

Wicking has a liner, No Dig has a sponge

Why No Dig ? - Always ask why !

- Digging and cultivating soil is always hard work.
- Digging and worse 'double digging' is a European technique for de-compacting heavy clay soils.
- New exposed soil will be full of thousands of dormant weed seeds (the soil is the best seed bank) every time we expose new soil (via cultivation) more weeds germinate and must be dealt with.
- Perth soils are very poor, the deep sand is hard/expensive to 'amend' to stop it losing (via leaching and microbial activity) your fertility (compost/carbon) every year, when simply gardening and watering.
- Buying high quality garden soil or compost is expensive - \$100/m³ so \$100-\$200 a Bed.
- Perth has a huge amount of free nutrient dense **food waste** and course mulch/pruning's/green waste. So using No Dig we can create our own compost and thus veggie garden soil.
- **No Dig is 'cold composting' so you can grow in it, and it's easier than hot composting.**
- No Dig is also a worm farm (vermi-composting). Perth is hot, and nutrient rich, moist garden beds are a better place for worms than black plastic worm farms.
- No Dig automatically makes water and nutrient wise gardens, as your growing in a giant living sponge.

Nature knows how to garden, so put in the 'food' and leave it up to the expert to grow your soil and veggies

Technique and Tips

- ✓ Place cardboard/Newspaper down first to smother weeds and give a bit more of a barrier to nutrient leaching. You can 'No dig' on hard stand, but the bottom layer should be course to allow drainage, and surround with lots of woodchip mulch to sop up excess nitrogen/leachate.
- ✓ Soak the paper and all carbon/dry materials in a wheelbarrow as it's much easier and effective than hosing them.
- ✓ DONT 'No Dig' over runner grass (couch or buffalo) unless you are very careful as you risk filling your garden with grass and having to move everything to get it out.
- ✓ The base layers are a good place to put weeds with seeds. Never to see the sun again.
- ✓ Alternate 10 cm of brown, dry carbon material (straw, mulch, shredded cardboard) with 5cm green nitrogen rich material (manure, food scraps, fresh grass cuttings). This is the same as compost, so think 30-1 carbon to nitrogen.
- ✓ The bed will end up half its high. If you want 30cm of black soil in 3 months create 60cm of lasagne stacked material now.
- ✓ If you top/cap you 'No Dig' with compost or soil you can plant straight away but understand it will subside. The soil will get better after a few weeks/months.
- ✓ Put a course mulch over the top to reduce water loss and airborne weed seed germination.

What to use

All and Any organic matter. Whatever you have that is organic available in bulk and cheap or free, we are after a decent ration of carbon to nitrogen as we are composting but otherwise anything will do. Composting uses a ratio of 30:1 Carbon to nitrogen, so you need lots of brown (dry leaves, straw, cardboard, street tree mulch) if your other main material is food waste, green lawn clippings and manure.

Australian Community Gardens Network's - No Dig Technique (see below) is excellent see their website for more info.

How to make a no-dig garden

1. BED PREPARATION

- If you want to grow vegetables, choose a location for your garden bed that is protected from strong wind and that receives a minimum of four to six hours of sunlight a day.
- Cut long grass and clear stones and other unwanted materials such as dried seeds and weeds, so they do not grow in the mulch. Cut grass can be left on the ground.
- Prepare the garden bed by marking it out. To deter grass from invading your garden, construct sturdy edges with material such as timber or bricks.

2. SOIL PREPARATION: THE NITROGEN LAYER – AND WATER

- If you are building a garden on sandy or low-fertility soil, add a fertiliser layer about 2cm thick; compost, worm castings, manure and/or a sprinkling of dynamic lifter or blood and bone will improve soil fertility.
- To allow these nutrients, water and air to penetrate to the rootzone, open the soil using a garden fork. Push the fork into the soil as far as it will go, then move it back and forth to open, but not turn, the soil. Water sufficiently to moisten the soil to the root zone.

3. LAY THE WEED BARRIER: THE CARBON LAYER

- Cover the garden with newspaper that has been well-moistened so that it will not blow away – about 10 pages thick. If you have invasive grasses such as kikuyu or couch that spread by stems that grow horizontally, lay a thicker layer of newspaper to block light and discourage growth.
- Overlap pages by one-third their size to discourage weeds.

4. ADD A FERTILISER LAYER: A NITROGEN LAYER

- Spread a fertiliser layer of compost/wormcastings/grass clippings/manure to cover the paper. This will act as a slow release fertiliser and will become available to the plants over time.

5. LAY THE WEED-FREE MULCH: THE CARBON LAYER

- Lay mulch such as composted stable sweepings/hay/straw/lucerne hay on top the nitrogen layer to at least 10cm thick. A thicker layer is alright. Repeat nitrogen and carbon layers if needed.

6. PLANT SEEDLINGS AND SEEDS

- Germinate small seeds in pots for transplanting into the garden. Large seeds such as peas and beans can be sown directly into the bed.
- To plant the seedling or large seed, make small holes in the mulch to the depth of the newspaper, fill with compost and plant the seedling or seed into this. Don't plant the seed too deep – just to double the size of the seed. Some gardeners slit the newspaper with a trowel or knife so that the seedlings roots can penetrate the soil below.

7. WATER WELL

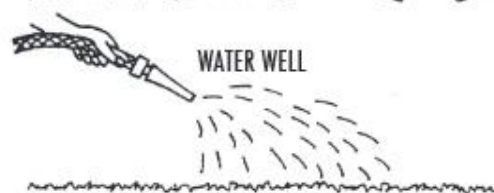
Give the garden a thorough watering to soak the mulch.

STAY WELL, STAY HEALTHY...

Compost and stable sweepings may contain living organisms that, on rare occasions, could cause illness. Precautions include:

- moistening compost/ mulch to avoid micro-organisms becoming airborne
- wearing gloves to protect broken skin
- washing hands after handling materials
- wearing a dusk mask if you suffer from asthma or respiratory disorders
- if you handle animal manure, such as found in stable sweepings, consider vaccination against tetanus
- protect yourself from sunburn with suncream and hat
- drink plenty of water while gardening.

CUT GRASS AND WEEDS



OVERLAP NEWSPAPER BY A THIRD



MARK OUT PATHS



ADD NITROGEN LAYER



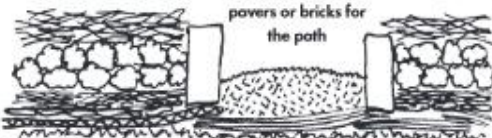
ADD CARBON LAYER



ADD NITROGEN LAYER



ADD CARBON LAYER



- Add sawdust, wood chip, recycled pavers or bricks for the path

GRAPHIC: ROB ALSOP ©

REFERENCES

Dean E, 1990; *Esther Dean's Gardening Book*; Angus & Robertson, Australia

Morrow R, 1993; *Earth User's Guide to Permaculture*, Kangaroo Press, Australia

Handreck K, 1993, *Gardening Down-Under*; CSIRO, Australia

Perth - Soil Types

Perth has many different soil types, but you will roughly have one of the following:

- **Northern Coastal sand dunes.** High pH (alkaline), shallow limestone, very poor sand soil, salty winds.
- **Western Coastal plain sands** grey on top, yellowish sand beneath, over limestone at depth. They tend to be alkaline to neutral in the surface soils. Bore water in these areas tends to be alkaline.
- **Central Coastal Plain deep sands (old swamps)** Soils tend to be grey, white or very pale brown sand. Deep sands ranging from neutral to acid (pH 4.0 to 6.0 of soil and bore water can be acidic).
- **Sediment soils** along the base of the Darling Scarp, and Swan and Canning Rivers, soils are very variable sandy, loamy and clayey soils which are often seasonally wet. Avoid bores as high risk of saline intrusion.
- **Hills soils** can be reddish-brown sands and loams thinly covering granite rock, gravelly loams and gravelly duplex (clay) soils. They tend to have some clay and be better 'garden soils' but will need to be built up and you focus on managing erosion.

Veggie Garden Soils

As a general rule you can assume that you have poor soil. It will not hold enough water and nutrients to garden with or 'in'. Most of Perth's successful veggie gardening techniques involve buying soil or composting organics and containerising it to create a garden bed. I also encourage you to learn how to slowly build fertility (carbon) into all your soil, but, not to try and garden in that soil for a few years. Mulching, natives, ground covers, cover crops, nitrogen fixers, should be established in winter to enrich the soil and look after it in summer.

Soil Amendments - Which to Choose

- **CLAY - The most important thing** to add to Perth's sandy soils before adding organic matter and minerals. Good veggie soil contains 3-5% clay, so add 4-5 handfuls per m2 under mulch (when wet it is very sticky) or preferably mix into garden bed soil to 30-50cm deep at a rate of 5-10 kg per m2 when creating soil ensuring you add compost and rock minerals. [See Peter Coppin's claying tables here -->](#)
- **COMPOST- High Priority** organic matter that has been decomposed and recycled as a fertilizer and soil amendment. At its most essential, the process of composting requires simply piling up waste outdoors and waiting a year or more. Modern, methodical composting is a multi-step, closely monitored process with measured inputs of water, air and carbon- and nitrogen-rich materials.
- **ROCK DUST - High Priority.** Rock dust is a powder made from finely ground up bedrocks; it is a by-product of rock crushing and polishing. In other countries the bed rock is slowly breaking down providing this to the soil, but this doesn't occur in Perth coastal plain. Packaged products are usually a mixture of granite and basalt rocks containing iron, boron, manganese, copper, zinc and molybdenum. The soil food web break down the minerals for plants while staying

Table 1. Comparative (minimum) costs of the different products:

(as at 29/05/05 – Note many retailers may charge significantly more)

Table 1	Product Examples:	Cost per Unit:	Cost/Kg
Bentonite (Sodium)	'Truefeed'	\$16/25Kg bag	\$0.62
	Clumping Cat Litter	\$3/4L bag	\$0.69
Bentonite (Calcium)	Watheroo bentonite	\$20/20Kg bag	\$1.00
	Watheroo bentonite	\$550/tonne bulka-bag*	\$0.55
Zeolite	'ZeoClor'	\$18/15Kg bag	\$1.20
	Green Life Soil Co	\$45/20Kg tub	\$2.25
	Bulk from Nick Bell	\$814/tonne bulka-bag*	\$0.81
Bentonite, Spongolite & Zeolite mixes	'Sand Remedy'	\$32/5Kg (Greenlife Soil)	\$6.40
		\$85/20Kg (Greenlife)	\$4.25
Other clay products	'Sand to Soil'	\$28/15Kg	\$1.87
	'Soil Solver'	\$25/10Kg bag (retail)	\$2.50
		Bags (company direct)	\$1.22
		Bulk (company direct)	\$0.80

* NB: You will also have to pay delivery charges for one tonne bulka-bags unless you have access to a vehicle with a sufficient payload rating.

Table 2. Total cost/sqm according to product recommendations:

('Bulk' is for Bentonite, Soil Solver or Zeolite by the tonne.)

Table 2	Rate / square metre:	By the bag:	Bulk:
Minimum to make it start working	2Kg Calcium Bentonite + 300gms Zeolite	\$2.36	\$1.46
Pete's basic mix – cheap but good	4Kg Calcium Bentonite + 600gms Zeolite	\$4.72	\$2.92
Ideal – best benefits	5-8Kg Calc. Bentonite + 2-3Kg Zeolite	\$7.40 to \$11.60	\$5.15- \$6.80
'Sand Remedy' at recommended rates	320gms * see note 1Kg * see note below	\$1.36 - \$2.36 \$4.25 - \$7.39	N/A N/A
'Sand Remedy' at better rates	3kg (by a 20Kg tub) 5Kg (by a 20Kg tub)	\$12.75 \$21.25	N/A N/A
'Sand to Soil'	4.5Kg	\$8.42	N/A
'Soil Solver' at rates recommended (7.5-10Kg/sqm)	Small retail bags Direct from company	\$18.75 - \$25.00 \$9.15- \$12.20	N/A \$6.00 - \$8.00

* NB: This is to 100-200mm soil depth, the lower rate/soil depth great for lawns. Clays &/or zeolite really need to be mixed at least 2Kg/sqm, 200-300mm deep.

in a non leaching 'slow release' state. Use those trace element powders for liquid foliar (leaf) feeding only.

- **COURSE MULCH/ HOME PRUNINGS/STREET TREE CHIPS – High Priority** – Street tree mulch and other course mulches for slow and steady feeding and water conservation at the soil surface. A combination of feeder mulches (alfalfa) and water wise mulch is best.
- **GREEN MANURES and COVER CROPS - High Priority** - Green manures hold nutrients in their leaves, roots and stems, which stops the nutrients being washed out of the top soil. They keep the carbon pathway increasing, smother weeds, bring nutrients to the surface and remove the need for as much outside inputs of fertility. Keep them alive or turn them into the soil when your ready to plant.
- **KELP / SEAWEED SOLUTIONS - High Priority.** Kelp powder (stock feed companies) and good seaweed solutions add micronutrient and organic agents to the soil not be found in the land based rock dust. The best mineralisation of your food comes from plants grown in soil with both land based and sea based minerals and trace elements.
- **LUCERNE/ALFALFA - High Priority** Primarily they are used to increase organic matter in the soil, high in nitrogen and it does offer nutrients and a high availability of trace minerals. Avoid seedy hays and virus filled pea hay.
- **FISH HYDROLYSATE** - Should be 100% pure liquid fish from the waste product of the fishing industry. The difference between fish emulsion & fish hydrolysate is the fish oil. Emulsion had the oils removed, Fish Hydrolysate still contains the oil and is undiluted, and so is a richer food source for beneficial microbes and especially beneficial fungi in the soil. Similar tonic benefits to soil and plants as per Kelp (sea minerals).
- **BLOOD and BONE** - A source of natural NPK and minerals, however given its from animals and of unknown sources (unless your own animals) Lucerne or Rock mineral organic fertilisers are the preference for this soil boosting 'fertiliser'.
- **MANURES** - Animal manures are organic matter with lots of leachable/available nitrogen. They are a good fertiliser in moderation, if you don't have clay, humus, zeolite, a physical barrier most of the nitrogen is lost to the water ways before your plants can take it up. Chicken manure if high strength and dry sheep manure low. Manure really should be composted first to kill weed and pathogens, thus its often better to buy a quality compost that is made of 30% manure as the nutrients are more stable. [See Heavenly Acres Workshops - Manure as Fertiliser Table --->](#)
- **Natural 'ROCK' FERTILSER** - There are many blends of liquid and dry organic rock fertiliser, these are different blends of minerals and trace elements. They are best added to the soil after the previous items, or once you have grown a heavy crop and plant growth slows or deficiencies become apparent. Even though these are slow release if you dont have good soil most is lost into the ground water and rivers as per manure.
- **BIOCHAR** - Biochar is made from carbon sources put through a special pyrolysis burner, which keeps the waste at a very high temperature for an extended period. Carbon produced in the process is captured and stored in the biochar (it is a carbon negative (sequestration process). Biochar provides large amounts of carbon, which won't break down is highly absorbent, and provides a habitat and food source for beneficial microbes.
- **HUMUS** - This is the dark brown colour in fertile soil. It is the small amount of 'inert' organic matter left after manure, mulch, compost is used up by organisms and plants. Like clay, Bio-char, zeolite and spongelite it attracts and holds fertility (minerals and trace elements). It is made from coal powder from eastern states so use compost instead and be patient.
- **ZEOLITE** - Produced through volcanic activity, Zeolite is a very porous mineral. Due to its porous nature, each particle has a large surface area, enabling what is known as 'cation exchange' to take place. This means that Zeolite can hold and exchange nutrients required by plants, making nutrients readily available. This is a good product but compost and humus do much the same thing and you will have used them for primary soil building already, [save this for using heavily in long term pots needing stable soils for trees.](#)
- **SPONGOLITE** (Silicon dioxide) - Spongolite is actually ancient, fossilised sea sponges and is almost 99% silica, Silica plays a very important role in strengthening cell structure in plants.
- **Wheat/Oats Straw bales and Pea Hay bales** are great for adding carbon matter (to feed the soil microbes who intern feed your plants) and protect soil from the sun. These are fast breakdown 'feeding mulches', in summer also put street tree pruning's on top of 'feeding mulch' to stop water loss.

Type of Manure	Typical Nutrient Content (%)		
	Nitrogen (N)	Phosphorus (P)	Potassium (K)
Cow	1.0	0.4	0.5
Poultry	2.1	1.6	1.0
Horse	0.7	0.4	0.5
Pig	1.1	0.7	0.1
Sheep	1.8	0.4	0.5