Vegetables & Fruit Trees Version 3.8 18 December 2014

Growing toxin-free foods will improve your health, and gardening will give you exercise & pleasure, but with age don't overdo it, or backs and muscles can suffer.

Analyses

The most important aspect of vegetables and fruit is their health, which depends on the soil and the LimeMagPlus and fertilisers applied. This dinner is 90% our home grown from correctly fed soils. Comp below is short for compatibility, which relates to the suitability for the person. This varies slightly between people, because all are different, but when heavy metals are high, comp for all people is low. Carrots from a supermarket in June 2012 were Compatibility 35, Hg 10, Cd 50, Mn 7, Pb 5, Glyphosate (Roundup) 10. Hg is mercury, Cd is cadmium, Mn is manganese, Pb is lead.

Vegetables	Date	#	Comp	Hg	Cd	Mn
Sweetcorn from supermarket	1209		40	5	0	11
Sweetcorn ours no sprays	1209		92	0	0	0
Carrots from supermarket	1206		35	10	50	7
Carrots from supermarket	1208		30	13	10	
Carrots ours naturally	1208		90	0	0	0

Carrots and pineapples are not affected by glyphosates so some farmers use Roundup to control weeds. Few people know this. Read Carrots below. I won't eat glyphosate sprayed vegetables or fruit such as pineapples from Philippines. Muscle testing, see Human Health, warned me to not eat and how Chris Rhodes can detect it.

It is not only New Zealand doing this. Two different brands of Pineapples grown in the Philippines contained glyphosate used to kill their weeds.

Raw naturally home grown green smoothies and vegetables help drain toxic elements out of our bodies. Every second lunch I drink a green smoothy to help do this. With it and heavy metal drainage from Chris Rhodes, my body's Hg (mercury) level has dropped from 33 to 3. Cadmium (Cd) and

manganese (Mn) have also dropped, but are high in most NZ soils. Read the three Human Health chapters in Minerals called Mercury, Cadmium and Manganese.

Insects

A problem with even organic gardening is insects. Healthy plants on healthy soils have fewer and cope better, but it takes only a few slugs or caterpillars to do damage. SEAVITA is a comparatively safe effective plant food that makes plants grow better and controls small insects. Its analysis is no heavy metals except 5 manganese which is not a problem at all when it is not being eaten and is mixed in water at 1 mg per litre. You may find stockists in your area or purchase direct from seagra@xtra.co.nz Sources of products are at the end of this chapter.

It is impossible to grow healthy high yielding crops on shallow sick, acid soils, as most residential sections (lots or plots) are. Topsoils should be at least 30 cm deep. Digging deeply mixes in some subsoil with its higher mineral content, which mostly improves soils. The sandy clay subsoil under Horotui Sand Loam is an excellent one measuring

You can't make a silk purse out of a sow's ear, so write down what you want in a property and reject those that don't have them, or that can't be fixed. We looked at and rejected about 200 homes to find the above one in Hamilton, NZ. We wanted good deep top soil, a single level home on a cul-de-sac (a no exit) street, near a park and bush (NZ native forest) shown at the top, on a decent size section of at least 1,000 m2 (¼ acre), in a quiet area.

The garden on our first farm at Gordonton, Waikato was two metre deep peat, so, once drained, limed and fertilised, was an excellent soil almost as good as a potting mix. The back yard of our second home (in Hamilton) was a tennis court which took years (we lived there for 33 years) to get into a lawn and garden, despite carting in truck loads of soil. We should have paid someone to remove 25 cm of the court surface and replace it with topsoil which then should have been mixed in with 10 cm of the subsoil there, to give 35 cm of good soil.

Hamilton Council has no regulations for developers and shapers of sections, so they level and then replace only about 10 cm (4 inches) of topsoil and sell the rest. Luckily the original owners of our current section (shown above) bought five truck loads (40 cubic metres) of topsoil to achieve 30 cm (12 inches) of topsoil over the whole lawn and garden. As with farming, a deep topsoil gives healthy higher yields.

The Calcium and Fertiliser chapters in Elements in GrazingInfo, also apply to gardens, so should be read, at least briefly. Doing so will help you identify plant and soil deficiencies to correct them, which reduces the incidence of deficiencies and insect damage.

Lynda Kamphuis gets and supplies the fertiliser mix I recommend, which is the only complete reactive phosphate one I know of. See Suppliers at the end.

Insect control systems is mentioned throughout.

Plants from nurseries

Some plants come with insects (a new one in the Waikato is HERE and blight, so spray them for insects with a toxin-free product like SEAVITA on arrival, before they spread pests around your garden. Buying seeds prevents this, but also has failings. See below.

Avoid buying old and large plants from nurseries because they are usually root bound so take more of a knock when transplanted. They can also be dry at the bottom so stand them in buckets of water for half a day. When you dig the holes, sprinkle a heaped tablespoon of my fertiliser and mix it into the soil, then pour some water in the hole and plant them and water them twice daily for a few days then every third day for two months, unless regular rain falls.

Plants in small pots are often root bound, with half the roots growing out of the bottom of the container, which makes them difficult to get out, so the roots get damaged and the plants suffer a set back, as happened to this bean on the right. Cutting the bottoms of the containers off, with a hacksaw or a serrated knife, cuts off some of the roots, but the plants slip out easily with no damage to most of the roots. This was done to the one on the left below, which then didn't suffer at all. The photo was taken 24 hours after planting them in cool showery weather. In hot weather the difference would have been greater. Always do the planting of seedlings in the late afternoon so they don't suffer heat all day before having grown roots into damp soil. Water them at planting and lightly twice a day for a week or so.

Watering in the late afternoon encourages humid requiring diseases to multiply over night, so don't overdo it.

Slugs and snails

One slug is dead in the lid or cap next to the beer can, which is only to show the sizes. Slugs like all beers to death. Five dead slugs in the blue lid left the beans for the beer. More and a snail are in the larger lid.

Many failures in growing from seeds are because of slugs, snails and birds eating them, not because of poor germination, which is also a serious problem described below. They all love seedlings and new plants. Any beer in lids attracts slugs from 20 cm (8 inches) away, and snails from further. They crawl in, drink and die. Birds will eat them and drink the beer, so check lids in the early mornings before the early birds consume them so you can't see how many you've killed. Set up the bottle lids of beer in the evening and they'll last two nights, provided there is not too much rain. If trapping them during rain, use small plastic medicine or supplement bottles lying on their side and sloping slightly to stop the beer running out.

Deterring insects can be achieved with netting shown below or SEAVITA sprayed on every three weeks at one level teaspoon per litre (more can burn the plants), or garlic powder from groceries at 5 ml (level teaspoon) per litre of water. SEAVITA is a mild safe spray that discourages small insects.

All sprays do a better job with an organic vegetable oil based adjuvant like Codacide. Add the spray to it before adding it all to the water. See Sources at the end. Best of all, Codacide halves the amount of spray needed of some products such as Roundup. I don't use it, but many do and complain of headaches after using it.

The above are not advertisements, they are to help you. If you find better products, please email us full details.

These lettuces are safe from butterflies slugs because of old scrap plastic vertical wind protection on the cold side and a footpath on the other. Snails cross foot paths, but slugs usually don't go as far. Fallowing or rotating with crops they don't eat helps reduce them, but doesn't get rid of them all.

A little coarse sand or agricultural salt spread thinly around plants does no harm to plants, but discourages slugs and snails from plants such as carrots that are slow establishing and growing, so need a long period of protection. Poultry like salt and can die from eating too much, so place netting over the salt.

If the holes in soils made by slugs can be seen, press your thumb or a 2 or 3 cm diameter rod over the holes and well down to squash and push them down deep and compress the soil so hard that they die or can't come up again.

Plastic sheeting, weighted down with stones gives protection to larger plants. It has a slit cut to the centre for removing it from around the grown plant.

Bigger plants like courgettes can have their root centres eaten out by slugs, ants, snails and/or rodents. Fallowing the land for a month before planting can starve some out some, but there are always survivors.

Yates Baysol from plant shops, snail and slug bait is a much more effective killer than others. It attracts them from further and some will pass seedlings to get to the little blue poisonous chips. It is a strong poison so don't use it in food growing areas unless putting one chip in a lid and disposing of

them and the corpses safely later.

Brown aphids attacked our Swan plant shown here. The plant feeds Monarch butterfly caterpillars. SEAVITA killed all the aphids in day, and in a few days the plant took on a new vigour as shown on the right, partly because SEAVITA is a water soluble quick acting plant food.

Beer in lids and garlic powder bought from a supermarket and mixed in water and sprayed on to plants or from a small watering can control some pests without sprays. Garlic discourages some insects from laying eggs on plants, but SEAVITA does a better job at discouraging insects and also increases plant growth and health amazingly, potatoes by about 25%, but is limited to once every three weeks.

Natural No Rats safe rodent poison doesn't kill dogs, cats or Moreporks even if they eat the dead rodents. The blue rodent blocks can kill even dogs. Using rat traps saves using toxins.

Broad beans *also known as Vicia faba, fava bean, faba bean.*

These are one of the most grown vegetables in the world, and are very nutritious. Both the leaves, pods and beans can be eaten raw, or in green smoothies, however, there are some possible health problems if too many broad beans are consumed because of their high feed value. Broad beans are an excellent vegetable source of protein and fibre. This may be a winning combination for weight loss. A study published in the European Journal of Clinical Nutrition in 2010 found that overweight women on a high-protein, high-fibre diet lost more weight than those on the standard high-carbohydrate, low-fat regime that currently forms the basis of government "healthy eating" advice. Broad beans are also rich in both folate and B vitamins, which we need for nerve and blood cell development, cognitive function and energy.

All these broad beans got LimeMagPlus at 0.6 kg per m2 (6,000 kg per hectare) and fertiliser described below at 0.1 kg per m2, (1,000 kg per hectare) and 10 cm deep compost dug in 40 cm deep. The fence is 1.6 m (6 ft) high. The left metre of beans were "no till" so everything was applied to the surface and scratched in. The metre on the right also got TM Agricultural, applied at 250 ml/ha costs $23.50 per 250ml.

(See Sources at end.) equal to two litres per hectare. It reduces leaching, increases nutrient availability, improves soil structure, improves drainage, reduces water logging and keeps soils more moist in dry conditions. I have seen the moisture difference in paddocks and felt it by hand. See Forage Crops > Maize for more evidence of higher yields from Tri-Fix. It can be used as a foliar feeder at 1 litre per hectare in 200 litres of water. It reduces moisture loss, but won't work on crops suffering from dry conditions, or where the soil temperature is below 12°C.

The beans on the right had thicker stronger stems and no rust, and yielded 8 times more beans than the no-till ones. The no-till and lower fertility ones matured earlier as mostly occurs with under-fed plants. Feeding most correctly and some insufficiently gets some earlier, but lower yields of most plants. Spraying the flowers with weak honey and water encourages bees to pollinate them. It and a piece of red plastic every metre on the row of beans encouraged bumble bees. Doing both gave 25% more early broad beans. Auriel freezes them and runner beans, so we have our own correctly fertilised organic beans all year. We keep seeds from the first plant to bear beans, to encourage earlier fruiting. Our saved seeds from the first best pods for four years are larger than bought ones and germinate more quickly and the plants grow bigger, and more strongly.

Like many plants, broad beans don't like water on their leaves, so water the base or get a 60 metre length of perforated rubber soakahose made from old tyres, called Neta Drip Hose, made in Australia, and place it under plants that don't like water on their leaves. We tried another brand which was badly made so was uneven in its irrigation. Another brand has hard plastic with holes drilled in it which squirted water too far.

Sow broad beans in late autumn before it gets too cold. They can yield a lot and can be frozen for all year consumption. Some people don't like them, partly because they have been picked when too old and not had boron (OrganiBOR) (See Sources at end) in the fertiliser which sweetens even very sour grapefruit. I prefer eating them in the pods because it saves work, provides more to eat and they taste nicer and juicier, even after being frozen for nine months. In most soils they need boron as OrganiBor (slow release) boron which sweetens them, grapes, citrus and most plants. The boron also reduces joint problems which have increased in recent decades as our soils become more 'mined' and deficient. Also read Elements > Boron to get fuller filled sweet corn cobs and sweeter broad beans, grapes, citrus, and fewer human joint problems. Read Human Health Boron and Human Health Elements.

The large pink nodules on the right were on the broad bean roots showing how much nitrogen they make for themselves and the next crop. See Legumes, Soils > Cultivation. Farmers can buy inoculated legume seeds, but pea and bean seeds are not inoculated. Moving some soil from the same plant area the year before can help.

My trials in 2011 spring with boron have shown problems caused by some borons and some fertiliser companies not knowing or caring that plain boron is highly water soluble, so increases plant levels rapidly, which can cause edge of leaf burn as shown and leaching. After a month the burning stopped. I had ordered Ulexite, but plain boron was supplied, which is very water soluble so after applying it the levels got too high. The aim was to get the broad beans to set more beans which boron helps with. After OrganiBor® was launched I did trials and found that it is slow release as promoted, and is the best slow release boron on the market in New Zealand in 2012.

Parts of USA are very low in Manganese. According to the University of Maryland Medical Center, up to 37 percent of Americans may fail to consume enough of manganese regularly. Fava beans are an excellent source of manganese, providing 1.6 micrograms in every cooked cup. This amount is nearly 100 percent of the RDA for women and 70 percent of the requirement for men. Manganese supports the function of the nervous, immune and endocrine systems and is required for the production of superoxide dismutase, an enzyme that is also a powerful antioxidant. A diet high in manganese may help prevent arthritis, osteoporosis and diabetes. Adequate boron does the same. Manganese may also help decrease the severity of premenstrual syndrome. A reminder that most of New Zealand has an excess of Mn. See Elements > Minerals > Manganese.

Butternuts

These pumpkin type vegetable are delicious and easy to grow and store in cool places. They can be guided to spread over or around flower beds and up trees as shown. Lyn Pickering of Palmers GardenWorld Ltd, Hamilton, pointed out that the leaves in the photo have Powdery Mildew, which is a fungal disease that makes the leaves look grey or dusty. If not treated, the affected leaves can then cause the plant to die. Remove the worst affected leaves, and spray the plant with a mix of one teaspoon of

baking soda in one litre of water with a drop of dish detergent, or BB7 adjuvant, Codacide. Sprayfix, or similar. I've found BB7 the best by far and it kills insects - harmlessly. Repeat the spraying as new leaves appear. This doesn't kill the fungal spores, it stops them spreading on to other leaves. Water in the morning, not afternoon which causes plants to be wet all night and possibly suffer any moisture caused diseases.

Carrots - Manchester Table is the best of five we compared.

Also read page one. Carrots like deeply dug soft fine pumice or sandy type soils - not pure pumice. They must not be sown too thickly or they will not grow into a good size plants and their roots then usually twist. When 5 to 8 cm high, ones closer than about ten cm should be transplanted, which is easy with a 100% success rate, provided it's done out of and into moist soil in the late afternoon, and watered twice or more times a day for a week. Using a tablespoon or similar helps lift them out of the soil. Pull them gently so the long tap root comes out without breaking off.

On the right are two varieties showing differences in germination rates.

As can be seen, lawn clippings were spread thinly over the 1 cm of seed potting mix and pressed firmly. Lawn clippings reduce drying of the top soil and slow slug and snail movement. We spread fine clippings over all bare soil and thinly over all buried seeds. Vegetation should always cover soil to protect it from the sun.

Three cm width of coarse sand, coarse salt or phosphate type fertiliser around a bed can stop slugs and snails entering. The carrot seedbed must have ample organic matter, some sand or thin pumice, and be firm, or it dries out in half an hour of hot sun, resulting in poor germination.

Carrot (and beetroot) leaves have a higher food value than the roots. I eat (drink, in green smoothies) carrot leaves with broad bean leaves, a Kiwi fruit and a date, lettuce, pea protein and a raw egg for protein, with salt to flavour. Maple syrup contains copper naturally so as in animals, gives colour to hair, so reduced my going grey. With bicarbonate of soda to add flavour, apparently reduces the chance of cancer and, which the green smoothy is mixed in dairy milk, or brown rice 'milk', or juice and ground up in a blender or food processor that grinds everything to smooth pulp or liquid, depending on the amount of liquid added.

Sunshine reduces nitrates (toxic nitrogen) so harvest your garden greens in the late afternoon or early evening when nitrates are lowest. Don't apply much nitrogen which increases nitrates. Sheep pellets give the best form of nitrogen and a full range of minerals, which are better and purer than sea weeds like kelp. All I've tested had high mercury.

Courgettes

Courgettes are very easy to grow. With ample compost, LimeMagPlus and Gafsa fertiliser, they will produce for several months and one can feed a family. This has yielded 30 and has three growing, and is flowering for more. Feed and water them well. Spray the leaves with SEAVITA and remove old grey leaves like in the bottom left.

Brown rot on the base of the stem is a problem and can kill the plant. Ants and other insects consume the rotted part which helps spread it more.

Watering only in the morning reduces mildew and fungal diseases breeding all night on plants watered in the late afternoon.

SEAVITA or pouring a mixture of garlic powder in water with Codacide over the base stops the

insect damage because they don't like garlic.

Removing old courgette leaves helps by allowing more sun on to the base.

Correct liming, fertilising and ample compost, plus the control of snails and slugs can stop brown rot forming.

Runner beans - Their roots go down half a metre if the soil is deep enough, so dig compost and fertiliser in deeply. Sometimes they will have deficiency symptoms of zinc or boron until their roots are deep. More of a good fertiliser or potting mix can prevent the deficiencies.

Seeds

A few years ago, NZ Consumer tested vegetable seeds and was disgusted with them and the suppliers. I bought lawn seed in 1988 from a large reputable company and there were a lot of turnip seeds in it. Seeds are even worse now so we are keeping more of our own vegetable ones. Bought sweet corn seed this year had 10% germination. Last year I returned two packets of other seeds because only a few seed germinated. Others are having the same problem. A neighbour told us that he'd found that The Warehouse seeds had the best germination rate. This could be because it is an air conditioned shop, whereas many garden stores are not. Once seeds get to 25 degrees C, their germination decreases. We tried Warehouse seeds and got 90% germination in a shorter time (5 days) than those from two garden stores that were down to 10% over 10 days. Whatever seeds you buy, test 20 of them for germination well before sowing. At least 90% should germinate within five days. Also check that you get what you ordered. An Oregon, USA company was fined $100,000 for illegal labelling and in NZ I've seen Forager chicory growing where Puna was bought, winter ryegrass growing where none was bought, turnip seed in lawn grass seed, etc.

Cockroaches and snails are a nuisance, especially when the former come under doors into the house. Trays placed upside down on shrubs, or anywhere in the garden, attract them, from where they can be dropped onto the lawn and squashed, or snails killed and given to birds or poultry. The tray below over a Pittosporum shrub caught 50 snails and two cockroaches in six months. Dropping cockroaches onto concrete will lose them because they run so fast.

Check and move the trays daily to catch more, and to stop the shrub tips getting burnt in hot weather. Cockroaches increase in bark, under wooden fence cappings, under timber and in drains. If catching them doesn't give enough control, Ripcord, a fairly safe spray along both sides of wooden fence cappings controls them. Treat all sprays with care.

If your house downpipes have gaps where they go into the storm water underground pipe, cockroaches can breed down there and come up and enter your house. Fill the gap with Pliobond, a glue made by Goodyear. Pliobond glues anything to anything, and blocks gutter leaks even when the gutter has water in it, and fixes children's broken plastic toys. Pliobond is an ideal present or company staff gift. Google for it or email Charl Marais <charl@biomedicines.co.nz> I've never found a better or more versatile glue. If a gap is too wide, wrap wire (aluminium wire is the easiest - wear gloves or wash your hands thoroughly after using aluminium). Twine or nylon chord can be used, before gluing.

If nails in garden furniture come out, apply Pliobond before driving them in again.

Brief electric fence safety rules - for those who didn't read the Fencing chapter.

- Everyone with pacemakers should keep away from electric fences.
- Children and those incapable of a normal response should be warned to keep away from all electric fences. Demonstrate the shock to children and visitors by using a long piece of green grass or weed to touch a live wire.
- No one should climb through an electric fence.
- Barbed wire should never be electrified or even be used in a fence with electrified wires.
- Don't string galvanised wires across lanes or thoroughfares without marking them clearly. Motor cyclists have been injured through not seeing them.

Cats & small dogs

These can be kept in or out with an electrified cat stop using a low powered electric fence unit. Cats can be a nuisance in gardens when they urinate and kill patches of the lawn or mess in dug up soil. Two +/-6 mm round steel rods (wrapped in white paper for this photo, and seen as white dots), or 15 cm long nails in the ground or in concrete on a very slight angle towards the fence, hold the 2 cm thick timber which holds the two insulators. Hook it on to one pin then pull the other side on to the other pin.

If a car mud flap or someone's feet catch in the wires, the angle of the rods allows the plank to come up and off.

The 4 mm wire over the top of one polywire is a handle. The two white things in the right photo are polywire wrapped around the insulators as spare wire in case they break. The small thing on the left is a joint clamp to give a tight connection. If not used, and a spark occurs, it can cause clicks on phones and radios.

The polywires are about 20 cm apart and about 5 cm above the ground. They are white polywire for better visibility. Originally we had three wires, but two do just as well and are easier to step over.

On the right, screw-in insulators have been set in concrete. The black cable is double insulated for the 5,000 volts and comes overhead from the energiser in the garage.

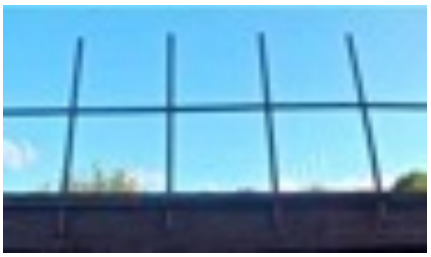
Warning signs should be displayed every 30 metres, or as required by your law. Cars can drive over the polywires. If cars have low mud flaps they should drive slowly so the polywire doesn't spring up and get caught in them.

The electric fence energiser (charger) is in our garage, which has glass in the top of the door in the passage, so, as we pass when going to bed, we can check that the garage doors are closed and the fence is going. A timer turns it on at night and off in the morning.

There is zero voltage on the galvanised one metre deep earth stake which is in a damp area of the garden, and joins are clamped or well tied, to avoid sparks, so we get no clicks on the phone or radio. Some brands of energisers cause clicks. Voltage on earth stakes can cause phone clicks. See Fencing.

One point eight metre (6 ft) high wooden fences that cats can jump and crawl over, will need about 20 cm (8 inch) high concrete reinforcing steel on left or plastic mesh with 5 cm square holes on right, stapled to the top.

If a cat does come in, and few have over the seven years ours has been up, chase them with your hands waving high in the air to look bigger, and shout at them. They usually don't come back, because as well as the shock, they don't like being in a confined area. The equipment is available from farm stores.



Cultivation

On the right is a Dutch hoe which makes mixing in fertiliser and weeding easy

because it is used standing up and the weeds are left as a mulch to reduce the drying of soils, and they increase the soil's organic matter.

This hand chisel plough on the right is for mixing lime and fertiliser into soils and for deeper weeding. It has a cutter on the back for hoeing out larger weeds. See Soils > Cultivation. It can also mix lime into lawn-clippings on compost heaps.

Stainless steel forks and shovels are much easier to dig with, because there is less friction and effort than with rusty steel. You'll have to use both to believe the difference. Get a large fork to go deeply, preferably to bring up some subsoil to mix in with the topsoil, to give it more body and grow healthier plants from the subsoil minerals.

Chisel ploughing to bring up some subsoil gives soils major improvements with many crops, and in some cases less bloat, which shows its health-giving characteristics. See Soils > Cultivation, and achieve the same when digging your garden to deepen your topsoil, and to bring up minerals to improve the farmed-out top 15 to 20 cm of soil.

This fine knife rake has thin tynes that can cut through turf to get rid of thatch which we don't have in our lawn because we apply LimeMagPlus, have many earthworms, and mow it down to just above ground level every spring and every autumn, then oversow it and knife rake it like this to bury the seed.

Earthworm information

See Soils > Earthworms on how to make compost without having to turn it or buy special boxes for them. To improve your soils, and use earthworms as your lime indicator. Soil stuck to them indicates a lack of lime in the soil. See Elements > Calcium.

Fertilisers & Lime

See Elements > Calcium (Lime). The tomato photos in it show that they need more agricultural lime and its synergisms than do potatoes and carrots, to grow without wilting in hot dry weather and without blight. If the soil has not had lime for two years, or if earthworms are rare, sluggish, or if they have soil stuck to them (calcium deficiency sign), apply 3 kg of LimeMagPlus per 10 m2 (3.3 by 3.3 metres) before digging the soil over, and mix it in to about 30 cm or deeper.

Tomatoes, maize and legumes (beans and peas) need a lot of LimeMagPlus, so dig it in before planting them. pH doesn't measure calcium and is inaccurate, so do your own trials in your garden by varying applications rates of LimeMagPlus from between 2 kg and 5 kg per 10 m2 (3.3 x 3.3 metres), but, I repeat, not before root crops. Fertilisers to be applied after the LimeMagPlus has been dug in deeply should have boron, which is deficient in most soils, magnesium if needed, potassium, etc. Ask good gardeners, farmers and plant nurseries about deficiencies and excesses in your area.

Don't apply phosphorus fertiliser at the same time as lime because the calcium will slow the release of P. Mix in the lime, then apply half a kg of correct fertiliser a few weeks, later.

No person and no test can tell you **exactly** how much fertiliser and lime you need, so always go on observations, and do your own comparative trials on different soil types, by applying different amounts in rows of plants, until you know how much is needed in the future.

Also do compost and no compost, deep digging and 'no till', which the promoters claim saves costs by just scratching the surface and sowing, which I can assure you may work once or twice, but certainly won't sometimes (see Broad bean photo) and won't work long term. As with everything, remember that they are selling the most expensive farming equipment there is. See Soils > Cultivation.

Fertiliser

The best garden fertiliser, except in alkaline soils, is a mix as follows. It is neutral pH.

Don't apply it to, or anywhere near, acid loving plants, except in small amounts to some such as camellias, azaleas and rhododendrons. Citrus don't like too much lime and do well if you give sheep pellets and magnesium sulphate (Epsom Salts), both of which are acid like all animal manures which is why they go bad and smell. Read Elements > Calcium.

Don't apply more than recommended. A good response can be expected from correct amounts, but more can be negative.

The base of the mix is Gafsa reactive phosphate from Tunisia, or a better faster available RP with fewer heavy metals, if ever available.

After applying optimum mixes like this, based on pasture tissue analyses, farmers get an improvement in soils, pastures and animal health. So, if you analyse your lawn grass, use the Pasture Analysis spreadsheet in Free Items and the Fertiliser Nutrient Planner in Spreadsheets to work out a suitable fertiliser mix, and apply it to your vegetable garden, you may then also become healthier! A farmer client did. In the Waikato this will help most soils. In other areas, ask local farmers to see their pasture analysis figures and use Calcium Nutrient Planner or Phosphate Nutrient Planner to calculate yours.

Garden Fertiliser Mix of 12 minerals. At this stage Rorisons is the only company retailing it in amounts for one tonne bags up. Less is available from Linda Kamphuis.

Percentages of elements

N	P	K*	S	Mg**	CaCO3***	B	Co	Cu	Se	Zn	Salt
2	7	3	5	5	15	0.88	0.04	0.14	0.003	0.35	0.13

*The best potash is sulphate of potash which doesn't damage seedlings. Read Elements > Potassium, but being water soluble, it leaches.

** 23% Mg in serpentine that contains magnesium citrate.

*** 24% Ca in Gafsa reactive phosphate, is an approved organic reactive phosphate fertiliser.

This is not a nitrogen fertiliser, but one made for gardens and for lawns once a year at about 600 kg per hectare. If N is deficient, apply Ammo but not urea. See Nitrogen.

Garden LimeMagPlus mix of 9 minerals. I'm hoping that firms will retail it.

N	P	K	S	Mg*	CaCO3**	B	Co	Cu	Se	Zn	Salt
0	0	0	5	24	85	0.03	0.05	0.14	0.003	0.35	0.14

* 23% Mg citrate in Serpentine which is slow release magnesium.

* * CaCO3 is calcium carbonate or soft agricultural lime with 97% Ca and very finely ground.

Lawns benefit from Gafsa alkali phosphate fertiliser with deficient elements and LimeMagPlus, which reduce weeds and moss. Apply extra LimeMag on moss areas. Soils vary so do comparative quantity trials on you lawn and garden.

These Garden Fertiliser application rates are -

Vegetables - 1 kg per 10 m2 (3.3 by 3.3 metres) dug 20 cm well into the soil. Plants such as tomatoes that yield heavily over four months (See www.gardeners-tips.com > Garden). To get 400 tomatoes from one Zealandia Tastiest Tomato plant, apply more of this or correct fertiliser in mid to late summer and rake it in.

Citrus - 1 kg per 10 m2 (3.3 by 3.3 metres) twice a year. If leaves go yellow apply Sulphate of Ammonia (21 N and 23 S), if leaves go yellow with green ribs apply more magnesium (Mg). Mg deficiency can cause yellow stripes on leaves from the base of the leaf outwards, with some of the lower leaves dying completely, which is the opposite to iron deficiency. Mg sulphate (epsom salts) has 10% Mg and 41% sulphate sulphur is water soluble, so is all available and leaches so some is wasted. Serpentine has 23% magnesium (citrate), and is slow release so doesn't leach and 86% is used by

plants, which is more than from other magnesiums (MAF figures).

Suggested application rates are -

Vegetables - 1 kg per 5 m2 (2.2 by 2.2 metres) mixed well into the soil to the expected depth of the roots. This sweet corn seedling is only 13 days old. The leaves are 8 cm (3 inches) high and the roots are 11 cm (4 inches) deep. It shows how quickly plant roots go down, so for top yields, lime and fertilisers must be well mixed in. Check pasture and other seedlings and you'll find the same, i.e., roots go down much faster than leaves and stems grow up. Plants such as tomatoes that yield 400 tomatoes over four months should have more fertiliser added two months after planting. Other high yielding plants like courgettes can also benefit from extra fertiliser two months after planting.

Citrus - 1 kg per 5 m2 twice a year. If leaves go completely yellow apply sheep pellets, is reamin yellow after months, apply Sulphate of Ammonia (21 N and 23 S) or Ammo (30 N, 0 P, 0 K, 14 S.) which is 50% urea (46% N) and 50% sulphate of ammonia. If leaves go yellow with green stripes. Citruses don't like too much lime.

Mg deficiency can cause yellowing of leaves from the base of the plant upwards, with some of the lower leaves dying completely, which is the opposite to iron deficiency.

Mg sulphate (epsom salts) has 10% Mg (soluble) and 41% sulphate (water soluble) sulphur.

Runner beans - Their roots go down half a metre if the top soil is deep enough, so dig the compost and fertiliser in deeply.

Lawn - 1 kg per 10 m2 twice a year. See Lawns.

After that, if the lawn starts to go yellow, apply the same again of Ammo which is 50% Sulphate of Ammonia (21 N, 0 P, 0 K, 24 S) and 50% urea (46 N) available from farm stores such as RD 1, Farmlands or PGG, or buy a bag of each and mix them. Apply more to yellow areas and less to green areas, to try to keep the lawn an even green. Yellow patches may need magnesium in Serpentine for slow release (best) or Sulphate of Magnesium for fast release.

Dig agricultural lime in to 30 cm every three years at 3 kg/10 m2. LimeMag is best where Mg is low, and if available. LimeMag may have to be got from a farmer using it, because I have not seen or heard of it in stores. Magnesium Sulphate (Epsom Salts) is usually available. It needs less more often, because it leaches. The slow release Dolomite is usually available, but can be expensive when the source is a distance. metaphor

Legumes, brassicas and maize and tomatoes are intolerant of low calcium. Leaf tips on some plants (broad beans and tomatoes in particular) become stunted and/or wilted. Tomatoes lacking Ca will suffer more blight and Blossom End Rot, that shows as a brown patch at the bottom of the fruit and/or black spots. Excessive N increases the chances of these occurring.

Irrigation

This is covered in GrazingInfo.

Native trees

This 12 metre high Kauri planted on the side of our vegetable garden is 12 years old, showing how fast native trees can grow if in deep fertile topsoil. This is 60 cm deep from fill, and is limed, fertilised and watered as required by a vegetable garden.

Organics

New Zealand is a young country geologically, has a lot of poor volcanic soils, pumice and peat, and almost no alluvial soils that are naturally more fertile. Our high rainfall accentuates the problem by losing minerals through leaching so making soils more acid. All New Zealand soils need lime. Those, like most in the 'establishment' (Ruakura, MAF, Dexcel, DairyNZ, AgResearch, LIC, etc.) some fertiliser companies, and most consultants, who say otherwise, are being rewarded for selling and/or promoting fertilisers, so ignore the facts about agricultural lime

and what applying it achieves.

Most good animal farmers fertilise their pastures with elements such as magnesium, selenium, cobalt, copper, zinc, and boron. Many feed animals minerals, including iodine, to keep them healthy, however, commercial vegetable growers are not rewarded for applying trace elements, so don't, so some consumers have to take magnesium to avoid cramps and migraines, zinc to strengthen nails and prostates, selenium to cure sore necks and reduce the bad effects of osteoporosis, etc. Finland legislated that all mixed fertilisers had to include selenium. New Zealand should do the same. See HumanHealth > Selenium and you'll see why. South Africa includes zinc oxide in maize meal, a staple diet there. The zinc is an excellent idea, but the oxide is a mistake because some people are allergic to all oxides. See Elements > Zinc.

Good animal farmers analyse their pasture tissue to determine which minerals should be added to their fertilisers. An tissue analysis for 17 elements costs about NZ$130, which can be justified in a home garden which can then grow correctly fertilised health-giving vegetables. Another way to identify the requirements of your garden his to buy the Yates Garden Problem Solver from a garden centre or stationer and to grow a citrus tree. They are very sensitive to deficiencies and their leaves show the symptoms of deficiencies as described in the book, so you'll know what to apply. Also do your own trials with different fertilisers and use plenty of compost and animal manure, such as sheep manure pellets that can be bought, and are clean to handle - with gloves.

A UK study showed that the mineral content of conventional vegetables had "dropped dramatically since 1940." Organically grown vegetables have a higher dry matter content (less water) so more contain a higher percentage of minerals, so you get more for the kilograms bought.

Below are Rutgers University, New Jersey, and USA Soil Society figures showing the better value of organic vegetables. The figures show that organic vegetables even at twice the price are better value because they contain more than twice the essential elements. The very low non-organic figures for lettuces are likely to be from being grown under hydroponics. The figures show that eating a variety of different vegetables supplies a variety of minerals.

I've had three vegetable analyses tables from Rutgers over the years and can see that their figures have mistakes because the six zeros (a previous table had nine zeros) are unlikely in practise, and 1,938 iron in tomatoes will definitely be so high because of soil in the sample tested. The high manganese and cobalt figures in the same tomato sample confirm it is from soil, as do high iron levels that too often occur in pasture samples through careless collecting. Iron in 'clean' pasture samples should not exceed 100. I have been given and seen pasture analyses with iron levels of 400 and even 600 by scientists, which is a disgrace. The other Rutger's high iron levels also have high manganese and high cobalt, and the 94 iron in cabbage is free of soil pollution so is accurate, as are the manganese and cobalt in that one. I know this from having done and seen thousands of pasture analyses since 1980.

It is a pity that New Zealand and other countries' health researchers don't do similar trials and encourage improved human health from better organic food. Despite no more evidence, organically grown vegetables (and fruits) are far superior in nutritional value. Even more importantly, organically grown don't contain toxins such as glyphosates, organophosphates, dozens of others, and both paraquat and DDT in the past. An orchardist friend in South Africa, who died young, told me that spraying poisons made him sick and get demenia, and many orchardists in NZ are pastier and sicker than other people. This has been confirmed by an insurance person who collected health information from farmers wanting insurance.

Meat eaters get minerals from animals grazed on correctly fertilised pastures with minerals in their soils. Cobalt is lacking in low organic-matter sandy and pumice soils, and in many vegetable-growing soils after the organic matter levels drop from years of harvesting and removing crops.

Zinc is low in most NZ soils and in many people. 50% of American people are deficient in it. Some animals can thrive without zinc supplements, as can some humans.

This tomato and the one on the near right show severe zinc deficiency. The adjacent one on the extreme right got zinc sulphate poured over it, and improved within days,

the one on the left of it was not given any. Later all got zinc. See the tomato photos below. Applying lime can create an deficiency. Zinc sulphate at about 10 kg per hectare with LimeMagPlus corrects it, This is 0.01 kg or 10 grams per m2. The maintenance rate is about half that.

All NZ is low in Zn so the government sponsors it for human health through the medical system through doctors. Human mineral deficiencies can show up in different ways. Read Human Health Elements > Zinc (Zn) for Humans

Sweet corn

See Forage Crops > Maize for full information on growing sweet corn. The sweetcorn on the left of this photo has rust, which is more common on all plants lacking organic matter and natural nitrogen. That on the right had compost. All had LimeMag and correct fertiliser dug in to a depth of 40 cm.

To make sweet corn taste even more delicious and be healthier for you, make sure that there is enough boron or buy and add OrganiBOR to the fertiliser at one level teaspoon per m2.

Some maize and other crop failures have been the result of NOT chisel ploughing, or in gardens not digging the compost, lime and fertiliser in deeply enough. Boron (B) must be mixed in thoroughly and deeply, otherwise the roots don't access it, especially in dry weather.

This cob on the left, fully filled to the tip had adequate OrganiBOR that this below lacked.

When kernels don't grow on the side of a maize or sweetcorn cob, next to the stem, it can be because of insufficient B. See Forage crops > Maize, and Elements in Soils, Pastures & Animals Elements in Soils, Pastures & Animals

Young plants can get damaged by insects, as shown here, and can be so badly that they never do well. Spraying with garlic each evening discourages the moths from laying eggs. SEAVITA does better but should not be sprayed more than monthly. Sow seeds closely to feed the insects and not all be damaged, then thin them. The moth flies around at 30 cm above ground level so having the sweetcorn seeds in pots on a metre high shelf or table avoids them being attacked.

There are ten cobs on this small area of sweet corn against a 1.8 metre high fence. Maize needs plenty of water. When pollinating spray water over the whole plant daily to get full cobs. Large full cobs are a sign that fertility, especially calcium and boron, were optimum. Maize loves humus, compost and agricultural lime. Read Forage Crops > Maize.

Potatoes

In 2013 we tried the new Double Up Potato Tom which has tomatoes on top and potatoes in the soil as roots. It didn't do well and got severe blight very quickly in December while our other tomatoes got no blight and by 8 April 2014 still have no blight. We had to dispose of it. There was one small potato in the soil and no tomatoes.

Heather potatoes are the variety we've grown since 2005 for early, main and late crops. It beats all others we've tried. Our friends and relatives find the same. The seed sells out within days of arriving so it must be good. It has a slight purple colour. One seed can produce 16 potatoes.

We put some in the box at the bottom of the fridge to keep for plant later. They are sometimes available again in February. Order them early to secure supplies.

Potatoes do best in deep topsoils a little sandy, rather than heavy clay, out of grazed (fertile) pasture or lawns and do worst where recently grown there. We tried covering them with fine mesh plastic every night from well before dark until 8 am, and spraying them with SEAVITA, a sea weed type stimulant and mild, small insect killer, but wireworms still caused bad damage to our potato tubers. We then bought KMn04 Potassium Permanganate from plant shops. Spreading it is not easy, because it is so

fine and because so little is used. Dissolve and pour it on as shown from a watering can through an 8 mm hole drilled into the rose with all the small holes that block, glued over with Pliobond glue. Screw and glue a piece of hardboard on and able over the hole. The can is then also excellent for spreading dissolved sheep pellets on plants (not root crops such as potatoes carrots and beetroot) as a quick natural liquid manure.

Alternatively spread the Potassium Permanganate as a powder mixed with 10 parts of sand or lime, or something similar. Three years ago we had no wireworms, two years ago damage was slight, in 2012 the crop was ruined completely, because there were 12 wireworms in each 30 cm by 30 cm. They are one centimetre long white worms, thin like cotton, and move as soon as they are exposed to light, so are easy to find. In 2013/4, after using this, they all died. It shows how finding the right spray makes the plants grow better, like SEAVITA does for some, but it doesn't control Wireworm.

As this photograph shows, in 2013 our potatoes were the best ever, thanks to Potassium Permanganate. This is our second crop of the year off the same ground, photographed in January. Part of the reason for this is the fact that potatoes need and thrive on high levels of potassium. It appears that potassium with health, also suppresses blight to a degree. However, the second crop on the same ground was not a good idea because they got a virus which made most of the potatoes very slightly bad through the middle. Whether the virus came in the seed, or is in soils and increased, I don't know. Potassium Permanganate also helps prevent Club Root in cabbage types, Carrot Fly and moss in lawns. Full instructions are on the bottles.

If you want to grow organically, to provide the N, work in 10 kg per 10 metre row of old well decomposed vegetation compost with no animal manure in it, and about 4 kg of Lime Nutrient Planner fertiliser per 10 metre row, depending on the need for calcium. Dig it in to 30 cm, without animal or poultry manure in any form, and with 1 kg of reactive phosphate and the deficient trace elements per 10 m row, using the Phosphorus Nutrient Planner spreadsheet, and dig it in to about 30 cm. Never mix reactive phosphate with lime in any form because the lime will slow the release of the P. The potassium (K) is best as half Sulphate of Potash for immediate availability and less damage to the potato seeds and shoots, with half slow release Potassium Chloride (Muriate of Potash) for a long lasting supply. In all cases mix fertilisers in deeply and thoroughly weeks before planting and water it. It must not contact the seed potatoes (or other plant's seeds or seedlings).

It is important to dig the soil deeply weeks before planting. Use a stainless steel garden fork (easier digging, goes deeper and doesn't kill earthworms like shovels do).

Work the fertiliser in to a depth of about 30 cm or more if possible. This allows good root and tuber development. The soil must be dug over several times to make it free of lumps which make potatoes rough shaped.

Potatoes prefer slightly acid soil, but need some calcium. Too much can cause scabby potatoes. Check the earthworms in the soil. If there are some and they have a lot of soil stuck to them, apply more lime. If there are none, apply lime as above. If there are plenty and they are shiny with no soil stuck to them, apply no lime. This method is far more accurate than pH which I and many researchers have shown to be irregular and a cause of the poor pastures we see everywhere.

Many 1 to 2 cm long green sprouts are essential before planting. Get these by placing the sprouted seed potatoes in warm light conditions, but not in direct sun. Dampen them occasionally to reduce wilting. Use large potatoes, not small late ones that will grow late maturing small ones. Cutting them to get more, can cause some to rot and not grow at all.

Plant them in 15 cm deep holes 25 cm apart. When about 15 cm high, or sooner, start ridging them to reduce insect access to the new potatoes and to ensure that the growing tubers are always well

covered right until harvesting.

If your soil is very fertile and previous potato crops have grown too many tops and not many tubers, apply less nitrogen and spread lawn clippings or other vegetation and dig it in to use up some of the nitrogen. If you have already planted yours when you read this, sprinkle 2 to 3 cm of lawn clippings over the soil surface and mix it in or ridging will mix it in.

Sprouting potatoes

Onions, bananas, or other fruit encourage them to sprout faster. Bananas are usually still green when bought. Place them next to the seed potatoes until ripe them eat them, then place the new ones on the potatoes.

Storing potatoes

Make sure they are totally dry before storing. Put them in brown paper bags in a cool dark area, in a basket or breathable cotton sack or cardboard carton, not stacked more than about ten potatoes high. Store potatoes from fresh in a dark and cool location, and not near onions, bananas, or other fruit, which encourage them to sprout faster.

Apples encourage better keeping. They release ethanol gas which slows potatoes growing sprouts.

Tomatoes

In 2013 we tried the new Double Up Potato Tom which grow tomatoes on top and potatoes in the soil as roots. It didn't do well and got severe blight very quickly in December while our other tomatoes got no blight and now 8 April 2014 still have no blight. We had to dispose of it. There was one small potato in the soil and no tomatoes.

In 2013/4 we went back to the more delicious shown Sweet 100 small cherry tomatoes that yield up to 5,000 sweet tasting trouble-free tomatoes per plant, because the Tasty Tom arrived with a parasite that killed it.

Sweet 100 is very easy to grow without spraying. It yields about 40 a day for months and are more delicious than other tomatoes we have grown.

Prior to 2013 one Zealandia Tastiest Tomato Gourmet Campari (new name for Tasty Tom tomato plant) from Palmers Garden World at $12 yields more fruit than several plants of other varieties of tomato at $3 each. As shown one grows to 3.6 m (12 ft) wide by 1.8 m (6 ft) high. We've bought and grown only one Zealandia Tastiest Tomatoes like this one every year since 2006, and we always got about 400 delicious, firm, medium size tomatoes, shown being picked by Auriel, without spraying for anything until near the end when blight needsed controlling. This is provided it is grown in a well composted, fertilised and limed 40 cm deep soil and 60 cm square. If earthworms are few, or have soil stuck to them it shows that LimeMagPlus is needed. Blighted leaves must be removed and disposed of as soon as they occur. See Elements > Calcium. Dusting with LimeMagPlus as shown here, through a blower or small fine sieve on 10 April 2011 on late planted Roma acid-free tomatoes, helped them keep yielding into cold weather without much blight. If blight strikes you can spray with copper sulphate (an organic item), at 2 ml per litre of water with the same amount of Codacide, before adding the copper. Use a fine spray nozzle, and don't apply too much that can burn

leaves. If unsure, do a few old leaves and wait for three days to ensure that there is no burning of leaves. The testing can be done before blight so you are ready for it. If blight is severe or copper is not working use Bravo which costs more and may not be organic, but works well where others fail. The light grey scale or white on stems on the right is calcium deficiency. Gypsum (Calcium Sulphate - water soluble) at half a kg per m2 hosed in to the soil, fixed it.

Plant smelly marigold plants (not all of them smell) under tomatoes and next to potatoes to discourage white flies which spread blight.

Leaves curling or wilting even slightly usually indicate insufficient calcium. See photos n this page below.

To have tomatoes further into winter from taking slips like these three, nip off two 15 cm long laterals (slips) about two months after planting (in January), and place them in glasses of natural Kaiapoi spring water that we now drink. The top slip was in Hamilton tap fluoridated water, the bottom slip was in Hamilton filtered water and the middle one was in Kaiapoi spring water that contains calcium, sodium, magnesium and potassium, all for about two weeks. See below right.

Plant them in a warm, sunny, sheltered area of your garden, in fertile well limed soil with six week old compost which will still have earthworms and organic matter for them to live on. Add lime, animal manure or sheep pellets and correct fertiliser - not superphosphate which uses sulphuric acid to make the phosphate available ans also makes mercury, cadmium, manganese and lead available for plants to absorb. Spray them when 15 cm high and monthly with SEAVITA powder dissolved at one level teaspoon per litre of water. Don't spray any leaves or items you'll eat a month before eating because SEAVITA is not edible. No seaweeds can be called organic because there is so much pollution from land and in sea water. Currents move water and toxins everywhere. All seaweed products we've tested have high mercury, cadmium and other toxic elements because the world is polluted and the sea is its sewer. Read Pollution.

The Elements > Calcium chapter shows how to identify how much is needed. Insufficient correct fertiliser will adversely affect tomatoes health and yields.

After frosts start, tomato growth stops, so cut off the green tomatoes and place them in a warm dry sunny (window sill) place to ripen, or mix them with half ripe ones and make chutney. These two Tastiest Tom (TT) tomatoes were from slips off a grafted TT in 2011. The plant on the left was grown with insufficient lime - half as much as the one on the right. How much you'll need depends on the liming history. Moist slimy earthworms and good soil structure indicate adequate Ca levels. See Soils > Earthworms.

These tomatoes in July on our window sill were from TT slips taken in January 2012 then grown in a sunny sheltered spot shown below right. They were photographed (on left) in mid June and harvested three weeks later and gave us 200 tomatoes each which fed us until mid July. The mother plant yielded 400.

They have been dampened and then dusted with lime to reduce blight and winter marigolds are growing under them to discourage white flies that spread blight.

The air conditioner on the upper right, mounted high, gets warmer air to heat than, if on the ground and cooler air in the shade of the roof for cooling in summer. Being closer horizontally to the inside unit makes it more efficient.

Some people are allergic to normal acid tomatoes so grow Roma acid-free ones which need the same as above. Some people (men more often) get gout from raw tomatoes. Cooked ones don't cause it and give lycopene which is good for us. I used to suffer tomato gout, but don't now and have fewer allergies since Chris Rhodes (See Human Health > Specialists) drained mercury, cadmium and other toxins out of our bodies and by not eating polluted foods which are most non-organic ones, and ones such as all Macadamia nuts and its biscuits, are high in mercury, Brazil nuts containing lead, Harraway's oats which have gluten from wheat so can't be Organic as advertised. See Human Health Elements. Harraway's free samples in a farming magazine in 2012 tested very badly at 50 compatibility (suitability for consumption 100 is perfect, 50 is bad and 5 should not be eaten. 15 Hg, 10 Cd and Manganese 5.

Fruit Trees

Avocados

Whether you are establishing an orchard or just a few trees, it pays to use the latest techniques.

Warm, sunny, well-drained locations are best. See AvoPro Ltd. www.avopro.org

Like most fruit trees, apparently most avocados are sprayed a lot with diazinon and other toxins so again organic is the essential way. I and one grandson are allergic to avocadoes. Muscle testing and Chris Rhodes confirmed it.

Blueberries - by Dr Al Sears <alsearsmd@alsearsmd.com>, MD in South Florida.

I've tried to grow blueberries at my house along with other fruits in my garden. It almost drove me crazy.

The easy part is that blueberry bushes like to be in full sunshine and get about an inch (25 mm) of rain a week which is no problem in Southern Florida.

The hard part is that blueberries like acid soils (That means no lime and lots of organic soil like peat. VJ.)

I had to experiment a little to get the soil right, and once I was able to grow them, I was really excited, until the raccoons ate them all (In New Zealand it's birds so they need to be covered with plastic bird mesh. VJ).

Blueberries have lots of fibre which helps prevent heart disease, and they're low on the glycemic index (40), so they don't spike our blood sugar, and eating them can help the memory and other mental abilities. Don't eat them with protein, because it has a negative effect on the blueberry benefits.

Recent research on blueberries has found two exciting things. They can help fight hardening of the arteries (atherosclerosis) and protect your liver.

In one study, researchers from the USA Dept. of Agriculture looked at animals with atherosclerosis. They gave a formula with only 1% freeze-dried whole blueberries to one of two groups. The other group's formula did not contain the berry powder. After 20 weeks, the blueberry formula group had as much as 58 percent less artery hardening than the non-blueberry group.

Most people think of the liver as just a blood filter, but it helps with some of the most important things that happen inside you. One is that your liver turns almost every nutrient you put in your body into the proper form so you can use it effectively.

Blueberries can also reduce damage that might have already occurred. In one study, researchers gave animals liver disease, and then fed one group a regular diet and another a "blueberry prevention" diet. The blueberry-fed animals all had their liver disease significantly weakened, and had reduced signs

of liver injury.

It's easy to add blueberries to what you eat. If you can't grow blueberries at home, fresh blueberries are available for nearly eight months of the year, followed by frozen ones.

If you already eat blueberries and you're looking for ways to get more, the first thing you want to know is that many processed foods like cereals, pastries, bagels, breads and breakfast bars are not made with real blueberries. Instead, some manufacturers are faking blueberry content using artificial colours, hydrogenated oils and high fructose corn syrup.

Stick with real blueberries or products more likely to have real blueberries in them like organic jams and yogurts.

End.

Citrus

Mandarins should not have black or yellow leaves and not white flies under leaves shown on the right. It also has black parasite scales, which adversely affect citrus trees. They can be sprayed with poisons, but who wants to do that, when dusting the trees twice or more a year with finely ground agricultural lime helps. Wet the tree thoroughly and throw lime upwards by hand or from a hand shovel shown, to get it under the leaves, or spray on liquid calciums like Plexacal (calcium & boron) from http://www.hortigronz.com They have some good products. For instance they recommend acidifying water that is used for some sprays to improve the effectiveness and improve its lasting strength. Apparently some sprays of all kinds (organic and others) can lose effectiveness in a few hours if not in acid water. Codacide or BB7 from Hortigro corrects this.

The new leaves on this lemon show how serpentine improved a small citrus tree from a nursery, two months after digging it in to the soil surface.

Tri-Fix is exceptional for giving 20 to 30% more growth of maize and retaining moisture in soils in dry conditions.

In New Zealand's high rainfall areas, acidity is a problem that applying adequate lime helps overcome, but don't overdo it with citrus, and none for camelias, azaleas and rhododendrons and other acid loving plants. Give them sheep pellets and magnesium sulphate.

Once too much of anything is applied, it can cause problems and be slow to decrease, although agricultural lime is least likely to do this - I've never seen it, and have seen clover leaves larger than ever (6 cm diameter) where bulk lime has been tipped in a paddock before spreading. See Elements > Calcium for more information, and photos of tomatoes not getting blight if enough lime is cultivated in.

Both plants in the trial had marigolds growing under them to discourage white flies.

Hydrangeas can also suffer from too many white flies. Marigolds and dusting with lime help them, but lime tends to make hydrangeas pink.

Citrus trees and grapes need our lime mix once at 2 kg per 10 m2, and our fertiliser mix twice a year at 0.5 kg per 10 m2. If dusting with lime for white fly, less will be needed.

Citrus's main cause of ill-health is too many fruit on trees, and insufficient water. Lemons suffer from these a lot, so discard some fruit down to 50 per 2 metre high tree.

Deficiency symptoms and excess symptoms are mentioned where likely.

Citrus deficiencies

Citrus leaves show deficiencies clearly, and respond to the applications of deficient elements. The following may help you identify deficiencies in your soil, although crops, grazed or harvested pastures will be different, so should be analysed for minerals, preferably twice a year, but at least annually, before applying anything.

Inedible, dry, sour grapefruit on our first city home in 1966 changed to sweet, juicy fruit in one year after applying correct fertiliser, including slow release boron, and magnesium and zinc, the main elements that citrus suffer from when low in soils.

With citrus it is normal for some trees to yield heavily one year and lightly the next. Apply less fertiliser in the low yield years, but always correct all deficiencies as soon as they are seen.

In all farming, slow release fertilisers are the best, but give the best results when cultivated in. Earthworms are the best cultivators. One or two earthworms per spade spit will achieve little. More than 20 in total of the three important kinds are needed. Numbers will be lower after extended dry periods. See Soils > Earthworms.

A frequent problem with citrus is fruit becoming dry, and the whole tree, especially lemons, suffering because there are too many lemons on the tree. For example, to avoid dryness and shrivelled fruit, a two metre high tree should not have 100 or more fruit, when 50 at any one time is more than enough. If lemons are rough and dry on year-round bearing trees, pick at least half of them.

The following shows that complete, correct fertilisers are essential for citrus, and all fruits and plants.

Symptoms & deficiencies

Buds die back before they are fully developed. Low copper.

Fruit develops brown patches. Low copper.

Fruit has black patches in the middle and around the pips. Low boron.

Fruit is dry and tasteless. Low boron and other imbalances.

Fruit skin is rough with raised points.

Fruit skin is thick. Too much N, low phosphorus, boron and/or copper. Some varieties naturally have thicker skins than others.

Fruit skin is **very** thick and rough. Excess potassium and/or nitrogen.

Fruit is small and goes black. Low potassium.

Fruit shape distorted. Low zinc which leaches out of sandy and pumice soils, and can be less available in alkaline soils.

Thrips or other sucking insects at early fruit development stage.

Fruit is sour. Low boron.

Juice is very acid. Low phosphorus.

Juice is lacking. Excess nitrogen and/or low phosphorus.

Branches and leaves die. Borer. Spray the caterpillar holes with a mild safe spray to kill them and remove and burn all parts of branches that have holes.

All the above can be accentuated by too much fruit on trees, and sometimes a lack of water.

Leaf symptoms - there can be more than one deficiency

Leaves narrow, pointed, close together and grow more upright than normal. Edges of leaves go brown and dry looking as shown on this flower. Low zinc, especially when calcium has been applied. Ten kg per hectare of zinc sulphate, costing NZ$26 per hectare fixes it. Excess boron can cause the same symptoms of leaf edge burning, but they are browner and more shrivelled and dead looking. See Elements > Boron.

Leaves' midrib and veins remain dark green, while the tissue between them goes a light yellow or, in bad cases, brown and dry.

Leaf ends weak and/or curl. Low copper.

Leaf veins, especially the centre one, last to go yellow. Low magnesium, which occurs more in acid soils.

Leaves a light brown or yellow colour, especially on the edges, while each side of the centre becomes a motley green. Low calcium.

Leaves have very pale yellow blotches towards the edges. Low calcium.

Leaves have yellow spots. Low molybdenum. Liming can usually fix this, but if calcium is high, apply Molybdenum.

Leaves develop patchy yellowing on ends and have an overall anaemic (light green) look, but the veins are green. Low iron.

Leaves yellow and with an inverted green V at the base of the leaf. Low magnesium.

Leaves lose their dark green colour and show a yellowing down the centre and/or along the edges. If the deficiency is acute leaves becomes very yellow, except for each side of the main stem and veins. Low manganese.

Leaves nearly all of which are yellow, starting at the tips. Low nitrogen.

Leaves when new are yellow while the older ones are green. Early stages of low sulphur.

Leaves go completely yellow next to the fruit, and frequently drop off, leaving the long twig devoid of leaves. Low magnesium.

Leaves rough with swellings. Can be insect damage.

All leaves yellow. Nitrogen deficiency. Sheep manure pellets can supply N with other elements and the always valuable organic matter. Leaves all small and yellow. Low fertility.

Branches

Twig growth is spindly. Low iron.

Twigs break easily. Low copper.

Twigs have few leaves. Low magnesium.

Holes in the branches. Borer. Cut the branch off below the hole and below where the borer stopped, and get rid of the branches.

Boron (B)

A deficiency in this makes the fruit dry and tasteless. Black patches appear in the middle and around the pips, and the skin is thick. Hard brown lumps can form in the fruit. Apply 2 g Ulexite slow release or Boronate 32 per mature tree. Both contain 11% of elemental boron. See Elements > Boron.

Calcium (Ca)

Leaves go a light brown yellow colour, especially on the edges, while each side of the centre becomes a motley green. Very pale yellow blotches show up towards the edges.

Copper (Cu)

Buds die back before they are fully developed, twigs are weak, and the ends of the leaves weaken and/or curl. The fruit develops brown patches over it and has thick skin.

Iron (Fe)

Twig growth is spindly and end leaves develop a patchy yellowing with an anaemic look. Excess lime and high pH (above 6.5) can create an iron deficiency.

Magnesium (Mg)

Leaves go completely yellow adjacent to the fruit, and frequently drop off, leaving the long twig devoid of leaves. The veins, especially the centre one, are last to go yellow. Deficiencies are more common in years of high yields.

Magnesium moves from old leaves to the newer ones, so deficiency symptoms show up in the old leaves first. Lower leaves go yellow from the tip in, while veins remain green. A deficiency can cause yellowing of leaves from the base of the plant upwards, with some of the lower leaves dying completely, which is the opposite to iron deficiency. Low magnesium occurs more after prolonged wet weather.

Manganese (Mn)

The leaves lose their dark green colour and show a yellowing down the centre and/or along the edges. If the deficiency is acute, the leaf becomes more yellow, except for the veins and each side of the main stem. Deficiencies are common in NZ orchards that have had a lot of lime, but not in pastures that animals are grazing and removing calcium.

See Zinc below. Excess lime and high pH (above 6.5) can create a manganese deficiency because it needs acidity to become available to citrus.

Molybdenum (Mo)

Yellow spots on leaves.

Nitrogen (N)

Most of the leaves go yellow, starting at the tips. Too much delays maturity, reduces juice content, causes thick skins and adversely affects fruit quality under storage.

Phosphorus (P)

Poor fruit quality, little juice which can be acid. Skins are thick.

Potassium (K)

Fruit is smaller and go black, while an excess causes a very thick rough skin to form.

Sulphur (S)

New leaves go yellow, while the older ones remain green.

Zinc (Zn)

The midrib and veins remain dark green, while the tissue between them goes a light yellow to brown colour and is dry. The citrus leaves become narrow and pointed, and grow more upright than normal. Symptoms are similar to manganese deficiency and both can be lacking at the same time. Fruit shape can also be affected. Excess lime and high pH (above 6.5) can create a zinc deficiency. Apply 10 kg per hectare or 1 gram per m2 of zinc sulphate Mono (35% Zn).

Fertilising

There are 10,000 square metres in a hectare and 1,000 grams in a kilogram (kg) so multiply the above figures by 10 for the figures in kg per hectare a for larger areas. Pounds per acre are 0.9 kg per ha, so N will be 30 kg/ha or 27 lb/acre, etc.

Correct fertilising is essential in early spring and again in summer (young trees need fertilising more frequently) and liquid foliar sprays can be effective and economical. Apply them in the morning or evening when the sun is not hot. Young leaves as in spring are more efficient at absorbing nutrients than old ones. Don't apply foliar fertilisers with insecticides or fungicides.

Molasses as a foliar spray has been claimed to help with energy and minor element deficiencies such as iron, magnesium and zinc which it contains. Warm it up and dilute it in five parts of water and drench the plant. As with many modern plants, for example cocktail (cherry) tomato plants, one of which yielded 5,000 tomatoes in our garden without any spraying against blight, a modern citrus tree can yield more than it can carry without stressing itself. We had a 1.5 metre high lemon which looked dreadful and had dry rough fruit. The local nursery suggested that it might be overproducing, and asked how many lemons in had. I thought about two or three dozen. They suggested picking some to reduce them to nor more than 50. I counted them and it had 70. After reducing the number of lemons, the tree improved dramatically.

Please send any observations to grazinginfo@grazinginfo.com

Thanks, and say if you don't want recognition.

Before doing anything read Pasture Analysis.

If for citrus ask for a **Citrus analysis and recommendations** of the elements below.

The figures are optimum pasture tissue analyses levels in perennial ryegrass leaves and stems (tissue) in case you analyse your lawn. We did ours and made a fertiliser mix for the whole garden using the spreadsheets called Lime Nutrient Planner and Fertiliser Nutrient Planner.

Email them to us before the laboratory and we'll check them for you at no cost.

Read Sampling & Reading Plant Tissue first and enter the figures into the spreadsheet called Pasture Minerals Analysis which has the optimum levels in ryegrass for which to aim.

If in the business of vegetable or fruit growing, it is a good idea to analyse the tissue (leaves) of all crops and pastures twice a year. When sampling citrus leaves, take 40 to 60 leaves from five to seven

month mature flush growing, non-fruiting laterals at shoulder height from the problem area or if there is no specific problem, then at random over the orchard. Have clean hands or wear clean gloves because measurements are in parts per million. One grain of soil can increase the iron, manganese and cobalt figures.

Wasps

German wasps are a curse. Rags can catch queens. Hang them over any supports and check them in the mornings in late winter and early spring.

Watering

Before watering the garden, check by digging to see if it needs it, and afterwards check to see that the amount given has gone deep enough. If there is a dry layer between the watered depth and the lower moisture, the roots will stay or develop in the moist surface area, which will encourage shallow rooting. The same applies to your lawn.

Lawn clippings spread thinly as a mulch reduce cracking and evaporation, and encourage Calignosa earthworms, the most useful earthworm. If the earthworms have soil stuck to them, sprinkle a mix of lime, serpentine (if low in magnesium) and trace elements, based on the deficiencies above and in GrazingInfo.

Weeds

Boiling water poured from a kettle is a fast, clean, non-selective killer for small areas of plants.

Organic weed killer

This is a small-scale safe organic weed killer recipe for gardens.

1 litre of white vinegar

100 g of table salt

2 drops of liquid detergent.

Heat the vinegar and salt in a pan until the salt is dissolved. Stir in 2 drops of detergent.

Allow it to cool.

If you use a stainless steel pan that is a bit dirty looking, it will acquire a new look.

The spray is excellent on paths and drives.

In gardens, use a jet spray aimed at the middle of the weed, to avoid killing the surrounding plants.

As with all sprays, wash the equipment well because, while stainless steel can cope, rubber seals may not.

A flame thrower is also toxic-free. Fumes from it are nothing compared with some toxins.

If an old dirty looking stainless steel pan is used, it will acquire a new shiny look.

In gardens, use a jet spray aimed at the middle of the weed to avoid killing the surrounding plants.

As with all sprays, wash the equipment well because, while plastic and stainless steel may cope with the sprays, rubber seals may not.

A flame thrower is toxic-free, and the fumes from it are nothing compared with those of some hormones, bit it won't kill the roots of permanent grasses.

Hot water from a kettle kills weeds in paths and other small areas.

Farm scale removal of weeds like buttercup should be by liming correctly with its synergisms which then discourage many weeds and make some (including buttercup) palatable so animals eat them. Earthworms increase, and eat weed seeds on the soil surface.

Weeds like Wandering Jew (Tradescantia) when thick can be pulled out and buried in a one metre deep hole and covered with plastic until dead, after which the plastic can be removed. Adding lime as you fill it will speed its decomposition and encourage earthworms to consume it. Grazon, a very safe spray, kills it very easily. The Hamilton Council bush that we look after was covered in it, but we have eliminated it with Grazon spraying and pulling single plants. Their area a few metres away is covered in it and other weeds.

Further Reading

NZ Vegetable Garden book by Tui from a plant nursery store. Phone and reserve one, because they

don't stock many. Garden Problem Solver by Yates from a plant nursery store. Phone and reserve one, because they don't stock many.

Sources of products mentioned

Milks, except Naturalea which is the best organic milk I know of, have toxic poisons from grazing superphosphate fertilised and Glyphosate (Roundup) sprayed pastures and maize. Cows fed toxic minerals containing manganese, mercury, cadmium, etc., suffer, and their milk is toxic. No wonder so many children, and adults, are so allergic to dairy products. Read HERE

At least two big companies sell polluted mineral feeds, while DeLaval's Solminix that I designed over three years until 1987 and I analyse, has more minerals (9), but absolutely no toxins, so milk from farmers farming organically, but not necessarily registered organic, have none.

I'd appreciate it if dairy farmers using SEAVITA to reduce clover fleas on pasture and then grazing it, could please send me a small glass* jam jar of milk to test for toxic elements at no cost to you. I'll reply and report on it. Please send your name, email and delivery address. It could take a month to do it.

* Most coloured plastics are from recycled plastic (not pure clear virgin plastic) so have toxins from previous uses.

BB7, Tri-Fix, from Hortigro Ltd, 44 Crosbie Road, Pukekohe 2120, Ph 09-237-1777 or 0508-54-746, Fax 09-237-1778. www.elisionz.com or Glynn Douglas <glynn@hortigronz.com

OrganiBOR from all good fertiliser and lime companies, and Rick Jamieson, Jaybez Trading Ltd,

www.jabez.co.nz Ph +64 (0) 6 842 1371, Mobile +64 (0) 21 987917.

SEAVITA from seagra@xtra.co.nz For safe insect killers. It is the best one we've found and makes plants healthier and grow better. Farmers with clovers being damaged by any insect can contact seagra@xtra.co.nz about spraying them for about $30/ha, plus application costs. My recommendation is to not spray for at least three weeks before grazing.

LimeMagPlus and Gafsa fertiliser mix from Lynda Kamphuis for fertilising your garden and doing paddock pasture comparative trials.

33b Marshmeadow Road, Newstead, Hamilton near SH26, the Morrinsville Road. There is a sign outside saying, "John Kamphuis, Plumbing". Phone: 07-858-2200

Email: john.kamphuis@maxnet.co.nz

I would like to have people doing the same around the country as a service. A margin can be added. Please contact us to help you get started with the best lime and phosphate mixes for your area.