Bed building method demonstrated by Carolyn McGee. Date 1978. Amazing.

In the onion/leek group of plants, many are in any case perennial. Near the kitchen door we can plant two varieties of European chives (coarse- or fine-leaved), Asiatic garlic chives, and shallots of various types. Further away, as a border, set out potato onions (which give about 6-10 onions for every one planted), Welsh onions, evergreen bunching onions, the top bulbils of tree onions, and plant the cloves of garlic in the strawberry patch in autumn, or any space left in raised beds. Garlic bulbs, if allowed to multiply for two years, give a constant crop.

If the large pods at the base of broad bean plants are left on the ground to dry and are straw-mulched in late summer, they will resprout in autumn; or the crop may be pruned back hard after harvest and will sprout again. Seed potatoes left under mulch sprout in spring, and lettuce left to go to seed will scatter seedlings around their base for replanting. Parsley and many flat-seeded species re-seed freely in mulch, and their seedlings can be set out to grow. In fact, a small proportion (about 4-6%) of all crops sown can be let run to seed or ripen for scattering under mulch, rather than buying annual seed crop.

Various fruits and vegetables (tomatoes, pumpkin, melon), placed whole under mulch at harvest, ferment and rot, throwing up seedlings for new plantings. Carrot tops kept in a dark or cool place will sprout again, and can be set out to grow in soft soil (**Figure 5.11a**). Cabbages are cut low, and the stalk split crosswise with a knife. Smaller cabbage heads sprout, which are harvested in their turn, or divided up and replanted (**Figure 5.11b**).

In warm climates the axil shoots of tomatoes and related species can be pinched out and reset as small plants all summer (**Figure 5.11c**), the last lot potted and brought in to fruit over winter. Capsicum and chilies treated in this way may be winter pruned and then set outside in spring.

All these methods minimise resowing or making seed beds, and keep the garden turning over constantly.

5.3 THE INSTANT GARDEN

Sheet mulching for gardens is a technique which has been described by many people, with as many variations. It is my favourite technique as it gets you going immediately, without the back-breaking work of digging the soil for beds. You can start on almost any type of soil, except for those leached-out, rock-hard soils looking and feeling very much like concrete. With these, you build boxes *up off the ground* and cart in earth and compost materials to fill them.

Sheet mulching suppresses all weeds: ivy, onion and spear twitch, kikuyu and buffalo grass, docks, dandelions, oxalis, onion weed

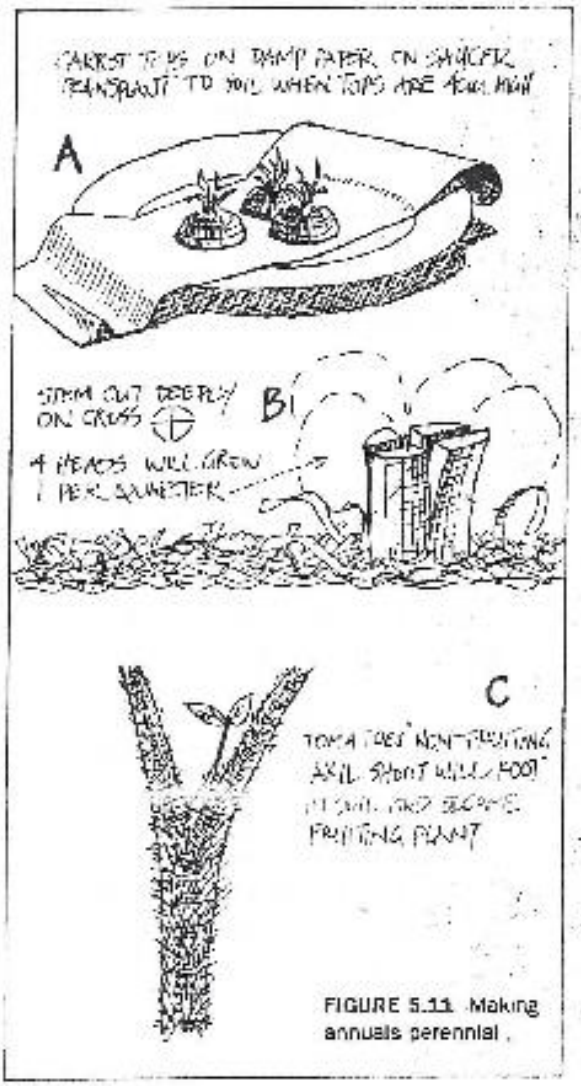

FIGURE 5.11 Making annuals perennial.

reproduced from:
Introduction to Permaculture.
by Bill Mollison with Reny Mia Slay.

and even blackberries. The important thing is to fill up the area with plants, according to the prior planting plan you have worked out on paper, and to totally cover the area with mulch. For that reason, start with an area of about 4 square metres, and branch out as time and materials permit. Your first attempt should be very close to the house, preferably starting from a foundation or path which is itself weed-free. Thus, you are protected from an invasion of weeds from the rear. **Figure 5.12** shows the sequence for sheet mulching.

First, plant any large trees or shrubs. It is easier to plant these now than to dig through the mulch layer at a later date. Next, sprinkle the area with a bucket of dolomite (and gypsum, if the ground is particularly clayey), and chicken manure or blood and bone (to add nitrogen to start the process of reducing the carbon in the following layers). A bucket or two of compost scraps can also be scattered, for the worms. If you have a source of weed-seedy hay or like material, place this also over the area.

Don't bother to dig, level, or weed. Now, proceed to tile and overlap the area with sheet mulch material. This can be cardboard, wallboard, newspaper, old carpet (non-synthetic), underfelt and anything that will eventually break down and provide nutrients for plants. Cover the area completely, leaving no holes for weeds to poke through. If you have a valuable tree or shrub in the way, tear paper halfway across and pull it around the stem. Serve another, at right angles to the first. Go on, leaving only valuable plants with their stems and leaves poking out.

Water this layer well; it will start the processes going. Then apply a 7.5cm layer of either (or mixed) horse-stable straw; poultry manure in sawdust; leaf mould or raked leaves; seagrass or seaweed.

All of these contain essential elements, and hold water well. Follow these with dry, weed-seed-free material on top, of at least 15cm of pine or casuarina needles; rice husks; nut shells; cocoa bean husks; leaf mould or raked leaves; seagrass; dry straw (*not* hay); bark, chips, or sawdust or any of these mixed.

Water until fairly well soaked. Now, take *large* seeds (beans, peas), tubers (potato, sunroot), small plants (herbs, tomato, celery, lettuce, cabbage) and small potted plants. Set them out as follows:

With your hand, burrow down a small hole to the base of the loose top mulch. Punch or slit a hole in the paper, carpet, etc. with an old axe or knife. Place a double handful of earth in this hole, and push in the seed or tuber, or plant the small seedling in it. For seeds and tubers, pull the mulch back over. For seedlings, hold the leaves softly in one hand, and bring the mulch up to the *base* of the plant.

If you must use small seed, do it this way: Pull back the mulch in a row; lay down a line of sand, or fine soil, and sow small seeds of radish, carrot, etc. Water, and cover with a narrow board for a few days, or until the seeds have sprouted (or sprout them first on damp paper). Then remove the board and draw mulch up as the tops grow.

Root crops do not do well in the first year, as the soil below is still compacted and there may be too much manure. Plant daikon radish, whose 30-60 cm root will begin to break up the compacted ground. Plant most root crops in the second year (or dig a separate bed for them), when it is only necessary to pull back the loose top mulch to reveal a layer of fine dark soil.

By the end of the first summer, the soil is revolutionised, and will contain hundreds of worms and soil bacteria. Just add a little top mulch to keep levels up, usually a mix of chips, bark, pine needles, and hay. Scatter some lime or blood and bone. Annual plants need occasional fresh mulch after harvest; their outer leaves are "tucked under" the mulch layer, as are all your food wastes from the kitchen. Worms are so active that the leaves and peelings disappear overnight. Leather boots take a little longer, old jeans a week or so, and dead ducks a few days.

In the first year, you need to water fairly frequently, as the layer of fungal hyphae and plants at the base of the mulch are slow to develop. As in normal gardening, all newly-

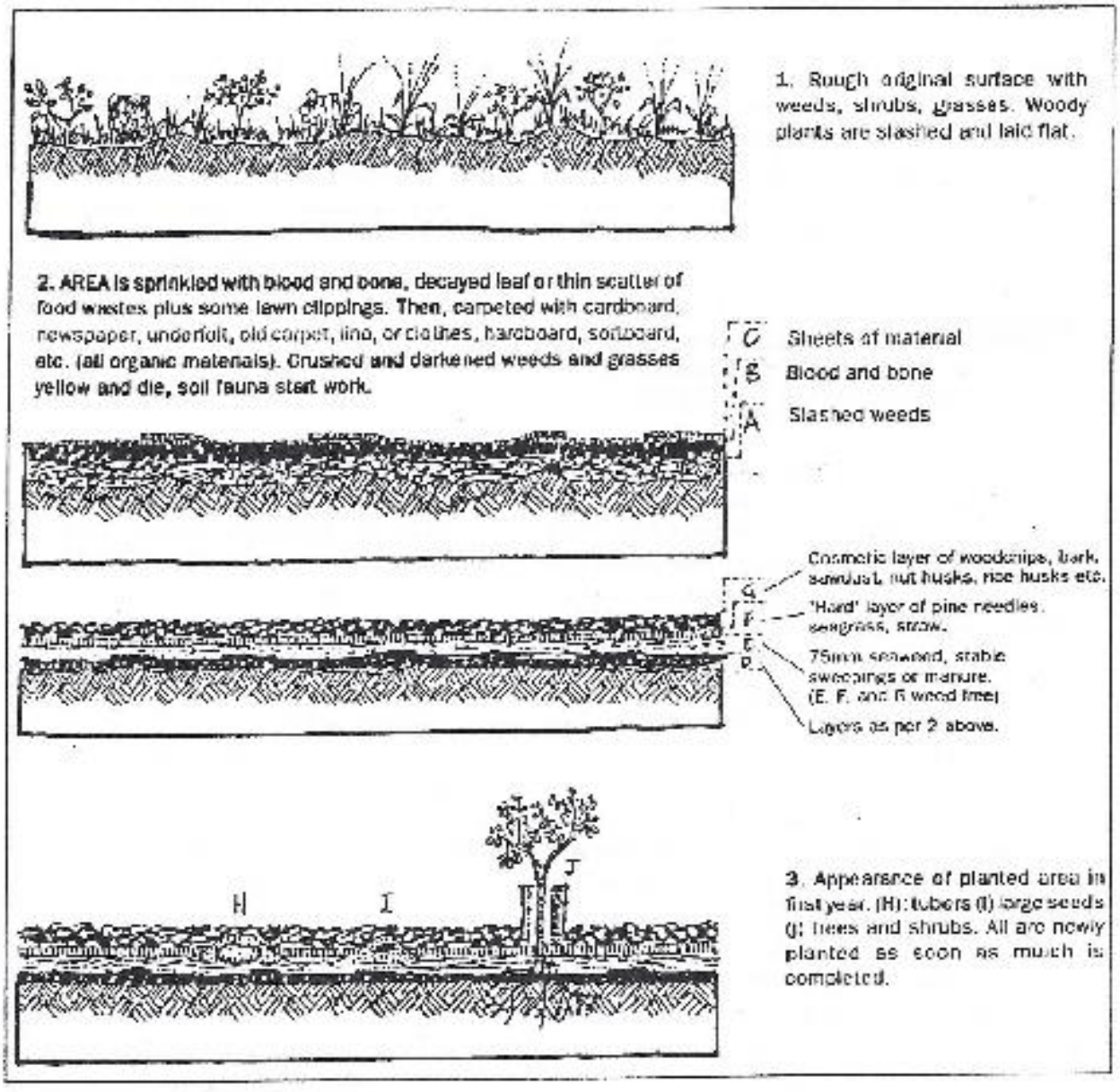

FIGURE 5.12 Steps in sheet mulching.

planted seedlings need water initially.

There is no need to rotate plants in this system, or to rest the ground. Potatoes are simply placed on top of the old mulch, and re-mulched. There is no need to leave room to hoe or dig either, so plants may be stacked much more closely, and preferably in mixed beds rather than in strict rows. By frequent and random replanting, the garden will start to assume the healthy appearance of a mixed herbal pasture. This diversity of plants act as hosts for a range of insects, frogs, and birds and is a major factor in successful pest control.

Some strong weeds may force through. Push the weed down in the mulch, put damp paper on its head, cover with sawdust. If 10% of the kikuyu or twitch comes up, sheet with paper and cover with mulch. All eventually die out under this treatment, leaving the area clear of weeds; only your plants have their heads in the air. Another ploy is to dig up dock roots, bury kitchen scraps there, and re-mulch.

Never bury sawdust or woodchips; just put them on top where atmospheric nitrogen breaks down the wood. Worms add sufficient manure to supply the base manure. Keep the mulch loose, don't let it mat, and thus mix lawn clippings or sawdust with stiff dry material like chips or pine needles, bark, etc.

5.4 THE URBAN AND SUBURBAN PERMACULTURE GARDEN

Urban/suburban design takes the same principles of permaculture and applies it to a smaller scale. Usually, there is space for only Zone I and some Zone II plants, animals, and structures. The important thing to remember is that the smaller the available space, the greater care that must be taken to both intensify food production, and to minimise waste space by using spiral, keyhole, trellis, least-path systems, and stacked or clumped plantings.

■ SMALL URBAN SPACE

This situation requires most thought, but it is surprising how much food can be grown on window-sills, roofs, verandahs, narrow walkways, and patios. Plants can even be grown indoors in pots as long as they are wheeled out to a sunny location; most plants need at least 6 hours of sunlight a day during the growing season.

Containers can be of almost anything: plastic garden pots, wastepaper bins, old baskets, half-filled sacks, toy boxes. Poke holes in them so that water can escape, and be sure their combined weight does not bring the balcony crashing down onto the people beneath. A light soil mixture is made up specially for container planting on balconies and roofs; it may need more frequent watering.

Deeper containers are needed for root vegetables. Potatoes are grown in a small area through the use of a potato box, which is made from a 44 gallon drum, a wooden box, or (outdoors) old railway sleepers or car tyres. Potatoes are placed on a bed of mulch inside the box, with mulch put over them. As the potatoes sprout and grow, more mulch is piled in, until the green leafy tops are sticking up out of the box. In this way, potatoes are formed from the covered stem and are more easily picked than if grown in hard ground (**Figure 5.13**).

Choose plants you are certain to eat, which are particularly nutritious, and which can be picked at least twice a week, such as capsicums (bell peppers), tomatoes, parsley, chives, silver beet (Swiss chard), and lettuce. If space is limited, stick to herbs that are frequently used (thyme, marjoram, basil).

Window-sill space is better used if hanging baskets or 2-3 shelves are added (**Figure 5.14**). Better still is a window-box greenhouse

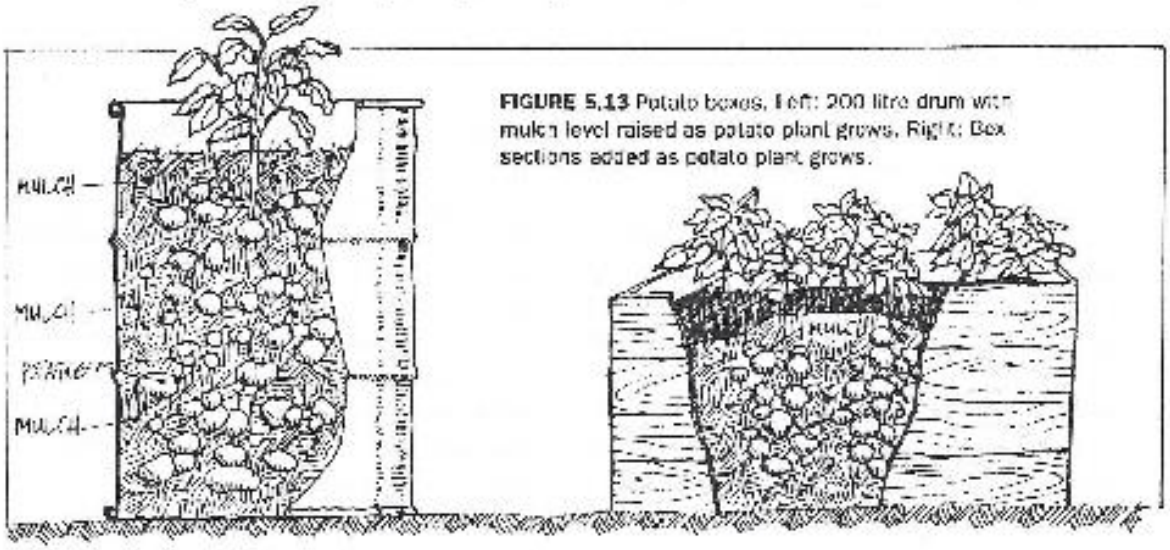

FIGURE 5.13 Potato boxes. Left: 200 litre drum with mulch level raised as potato plant grows. Right: Box sections added as potato plant grows.