Edible Landscape Creations is a Vancouver-based company specializing in the design, installation and maintenance of permaculture-based, edible landscapes. Contact Harold Waldock at 604.645.9529 or via email at haroldw@alternatives.com.

The North Shore Recycling Program (NSRP) is the municipal recycling department for the City of North Vancouver, District of North Vancouver, and District of West Vancouver, British Columbia, Canada. Jointly funded by these three municipalities, and managed by the District of North Vancouver, the NSRP plans and administers all municipal recycling and waste reduction activities on the North Shore including school education and liaison programs, community events, the North Shore Recycling Drop-off Depot and public outreach. The NSRP also offers a variety of free programs and workshops to North Shore residents on topics as varied as Biological Pest Control, Reducing your Footprint, Voluntary Simplicity and Composting (backyard and vermiculture). Contact the NSRP's Community Programs Coordinator at 604.984.9730 or schimplh@dnv.org for more information about programs and services.

An Introduction to Permaculture

Sheet Mulching

Experimental Strategies and Techniques for the Pacific Northwest Coast

3rd Edition
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Disclaimer

Though sheet mulching has been used for millennia in cultures around the world, it is still an experimental technique and not well known outside permaculture circles. This publication is an attempt to explain the basics. If you have questions or concerns about any of the information contained in this publication, or have suggestions for the next edition, please contact:

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get the nitrogen in there after a year or two. Never bury or till woodchips into your soil, as they will drastically reduce the nitrogen available for plants (they won't do as much damage on the surface).

Can you tell me a safe, effective way to control the slug population in my new sheet mulch?

Harold Waldock suggests the following... the slug solution. "Get a beer. Get a large yogurt container with a lid. Cut a hole near the top of the container, large enough for a slug to fit through. Pour in a teaspoon of sugar, 1/2 teaspoon of yeast, several tablespoons of flour, then fill to the top with water and stir. Place in the whole container in the mulch and cover it so it is out of the sunshine with the hole to the north. This solution and trap will kill slugs for weeks at a time with out having to check on it. Then drink the beer yourself - why give slugs your hard earned beer?" Another option is to collect the maurauding slugs in a bucket each evening and transport them to a wild area near your home (i.e, NOT your neighbour's yard). Continue this for about two weeks. Slugs are supposedly quite territorial, so once they have been activley removed from their territory over an extended period of time and no young slugs are allowed to establish your garden as theirs, you will no longer have a slug problem. This method has been used by many gardeners with much success.

So now that you've mastered the basics of sheet mulching, maybe you're interested in getting a work party together to put your vision into creation and action, or perhaps you'd like to gain your Permaculture Design certificate. If so, call the Vancouver Permaculture Network at 604.645.9529 to have your name put on a list to see if a work party can be organized for your site or to register for the next Permaculture Design course in your area. Or, **for a list of sheet mulching sites** on the North Shore you can check out, call the North Shore Recycling Program at 604.984.9730 (or visit the website at www.nsrp.bc.ca for links [check the Links page] and workshop information throughout the year [check the Events page]).

Reading List

Basics of Permaculture Design. Mars, Ross and Martin Drucker. Rodale Institute. October 1996.

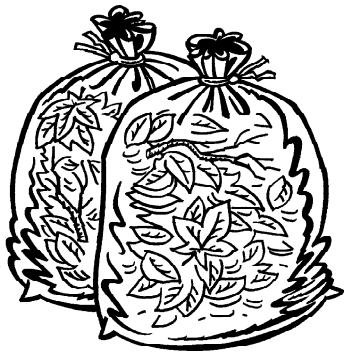
Designing and Maintaining Your Edible Landscape Naturally. Kourik, Robert. Metamorphic Press. 1986.

Earth User's Guide to Permaculture. Morrow, Rosemary and Rob Allsop. Simon & Shuster. March 2000.

Permaculture in a Nutshell. Whitefield, Patrick and Terry Greenwell. Preface by Jonathon Porritt. February 2000.

The Permaculture Garden. Bell, Graham. HarperCollins Canada. 1999.

and corrugated cardboard (fossil fuels, water, hydroelectricity, etc.), it makes far more sense environmentally to utilize it in your own yard for a good purpose.



Where do I get mulch?

It's easy - just put up a sign saying what you want. It can be a gleeful moment when you're sitting down enjoying the sun and a neighbour delivers what he thinks is organic waste but what you know is valuable garden builder. Also, get to know the local lawn and garden maintenance people - if they only knew what valuable resources they throw out! Ask your municipal parks and maintenance department if there is any material they wish to get rid of. Just make sure they haven't used any pesticides. Often they have piles of woodchips available for free. Another alternative is to grow your own mulch (see page 12).

How do I get woodchips?

Check the Yellow Pages for tree service operations in your neighbourhood and give them a call. They often have to drive long distances to blueberry and cranberry farms or pay a significant tipping fee at the Transfer Station to dispose of the material they collect from clients' yards. The best option is to contact the roadside and power line clearing teams - ask for mostly hardwood with little cedar or laurel, as cedar and laurel have compounds that inhibit the growth of many plants. Give them advance notice of 3 weeks before you need the material and make it as simple as possible for them - they are doing you a favour, after all (i.e., their trucks carry 8 to 15 square yards of material - asking for 1 or 2 yards is not going to help them out much). Please note that getting pure hardwood chips is impossible most times, and that straight bark mulches are not ideal for vegetable gardens (try some of the other recommended top-dressings instead).

Why is it not recommended to put kitchen scraps in the sheet mulch?

Bears, raccoons, rats and mice may destroy the mulch or multiply and damage trees and buildings, not to mention how unpopular you would become with your neighbours (having attracted the little critters in the first place)!

How do I know what has carbon and nitrogen, and how do I know when I have enough?

Read the appendix at the end of Designing and Maintaining your Edible Landscape Naturally by Robert Kourik (Metamorphic Press, 1986) or contact the North Shore Recycling Program (see back page) for composting resources. Composts work the best with about a 30:1 carbo- to-nitrogen ratio, damp but not soaking water levels, and with a little lime added to encourage organisms like worms and reduce nitrogen loss. One of the difficulties is that over time nitrogen is usually lost or used up. For wood chip mulches it is very important to consider how one will

The information contained in this booklet has been excerpted from the notes for participants in a workshop offered by Harold Waldock entitled "Introduction to Permaculture and Sheet Mulching" (see contact information at the back of this booklet).

Introduction to Permaculture

Permaculture is a term that will be unfamiliar to most residents of the Lower Mainland. Extracted from the terms Permanent Agriculture and Permanent Culture, permaculture is "the harmonious integration of the ecology, landscape and people providing their food, energy, shelter, and other material and non-material needs in a sustainable way." The key to designing in the permaculture way is to: a) carefully observe and plan long-term for the provision of human needs; and b) preserve healthy ecosystems and undertake ecosystem promotion practices (commonly termed "earth repair").

Permaculture is practiced in a variety of places, from urban lots to rural farms. The idea is to restore damaged natural systems, not alter intact ones. Its design is a collection of sustainable ideas, methods and techniques borrowed from scientific, traditional and tribal cultures around the world, with the central text for this movement to healthier land use being the Permaculture Designers Manual, by Bill Mollison (Tagari 1988).

Permaculture incorporates a variety of more natural techniques and strategies. The one we will be focussing on in this booklet is **sheet mulching**, a classic example of a permaculture method which imitates nature, is multi-use and multi-function, recycles and reuses, builds soil, utilizes biological resources and consumes little energy.

Famous Modern Mulchers

Although mulching has been used for millennia, it has not been promoted much in modern times. Manosubo Fukuoka, the first person to develop no-till permanent grain production method, used straw mulches for weed suppression from the 1920s through 1980s and into the 1990s when his books were introduced to the world (see The Natural Way of Farming, Japan Publications, 1985). His achievements are still considered astounding to this day. A number of other agricultural pioneers are attempting to do parallel work in other ecosystems. Ruth Stout, the most famous mulcher from the late 1960s and early 1970s, was a writer of several books, a columnist, and a media personality around the topic of gardening. Bill Mollison, the leader of the permaculture movement, espoused sheet mulching techniques in Australia from the mid-1970s and globally through the 1980s and 1990s.

And now, sheet mulching has hit the Lower Mainland! Despite the very recent development of these techniques in our community, we have a wealth of experience and expertise to draw from. There are a number of individuals in the Lower Mainland who have made it their business to spread the word about this fabulous technique. For example, Harold Waldock, coordinator of the Vancouver Permaculture Network, regularly lectures and facilitates work parties in our community, as well as maintaining his business, Edible Landscape Creations. He can be reached by telephone at 604.645.9529 (pager) or via email at haroldw@alternatives.com. Harold can also put you on to others who are great resources for permaculture information.

What is it?

Sheet mulching is a practice which harnesses the goodness of large volumes of organic material collected in your own yard and neighbourhood to create rich, healthy soil for your garden plants (this material often ends up in the landfill or the curbside yard trimmings collection program). It is a layering technique that sort of resembles an "organic sandwich", with the actual sheet mulch layer itself being the secret - it actually **blocks out weeds** and encourages the development of wonderfully nutrient-filled soil. The following sections will tell you how to do it, step by step.

Why Sheet Mulching?

The benefits to sheet mulching are many and varied. Here are just a few:

It Requires LIttle Labour - Who doesn't want to enjoy their garden more and sweat over it less? With just a little preparation, sheet mulching will allow you to do just that.

- the least laborious way to convert a lawn or weedy area into an intensive annual bed
- a "no dig" gardening method and way of weeding
- low labour because it's low maintenance
- kills weed seeds in the soil underneath the mulch while digging just brings them to the surface to sprout
- kills or stunts difficult weeds and invasive plant species like field bindweed, horsetails, bamboo and blackberry enough in one year that management and removal (usually) of the weed is achievable the next year (and this can all be done while you're growing your crops!)
- does not remove valuable nutrients, as weeding does (the weeds actually do you a favour by keeping the nutrients from being washed away)

a large area can be done in one day

- the strength required is far less than digging - people with bad backs and arms can still garden

- never use human, dog, cat, mouse, rat, bear, any carnivore or pig manure under or around annual vegetables (i.e., salad or as surface mulch) - all carry parasites and bacteria that are harmful to gardeners and fresh food consumers (remember - overuse of any manure can contaminate the water supply) - consider burying small amounts under trees you plant
- organic regulations are fairly strict - if you are aiming to grow organically and attain the same standards as those used by certified organic growers, then make a thorough study of organic regulations and practices. Usually human manure, even that from composting toilets, is not acceptable on any land that is certified organic. (Point of interest: many mulches and fertilizers used in the organic growing have non-organic sources - for instance, cottonseed meal, an extensively used organic nitrogen fertilizer, is sourced from one of the most heavily sprayed crops in the world).

Common Questions

When can I plant in my new sheet mulch?

Right away! Perennials (including edibles) and woody groundcovers do especially well immediately after sheet mulch completion. Following are some ideas for planting into your new mulch bed:

- plant garlic after the potato and squash family plants are finished
- in the spring, plant mostly day neutral strawberries such as "Tristar" (avoid everbearing types like "Ft. Laramie") in between the garlic plants in February or March; the strawberries will cover the area in 1 to 2 years and fade away in 4 to 6 years
- ground covers like creeping raspberry take 3 to 5 years to thicken up
- plant nitrogen fixers such as Cystis (a low broom) and lupines after the first year, when there is still high nitrogen from the grass clippings (do not deadhead the lupines, but rather let the seeds mature and throw them around the garden) .

Won't newspaper poison the soil?

When newspapers used to be printed with lead and petroleum-based inks, the calculation was that it would take a foot of newspapers to leave enough lead to get into the food chain in any quantity that was know to be a problem. Newspapers are no longer printed with lead or petroleum-based inks (not the big dailies or local weeklies, anyway), though they may contain other substances such as dioxins (from chlorine bleaching). A good plan is to sheet mulch using newspapers only once in a particular area. If sheet mulching again in subsequent years over the same spot, try using cardboard instead, which is subjected to far less bleaching than newsprint.

Would it not be better to recycle the newspaper and cardboard?

In terms of energy and water use, it is better in most cases to mulch your newspaper and cardboard than to recycle it. If you think of the energy required to collect and recycle newsprint

There are huge volumes of material out there waiting for you to come pick them up - just be sure to ask first.

Top Dressing Materials: This is the only layer that might cost you a little money. The type of garden you have or are planning to create will dictate what kind of material you use for the aesthetic layer of the mulched plot. Whatever material you decide to use, be sure it is sourced locally and does the job - that is, it covers the newspaper well, doesn't end up strewn about your yard, and is weed- and seed-free. Fraser Richmond Biocycle has a variety of mulch grades that look great in any garden, but you can also use straight straw, leaf mulch, or any other organic material that is attractive and easy to work with. Have a look around your community - use your imagination!

Grow your own mulch:

Instead of sourcing mulch materials, you can grow your own. Consider the following:

- Comfrey - High in nitrogen, potassium and a source of phosphorus, comfrey is easy to grow. Traditionally, it was grown around compost piles/bins both to capture nutrients and use as a compost starter (it adds enough nitrogen fast enough to get the compost working quickly).

- Straw Substitutes - It can sometimes be difficult to source straw. Sword fern or pampas grass are attractive, weed- and seed-free, and easy to grow.

- Fertility Patches - This a technique developed in England for increasing the organic content and nutrients of soil, especially nitrogen and phosphorus, and is perfect for sandy, low nutrient soils such as those we have on the Coast. The suggested planting is up to one third of the area under production be grown in alternating rows of comfrey and alfalfa for up to 6 years. Alfalfa does not grow that well in this area, so white clover and lupines might be a better option. Several harvests a year can then be mulched or incorporated into the soil of any areas that are in intensive annual vegetable production.

Mulch Materials to Avoid

While there are a huge variety of materials we can use in our sheet mulches, there are also a number we should not. They are as follows:

- never use sewage sludge or any material that you are unsure of its origins

- low labour allows for seniors of an advanced age to garden
- can be done most times of the year, unlike tilling and is very inexpensive to make, even on a large scale
- good for the lazy gardener (you may even get people wanting to help!)
- clean to walk on compared to soil

It Builds Soil, Adds Rare Micronutruients, and Prevents Erosion - The key to a garden worth showing off is not fertilizers and pesticides but rather rich, healthy soil. Sheet mulching can help you get it!

- maintains soil profile and does not promote organic material loss or disrupt the fertility building cycles present in untilled soil (tilling and digging distrupts this profile)
- an exceptional way of killing weeds and weed seeds
- rapidly builds soil
- surface mulches of wood chips in perennial beds may need no significant weeding for up to 3 years; mulches in annual gardens can have no significant weeding for up to 4 seasons
- keeps soil warm in the fall and winter and cool in the summer
- greatly increases the content of organic matter in your soil and soil biodiversity (including soil megafauna such as worms (which will "till" up to a depth of 4 feet of soil)
- reduces nutrient loss, which reduces the need for fertilizing your plants
- melanizes soil and increases its ability to heat up in the spring
- enormously reduces erosion and runoff
- reduces problems relating to excessive moisture
- reduces effects from excessively high and excessively low soil pH
- provides long-term slow release nutrient supply
- protects soil from raindrops (protecting it from nutrient depletion and erosion)
- protects soil from UV
- is very good for potatoes, squash, leeks, garlic and onion and pumpkin
- excellent for planting seedlings, perennials, shrubs and trees

Recycles Waste - Processing organic waste is extremely costly, even if it's composted through your municipal yard trimmings collection program. By processing it at home into something useful, you are saving resources and money (read "taxes") for the municipality, and therefore for yourself.

- recycles organic matter that would otherwise become part of the waste stream
- reduces municipal garbage and recycling costs because your organic material stays on YOUR homesite and doesn't require trucking or processing by the muncipality
- reduces taxes because if enough people start sheet mulching, your municipality will no longer have to fund as many trucks and crew to pick up residential yard trimmings

Reduces Watering - As our population grows, water conservation is becoming more and more important. It is important that we all think about how much water our gardens use so as to lower our collective impact.

- drastically reduces soil moisture loss
- greatly reduces the need for watering
- increases the ability of water to percolate into the soil
- increases total water held by your soil, creating healthier plants with less watering requirements

Bioremediation of Toxic Soils - An inexpensive way to return sick soils to health.

- the organic matter in mulch reduces uptake of lead, cadmium and other heavy metals
- greatly dilutes and encourages the breakdown of toxins

Things to Think About

While sheet mulching sounds like a wonder-technique, there are a number of things you should consider before planning a sheet mulch in your own yard.

Small seeds, root crops and warmth-loving plants grow better in bare soil:

- when your soil is good, weed-free and you want to sprout small seeded plants, you probably don't need a sheet mulch
- root crops do not do well in mulches (the exception is potatoes)
- mulches cool the soil in the spring and summer - for many annuals this slows them down and makes them vulnerable to pests
- mulches increase fungi growth for the first year, and some fungi kill seeds and seedlings
- mulches keep the soil wet (in some cases) and stunt plant growth (this happens often over heavy clay soils during the first year or two until organisms such as worms increase drainage)
- if you are mulching against building foundations, you must leave at least 3 to 6 inches (10 to 20 cm) from the top of the mulch to the top of the concrete foundations of a wood frame building to keep carpenter ants and termites from the structure

Slugs and snails will multiply (to send these critters a clear message of "You're Not Welcome Here!", see the slug solution on Page 15), but the benefits far outweigh this problem:

- slugs and snails love mulch and will rapidly multiply for the first while - some plants sustain cosmetic damage from slugs, so if you have plants that are sensitive to slugs and snails, you may want to consider other methods

- Horse Manure: Often what is sold as horse manure is really a pile of cedar woodchips and a little old manure. The cedar has alleopathic (poisonous) compounds that stop the growth of most plants and it breaks down very slowly. The horse manure actually has very low nitrogen levels to begin with, and after only one season there will be very little nitrogen left, with the woodchips pulling out whatever remains. Try to source pure manure from local stables or horsekeepers (try LauraLynn Stables at 604.986.8714) and then plan on using other materials to get the nitrogen in.

- Alfalfa: Feed stores often have broken or rotten bales that they will give away.

- Nettles: A good source of nitrogen and iron but difficult to handle. The plant proliferates by spreading roots and can quickly get "out of control". Not recommended for small gardens.

- Comfrey: There are three different species that are common. Comfrey is a spreading weed in some jurisdictions and it is difficult to clear an entire field when it is well established. The recommended variety is a Russian Comfrey variety called Bocking #4, as it has the highest nitrogen and phosphorus levels in its leaves and has sterile seed. It can be propagated from its roots. Comfrey is considered a permaculture wonder-plant. Call Edible Landscape Creations to purchase some plants for your garden - call 604.645.9529.

There are many other sources of nitrogen. Just become aware of what is around your home and the homes of your neighbours.

Carbonous Materials: Straw, hay, woodchips, hedge trimmings (not too much laurel or cedar), leaves, tops of perennials in the fall, sawdust, cotton and wool clothing, ruined futons (really good source - peel the layers off and use as sheet mulch!), bracken and sword ferns, pampas grass and other big grasses, bull rushes, pond detritus (when your pond fills up dig it out and lime it and add it to a mulch). Most fleshy green plants have carbon but also a fair bit of nitrogen and are available in large quantities: Japanese Bamboo, Jerusalem artichoke tops, daylilies, etc. There are many materials that could be used, so keep your eye out for sources in your neighbourhood.

Futons/Carpet, etc.: Here's an idea - try using old wool carpet for the sheet mulch layer (instead of newspaper and/or cardboard). It's an even thickness, it won't let the weeds through, and it will rot away in one to two years, just like newspaper or cardboard. Just be sure that there haven't been any pesticides (flea powder, etc.) or fungicides sprayed on the carpet at any time, as these are not good for your plants. Also, consider old futon matresses for the mulch layer - they are perfect for those more difficult jobs such as bamboo thickets.

Newspaper and Corrugated Cardboard: These materials are easily found around your house, from your neighbours or from local businesses. Ask all your neighbours to save their newspapers for a week, or talk to your local appliance supply store to get the boxes that stoves, fridges and dishwashers are shipped in (these cover large areas very quickly).

Plant Considerations: The best annuals that can be grown from seed in the mulch are potatoes, squash, pumpkin, garlic, tomatoes, scarlet runner beans, beans, and other large-seeded plants like nasturtium. There are also many other species that do well as transplants (cabbage family, spinach family - any plants that like a medium-to-high nutrient level and cool damp roots). Because of the slug and snail problem mentioned earlier, it is generally advised to move directly to planting woody ground covers, perennials, shrubs and trees for the first couple of years, then plant small-seeded annuals in subsequent years (i.e., lettuces, herbs, etc.).

Sources & Qualities of Mulch

Nitrogenous Materials: You can source these materials from your own yard, or from neighbours' yards (i.e., ask them to save their lawn clippings and weeds for you for a couple of weeks pre-mulchin - just make sure they aren't using pesticides in their yard). The idea is to not have to go too far from home to complete this project. Here are some ideas and tips:

- Grass clippings: Collect them early in the spring and summer and store in an old garbage can - it will smell strongly. At this time the grass has no weed seeds and is very high in nitrogen - it is useful in the garden during the growing season, but can kill small plants (also be sure there is no dog feces in the grass, as it is a serious problem for salad and root crops and not nice to have around).

- Seaweed: There is some controversy about this particular material, as using it removes nutrients from an already impoverished ecosystem (i.e., urban beaches). Try others instead.

- Soya grits: Grits are what remains after the soya beans are pressed for tofu. They are high in both nitrogen and phosphorus. Contact local soy processors for sources.

- Death Bucket: There are quite a few weeds that will overpower a cold compost, even in the dark. Try putting them in a large bucket of water (with a lid - try an old garbage can) and setting it in the sun. Usually after 2 warm months the roots are dead. Couch grass, canary grass, forget-me-not, bindweed, horsetails and anything in seed works well. This stinky mixture is high in nitrogen and nutrients thanks to the weeds' hard work. Be sure not to leave it around during the spring or summer as it is a breeding place for mosquitoes.

- Compost with Unfinished Kitchen Scraps: These are good, especially when there has not been enough carbon introduced to the compost or it has been too wet. It will be rich and stinky and full of nitrogen (do not use fresh kitchen scraps, as they will attract animals).

- Chicken Manure: When it's fresh is when it is the strongest. It is the most nutrient-filled nitrogen and phosphorus source known. As it is so acid, lime is usually added to reduce the acidity, and to prevent the nitrogen from breaking down. After it is composted it is usually easier to use and less likely to burn your plants (this happens when too high a nitrogen source is introduced to plants) or smell strongly.

- typically it takes about 3 years before the predators of slugs have any effect on the exploding slug population - after that slugs are greatly reduced but snails may increase.

Where Should You Do It?

Sheet mulching is a wonderful way to transform poor soils, weedy areas or even concrete to a productive, rich garden plot. Here are some areas ideal for a sheet mulch transformation:

- old, spent vegetable garden plots
- weedy, unkempt lawn
- lawn you want to transform into a perennial bed, vegetable garden or berry patch (no sod turning!)
- broken, unsightly paving stones or concrete surfaces (takes a little longer, but it works)
  weed patches
- thickets of bindweed (morning glory), bamboo, etc.
- virtually anywhere you want more productive soil without paying for and using synthetic fertilizers and pesticides (which actually work to make your soil LESS productive in the long run, not more)

Now That You're Convinced of the Tremendous Benefits...

There are a few things you need to think about with sheet mulching, but every good thing requires at least a little work, right? Now that you've decided to try it out, we've put together a simple, step-by-step guide to the Classic Sheet Mulch Sequence. Remember - there are no hard and fast rules, just some basic principles that will help you get the most out of your sheet mulching experience. And the rest is up to you - mulch away!

Classic Sheet Mulch Sequence

Basically a sheet mulch is like composting in layers directly on the ground. One general rule to keep in mind: each layer is usually 3 inches (10 cm) thick unless it is fresh chicken manure - then it is better to have at most 2 inches (5 cm).

Step 1: Plan the Plot

A great garden starts with good planning. Before planting any garden, it is important that you know your soil type (expecially pH levels - test kits can be bought quite inexpensively at most garden supply stores). The advantage to knowing your soil is that you will then know what

plants are appropriate for the site, or, conversely, what remediation will be required for special-needs plants to thrive in your garden. Develop a plant list and a list of the materials you will require for your sheet mulch (see steps below) - and remember that you are creating a rich new growing medium for plants. In your plan, include fast-growing ground covers and plants that will keep the weeds down long after the sheet mulch has decomposed into the soil. Think through how you are going to keep weeds out for the long haul - the plants you pick should be to be easy to look after and require little water or special care.

Step 2: Collect the Materials

The size of the plot you will be creating will dictate how much material you will need to gather for your sheet mulching project. Generally, each layer will be about 3 inches (10 cm) thick. You will require the following materials:

1. Dolomite lime and/or rock phosphate/bonemeal (depending on your soil type and planting plans)
2. Nitrogenous materials
3. Carbonous materials
4. Lots of newspaper and/or corrugated cardboard
5. Top dressing material
6. The plants and/or large seeds you wish to set in your new plot
7. Some friends to make the job go fast!

For more information on good sources for the above materials, please see page 10 and 11.

Step 3: Lay Out the Shape of the Area to Be Sheet Mulched

The best thing to use for this is an old garden hose, or something similarly "bendable" - this will allow you to create rounded corners for a more interesting garden design. Lay out the hose and try it in a variety of different positions on the ground so as to design the "perfect" layout for your new garden plot, perennial bed or berry patch, etc. Once you've decided on a shape...

Step 4: Water the Soil Until it Can Hold No More

Using a conventional sprinkler, water the soil in the area you want to sheet mulch for about 1 hour. If your soil is good and loamy (with a bit of clay), water it for one half hour more (1.5 hours total). The object is to put about 1 inch of water in the soil, as that is about as much as most soils can hold (assuming a high water table and no desert conditions!). Very dry places may need much more.

Step 5: Trample the Vegetation!

If the area to be sheet mulched contains growing vegetation, take a few minutes to trample it down, as flat as possible. Try not to cut the vegetation, as the technique works better if you don't. This is the first layer of your sheet mulch. Your plot should now look like, well, a trampled mess!

find out what works for you on your particular site, using the guidelines outlined here. The basic thing to remember is that the tougher the weed, the tougher the sheet mulch needs to be - the Coordinator of the Vancouver Permaculture Network has seen newspaper sheet mulches up to 1 inch thick! Here's a tip - for the toughest jobs, use old carpet (see Page 11 for more information).

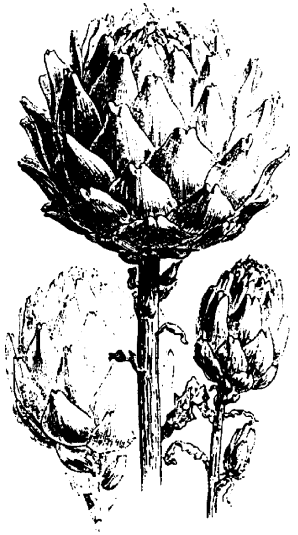
Step 11: Carbon Layer

This layer is not required, but it is preferred. The more layers a mulch has the better it becomes, increasing the variety of nutrients. Just remember that the carbon layer is above the sheet mulch layer - everything used here should be free of seeds (that includes hay, weeds, and grasses). If you use any materials containing seeds above the sheet mulch (newspaper/cardboard) layer, you will end up with a very lush but weedy garden plot!

Step 12: The Aesthetic Layer

Once the mulch layer is good and wet, and you've added your carbon layer, it's time to load on the aesthetic layer, which is the top layer designed to make the plot look attractive in your yard. You can use a variety of high-carbon materials, from straw to wood chips (note that there is a difference between wood chips and bark mulch - use the latter only as a very last resort as it has a tendency, because of it's acidity, to kill plants fairly quickly, which isn't so good if you are trying to grow a brand new garden). The type of material you choose will depend on your design, what materials are available, and how much money you want to spend, if any. Try hardwood chips (alder and maple), sword or bracken fern, or pampas grass as some alternatives. The most important thing is to try to locate local materials for your mulching project, which saves on fossil fuel use and air pollution. See Page 12 for ideas on other types of top-dressings. And remember - like the carbon layer in Step 11, any organic material used in the aesthetic layer must be weed and seed-free...

Step 13: The Plant Layer

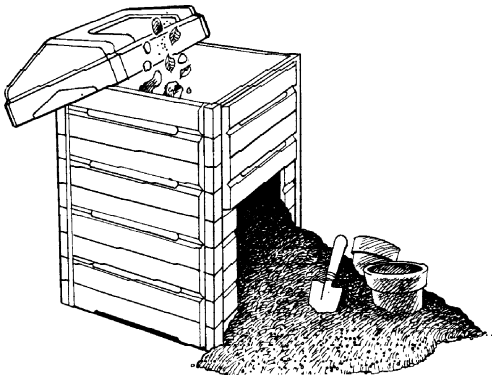


And now you're ready to plant - the same day you mulch is the same day the plants can go in the ground! Just pull back the top-dressing in the spots you wish to plant, use a garden knife to cut through the newspaper/corrugated cardboard mulch layer (cut an "x"), dig a hole large enough for the transplant or seed, fill it with a planting medium (garden soil from Fraser Richmond Biocycle (at the North Shore Transfer Station Chipping Yard - 924.9252) will work great, but so will other, weed-free garden soils), and pop in the plant or seed as you would in any garden. Then replace the mulch layers back around the plant and voila - the materials underneath the mulch will slowly decompose, helping to create balanced, healthy, biologically rich and diverse soils for your plants and garden. Planting in this way give the roots a choice to either grow down through the soil or out into the mulch. What could be better than that?

Step 8: The Nitrogen Layer

You now need a layer of high-nitrogen organic material to kick-start the decompostion process underneath the mulch. This layer can be full of weeds and weed seeds, as it will be blocked out by the newspaper/cardboard layer you will be putting on next. Typically, manure or grass clippings or cut comfrey work very well. Also, compost materials that don't have enough carbon or have been kept too wet are good to use, as they are full of nitrogen. One word of advice - It is not a good idea to use fresh kitchen scraps due to their attractiveness to rats and mice, not to mention dogs, raccoons, bears, etc. (stick to materials that are not so tasty to our four-legged friends). This layer should be at least 3 inches thick (10 cm), but can be thicker if you have lots of material to dispose of.

Step 9: The Inocculation Layer



This layer is required to kick-start the decomposition process in your sheet mulch. Because some mulches are very thick, and have very poor soils underneath which contain few decomposition organisms, it is a good idea to "inocculate" the sheet mulch with some additional "good bugs". The best thing to use for this layer is compost - just a few handfuls scattered over the area to be mulched is perfect (don't use more than this, as compost has better, more valuable uses). Compost both innoculates the mulch with beneficial bacteria and fungi, and introduces good insects, such as beetles and worms. If you don't have access to compost, just use plain garden soil.

Step 10: The Sheet Mulch Layer

Now comes the critical component of sheet mulching - the sheet mulch itself. The best and most easily accessible materials to use are newspaper and/or corrugated cardboard, though you can also use old wool carpet or a variety of other materials (see page 11). You will need enough newspaper and/or corrugated cardboard to cover your desired space [i.e., 10 or so pages thick for light weeds in a veggie patch, 15 or 20 pages thick for a lawn, and 30 or more pages thick if it's bindweed (morning glory)]. Open the newspapers up and lay them down in sections across the plot. Obviously, using large pieces of corrugated cardboard makes the job alot easier! While you're covering the entire space to the edges, be careful to overlap the edges of each section by at least 4 inches (12 cm) so as to not allow the weeds to creep through, then water the whole thing again, very well. The newspapers and/or cardboard will need to be saturated to create a paper mache-type material (obviously, newspapers will work better for this than cardboard) to keep the weeds and unwanted plants down. There is no hard and fast recipe for sheet mulching - it's mostly an artform developed by trial and error. The trick is to

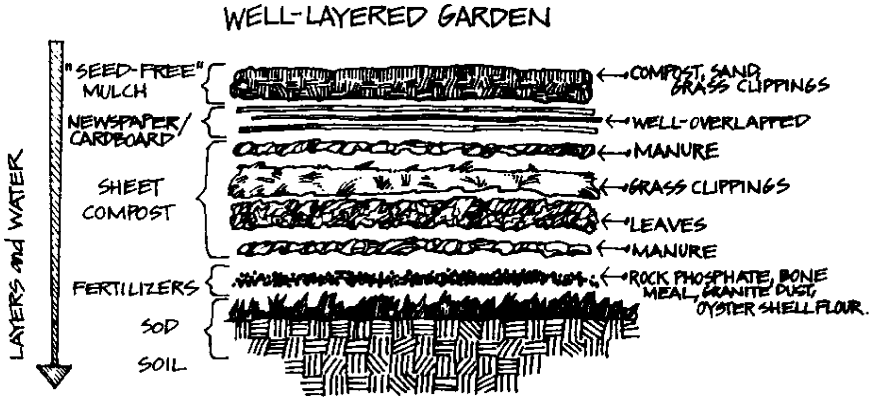
Step 6: Lay Down a Carbonous Layer

Take weeds from other parts of the garden (or your neighbour's gardens - they'll love you!) and strew them about the space to be mulched. Then, lay down a layer of carbon material such as brown leaves, dried grass clippings, etc.

Step 7: The Soil Conditioner Layer

Sprinkle a few handfuls of dolomite or agricultural lime (organic but not labeled so) or rock phosphate/bone meal around your chosen sheet mulching site - your soil pH test results and planting plan will tell you what's required. As a point of interest, most soils in the Lower Mainland are very acidic, resulting in weak calcium uptake (an important mineral for plant growth).

To Make Your Own Bone Meal - If your family and friends eat meat, save the bones for a few weeks in the freezer then dry them overnight in large batches in the oven. You can either store them in a dry place in this form until required, or you can crush them into bonemeal right away. To do this, place the bones in a strong cloth bag and crush them with the back of an ax or a sledgehammer. Then, come time to use bonemeal, spread them around - bonemeal contains nitrogen and calcium and raises the pH. Though this is a simple procedure, it's often difficult to get enough bones to produce large volumes of bonemeal. Save this precious resource for use around your newly planted fruit trees and shrubs.



Source: Kourik, Robert. Designing and Maintaining Your Edible Landscape Naturally. Metamorphic Press. 1986.

A Water Saving Garden Design...