Get the water to 50 degrees C and keep it at that temperature. Immerse the seeds contained in a suitable muslin bag and suspend in the water for about twenty minutes, then sow immediately.

BACTERIAL BLIGHT

Largish, water-soaked spots with yellow or reddish borders can be observed on leaves and these are termed bacterial blight. This condition spreads in wet weather.

To prevent this condition, disease resistant seeds only should be bought, crop rotation should be practiced and above all build up the quality of your soil.

BACTERIAL WILT

Bacterial wilt is classified as a fungus disease which strikes in the seedling stage and usually kills. The affected parts, namely the leaves, wilt and die.



Get certified wilt-free seeds if at all possible and rotate crops. There is no cure for affected plants. The best way to combat these diseases to perfect your living soil which will grow healthy plants and these healthy plants in turn will give you healthy seeds. Using these compost grown seeds will provide you with better strains generation after generation.

BLACK BLIGHT

If you see black areas creeping inwards from the edges of leaves and the whole plant collapsing then you have witnessed what is known as black blight. On beans etc. it is caused by an imbalance in the soil.

It will be too late to save the plants that have been affected. You might be able to improve matters by sprinkling the row with wood ashes. Spraying with a seaweed or fish-waste preparation would amount to foliar feeding which can be recommended as a stop-gap. In future enrich your compost heap with comfrey, nettles, alfalfa and dandelion leaves.

BLACK ROT

Black rot may affect all crucifers, especially cauliflowers and it is spread in wet conditions or by irrigation. Infected plants drop their lower leaves or they discolour and die. If the condition is severe, that piece of ground must not be planted with crucifers for the next two years and will need ample supplies of compost to clear the trouble.

It is considered a seed-borne bacterial disease and affected plants do not show any outward signs in many cases until it has developed to a marked degree inside the plant, when the plant suddenly collapses.

Therefore, if you cannot obtain disease resistant seeds, the hot water treatment should be employed. The seeds are held in a muslin bag in water which is kept at 50 degrees C for about 20 minutes; then dip them into cold water and dry.

BLIGHTS

In what is called a blight, an almost instant unexpected and very noticeable damage to leaves, shoots or flowers occurs. The infected or attacked parts are killed and have to be removed and burned; more experienced composters remove them to the hot centres of their compost heaps. Once the soil is in the right condition of living balance, the plants growing there will resist such disease manifestations.



BLOSSOM END ROT

Blossom end rot is a well-known phenomenon to all tomato growers. It can be attributed to a lack of calcium, but if soil is neutral or just slightly acid, it is more likely to be caused by an irregular supply of water. Hence the importance of mulching and compost for moisture conservation.

BROWN SPOT

Brown spot, especially on soya beans, is known as a fungus disease. The leaves turn yellow and drop off. Compost this diseased material if you can generate enough heat in your compost heaps. Crop rotation is usually suggested as a cure.

In the garden, as soon as you discover this condition a garlic spray may be used, but the real answer is prevention by a compost rich soil.

CLUB ROOT

Club root (*Plasmodiophora brassicae*) is a well-known and widely discussed phenomenon among gardeners. The cabbage tribe is mainly affected and blaming a soil-borne fungus does not help us very much.

It is better to realise that if the disease is in your cabbage plot it is your soil that is too acid and starved of compost. The usual signs observable which make you decide to dig up the plant are a stunted appearance and a marked tendency to wilt in hot weather. When you inspect the roots you will find them distorted, scabby and swollen. Club root can also infect radish, turnips, mustard, etc. and several kinds of flowers.

Novice composters should burn infected plants together with the soil adhering to the roots and should not use the ground for further crucifers for several years until it has been thoroughly rejuvenated with compost.

More experienced composters normally do not encounter this trouble in their gardens, but if for some reason or other they do, they are able to make sure that these diseased plants together with infected soil are properly broken down in the hot centre of their compost heap.

To cure this condition, keep on dusting the soil with agricultural lime until it reaches pH7 and apply plenty of compost until that living quality develops.



COMMON SCAB

Common scab on potatoes has the appearance of rough, corky spots. These are caused by alkaline soil conditions.

To prevent this happening, don't lime the soil when planting potatoes.

CORKY LESIONS

Corky lesions, especially on beetroot etc. indicates an imbalance in the soil; some attribute it to a lack of boron. Correcting such a deficiency with borax is tricky and I would rather recommend continued applications of mature compost to rectify the condition.

DAMPING OFF

When a number of your seedlings inexplicably collapse your friends will tell you it's 'damping-off'. It is usually caused by over watering, or overcrowding or both.

To prevent this disaster, you should sow the seeds methodically, giving them plenty of space and use a proper seed sowing mixture.

Take 2 parts good garden soil

1 part sharp river sand

1 part humic compost (preferably home- made).

Should you feel the need for extra insurance try the following suggestions:

- a) water with a weak solution of permanganate of potash,
- b) sprinkle a few crystals of permanganate of potash on the soil (after you have finished sowing),
- c) spray with garlic,
- d) spray with chamomile tea.

DOWNY MILDEW

Downy mildew is termed a fungus disease which appears on leaves in humid conditions and can be white, grey or lavender. Collect affected leaves and burn or compost in the approved fashion. Spray the rest of the leaves with garlic spray or fermented nettle spray, but the only way to prevent this trouble is to build up the quality of your soil.



EARLY BLIGHT

On potatoes, early blight shows up as dark green water soaked spots on leaves which turn brown and wither. It kills the whole plant and the tubers rot in storage.

On tomatoes, the leaves develop dark spots, go limp and fruit rots.

On celery, grey spots develop on foliage.

Blights are caused suddenly, they say, by bacteria or fungi and damage is caused to leaves, shoots or flowers, but real living soil gives plants the power to resist.

FUNGAL ROT

Fungal rot, especially on eggplant, can be stopped sometimes by garlic spray, if it's not too far gone. Attacked plants usually have to be destroyed or composted very care fully. The soil conditions must be improved for future operations.

FUSARIUM WILT

Wilting equals drooping. This drooping can be of a temporary nature, but when due to disease it is permanent. In tomatoes it is very serious. The fungus lives in uncomposted soil and enters the plant through the roots and as its toxins spread throughout the plant, the leaves go yellow and droop, then it turns a dark brown. The plant dies. Compost the diseased plant(s) very carefully or burn. The soil must be re-built by organic methods.

GLASSINESS

Glassiness of potatoes can be prevented if water supply is regular. The conserving of rainwater or soil moisture is best achieved by using compost and deep mulching.

GREY MOULD BLIGHT

Grey mould blight, technically called *Botrytis cinerea* attacks buds, blossoms, leaves and fruits – practically all parts – in moist weather. It rots lettuce, lima beans, etc.

To prevent this easily visible grey mould spoiling our plants, we must avoid overhead watering and make sure of good ventilation at planting time by wide enough spacing and of course using plenty of compost.



LATE BLIGHT

On potatoes: tubers have sunken, dark, rotted areas; vines die off.

On tomatoes: vines die; fruit is water-soaked.

On celery: spots develop on leaves and stalks. Only safe, organic culture will prevent these diseases. The building of real living soil will repay you a thousandfold.

LEAF SPOT

White to grey spots with brown to purple edges are referred to as leaf spot disease. This is called a fungus disease and can sometimes be checked by several applications of garlic spray.

Generally speaking, when these spots develop, they are meant to indicate to us a lack of balance in the soil and the living organisms in the soil would appreciate more comfrey and alfalfa hay in the compost heap or applied as mulch.

MILDEW

Mildew on cucumbers and similar plants can be treated with chives-tea, but to prevent it from developing, keep the roots moist and compost the soil well at planting time. Follow this up with liquid manure tea fortnightly.

MOSAIC

Mosaic is considered a very serious and wide spread virus disease. It can affect tomatoes, peppers, beans, potatoes, cucumbers, etc. It gives the leaves a mottled appearance and resembles incomplete chlorosis.

There is no cure for the disease. Compost and organic methods will restore the soil to life and health.

POWDERY MILDEW

Powdery mildew is encouraged by wet or damp conditions and looks like a white, felty coating on stems, shoots and leaves. The fungus grows on the surface of plants and behaves like a parasite. It prefers humidity and poor circulation and appears readily on plants over-stimulated by nitrogenous fertilisers.



To forestall powdery mildew, ample ventilation must be provided at planting time i.e. do not overcrowd plants. In the transition period, some use sulphur and this stifles an outbreak.

Mustard seed flour can also control the spread of the disease. Make the flour by grinding your own organically grown mustard seed.

But if the aim is to prevent this trouble getting a foothold in future, practise organic methods to the best of your ability.

ROOT ROT

Root rot is prevalent in damp, badly drained soils. It can also be caused by planting transplants too deeply.

RUST

Rust is yet another fungal disease and is very common on asparagus, beans, etc. that grow in damp conditions. One can see small brown spots or clusters of them mainly on the underside of leaves, but also on the pods and even stems. The affected parts soon die and the whole plant is killed. There is no simple cure.

Whereas conventional methods prescribe an application of sulphur, we substitute a garlic spray, but chiefly look to our soil for our main defence and check on the drainage of the area.

Remove all the diseased material and compost it under hot conditions (in the centre of the heap). Plant only rust resistant varieties in future and realise that the lack of compost in the soil is the real cause of the trouble.

Until the organic content of the soil has been improved, control the condition with a 2 to 3 year crop rotation.

SCAB

See common scab.

SEPTORIA LEAF SPOT

Septoria leaf spot is a late blight. The spots of the fungus are on the leaves and stems.

Garlic spray will help in an emergency, but better and more intense composting methods will prevent future outbreaks.



SMUT

A sooty black mass of spores are referred to as smut and it appears on mealies and onions chiefly. It thrives in hot weather and it is said that these spores survive in animal manures. This provides another good reason why we should always pass animal manures through the composting process and not apply them directly to the soil in the vegetable garden.

If possible, remove the lumps of black accretion before they break open; burn all affected parts if you cannot be sure of your composting methods.

SOFT ROT

On onions soft rot is avoided by rotation as the spores in the soil do not survive until the next crop is planted in three years' time.

On cabbage, soft rot turns the leaves brown, then black as they become soft and slimy. Rotation is a possible control, but a living soil will grow healthy plants.

SOOTY MOULD

Sooty mould is a black fungal covering on the surface of leaves, stems or fruit. This mould thrives on the honeydew secreted by aphids, scales, etc. In severe cases it can interfere with the process of photosynthesis. The best way to prevent its appearance is keeping down aphids to an absolute minimum by organic methods.



Remedies

HOW TO MAKE UP THE HOME-SPUN REMEDIES MENTIONED IN THIS BOOK.

AROMATIC SPRAYS & TEAS

Aromatic sprays and teas can be used to help your plants, for instance:

Camomile tea and spray: use blossoms

Chives juice: use whole herb

Horse-radish: use leaves

Wormwood: use leaves or juice

Either brew a tea or extract juices which are then diluted with water before being used. Use the liquids as sprays either separately or blend them according to your own inclinations and observe results. That is half the fun.

These sprays have the effect of strengthening the plants under stress, but always employ a soil improvement programme as well.

CAMOMILE TEA SPRAY

Use a handful of camomile (or chamomile) blossoms, preferably home grown and dried, to 5 litres of boiling water and let it stand for 20 minutes; strain prior to spraying.

CHIVES JUICE SPRAY

Put some chives through your grinder or mincer and prepare sufficient juice for your intended spraying operation. Remember it will have to be diluted with 10 parts of water. Strain well before putting it into your sprayer.

COMFREY TEA TONIC

Put a few fresh leaves of comfrey into a bucket and cover with boiling water. Let it stand in a cool place and as the colour develops it can be used like compost tea as a tonic for sickly plants during the transition period.

Because this comfrey brew gets stronger the longer it stands, it should be diluted to a pale-brown liquid before use. Comfrey tonic can also be made with dried comfrey leaves.

COMPOST TEA SPRAY

Compost tea can be used as a foliar spray if you feel this is called for. But in any case, it can be used to apply as a tonic to any struggling or weak subject.

Take a trowelful of ripe compost and pour 10 litres of rain water over it. Let it stand in its container, or the spare watering can for a few days, then water straight from the watering can. If you want to apply it with your sprayer, strain well before putting the liquid into the sprayer.

FERMENTED NETTLE SPRAY

Fermented nettle spray is made by soaking stinging nettles in water for 21 to 28 days. Strain before using in a sprayer. May be sprayed over the plants and the soil. It has no detrimental effects, but is invigorating to plant and soil life, similar to compost tea.

FLOUR AND SALT

Here we have a use for the 'best' white flour. Take a small bowl of flour and add a little salt, then sprinkle some on dew-moist insect infested plants. This will immobilise them and they cannot do any further damage.

GARLIC SPRAY

Take the juice from 125g of garlic bulbs and mix with ½ litre of water; some people also add a little liquid paraffin. As this juice is very strong it should be diluted before use. I suggest one part to fifty parts of water.

If you can use your own organically grown garlic to prepare this spray the results will be more reliable.

GLUE SPRAY

Take 125g of glue diluted in 5 litres of water and spray against aphids, red spider mites, etc. It immobilises these small insects and after a while the glue peels off the plants or trees and has no side effects. It can be repeated weekly if necessary.

KHAKIWEED SPRAY

Khakiweed or kakiebos spray can be made as follows:

- a) After gathering some weeds, place in a bucket or watering can and cover with boiling water. Let it stand until it has the colour of weak tea. When spraying, make sure to hit the underside of the leaves.





- b) Collect sufficient plants for your purpose and put them through the mincer or juicer. Dilute 1 part of the liquid with 10 parts of water. This is strong enough for most insects, but if you need a stronger solution use less water.

If you wish to improve adhesion of the spray to the plants, add some soap, liquified in water. (Don't use detergents.)

LIGHT TRAP

There are ready-made light traps on the market but it is possible to assemble one of your own quite easily. All you need is a light source, and this can be an old paraffin storm lamp, or you can use batteries. Suspend this light firmly over a small bath of water. The water can be quite shallow, and only needs to be about 3cm deep. Top this with a film of paraffin and position the whole thing strategically in your vegetable patch or in your orchard. It will collect moths and thus prevent a lot of eggs from being deposited on your vegetable plants or fruit trees.

NICOTINE SPRAY

To make a nicotine spray, or nicotine wash, you need:

60g pipe tobacco (or cigarette ends)

5 litres water

50g soap

- a) Dissolve soap (Sunlight or similar, but not a detergent) in ½ litre of hot water,
- b) Boil tobacco in 4 ½ litres water for half an hour,
- c) Mix a) and b) together.

When you are ready to use this mixture, dilute one part of it with four parts of water.

I do not recommend using this mixture as a fine spray; it is dangerous to inhale it. It should in any case only be used in extreme cases. If you decide to use it rather apply it with a sponge or dip the seedling into the mixture when transplanting.

PARSNIP TEA SPRAY

To prepare this tea spray, parsnips are juiced through a mincer or electric juice extractor. When you have sufficient juice, add ten parts of water to one part of juice. If you find that you need a stronger, more powerful spray, use less water.

Without using your juicer, you can prepare it equally well by pouring boiling hot

water over the roots and leaves of a few parsnips. Leave it to draw for 24 hours; strain and dilute to a light colour.

QUASSIA TEA

Quassia tea does not kill off ladybirds, therefore it should be employed against aphids, caterpillars, etc. It repels beetles as it makes their food taste bitter.

To prepare, boil 125g of the chips in 5 litres water for 45 minutes and then dilute with 25 litres water. It is now ready for use, but one can add soapflakes if desired.

SOAPY WATER SPRAY

Never use a detergent for this purpose. Dissolve 50g Sunlight soap in half a litre of water which can be lukewarm to hot; then mix with a further 4 ½ litres of water before starting to use it.

TOMATO LEAF SPRAY

Supernumerary tomato seedlings can be put to good use in this spray or you can use leaves, stems or pruning's from your 'single stem' plants.

Take a good handful of this material and boil in 1 litre of water for 20 minutes; strain and use when cold.

TURNIP TEA SPRAY

Turnip tea spray is made by putting sliced, whole turnips through the juice extractor. Use 15ml per litre of water for spraying.

Alternatively, peel the turnips and pour water just off the boil over the peelings and let it stand overnight. Ready for use after straining.

WORMWOOD TEA SPRAY

Use dried or fresh leaves of this herb and cover with water just off the boil; leave to stew. Before spraying dilute with about five parts of water or adjust according to strength of the brew and that required.

Wormwood can also be usefully employed as an insect repellent if planted near affected plants, or around trees.





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